USAF Mobility in Disaster Diplomacy:
An Inquiry into Disaster Relief Operation Impacts on Interstate Relations
(1992 – 2018)

BY

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A Thesis Presented to the Faculty of

The School of Advanced Air and Space Studies

For completion of graduation requirements

Air University

Maxwell Air Force Base, Alabama

June 2020

APPROVAL

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

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DISCLAIMER

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University.

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ACKNOWLEDGEMENTS

When I started this project several months ago, I knew it would venture into the unknown. I am grateful to my thesis advisor, Dr. Jim Tucci and my thesis reader Dr. Lina Svedin for their willingness to let me wander. They helped me wrangle my thoughts around a complex topic and express it in terms that opens a door to further research. Their encouragement and willingness to meet whenever I needed was instrumental in keeping me going.

I want to send a special thank you to the Air Mobility Command Office of the Historian for their prompt responses to inquire, without the help of those folks, I would not have been able to get this project completed on-time. The same is true for the Air Force Historical Research Agency and Muir S. Fairchild Research and Information Center staff who helped me quickly identify and declassify documents that were critical to some of the insights provided in the thesis.

Finally, I would like to thank my husband for his incredible support and understanding throughout this whole process. He kept me motivated and allowed me to focus on writing something that both of us hope will help the Air Force and our country be better.

ABSTRACT

It seems, often, policymakers send disaster relief personnel and resources into dangerous situations without a clear explanation of the mission's application to US national interests. So, what is the purpose of *air-enabled* disaster assistance missions? And, to what extent are these missions successful at meeting intended outcomes? Answers to, or a better understanding of, these questions are needed now more than ever considering the looming problem of climate change that will likely animate more calls for American aid. Using quantitative and qualitative analysis of 31 disaster assistance cases between 1992–2017, this research attempts to add rigor and breadth to policy reviews of foreign relief operations with positive interstate relations as an outcome. This research finds inconclusive evidence that disaster assistance missions positively influence interstate relations. Concurrently, it finds inconclusive evidence that supports nascent, qualitative disaster diplomacy scholarship suggesting aid missions are more useful to *sustain* existing interstate relations rather than initiating them. If scientific estimates about the effects of climate change hold, the US military and specifically the USAF will be called upon to assist with a growing number of international relief operations. If US decision-makers do not have a guide to help make choices about when and why committing air-enabled assets to an international disaster is appropriate, then there is a strong chance that high-demand low-density assets, like our mobility forces, may be misapplied. Thus, this thesis proports to continue research of linkages between disaster relief ways and means to appropriate outcomes.

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High Demand-Low Density, But How's the Payoff?

Introduction

Broadly defined, foreign disaster assistance has been a US policy tool since at least the early 19th century.[1] From the time of its establishment as an independent service in 1947, the United States Air Force (USAF) has supported disaster assistance missions around the world.[2] Today, the air service enshrines humanitarian assistance missions—a subset of foreign disaster assistance—under the doctrinal umbrella of air mobility operations.[3] A variety of Airmen and air assets comprise a portfolio of capabilities for this important undertaking. It seems, often, policymakers send assistance personnel and resources into dangerous situations without a clear explanation of the mission's application to US national interests. So, what *is* the purpose of foreign disaster assistance? More specifically, what is the purpose of *air-enabled* disaster assistance missions? And, to what extent are these missions successful at meeting intended outcomes?

Currently, there is sparse critical analysis linking US grand strategic goals and the provision of foreign disaster assistance—the US military's subcategory of foreign humanitarian assistance that deals specifically with natural disasters.[4] Answers to, or a better understanding of, these questions are needed now more than ever in light of the

[1] Julia Irwin, "The Origins of U.S. Foreign Disaster Assistance," The American Historian, https://www.oah.org/tah/issues/2018/february/the-origins-of-u.s-foreign-disaster-assistance/.
[2] Daniel Haulman, *Wings of Hope: The U.S. Air Force and Humanitarian Airlift Operations*, (Maxwell AFB: Air Force History and Museums Program, 2007), 1-2.
[3] *Air Force Basic Doctrine Annex 3-17 Air Mobility Operations*, Curtis E. LeMay Center For Doctrine Development and Education, 28 June 2019, 45, https://www.doctrine.af.mil/Portals/61/documents/Annex_3-17/3-17-D03-Mobility-Types-of-Ops.pdf.
[4] *Joint Publication 3-29: Foreign Humanitarian Assistance*, Joint Staff, 14 May 2019, GL-7, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_29.pdf. This research does not attempt to address operational outcomes such as lives saved or material delivered, there is a wide body of analysis that addresses those topics.

looming problem of climate change that will likely animate more calls for American aid. Importantly, climate scientists indicate a high confidence of quantitatively more or more intense natural disasters—particularly from flooding and tropical cyclones—over the next 30 - 50 years in certain geographic areas, hence the likelihood of greater need for global assistance.[5] Air assets are often called to assist with these more catastrophic disasters. However, like other national military resources, air mobility assets are limited; greater involvement will constrain America's ability to help itself and others. Moreover, it behooves the US government to make sure taxes are spent well, warranting a cost-effectiveness analysis of the use of mobility assets in disasters. Thus, this research seeks to assist US policymakers and strategists in their efforts to enhance understanding of best-use scenarios for air-enabled relief operations towards national outcomes, specifically for foreign disaster relief. I argue that the best use of air-enabled disaster relief is to positively influence interstate relations between the US and the recipient state.

Data and Method. Using quantitative and qualitative mixed-methods analysis of 31 disaster assistance cases between 1992–2017, this research attempts to add rigor and breadth to policy reviews of foreign relief operations with positive interstate relations as an outcome. Though these types of operations have been part of the US policy portfolio for over 100 years, a focus on the post-Cold War period allows for standardization of global conditions in the study period. Standardized disaster data from the Emergency Events Database (EM-DAT) serves as the empirical foundation for this study, along with mission data, interviews, e-mails and presentations from USAF unit histories. Cases were included only if data could be provided and verified from primary source documents or multiple, corroborating secondary sources. There are 11 cases where a natural disaster event occurred that were not included in the study because of a lack of data for at least one area of inquiry; future studies would likely benefit from additional data on these cases. Furthermore, the quantitative analysis includes multiple treatments such as one-tailed, coefficient correlative and case influence tests.

[5] 2014 Intergovernmental Panel on Climate Change, *Climate Change 2014: Synthesis Report. Contributions of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. United Nations, Rajendra Pachauri and Leo Meyer, 7-8, 15, https://www.ipcc.ch/report/ar5/syr/.

Hypotheses and Relevance for Theory and Practice. This research finds inconclusive evidence that disaster assistance missions positively influence interstate relations. Concurrently, this research finds inconclusive evidence that supports nascent, qualitative disaster diplomacy scholarship that suggests aid missions are more useful to *sustain* existing interstate relations rather than to initiate them.[6] However, the analysis herein found is useful for security studies, air power, and disaster diplomacy researchers who want to provide greater clarity of linkages between humanitarian assistance operations and national outcomes. Additionally, the study helps spark a quantitatively based dialogue, where few exist, that enriches extent inquiries to achieve a more robust explanation of the use of relief activities.[7] National security policymakers and their staffs can also benefit from this robust discussion because it illuminates potential discontinuities between perceptions and realities of expected benefits from this vein of operations.

Outline of the Study

In chapter one, I explore current disaster science that projects a high likelihood of future intense and frequent natural disasters in areas of high risk for impact to human life. This review generates awareness of practical reasons why disaster relief analysis will be increasingly important to researchers, policymakers, and practitioners in the coming years. Next, there is discussion of why, though scarce, air mobility assets uniquely fit large-scale disaster response scenarios. The chapter closes with a literature review of applicable academic schools and research agendas including international relations, disaster science, air power studies, and disaster diplomacy. This review demonstrates connections of this study to existing bodies of knowledge.

Chapter two introduces a theoretical framework that links aspects of natural disasters and air-enabled foreign relief activities—the independent variables—to the outcome of interstate relations, the dependent variable. A robust discussion of the model's assumptions, parameters and limitations accompany the framework. The next chapter is a quantitative analysis of 31 relief cases between 1992–2017 with multiple hypotheses. Importantly, these cases only cover the United States as the donor nation and

[6] Ilan Kelman, *Disaster Diplomacy*, (New York: Routledge, 2012), 15-16.
[7] Ilan Kelman, *Disaster Diplomacy*, 38.

only those relief operations with use of air assets. In the fourth chapter, there is a case study of the 2004 earthquake and tsunami in Thailand. The chapter explores a potential causal chain between several independent variables like the magnitude of the disaster, magnitude of the response and interstate relations to demonstrate the applicability of the theoretical framework.

In the fifth and final chapter, I summarize findings to distill academic and practical takeaways. For future researchers, there is a brief discussion of suggested pathways towards a better understanding of the phenomena of inquiry. Further, the chapter provides a brief overview of implications for policy analysts and strategists to consider for future application. In a world of increasing requirements, data and analysis can help decision-makers engage in the best application of scarce resources towards the most useful national security purposes. If air staffs, commanders, and civilian leaders fail to properly marshal resources—like USAF Airmen and mobility assets—at their disposal, they may miss opportunities to maximize their organization's contribution to America's national interests.[8]

High Demand – The Challenge of Climate Change

Hydrological, climatological, and geological disasters like floods, tropical cyclones and earthquakes, have dominated the history of USAF participation in foreign disaster relief operations. There is little evidence to suggest a change in underlying justifications of future calls for assistance. Greater understanding of these events provides a richer appreciation for circumstances under which air assets are likely to be called to assist as part of a broader foreign policy effort.

Triggers for natural disasters are often hard to identify though there are efforts to make sense of some of these phenomena with data that can help lead to predictions. For instance, as a subfield of geology, seismology is concerned with the study of earthquakes.[9] However, at present, seismic events are incredibly difficult to model and

[8] James McBride, "How Does US Spend Its Foreign Aid," Council on Foreign Relations, 1 October 2018, https://www.cfr.org/backgrounder/how-does-us-spend-its-foreign-aid.
[9] "Can You Predict Earthquakes?" United States Geological Survey, https://www.usgs.gov/faqs/can-you-predict-earthquakes?qt-news_science_products=0#qt-news_science_products.

are unpredictable.[10] On the other hand, climatological and hydrological analysis and prediction is much more accessible because of advances in remote sensing and computing technologies coupled with historical data cataloguing. Specifically, the field of climate science draws upon a variety of academic schools like meteorology, oceanography, physics, and others to investigate the earth's climate system and how it changes over time.[11] Analysis of these changes allows scientists to provide assessments about impacts on a micro scale, like local weather forecasts, and on a macro scale such as global climate change predictions. Based on prevailing climate science, this thesis points to a critical assumption: the Earth is warming, this warming causes varied climatological and hydrological disasters with the possibility that the intensity of these disasters may increase in future years.

First, my use of the term "climate change" refers to the scientific observation of Earth's current climate state in a cycle of increasing temperatures that may be induced by the rapid atmospheric buildup of greenhouse gases (GHG), particularly carbon dioxide (CO_2) from natural and anthropogenic sources.[12] Historians credit scientists like Jean-Baptiste Fourier, John Tyndall, and Svante Arrhenius, who date to the mid-19th century, with discovery of the effects of airborne trace constituents on the absorption and emission properties of the atmosphere.[13] Specifically, solar radiation is susceptible to absorption in the atmosphere by CO_2 that is not extracted from air through the carbon cycle.[14] The absorption is demonstrated in Figure 1.

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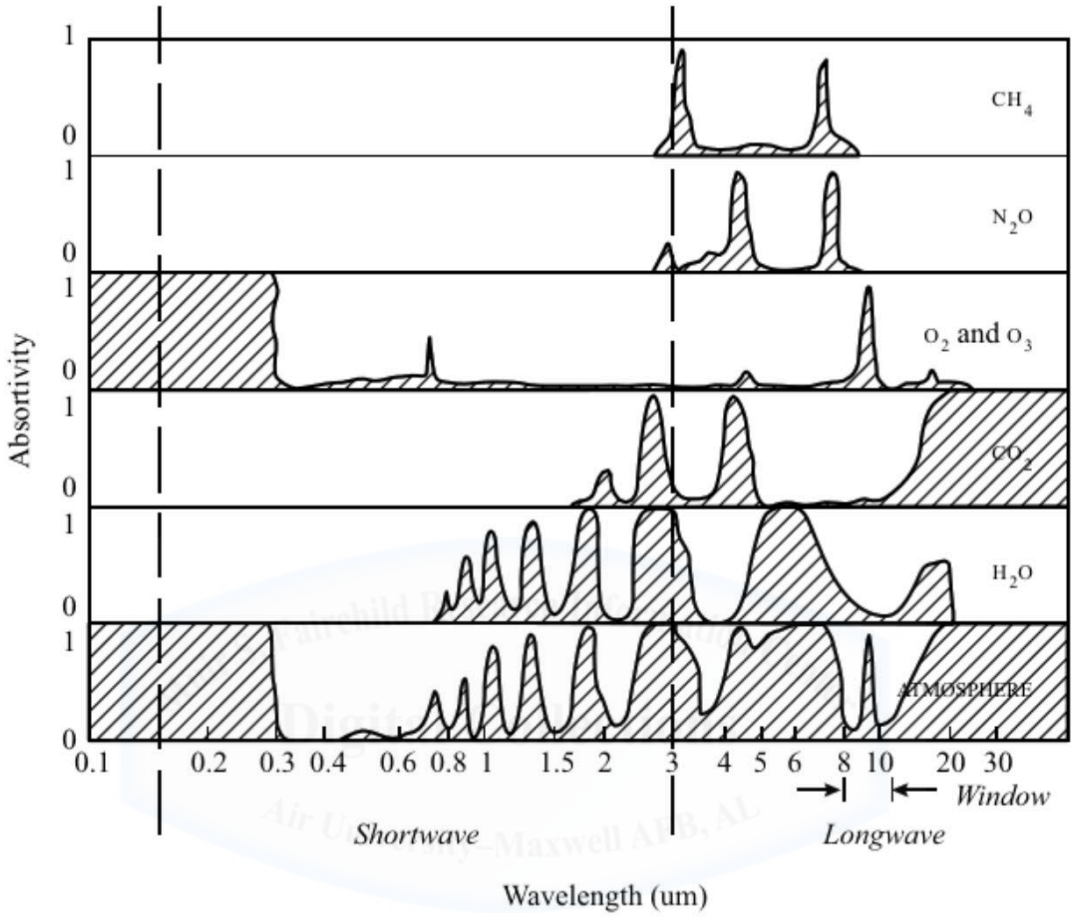
[10] James Fleming, *Historical Perspectives on Climate Change*, (Oxford: Oxford University Press, 2005), 6.
[11] Wendy Parker, "Climate Science," Stanford Encyclopedia of Philosophy (Summer 2018 Edition), 11 May 2018, https://plato.stanford.edu/entries/climate-science/.
[12] 2012 Intergovernmental Panel on Climate Change, *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* A Special Report of the Intergovernmental Panel on Climate Change, ed. Christopher Field, Vicente Barros, Thomas Stocker and Qin Dahe, (New York: Cambridge University Press, 2012), 5; Stewart Cohen and Melissa Waddel, *Climate Change in the 21st Century*, (Montreal: McGill-Queen's University Press, 2009), xxiv; Greenhouse Gases (GHG) consist of carbon dioxide, methane, nitrous oxide, water vapor.
[13] Stewart Cohen and Melissa Waddel, *Climate Change in the 21st Century*, 10-11; James Fleming, *Historical Perspectives on Climate Change*, 65.
[14] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 42; Christopher Field, Michael Raupach and Susan Hill MacKenzie, *The Global Carbon*

Figure 1: Absorption of Radiation at Various Wavelengths by Trace Gases and by the Atmosphere as a Whole.



Source: Adopted from Stewart Cohen and Melissa Waddell, Climate Change in the 21st Century. "Oke (1978), after Fleagle and Businger (1963). Reprinted with permission of Tim Oke."

Over time, research concerning this particular gas in the atmosphere shaped the debate about average, rising global temperatures. Eventually, the measured levels of carbon dioxide in the atmosphere would form the foundation for scientifically based assessments about how rising heat levels shape the global climate and cause impacts on human settlements.

Cycle: Integrating Humans, Climate, and the Natural World, Revised 4th edition, (Washington DC: Island Press, 2004), 18-19.

Over the last 40 years, climate scientists compiled and analyzed atmospheric, oceanographic, and land-use data to conclude that there has been an increase in the amount of carbon dioxide in the air.[15] An international body of scientists last validated the data in 2005.[16] During the 1990s the researchers identified a 20% increase in the amount of global carbon emissions, but there was virtually no atmospheric absorption due to ocean and land sinks that compensated in the natural carbon cycle.[17] However between 2000 – 2005, carbon emissions continued to rise and, this time, so did the atmospheric carbon levels, by 15%.[18] Climate scientists suggest that "carbon sequestration rates may be reaching their limit, or that land use change, particularly deforestation, may be accelerating."[19] In other words, the Earth may be unable to adapt to continuing changes in CO_2 levels in a way that preserves a climate to which contemporary humans have grown accustomed. A key indicator and further evidence of CO_2 buildup is born out in rising global air temperatures, an integral ingredient for climatological events like storms.

Climate scientists largely agree that aggregate global temperatures are increasing as a result of natural and anthropogenic carbon dioxide buildup.[20] Using local, regional, and hemispheric records garnered from a variety of scientific stations around the world, estimates and models of global temperatures were made possible. The scientific consensus is that during the late 19th century, the rate of increase began to accelerate; this timeframe coincides with the global industrialization movement.[21] Interestingly, during the 1970s and 1980s and into the early 1990s, there was a more rapid increase in global temperatures as the millennium came to a close.[22] Significant controversy has followed the correlation of increased CO_2 levels and the global temperature increases.[23] What is

[15] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 37, 40-41.
[16] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 37, 42.
[17] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 42-43.
[18] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 43.
[19] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 43.
[20] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 44.
[21] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 44.
[22] Stewart Cohen and Melissa Waddell, *Climate Change in the 21st Century*, 44 – 45; Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 40-44.
[23] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 49.

indisputable is that high CO_2 levels in the atmosphere lead to high atmospheric temperatures. The dispute is about the *source* of the gas, which is irrelevant to this thesis. What is relevant is the fact that carbon dioxide levels have increased, that global air temperatures are increasing, and that they have effects. The temperature increases are of great importance because they fuel many of the climatological and hydrological disaster events like tropical cyclones and torrential rains as well as polar ice melting—leading to increased coastal flooding. The impact of such events has drawn the attention of global intergovernmental organizations like the United Nations (UN) where the practical effects of climate change are a topic of inquiry.

In 1988, the UN established the Intergovernmental Panel on Climate Change (IPCC) to "… provide policymakers with regular scientific assessments on climate change, its implications and potential future risks …"[24] This group represents the most comprehensive cross-section of global climate scientists, sanctioned as official government representatives. They create finalized and synthesis reports that provide various aspects of topics mentioned above. As it relates to assessments, which include projections for future climate activity, Synthesis Reports are the most up-to-date distillations of the group's findings. The most recent Synthesis Report was published in 2014; of note, data referenced above is used in the underlying pool for these UN reports.[25] Based on this data, the scientists generally conclude that there have been "changes in many extreme weather and climate events" since about 1950.[26]

Of significance, the report highlights that there is high confidence of significant vulnerability and exposure of many human habitats to climate variability from floods and cyclones among other extreme events.[27] As it relates to coastal flooding, the report indicates that global mean sea level will continue to rise at an accelerating rate due to Arctic ice melt and permafrost melt resulting from higher air and sea temperatures.[28]

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[24] "The Intergovernmental Panel on Climate Change," United Nations, https://www.ipcc.ch.
[25] The IPCC scheduled its next report for publication in 2022 which will precede a mandate implemented by the Paris Accords.
[26] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 53.
[27] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 53.
[28] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 62.

Scientists are less confident that extreme tropical cyclone events will increase in frequency and intensity as a result of higher temperature changes.[29] This is because of a lack of data regarding cyclone events prior to the mid 20th century, hence the lack of dependable long-term cyclonic models, although confidence is increasing.[30] However, they are "virtually certain" that the intensity of cyclone activity has increased since 1970. And, over the next 10-20 years, there will be greater impacts on human establishments due to flooding, coupled with the continued high level of tropical cyclonic activity and other precipitation events.[31] Of course the impacts will not be uniform, falling disproportionately on nations with large populations in low lying areas that have few impact mitigation initiatives.[32] In general, the conclusions of the 2007 and 2014 Synthesis Reports are the same. However, the 2007 Synthesis Report provides a greater level of detail about *where* these impacts are likely to occur.

The 2007 report indicates that Africa and Asia are the two continents that will see the greatest impact from relatively more predictable hydrological disasters like flooding and tropical cyclones in the next 10 – 40 years.[33] Between 1970 and projections to 2030, Asia saw the greatest population exposure increase from 68 million people to about 126 million, while Africa is projected to increase to 2.8 million from about 500,000.[34] More specifically, sea level rises will effect tens of millions of people on every habitable continent. Asia will see the greatest impact as a result of exposure to sea level rises with about 83 million people exposed by 2050, if current projections hold for impacts on ice sheets on Greenland and west Antarctica.[35] Over the next 20 – 40 years, areas that may be most impacted by significant precipitation events —including cyclonic activity,

[29] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 53.
[30] Alan Buis, "Study Confirms Climate Models are Getting Future Warming Projections Right," United States National Aeronautics and Space Administration Jet Propulsion Laboratory, 9 January 2020, https://climate.nasa.gov/news/2943/study-confirms-climate-models-are-getting-future-warming-projections-right/.
[31] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 70-71.
[32] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 72.
[33] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 240-241; Rajendra Pachauri and Andy Reisinger, *Climate Change 2007 Synthesis Report*, 50.
[34] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 240-241.
[35] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 249.

include: Southeast Asia, East Africa, and West Africa.[36] It is important to note that these projections *may* not hold. However, the coming years, the IPCC projects that there will be tens of millions of more people at risk of significant impacts due to climate change than there are today. Simply, if these projections hold, there will be a high demand for international disaster assistance over the next several decades. If presented with these scenarios, is the US even positioned to respond on short notice and over long distances? To answer that question, a short discussion of the USAF's mobility capabilities follows.

Low Density – Summary of USAF Humanitarian Assistance and Disaster Relief (HADR) Operations

As a tool of foreign policy, mobility assets rarely take center stage as they relate to the air mission because most often that distinction goes to 'the bomb droppers' or, more commonly, fighter and bomber aircraft. The dominant doctrinal and practical idea of mobility assets is that they are organized, trained, and equipped for war and, moreover, as an enabling force for the 'bomb droppers' and 'trigger pullers.'[37] However, since the inception of the USAF, mobility assets have been used as an independent policy tool, particularly in the evolved mission of humanitarian assistance and disaster relief. Further, the frequency of their use for humanitarian operations rivals the scope of their use for wartime operations.[38] If climate scientists are correct, then the importance in mobility assets as it relates to an air-centric US foreign policy may be increasing.[39] Scientific predictions of increasing impacts to human activity are particularly salient because the United States Agency for International Development (USAID), the organization responsible for requesting Department of Defense (DoD) support for foreign disaster assistance, typically asks for help with "the largest, most complex disasters, according to agency officials."[40]

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[36] Rajendra Pachauri and Leo Meyer, *Climate Change 2014: Synthesis Report*, 141-149.
[37] Robert Owen, *Air Mobility: A Brief History of the American Experience*, (Lincoln: Potomac Books, 2013), 297.
[38] Robert Owen, *Air Mobility*, 297
[39] This research acknowledges that the US Navy and the USAF are the two services most often called upon to conduct foreign disaster assistance operations.
[40] David Gootnick and Brian Lepore, *Climate Change: Activities of Selected Agencies to Address Potential Impact on Global Migration (GAO-19-166),* United States Government Accountability Office, January 2019, 27, https://www.gao.gov/assets/700/696460.pdf;

Support from the DoD to humanitarian operations usually includes either the US Navy or the USAF.[41] These military services possess unique mobility assets that allow the provision of other capabilities to assist with disasters like specially trained-personnel, heavy equipment, and food and other supplies. Yet, while naval ships have a higher capacity to bring supplies to an area, air assets are positioned for rapid response. The USAF mission of 'rapid global mobility' is premised on the idea that, while air units may not be able to get the largest amount of supplies to an area, aircraft can get supplies to those in need, for wartime or peacetime crisis scenarios, much more rapidly and can often reach remote and dangerous locations. A UN review of relief operations from 1997 – 2006 where military assets were employed also highlights aircraft "used for the transport of relief items and personnel" as the number one military asset commonly contributed to international disaster relief operations by responding nations."[42] Thus, air assets are the focus of the disaster response dynamic used in this thesis.

Within the USAF, two airframes are the mainstays of humanitarian operations, the C-17 Globemaster III and the C-130 Hercules.[43] The infographic below in Figure 2, provides a general comparison of the two airframe's capabilities and those of their larger though less flexible counterpart, the C-5 Galaxy.

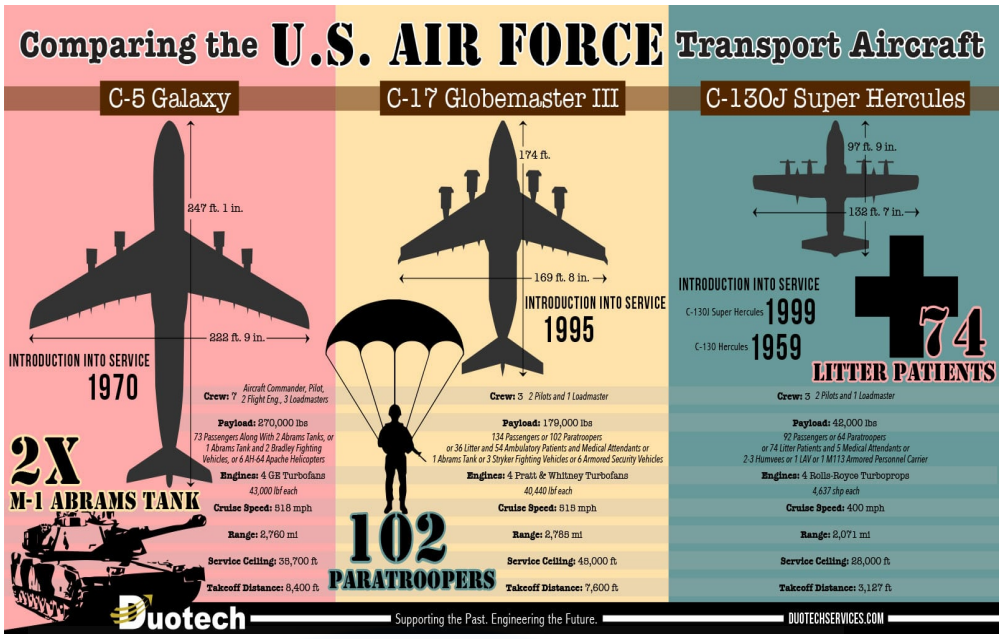
Jennifer D.P. Moroney, Stephanie Pezard, Laurel Miller, Jeffrey Engstrom, and Abby Doll, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, (Santa Monica: Rand Corporation, 2013), 3-5.

[41] Jennifer D.P. Moroney, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, 7.

[42] Sharon Wiharta, Hassan Ahmad, Jean-Yves Haine, Josefina Lofgren, and Tim Randall, *The Effectiveness of Foreign Military Assets in Natural Disaster Response*, (Stockholm: Stockholm International Peace Research Institute, 2008), x, https://reliefweb.int/sites/reliefweb.int/files/resources/236476AD3257088DC125741000474F20-sipri_mar2008.pdf.

[43] Jennifer D.P. Moroney, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, 7. The C-5 is another mobility asset that assists but only if there is an operable runaway of enough length for this large aircraft which is not always the case.

Figure 2: Infographic Comparison of USAF Transport Aircraft



Source: Duotech, https://duotechservices.com/compare-usaf-c5-c17-130-cargo-aircraft.

These aircraft are uniquely reconfigurable to assist with humanitarian missions because of their versatility in range, cargo-passenger mixtures as well as short-takeoff and landing capabilities.[44] Both aircraft are able to deploy around the world in less than 24 hours from bases in the Asia-Pacific region, the Caribbean, and South America. And, although some states in regions like the Asia-Pacific possess a relatively robust air-enabled disaster relief capacity of their own, many nations do not.[45] This lack of disaster relief capacity is a strong reason why the USAF is called upon and may be called upon more frequently to assist with foreign disasters.[46] Yet while these assets may be in high demand there is a need to understand whether they will be available for humanitarian operations and, ultimately, if this is a good way to use national military resources.

[44] Jennifer D.P. Moroney, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, 7.
[45] Jennifer D.P. Moroney, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, 124-126.
[46] Jennifer D.P. Moroney, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, 126.

Periodically, the US military conducts a Mobility Capabilities and Requirements Study (MCRS) to estimate the number of airlift aircraft "needed to meet combatant commander mobility requirements consistent with the [National Defense Strategy] NDS strategic environment, wartime missions and simultaneity guidance."[47] The most recent study was conducted in 2018 with a report issued in 2019. Projections were designed to meet requirements by 2023.[48] Importantly, the USAF has just enough capabilities to meet the expected requirements as outlined in the MCRS. For instance, according to the document, the USAF needs 275 C-17s and C-5s to meet requirements, however, there are only 222 C-17s and 52 C-5s, making for a 4-aircraft shortfall.[49] Major assumptions include all aircraft being operational and more importantly, that the USAF would have the *crews* to man these aircraft, a problem highlighted in a previous MCRS.[50] Previous studies with inaccurate assumptions demonstrate the problematic nature of policymaking with poor guidance.

According to a 2010 MCRS projecting for the year 2016: the number of C-130s, C-17s, and US Army C-27 Spartans—[later transferred to the USAF]—is more than sufficient to meet the demands of potential major contingency operations.[51] For instance, "The programmed fleet of 401 C-130s exceeds the peak demand in each of the three MCRS cases. The highest C-130 demand occurred in Case 1, which required 335 aircraft."[52] This means that there should have been plenty of excess capacity for the US to conduct humanitarian operations during the year 2016, though none were included in the assessment, and even during major armed contingencies. However, this assessment is

[47] "Mobility Capabilities and Requirements Study 2018 (MCRS-18) Executive Summary," United States Transportation Command, 8 February 2019, 1, https://www.airforcemag.com/PDF/DocumentFile/Documents/2019/MobilityCapabilitiesRequirementsStudy2018.pdf.
[48] "MCRS-18 Executive Summary," 2
[49] "MCRS-18 Executive Summary," 2. These numbers were also matched against facts sheets for the individual airframes on the US Air Force's Fact Sheet website.
[50] Col Carl Lude and Col Jean Mahan, "Mobility Capabilities and Requirements Study 2016 (MCRS-16) Executive Summary," United States Transportation Command, 2016, 6, https://www.airforcemag.com/PDF/DocumentFile/Documents/2010/MCRS-16_execsummary_0310.pdf.
[51] Col Carl Lude and Col Jean Mahan, "MCRS-16 Executive Summary," 6.
[52] Col Carl Lude and Col Jean Mahan, "MCRS-16 Executive Summary," 6.

based on the inclusion of the C-27 intra-theater airlifter, which is no longer part of the military's inventory; the 21 aircraft were relinquished by the USAF in 2013.[53] Some of the lost aircraft were made-up by additional purchases of C-130 aircraft.[54] However, the MCRS-16 also warns that "the C-130 crew force structure cannot sustain steady state operations in combination with a long duration irregular warfare campaign."[55] This caveat is particularly important because aircraft cannot fly themselves and the USAF's problems with aircrew retention are widely known.[56] Moreover, this period included long duration irregular warfare with ongoing operations in Afghanistan and the African continent among other locations. Thus, while there may be high demand for mobility assets in the coming years, the availability of aircraft for humanitarian missions may be relatively low. These disparities in equipment and manning inevitably leads to a low-density, high-demand scenario where a rapid large-scale response to a situation becomes increasingly difficult. This does not preclude the provision of disaster relief via non-governmental organizations (NGOs). However, the USAF is the largest, immediately deployable, and air-enabled force of humanitarian assistance providers in the world.

Over the next several decades, undoubtedly, there will be great demand for the relatively limited USAF resources that can assist with relief operations, but to what end? Hard questions should be asked and, if possible, answered. Beyond the most basic objective of saving lives, what—if any, is the utility of using precious mobility assets to assist other states with rapid-onset humanitarian disasters? There will be far more opportunities to save lives than the US will have assets to address, so what motivates application of mobility forces? These types of missions tangentially appear in the 2018 NDS and, unsurprisingly, do not appear at all in the MCRS-18 which bases its projections

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[53] Michele Mackin, *Coast Guard Aircraft: Transfer of Fixed-Wing C-27J Aircraft Is Complex and Further Fleet Purchases Should Coincide with Study Results (GAO-15-325)*, United States Government Accountability Office, March 2015, 3-5, https://www.gao.gov/assets/670/669286.pdf.
[54] John Tirpak, "The Saga of the Spartans," *Air Force Magazine*, 28 August 2014, https://www.airforcemag.com/article/the-saga-of-the-spartans/.
[55] Col Carl Lude and Col Jean Mahan, "MCRS-16 Executive Summary," 6.
[56] David Axe, "What's Driving the U.S. Air Force Pilot Shortage?" Foreign Policy, 4 May 2018, https://foreignpolicy.com/2018/05/04/whats-driving-the-u-s-air-force-pilot-shortage/.

off the defense strategy.[57] Indeed, several recent studies advocated that the "DoD should consider how intervening in [humanitarian assistance/disaster relief] HA/DR missions benefits the U.S. government" and to consider "[w]hat are the overall strategic aims of each intervention, aside from the obvious aim of saving lives?"[58] To further discussion of these and related questions, I turn to an exploration of existing literature that bridges international relations outcomes with air power theory to consider, as one scholar puts it, "the coercive *and* [emphasis added] non-coercive uses of military power."[59]

Limited Payoff? – A Literature Review

There are four bodies of theory and prior research that help illuminate the logics undergirding state use of HADR operations as a tool of foreign policy. The schools of inquiry each contribute to deepening understanding and assessment of HADR utility forming the foundation for empirical inquiry. The areas of study include international relations (IR), disaster science, air power studies, and disaster diplomacy. By identifying existing streams of research, this thesis builds bridges across relevant academic schools and communities of practice.[60] Therefore, this section reviews the theoretical assertions and findings in these four fields of study, in order to construct the theoretical framework I will use to assess the relative utility and impact of relief operations on interstate relations, my theoretically driven outcome of air-enabled disaster response. The IR discussion sheds light on why humanitarian assistance missions might matter to the US at the grand strategic level of analysis, whereas disaster science sharpens the debate about the appropriateness of mitigation and response measures given nuanced natural disaster terminology and prognostications. Using a unified framework of air power studies, this thesis challenges an overwhelming attitude that favors the 'bomb-dropping' aspects of air power over non-kinetic efforts such as HADR operations. Disaster diplomacy research

[57] James Mattis, *Summary of the 2018 National Defense Strategy of the United States: Sharpening the American Military's Competitive Edge*, 5.
[58] Jennifer D.P. Moroney, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, 122.
[59] David Capie, "The United States and Humanitarian Assistance and Disaster Relief (HADR) in East Asia: Connecting Coercive and Non-Coercive Uses of Military Power," Journal of Strategic Studies 38:3 (2015), 309.
[60] A.F. Chalmers, *What is this thing called Science?* (Indianapolis: Hackett Publishing Company, 1999), 135.

helps situate this thesis as a contributor to analysis of a relatively large number of disaster data to determine whether there is any utility in humanitarian operations based on the reasons revealed in the IR section.

Disaster Relief and International Relations. The theoretical foundation for *why* disaster relief operations may have any utility to a state as a tool of foreign policy comes from political scientists. First, I will address some general assumptions about the political science literature. This research acknowledges that states remain and are likely to remain central actors in the international system, though non-state actors, like NGOs and other organized groups, play a role. Further, states pursue interests using a variety of tools at their disposal including, but not limited to, diplomatic, informational, military, and economic instruments. Importantly, these tools are based on desired outcomes and less on the form of the tool. For instance, it is possible that a diplomatic act can be taken using something in a military form, such as during relief operations where a military asset is used for diplomatic purposes. Within political science literature, diplomatic actions are used for a variety of purposes and is a tool most often associated with the Liberal school of political scientists.

Liberal IR theory is rooted in the use of a state's instruments of power, as well as international institutions, to advance state interests via cooperation with other states and sometimes non-states like NGOs. Joseph Nye, a prominent liberal political science theorist, uses "soft power" to describe the persuasive and cooperative strategic uses of national instruments of power like diplomacy.[61] In other words, these are actions that states take to build trust and cooperation towards some common goal based on one state's ability to frame agendas, persuade and elicit favor over another state towards a preferred outcome.[62] The elicitation of positive attraction is the outcome that this research analyzes. The measure of this outcome is how we determine what, if any, impact humanitarian assistance and disaster relief have in the effort to achieve US goals. Hereafter, I summarize the concept of positive attraction as 'interstate relations.' From this term, three categories of states can be extrapolated: donor states, recipient states, and

[61] Jospeh Nye, *Soft Power: The Means to Success in World Politics*, (New York: Public Affairs, 2004), 8.
[62] Jospeh Nye, *Soft Power*, 8.

bystanders.[63] This research focuses on the relationship between donor states and recipient states because it is most immediately relevant to the topic.

By providing humanitarian assistance, donor states demonstrate that they care about another state's plight and not just their own, which should create a positive attraction to the recipient state.[64] This meets a central tenet of the Liberal school, which posits that cooperation among states is possible when pursuing interests. Cooperation is built on trust, which must be developed through demonstration. Humanitarian assistance missions are such a demo through which trust can be built. Following a natural disaster, the immediate cooperation could be toward the goal of saving lives, but in the longer term the goals may be economic or informational that depend on the quality of interstate relations. Moreover, at least theoretically, humanitarian operations can be a way to build trust between donor and recipient states. Trust is demonstrated through the provision of one state's resources for the express purpose of supporting another state's interest, disaster response, and recovery, so that the recipient state can more ably function in the international community of states. Ostensibly, for Liberals, the donor state builds soft power through the trust-building mechanism of humanitarian assistance. "But when trying to convince others to pursue soft power approaches [and their utility], it is important to be able to demonstrate their effectiveness."[65] A continuation of a state's ability to do just that, demonstrate effectiveness, is based on a clear understanding of the contextual parameters of the phenomena, specifically: natural disasters, humanitarian assistance/disaster relief, and air assets that achieve the HADR mission.

Disaster Science. The establishment of an understanding of natural disasters and, subsequently, defining responses to the problem can be found in the field of disaster science. The subject draws upon several fields like geoscience, physics, and engineering to clarify the phenomena that commonly reference as 'natural disasters.' Terminology

[63] Donor states are those states that provide disaster relief assistance for a particular event. Recipient states are those states that receive disaster relief assistance for a particular event. Bystanders are states and non-state actors that, indirectly, are influenced by the actions of donor states and non-state actors during a particular disaster event.
[64] Larissa Forster, "The Soft Power Currencies of US Navy Hospital Ship Missions," *International Studies Perspectives*, 16:4 (November 2015), 375.
[65] Larissa Forster, "The Soft Power Currencies of US Navy Hospital Ship Missions," 369.

has been hotly contested in this field. As a start, scientists draw on the broad term 'natural hazard,' which is a "potentially damaging physical event[s] and phenomena which may cause the loss of life, injury or human life disruption, property damage, social, economic and political disruption or environmental degradation."[66] The events can be single or multiple, concentrated or localized, intense, and associated with a probability of occurrence.[67] Moreover, some scientists even argue that some occur because of human actions, behavior, decisions, and values that create vulnerabilities, and those vulnerabilities are the fundamental cause of the hazard.[68] The term 'disaster' has a different meaning.

In disaster science, the term 'disaster,' deals with "a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceed the ability of the affected community or society to cope using its own resources."[69] This definition is important because the combination of the terms "natural hazard" and "disaster" creates a general definition in the field that has allowed scientists to provide greater clarity and cataloging for natural disasters. The greater clarification and tracking are necessary for scientists to make sense of these events over time, because of the inherent ambiguity in some of the disaster science terminology referenced above, like the implication of deaths, damage, and a government's ability to cope with its own resources. The most commonly referenced dataset that encapsulates this common language is the EM-DAT, maintained by the Centre for Research on the Epidemiology of Disasters (CRED) since 1988.[70]

The EM-DAT provides a definition of natural hazards that is consistent with widely accepted disaster science assumptions but provides a standard for "disaster

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[66] A.T. Ismail-Zadech, S.L. Cutter, K. Takeuchi and D. Paton, "Forging a paradigm shift in disaster science," *Natural Hazards* 86:2 (March 2017), 983.
[67] A.T. Ismail-Zadech, "Forging a paradigm shift in disaster science," 983-984.
[68] Ilan Kelman, *Disaster Diplomacy*, 19.
[69] A.T. Ismail-Zadech, "Forging a paradigm shift in disaster science," 984.
[70] Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database, https://www.emdat.be. The disasters classification used in EM-DAT is based on and adapted from the Integrated Research on Disaster Risk (IRDR) Peril Classification and Hazard Glossary, Data Project Report #2, March 2014 that can be found at http://www.irdrinternational.org/2014/03/28/irdr-peril-classification-and-hazard-glossary/.

events" which are much more discrete.[71] An *event* is defined as a disaster that conforms to at least one of the following criteria: (1) ten or more people dead, (2) 100 or more people affected, (3) the declaration of a state of emergency, or (4) a call for international assistance.[72] The CRED provides typologies of disasters in groups—natural and technological. This thesis focuses on natural disasters and the geophysical, meteorological, and hydrological subgroups. These subgroups include disaster main types like storms, floods, and wave actions consistent with the atmospheric conditions expected to amplify in the coming years.[73] Other disaster groups, subgroups, and main disaster types—like wildfires, insect infestations, and chemical spills-- are excluded primarily due to their extreme unpredictability. This limitation on categorizations is important because they help cordon the extent of cases selected in the broader disaster science pool of cases. There are more cases out there, but they are typically not the cases that apply to air-enabled humanitarian assistance. In general, in disaster science there are two primary ways to address disaster events, pre-emptively by mitigation and adaptation efforts or reactively through response. This research focuses on the response because of the discrete nature of the event and the ability to explore causal chains with fewer intervening factors. Disaster response is a military activity, a specific mission, tied to a disaster event, designed for a national outcome.[74] Within a recently proposed framework of air power studies, disaster response is the activity designed to achieve the outcome of interstate relations.[75]

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[71] Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database, https://www.emdat.be/Glossary.
[72] Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database, https://www.emdat.be/frequently-asked-questions.
[73] Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database, https://www.emdat.be/classification.
[74] This thesis acknowledges that military units can conduct mitigation activities as well such as building partner capacity to deal with natural disasters. Analysis of mitigation activities should be analyzed in a separate study.
[75] Jaylan Haley, "A Unified Framework for Air Power Studies," From Balloons to Drones: Air Power throughout the Ages, 23 February 2020, https://balloonstodrones.com/2020/02/23/a-unified-framework-of-air-power-studies/comment-page-1/#comment-45415.

Toward a Theory of Air Powered HADR? The topical field of air power studies is arrayed across a variety of relevant, established schools like history and political science. However, it is difficult to orient new literature or draw from existing literature in a topical field without a framework. In early 2020, I proposed a unified framework for air power studies in which I advance that the field consists of six components: personalities, organizations, outcomes, technologies, ideas, and events (Haley 2020).[76] These components are the basic construction materials that scholars can use to develop their contributions to the field. As it relates to the topic at hand, I use the 'outcomes' component of the framework to encapsulate how disaster response integrates into airpower studies. Air power outcomes are concerned with the "effects, assessments and results by which military and civilian leaders come to associate air power."[77] Disaster response is designed, in part, to affect interstate relations. Likewise, air power is also designed, in part, to effect interstate relations. The dominating and problematic conceptualization of air power by policymakers and strategists is that air assets should be used for the sole, or even primary, purpose of war and it tends to perpetuate myopic views of air power as *only* a weapon of war.[78] This frustrates inquiries about broader uses of air power and its effects perpetuated by the service's culture.

In the USAF, mobility assets and those who operate them—like Airmen in many other aspects of the service—do not receive the same level of attention and influence that the fighter and bomber communities receive; this debate about mission equities predates the Air Force as an independent service.[79] However, acceptance of this potential

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[76] Jaylan Haley, "A Unified Framework for Air Power Studies." "First, personalities may be individuals or groups that have a profound impact on the development of the notion [air power]." Organizations are "administrative and operational systems that foster ideas, leverage people and exploit technologies towards some outcome." "[…] Outcomes are the effects, assessments and results by which military and civilian leaders come to associate air power." "[…] Technology includes all the capabilities, research, design, development and testing that allow practitioners to do things in the air." Ideas are the "Doctrine, strategy, theories, policies and politics" of air power. Events are "Our understanding of past campaigns, battles and historical milestones […]"

[77] Jaylan Haley, "A Unified Framework for Air Power Studies."

[78] The mission of the United States Air Force is to fly, fight, and win—in air, space, and cyberspace.

[79] S. Rebecca Zimmerman, Kimberly Jackson, Natasha Lander, Colin Roberts, Dan Madden, and Rebecca Orrie, *Movement and Maneuver: Culture and the Competition for*

disfunction can be dangerous as it can operationally and intellectually limit the ways in which Airmen and policymakers look at air power.

For instance, during the first half of the 20th century, air power's utility was dominated by the idea of bringing overwhelming firepower to war. In 1921 Julio Douhet was one of the first published air power theorists advocating air machines could end wars before the fighting started by leveraging fear of bombing onto the people of a mobilizing enemy.[80] In the years between WWI and WWII, other theorists advocated for varying uses of air power such as Billy Mitchell who argued aircraft could be used for defense of America's shores as well as depriving enemies of their aircraft which would enable destruction of the opponent land forces.[81] J.C. Slessor said that an enemy's land forces could be decimated through a combination of friendly land forces with air assets focused on the enemy's "[lines of] communication and systems of supply."[82] Nuance in the debate centered on combinations of bombing, fighter aircraft, or pursuit utilities, and augmentation of other services like the Navy or Army. WWII became a laboratory for the competing and complimentary ideas.[83] However, air power's utility in the minds of people, and especially policymakers, all over the world culminated with the advent and employment of nuclear and then thermonuclear weapons.[84] The proposition was that nukes, primarily employed by air forces, were the ultimate weapon to 'win' international conflicts at first through decisive victory and in later writings by means of deterrence. This is when the users of these weapons, 'the bomber generals,' gained prominence in the

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Influence Among the U.S. Military Services, (Santa Monica: Rand Corporation, 2019), 77-79.

[80] Julio Douhet, *The Command of the Air*, ed. Joseph Harahan and Richard Kohn, (Tuscaloosa: University of Alabama Press, 2009), 58.

[81] William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military*, (Tuscaloosa: University of Alabama Press, 1925), xiv, 9-10.

[82] J.C. Slessor, *Air Power and Armies*, (Tuscaloosa: University of Alabama Press, 1936), 2.

[83] Thomas Hughes, *Overlord: General Pete Quesada and the Triumph of Tactical Air Power in World War II*, (New York: The Free Press, 1995), 13; Thomas Griffith, M*acArthur's Airman: General George C. Kenney and the War in the Southwest Pacific*, (Lawrence: University of Kansas Press, 1998), 11, 15-16.

[84] Conrad Crane, *American Airpower Strategy in Korea, 1950-1953*, (Lawrence: University of Kansas Press, 2000), 17.

USAF, organizing, training and equipping the service to carry out this mission at the expense of all others.[85]

In the second half of the 20th century, the ideation of air power as a tool to bring about the effect of helping to end wars *decisively* or stop them from occurring at all did not measurably change. As it relates to the latter idea, thoughts about the concept of deterrence became the theoretical basis for the Air Force's bomber and intercontinental ballistic missile (ICBM)-centric policies and organizational structures. Thinkers like Bernard Brodie broached the idea of first- and second strike-capabilities enabled by air and submarine launched missiles and the effects on the psychology of adversaries in choices of defensive and offensive strategies. [86] One must be prepared to employ nuclear weapons in a variety of ways to better deter an enemy force from using the weapons and potentially preventing war in general. In other words, information disparities became more widespread between the two great Cold War adversaries, the United States and the Soviet Union. Later, Thomas Schelling formalized ideas about deterrence based on a bargaining process undergirded by credible threats, unknown intentions, and information disparities.[87] These and other ideas about the use of hard military power, particularly air power, overshadowed much of the 1950s and 1960s. However, some conclusions and policies were called into question during the limited war realities of Korea and Vietnam, moreso about the utility of conventional power as opposed to the nuclear deterrent.[88] Mark Clodfelter conceptualizes this as he submits a more explicit typology of air power effects.

Clodfelter submits that the best conceptualization of air power is "The ability to project military force through a platform in the third dimension above the surface of the

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[85] Col Mike Worden, *Rise of the Fighter Generals: The Problem of Air Force Leadership, 1945-1982*, (Maxwell AFB: Air University Press, 1998), 86-89.
[86] Bernard Brodie, *Strategy in the Missile Age*, (Princeton: Princeton University Press, 1959), 201-207.
[87] Thomas Schelling, *Arms and Influence*, (New Haven: Yale University Press, 1966), 2-8; Daniel Byman and Matthew Waxman, *The Dynamics of Coercion: American Foreign Policy and the Limits of Military Might*, (New York: Cambridge University Press, 2002), 15-17.
[88] Conrad Crane, *American Airpower Strategy in Korea,* 6-8; Mark Clodfelter, *The Limits of Air Power: The American Bombing Campaign of North Vietnam*, (Lincoln: University of Nebraska Press, 1989), xiv-xvi.

earth."[89] Important in this air power definition is its premise on military force or war. Taking the idea a step further, Clodfelter separates air power into direct, lethal, indirect, independent, and auxiliary categories.[90] Mobility assets are considered indirect. This conceptualization is representative of how the mobility mission tends to be viewed in the air force. Though this view may be held by many, some have begun to highlight the wartime *and* peacetime effects offered by mobility assets that cannot be provided by 'direct' air power assets. Colin Gray explores this concept in his book *Air Power for Strategic Effect*.

Gray argues that "The strategic value of airpower has been limited in the past, as it is today, by the consequences of a failure on the part of polities to grasp and secure a realistic grip upon what it can and cannot accomplish for them[--effects]."[91] During the post-Vietnam years, many policymakers and Airmen became enamored with the air service's ability to deliver increasingly precise and lethal effects that were tailorable to US policy goals. Indeed, the USAF's common history is riddled with examples of what air power can accomplish within Clodfelter's direct form. However, Gray argues that it is a fallacy to segregate air power into this corner of the theoretical use of air power. In an in-depth explanation of his 9th of 27 dicta of air power theory, Gray writes "There is no disagreement that contemporary airpower can be precise and deadly, but that does not mean that precision and lethality are unique and eternal attributes of airpower."[92]

Gray agrees with Richard Hallion that air power can be used for a duality of purposes, "for both combat and humanitarian purposes,"[93] the latter is why, in the air power studies framework, the outcome of interstate relations that springs from humanitarian operations differs from other air power engagements. This is the nexus of where this research fits into air power studies: it explores the idea that humanitarian operations *can* create strategic effects under certain conditions and that there is a possibility that other effects can be created if given the same intellectual and practical

[89] Mark Clodfelter, *The Limits of Air Power*, 212.
[90] Mark Clodfelter, *The Limits of Air Power*, 213.
[91] Colin Gray, *Airpower for Strategic Effect*, (Maxwell AFB: Air University Press, 2012), 24.
[92] Colin Gray, *Airpower for Strategic Effect,* 280.
[93] Colin Gray, *Airpower for Strategic Effect*, 273.

currency as some of the earlier ideas about air power, previously discussed.[94] The research below helps expand the perspective of air power outcomes beyond lethal application to ensure the widest portfolio of options can be provided to national security decision-makers. We now turn to the political science subfield of disaster diplomacy to explore how mobility assets may be used to conduct US foreign policy that credibly builds interstate relations alongside all the other uses of air assets.

Air Powered HADR as Disaster Diplomacy. The field of disaster diplomacy is a relative novelty. The field emerged in the early 2000s as a method to bridge disaster science and the activities surrounding them (i.e. disaster response) with effects in the international community such as whether the activities "do and do not reduce conflict and induce cooperation."[95] Disaster diplomacy goes beyond disaster science by exploring "how and why disaster-related activities do and do not induce cooperation amongst enemies."[96] Although the field has expanded somewhat to go beyond original questions, this research pursues a previous question of the field: "'How and why disaster-related activities do and do not yield diplomatic gains, looking mainly at disaster-related activities affecting diplomacy rather than the reverse' (Gillard et al., 2008, pp. 511-512)"[97] Previous research relies almost solely on small-N case studies to reach various conclusions.[98]

Much of the previous research holds that there are clear, significant and positive connections between international disaster response and donor-recipient diplomatic positioning.[99] The unifying theme of current disaster diplomacy research holds that disaster-related activities support diplomacy when there are on-going diplomacy efforts. They do not produce new diplomatic results or initiatives.[100] In other words, states may use disaster-related activities to positively benefit interstate relations but not necessarily to *establish* those relationships. Importantly, sometimes the disaster-related activities are

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[94] Laura Lenderman, *The Rise of Air Mobility and Its Generals*, (Maxwell AFB: Air University Press, 2008), 4 , 22.
[95] *Ilan Kelman, Disaster Diplomacy*, 10.
[96] Ilan Kelman, *Disaster Diplomacy*, 19.
[97] Ilan Kelman, *Disaster Diplomacy,* 19
[98] Ilan Kelman, *Disaster Diplomacy*, 10.
[99] Ilan Kelman, *Disaster Diplomacy,* 19
[100] Ilan Kelman, *Disaster Diplomacy,* 19

not an accelerant to interstate relations. This conclusion holds primarily in the short-term, i.e., a time-scale on the order of weeks and months.[101] Second, over the long-term, a time-scale over years, non-disaster factors are generally seen to have a more significant impact on diplomatic processes than disaster-related activities, though there is little data that analyzes disaster diplomacy over years and decades.[102]

Disaster diplomacy is usually not a high priority because there is little understanding of the benefits or costs that these activities may bring about.[103] Indeed, there is little understanding of what policymakers want from the disaster diplomacy. A 2012 study by the Center for Strategic International Studies recommends "sharpen[ing] and clarify[ing] the rationale for humanitarian engagement."[104] Policymakers help researchers analyze and measure observed effects when they clarify what they want from disaster-related activities, though this is probably not why they provide goals. The assumption that policymakers want improved interstate relations as a result of disaster-related activities is one made by disaster diplomacy scholars and an assumption used in the research below. This assumption enables formulation of specific and interesting questions.

From disaster diplomacy questions, this research explores aspects of inquiries like "How are disaster-related activities influencing diplomatic activities?" Also, "To what degree are those diplomatic activities new and to what degree were they ongoing?" And finally, "How long does the connection between the disaster-related and diplomatic activities last? Why does the connection persist or fade away?" In chapter two, this research project pursues a large-N study to help bolster existing scholarship in the field. The intent is to make some of the conclusions from existing research more generalizable across a larger number of potential cases and applicable to air-enabled humanitarian operations. It seeks to simplify the *effect* of disaster diplomacy as an increase or decrease in interstate relations and to analyze these effects over years. Chapter 2 proposes a model

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[101] Ilan Kelman, *Disaster Diplomacy,* 19.
[102] Ilan Kelman, *Disaster Diplomacy,*19
[103] Larissa Forster, "The Soft Power Currencies of US Navy Hospital Ship Missions," 377
[104] Larissa Forster, "The Soft Power Currencies of US Navy Hospital Ship Missions," 377

of analysis to achieve these desired research objectives and lays the groundwork for a quantitative analysis in Chapter 3.

Chapter 2

Correlational Model

Introduction

This chapter provides a link between disaster-diplomacy research and the broader field of international relations (IR). Below, the thesis explores a positive correlation between the provision of air-enabled disaster assistance and interstate relations. First, I propose a theoretical model that bridges positive donor-recipient relations with various aspects of a natural disaster and a donor state's response. Next, is a presentation of specific attributes of the dependent and independent variables that make up the theoretic model. Another important contribution is an operationalization of specific data that I use to test the model followed by a discussion of control and intervening variables used to help ensure theoretical rigor of the model. Finally, I outline hypotheses that summarize connections and expectations of the analysis.

Model Sketch

The proposed model assumes that multiple attributes of a disaster's aftermath and the disaster response of the donor state affect the interstate relations of the donor and recipient state. The donor state is the government that provides disaster response after a natural disaster event. The recipient state is a government that receives disaster assistance. This study looks specifically at a narrower set of data where disaster assistance is air-enabled by USAF mobility assets. Theoretically, the model assumes that the number of days of aid provided by a donor state, the total number of deaths, and total persons affected by the natural disaster may lead to an increase in interstate relations. In general, the model does not assume there will be a negative outcome from the provision of disaster aid because recipient states generally value aid. Therefore, this thesis assumes all values of interstate relations will be positive.

The formal model follows general multivariate regression structures[1]:

Dependent Variable = a_0 + b_1Independent Variable$_1$ + b_2Independent Variable$_2$ + Error Term (ε)

OR

$Y = a_0 + b_1X_1 + b_2X_2 + \varepsilon$

The dependent variable is the general level of interstate relations. There are multiple independent variables including: number of aid days provided by the donor state, total number of deaths and total population affected by the disaster event in the recipient state as well as the total damage from the natural disaster in the recipient state. Importantly, the model assumes an additive independent variable. For instance, the more aid provided during the response and the more destructive the natural disaster, the more potential interstate relations benefit there may be for the donor and recipient states. Initially, the thesis included a potentially influential aspect of interstate relations, the opening or closing of an Embassy or Consulate— or the establishment of some type of diplomatic mission. However, most of the US' diplomatic missions for affected states were established decades ago, some date back to the 1800s, one example will be provided in a case study in Chapter 4.[2] Therefore, this data is not included in the final model. An error term is included accounting for any independent variables that may shape the outcome but is not accounted for in this thesis. Some unaccounted variables may include amounts of non-governmental organization (NGO) funding from the donor state, changes in trade status for the recipient state by the donor state, and changes in diplomatic mission personnel numbers.

The model's expression is as follows:

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[1] Michael Lewis-Beck, *Applied Regression: An Introduction*, (Newbury Park: Sage Publications, 1980), loc 695 – 706.
[2] Cory Gill and Edward Collins-Chase, "U.S. Overseas Diplomatic Presence: Background and Issues for Congress," Congressional Research Service, 6 June 2019, 1, https://fas.org/sgp/crs/row/IF11242.pdf.

(Dependent Variable – Interstate Relations) = a_0 + (X_1Independent Variable - Number of Aid Days/365) + (X_2Independent Variable – Number of Deaths or Total Affected) + (X_3Independent Variable – Total Damage) + Error Term

$$I = a_0 + \frac{X_1 A_\alpha}{365} + X_2 De_\alpha + X_3 Da_\alpha + \varepsilon$$

OR

$$I = a_0 + \frac{X_1 A_\alpha}{365} + X_2 Ta_\alpha + X_3 Da_\alpha + \varepsilon$$

a_0 = Constant

I = Interstate Relations

A = Number of Aid Days

De = Total Deaths

Da = Total Damage

Ta = Total Affected

ε = Error Term

Dependent Variable Measures

Interstate relations is an inherently subjective idea and must be measured by way of proxy variables as demonstrated by many thinkers on the issue.[3] Multiple researchers tried to make sense of interstate relations, which, generally, is construed as the positive or negative impact on the propensity for trust, between states.[4] Interstate relations should not be confused with diplomacy, which is the ability of one state to influence another state to get the target state to do what it wants. Interstate relations are a precursor to diplomacy and a way to develop a key component of diplomacy, trust. This research focuses on the precursor of interstate relations because it *can* be a foreign policy

[3] Mark Crescenzi and Andrew Enterline, "Time Remembered: A Dynamic Model of Interstate Interaction," *International Studies Quarterly* 45:3 (September 2001), 414-415.
[4] Aaron Hoffman, "A Conceptualization of Trust in International Relations," *European Journal of International Relations* 8:3 (September 2002), 376.

objective, albeit a difficult one to understand. Hence the factor of interstate relations is the dependent variable investigated within the model.

As discussed, the dependent variable is inherently subjective because it deals with building trust, which is a subjective idea. However, there are multiple ways that this thesis proposes an approximation of trust-building with certain indicators or proxies. I propose multiple proxies of the dependent variable including: the change in United States Agency for International Development (USAID) assistance for the recipient state from the donor state and the combined change in foreign direct investment (FDI) between the donor and recipient states. Again, these proxies are additive and, in the case of FDI, dyadic.[5] I use their combined changes to garner indications of trust building between the donor and recipient states.

Foreign Direct Investment. FDI is the first proxy variable of interstate relations for analysis. Multiple economic researchers indicate that FDI is an indicator of increased interstate relations because of the diplomatic bonds that must be forged to ensure smooth and legal financial transactions.[6] There is research that also suggests that natural disasters are negatively and statistically significantly associated with FDI, manufacturing in particular.[7] This means that if a natural disaster occurs in a recipient state, a recipient state is less likely to have FDI attracted, at least in the short-term. But, if there *is* an increase in FDI in a state that has a natural disaster, it is an indicator that relations may be at such a level that, where FDI was not likely before, it becomes more likely. Therefore, I use FDI as one of the proxy indicators.

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[5] USAID is the US' primary vehicle to provide international, non-military, aid.

[6] Rodolphe Desbordes and Vincent Vicard, "Being nice makes you attractive: the FDI – international political relations nexus," Maison Des Sciences Économiques, 22 June 2005, 4; Solomon Polachek, Carlos Seiglue and Jun Xiang, "Globalization and International Conflict: Can FDI Increase Peace as Trade Does?," Rutgers University, 2005, 24; Solomon Polachek, Carlos Seiglie and Jun Xiang, "The Impact of Foreign Direct Investment on International Conflict," *Defence and Peace Economics* 18 (2007), 425; Rodolphe Desbordes and Vincent Vicard, "Foreign Direct Investment and Bilateral Investment Treaties: An International Political Perspective," *Journal of Comparative Economics* 37, 2009, 373, 375.

[7] Nadia Doytch, "Upgrading destruction? How do climate-related and geophysical natural disasters impact sectoral FDI," *International Journal of Climate Change Strategies and Management* 12, 2019, 195.

To operationalize the FDI proxy variable, I use the US Bureau of Economic Analysis' international database on direct investment and multinational enterprise.[8] The database allows researchers to select dyadic relationships with varying conditions. As it relates to donor-recipient, I chose the "United States Direct Investment Abroad" option and information that relates to the "Balance of payments and direct investment position data." Next I selected the "U.S. Direct Investment Position Abroad on a Historical-Cost Basis" series. I chose the "By Country Only (All Countries)" classification to ensure that all data was reported by countries that may be recipient states. Finally, I selected all geographic areas and the years 1992 through 2017 though data will come from years ranging between 1991 and 2018. The date selection ensures that we have one year prior to the beginning of our study which will give us comparative data for the first year of natural disasters—1992—and the subsequent responses. Further, the selection of 2018 allows for data comparisons of the two years following the last year of the study, 2017. The information is provided in millions of dollars and I use these numbers for comparative purposes. I use changes in each year of FDI from the dyadic relationship as the measure of FDI for the analyzed period. I add changes in FDI to the change in USAID funding to provide a better understanding of the flow of funds into and out of the country which can be an indicator for the growth or contraction of interstate relations.

Foreign Aid. The second proxy for the dependent variable is foreign aid provided to the recipient state; for the US this is provided by an arm of the Department of State, USAID. Multiple studies indicate that both FDI and foreign aid have a positive impact on gross domestic product (GDP) growth particularly at the project level, provided a variety of assumptions are met such as both FDI and aid matching the development level of the recipient state.[9] Eventually, when used for appropriate reasons, aid helps a state grow internal industries that contribute to its GDP growth. Ostensibly, those states that contribute to this growth gain a level of trust from the receiving states. And this trust contributes to the building of interstate relations. Much

[8] United States Bureau of Economic Analysis, "International Data: Direct Investment and MNE," https://apps.bea.gov/iTable/iTable.cfm?isuri=1&reqid=2&step=1#isuri=1 &reqid=2&step=1; https://guides.library.harvard.edu/fdi.
[9] Roger Riddell, *Does Foreign Aid Really Work? An Updated Assessment*, Discussion Paper 33, Australian National University, March 2014, 13.

like FDI, foreign aid is counted in total number of dollars and is accounted for by the change between receiving years. I use State's Foreign Aid Explorer to acquire the needed data.[10]

It is important to ensure that timescales remain constant across the model, therefore I use years as the standard timeframe. Years are used because it is very difficult to differentiate the immediate effects of a change in interstate relations—in terms of weeks or months. Moreover, the chosen dependent variable proxies are provided in a calendar year. Resultantly the chosen measures can provide at least a minimal level of standardization among an already difficult phenomenon to operationalize. As it relates to the dependent variable, the measure of interstate relations reflects a unitless measure beginning the year following the natural disaster.

Independent Variable Measures

The independent variables herein proposed are suspected of having a causal linkage to increases in interstate relations between the donor and recipient states. Again, I propose that the following variables are contributing to changes in interstate relations after a natural disaster event: number of aid days, number of deaths or total affected in the recipient state, and the total damage from the natural disaster in the recipient state. Each term provides variability, which is necessary for a quantitative multivariable regression analysis. Moreover, each term possesses units of measure that can be standardized with other variables. Below is a description of each variable, the potential causal link to the dependent variable and an explanation of the data source. Maximum transparency is provided for scrutiny, replicability and refinement.

Number of Disaster Aid Days. The first, independent variable is the number of days that a donor state provides aid to the recipient state. For each disaster event that garners an international response from a donor state with air assets, there are several days

[10] U.S. Agency for International Aid (USAID), "U.S. Overseas Loans and Grants: Obligations and Loan Authorizations, July 1, 1945-September 30, 2018, " https://explorer.usaid.gov/reports. Researchers should not use the primary Foreign Aid Explorer but rather the database that provides all of the disbursements that go back to 1946. Also, importantly, fiscal years are used for USAID reporting so be sure to pay attention to the years that are provided in the data.

associated with the disaster response.[11] This number represents the number of days that the donor state obligates and uses assets to assist the recipient state. The raw number of aid days must be divided by 365 to ensure that the units of measure remain constant across the model. Theoretically, a recipient state should trust a donor state that commits more aid days than a donor state that does not. Conversely a donor state may not commit as many donor days to a recipient state for which it does not have trust. Thus, causally, as the number of aid days increases, interstate relations should increase. There is little research that explores the specific linkage of the number of aid days provided by a donor state with any effects on the recipient state. This may be a fruitful area for future research.

The source for aid days comes from an Air Force History and Museums Program study of the USAF's air mobility operations since the USAF's inception in 1947 through 2007. Additionally, recently declassified records from the Air Force Historical Research Agency as well as primary source information afforded by the Air Mobility Command Historian's office provide the remaining and corroborating information for aid provided from 2008 through 2017. Each disaster response entry is accompanied by a number of days associated with the event. If multiple sources of information were able to provide greater clarity about the length of the disaster response, then I updated the aid days with the appropriate number of days. Disaster events where the number of aid days could not be confirmed were not included in the quantitative analysis. Ultimately, this research submits that the number of days that a donor state commits to an international relief operation may have an effect on the interstate relations between the donor and recipient states.

Number of Disaster Related Deaths. Perhaps the most important independent variable in a disaster response is one that cannot be controlled by the donor or recipient state: the number of people who die as a result of the natural disaster event. As discussed in Chapter 1, I use data recorded in the Emergency Events Database (EM-DAT) from the Centre for Research on the Epidemiology of Disasters (CRED) in this

[11] Future models may use number of sorties to more adequately represent air power's contribution to aid efforts.

study. [12] The EM-DAT defines a death as "the number of people who lost their life because the event happened."[13] Total deaths include both deaths and the number of missing after the event. Theoretically, the number of deaths in a disaster has a psychological effect on the recipient state population, especially on the government. In-turn, international responses to deaths in the recipient state can develop an endearment of the donor state by the recipient.

The total number of deaths is important to the recipient state because the higher the number, the more a state must grapple with whether it is able to handle the situation, becoming the impetus for requesting international assistance. If a recipient government is able to handle the situation on its own, then it can be a show of independence and competence. If the recipient government cannot, then any assistance given to the government to address the natural disaster response allows for the government to demonstrate its effects to call upon partners. In so doing, recipient governments build trust with donor states, which allows them to build interstate relations. Thus, *ceteris peribus,* if a donor state assists with a total number of deaths that is higher than a relatively milder disaster with a lower number of total deaths, the recipient state is expected to have a higher growth in interstate relations after the disaster concludes.

Number of Persons Affected. Similar to the effects of total number of deaths, this research proposes that the total affected by a disaster event will also have an effect on interstate relations for those donor states that respond. The total number of affected persons that result from a natural disaster is yet another important independent variable that cannot be controlled by the donor or recipient state. Again, I use the EM-DAT to provide the definition for this concept which is: "People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance."[14] This is an important distinction from the total number of deaths which are included in this number. The EM-DAT

[12] Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database, https://www.emdat.be.
[13] Centre for Research on the Epidemiology of Disasters, "EM-DAT Glossary," https://www.emdat.be/Glossary#letter_d.
[14] Centre for Research on the Epidemiology of Disasters, "EM-DAT Glossary," https://www.emdat.be/Glossary#letter_a.

defines total affected as "the sum of the injured, affect and left homeless after a disaster."[15] To ensure that I do not double-count the total number of deaths, I separate the model into two iterations with the second term of the independent variable dealing with total affected instead of total deaths.

The logic of the linkage between the total affected and interstate relations is the same as for the total number of deaths. Indeed, it is possible that the total affected may have a more important impact on interstate relations because the impact of the affected (i.e. homeless, sick and injured) may be much longer lasting than the deaths. Importantly, a state that must address the needs of thousands of individuals that are homeless and still require food, water and some modicum of shelter is categorically different than dealing with removing and addressing corpses.

Total Disaster Damage. The final externality of a natural disaster that likely influences interstate relations is the total amount of damage. Total damage of a disaster is also captured in the EM-DAT. The database does not provide a specific definition for total damage that results from a natural disaster event. However, the source provides the total damage in thousands of dollars which will be converted to millions as a standardization with the amount of FDI and aid given. Unlike the total number of deaths and total affected, the total damage can be aggregated with either to demonstrate the difference between the physical and the human costs of a natural disaster. Indeed, it is possible that the data may show that those natural disasters with higher human costs are more causal to the building of interstate relations than those natural disasters with high physical costs. These relationships will be discussed more at length in the hypotheses section below.

Prior Diplomatic Relations. A final and perhaps significant way that a donor or recipient state can build interstate relations is to construct an embassy or consulate. Initially, I constrained the construction of an embassy to within two years of the natural disaster event. This is because, a consulate and embassy takes time to plan and build. If an embassy or consulate is considered for construction shortly after a natural disaster event, it could take years before it is present; therefore, I estimated two years.

[15] Centre for Research on the Epidemiology of Disasters, "EM-DAT Glossary," https://www.emdat.be/Glossary#letter_a.

Importantly, this construction can occur in either the donor or recipient state. Moreover, if multiple embassies or consulates are constructed, it likely leads to a higher level of trust. I estimate that the presence of an embassy or consulate has an exponential effect on interstate relations because they allow for greater interaction during the process of dealing with a natural disaster. Mathematically, I add one to the term to ensure that the term does indeed provide an exponential effect. [16] I removed this variable from the analysis because there were no significant diplomatic facility openings or closings during the study periods in the countries of study.

Error Term. While this model seeks to provide the best analysis of potential casual linkages between the proposed independent and dependent variables, it is an exploratory project fraught with potential errors. Resultantly, researchers should pay close attention to the model's error term which may reveal significant omitted variables. As much attention as is possible is given to the error term as well as to control variables that are discussed below. The error term may consist of a variety of omitted variables including those that are not easily quantifiable such as the number of relief workers provided by the donor state, the amount of specific aid provided by the donor state as well as the type of assistance provided such as medical or rescue resources. If the omitted term is more significant, it is possible that future research may identify more salient variables that could be tied by cause to the dependent variable.

Control Variables. I use the disaster type and the existence of internal conflict as control variables for the study.[17] Disaster type is the most important control variable to ensure that the dataset includes only those disasters that are most predictable. Higher predictability enables policymakers to orient resources towards something that may be more likely to occur versus disasters like infestations and extra-terrestrial events, which are highly unpredictable in terms of their expected devastation. Secondly, internal conflict is an important control variable because if disaster response is provided during a time where aid can be used as a weapon then its effects on interstate relations may have

[16] One way to start thinking about diplomatic facilities is in the number of people that they have on the staff at each mission.
[17] Gary King, Robert Keohane, and Sidney Verba, *Designing Social Inquiry: Scientific Inference in Qualitative Research*, (Princeton: Princeton University Press, 1994), loc 2622 of 5342.

an outsized effect. For instance, if disaster aid is provided to both sides of an internal conflict then the state government might perceive the aid to be a negative factor. Future control variables might be GDP difference in the recipient and donor states, physical distances between the recipient states as well as government type of the recipient and donor states.

Intervening Variables. A key intervening variable may be the difference between the total amount of aid and the delivery cost. The resulting amount represents how much money or monetary-equivalent aid (i.e. food, medical supplies, etc.) that the donor state provides to the recipient state. There may be a positive correlation between the dependent variable and the resultant aid. Unfortunately, the level of fidelity needed to parse the amount spent on specific aid operations is not publicly available. Future research should attempt to separate the two to test if there are any correlations or anomalies that could indicate the importance of this intervening variable.

Also, with greater data clarity, NGO contributions might also be a future intervening variable. For instance, US-related aid agencies might be associated with the US government providing a positive influence to interstate relations. These contributions are not air-enabled and may be difficult to separate as a potentially casual driver in interstate relations. If possible, future research should attempt to identify not only NGO contributions but, specifically, US-based NGO contributions to attempt to analyze their contributions as an intervening variable.

Hypotheses

My assumption is that HADR operations should positively correlate with interstate relations. Generally, the more severe a natural disaster for which a donor state chooses to respond, the higher the payoff in terms of interstate relations between the donor state and the recipient state. I argue that as the number of aid days, total deaths from a natural disaster (or total affected), and total damage increase, there should be a corresponding increase in interstate relations between the donor and recipient states.

Although there are a variety of situations that can be tested from the proposed model, there are three hypotheses that drive this research dealing with the severity of a natural disaster and the disaster response. I draw these hypotheses from the theoretical underpinning of the work that purports future natural disasters—especially hydrological

disasters may be more severe than current events. And, because of the severity, there may be more situations when the US may be asked to assist because the disasters will exceed the capacity of the devastated state to respond. Therefore, I propose three hypotheses to gauge the most salient points of the theoretical framework.

H_1: An increase in the number of aid days should lead to an increase in interstate relations.

The first case proposes that there will be an increase in interstate relations as the number of aid days increase. Aid days signal a few things to the recipient state from the donor state. First, the donor state is at least committed to helping in a situation where other states cannot or will not commit assistance. Second, the number of days highlights how long a donor state is willing to put its personnel at risk in a situation that is dangerous to all those involved. For instance, sometimes recovery crews and aircrews work in earthquake aftermath areas that experience aftershocks that threatening their safety. The higher the number of days that the donor state commits, there is the possibility that the government risks a media story of the death of military relief personnel that competes against the desire of a country to aid. In addition to the length of time that donor states provide aid, aspects of the disaster event's aftermath may cause a growth in interstate relations for those states that respond with assistance.

H_2: The greater the number of disaster related deaths, the more interstate relations should be strengthened by the disaster aid.

H_{2a}: The greater the number of persons affected by the disaster, the more interstate relations should be strengthened by the disaster aid.

As a second hypothesis, I expect that the total number of deaths or the total affected by the disaster event to be another important indicator of interstate relations for a committed donor state to a recipient state. I expect that the measure of interstate relations will increase as the level of dead and affected increases. These values indicate the level

of resources that may be needed from donor states. As this measure goes up, recipient states will probably give more credence and trust to those donor states that help in the severely desperate times. Again, this is another measure of a donor state's commitment and willingness to assist with larger scale incidents. I separate this hypothesis from H_1 to ensure that there is enough data to characterize whether it is the intensity of the event or the length of the response that is a key aspect. For instance, there could be a short response to a large event that is more significant than a long response to a shorter event. These are the primary hypotheses that I apply across the proposed data below.

Data Selection

Determination of data is driven by two factors: (1) whether a natural disaster event occurs *and* (2) whether the US responded with air assets to the event. A natural disaster event without a response does not provide data for a research study about the effects of disaster response on interstate relations. Furthermore, a disaster response without some standard of what qualifies as a natural disaster makes it difficult to compare cases because of ambiguity in definition. The requirement of a standardized natural disaster event criteria along with an air-enabled disaster response ensures that all cases are replicable with little room for ambiguity in meaning.

I begin data determination with whether a US air-enabled natural disaster response occurred in order to acknowledge that more natural disasters occur than the number to which the US can respond. I glean this data from a study conducted by the Air Force Historical Research Agency entitled *Wings of Hope*. The project captures US humanitarian assistance operations that go back to the USAF's founding in 1947. I only consider those air-enabled missions that respond to stated natural disasters. For instance, there are several humanitarian assistance missions that deal with mass displacements due to conflict and other human-induced disasters. That is not the focus of this thesis therefore these international responses are excluded. If the researchers highlight a response to disasters such as "floods" or "earthquakes" or "typhoons," these data are included in the possibility of cases that qualify for this thesis. And, as discussed, for data to qualify for this thesis, they must be part of an air-enabled disaster response operation as well as a declared disaster event in the EM-DAT.

As it relates to the determination of a natural disaster event, as previously discussed, I use the widely recognized EM-DAT. "For a disaster to be entered into the database at least one of the following criteria must be fulfilled:

-Ten (10) or more people reported killed

-One Hundred (100) or more people affected

-Declaration of a state of emergency

-Call for international assistance"[18]

This definition implies that an event from one of the focus typologies must occur. But importantly, the types of events that garner a response must increase because those events may occur in the future, such as earthquakes and pandemics. And while not predictable, they occur regularly enough to warrant inclusion. Therefore, case selection typologies for the historical large-n study includes more than jus predictable climatological and hydrological events, like tropical cyclones and coastal flooding.

To begin the matching process, I use the advanced search capabilities of the EM-DAT sorted by each country where a USAF disaster response mission occurred. As a note, there may be multiple disaster responses in a single country and each response is treated as a separate case according to how the EM-DAT separates the disaster events. As discussed, in the air-enabled response paragraph above I use a constrained set of criteria for the natural disaster types presented in the database. Below, I will explain why I include or exclude a natural disaster type from the set of cases.

Excluded Cases. The primary factors for the exclusion of a disaster event are predictability and unknown exposure risk. Unlike the other disasters that can be modelled using advanced sensing capabilities—i.e. climatological or hydrological, the excluded disasters are highly unpredictable and widely dependent on exposure risks that are difficult to measure. Excluded disasters from the database include: animal accidents, insect infestations, extra-terrestrial, mass movements, extreme temperatures, and fog. Two additional disasters that are excluded that are more predictable include droughts and wildfires. These are more predictable because they rely on environmental conditions that can be modelled. However, the possibility of droughts and wildfires that can trigger high

[18] Centre for Research on the Epidemiology of Disasters, "Guidelines: EM-DAT – Data Entry – Field Description/Definition," https://www.emdat.be/guidelines.

death rates or national emergencies are very much dependent on the extent of mitigating factors and the possibility that the fires cannot be contained in their early stages. Hence, I exclude those disasters are from this thesis.

Included Cases. Disaster typologies in the study include: epidemics, earthquakes, volcanic activity, flood, landslide, and storms. Not only do these typologies make up the bulk of historic US disaster response activities, they also tend to be rapid onset and the types of disaster events that exceed the response capacity of many states. Moreover, as state populations grow, these are the types of disasters that can place greater burdens on state coping capacities. Notably, the most predictable disasters—floods and storms, along with earthquakes make up the vast majority of disaster response cases. This is important considering the expectation that storms and flooding may become more significant in the future.

Time Period Covered. This study uses events that begin in 1992 and end in 2017 but data that begins in 1991 and ends in 2018 respectively. The events begin in 1992 to control for the post-Cold War environment. US-Soviet dynamics played a factor in interstate relations during the Cold War. As such, a focus on disaster operations following the December 1991 collapse of the Soviet Union helps separate this historic bipolar dynamic. I end the period of focus in 2017 because this is the last year of data that can be compared in two-year timeframes as data from 2019 is still being finalized for some databases or is preliminary.[19] Future studies can include capture of a more comprehensive dataset that includes missions ending through the most recent calendar year. Data from the EM-DAT, Department of State and the Bureau of Economic Research covers all of the study years, providing inputs for aspects of the dependent and independent variables.

Concluding Expectations

This chapter captures the theoretical basis and framework for decisions made during this analysis. It is important to temper expectations about the comprehensiveness of this study as it is limited in scope and time. Specifically, in the next chapter, this research seeks to provide a general characterization of recipient-donor, interstate relations

and will only assess an increasing or decreasing trend. The possibility of detailing such a trend provides justification for further analysis. Future research may be able to provide more nuanced, discrete assessments about the status of interstate relations. The more nuanced study can also provide better policy suggestions based on a robust dataset along with corresponding accommodations for intervening and control variables.

Chapter 3

Data Analysis Results

Introduction

Below is a review of quantitative analysis results that consider whether air-enabled disaster relief operations effect interstate relations between a donor state and a recipient state. This study incorporates disaster and humanitarian assistance data from 1992 – 2018 covering 31 cases. The analysis involves interstate relations as the dependent variable and independent variables of total aid days, total deaths (or affected) and total damage. Various regressions of the data indicate that the proposed model does not establish ties between the dependent and independent variables, collectively. Moreover, acknowledging the flaws of the proposed model, there does not seem to be a correlation between interstate relations and any of the individual independent variables of disaster days, total deaths, total affected or total damage. Further, there is little evidence to suggest that interstate relations increase more between states where the donor's gross domestic product (GDP) is larger relative to the recipient. Ultimately, my analysis suggests that there should be further studies to refine independent variable proxies as well as update dependent variable influences on the dependent variations. Despite these initial, disappointing results, there are many advances that can be made with large-N disaster diplomacy, specifically as it relates to air-enabled disaster relief and, more broadly, military relief operations. To begin, case selection and inclusion in the study represents one of the limitations with getting better models and results.

Caveats

There were 42 cases that met the criteria to be included in this study, discussed in the previous chapter, but some cases had incomplete data like missing damage estimates, number of deaths or total affected. Thus, the research below only accounts for the smaller number of cases, 31. In these cases, all of the data from the instance could be verified through the source databases, primary documents or credible news outlets. Also, due to time constraints, this study could not analyze the negative cases of humanitarian

relief provided when a natural disaster occurs. This means that I cannot characterize how interstate relations change—according to the proposed criteria—when there are no disaster relief operations provided. This is important because an analysis *may* show that interstate relations are *not* affected by disaster relief operations at all, and that there may be some other factor, like the simple provision of financial aid, reduction of barriers to trade, or some other independent variable, which is more important. However, the focus of this study was to try to draw out any correlations between interstate relations and aspects of natural disaster where air-enabled disaster relief is provided.

Methodology

In this large-N study, I apply an ordinary least squares (OLS) multiple regression, along with various treatments, to analyze changes of the dependent variable—interstate relations—given the independent variables of number of days aid was provided, total number of deaths resulting from the disaster, the total number of persons affected by the disaster, the amount of disaster damage in USD and recipient state-GDP in USD. The last chapter proposed the following overarching model:

$$I = a_0 + \frac{X_1 A_\alpha}{365} + X_2 De_\alpha + X_2 Ta_\alpha + X_3 Da_\alpha + \varepsilon$$

I = Interstate Relations

a_0 = Constant

A = Number of Aid Days

De = Total Deaths

Da = Total Damage

Ta = Total Affected

ε = Error Term

There were also multiple hypotheses proposed:

H_1: If there is an increase in the number of aid days provided then there should be an increase in the level of interstate relations.

H_2: If there is an increase in the total number of total deaths from the disaster then there should be an increase in the level of interstate relations.
H_{2a}: If there is an increase in the number of people in the recipient state affected by the disaster then there should be an increase in the level of interstate relations.

While all three of the hypotheses could be applied to the overarching model, I also isolated the variables of total deaths and total affected in their own models. Then I applied the appropriate hypotheses—like H_1 and H_2 or H_1 and H_{2a}—to the appropriate alternative model. The alternative models remove either total deaths or total affected. They are listed below:

$$I = a_0 + \frac{X_1 A_\alpha}{365} + X_2 De_\alpha + X_3 Da_\alpha + \varepsilon$$

OR

$$I = a_0 + \frac{X_1 A_\alpha}{365} + X_2 Ta_\alpha + X_3 Da_\alpha + \varepsilon$$

Separation of these models is important because it allows for better isolation of what I assume is the most theoretically salient elements of the overarching model. Regardless of which model was tested, the multiple regression of the independent variables are not correlated with the chosen measure of interstate relations across the 31 cases of humanitarian assistance represented in the time period chosen. Nevertheless, much can be learned from this analysis.

Multivariate Regression. Regressions are just one of many methods that help researchers harness key nuggets over several cases. This type of statistical analysis attempts to measure variations of the dependent variable given changes in a single independent variable and one unit change in one variable, in a set of variables, holding the others stable. The option for a multivariate versus a bivariate analysis addresses the complexity of the dependent variable; i.e., how likely it is that change in the dependent variable is driven by a complex set of factors. Complexity in the dependent variable

impacts the selection of proxies discussed in the previous chapter. The selection of the proxy variables for interstate relations drove the need to select multiple independent variables instead of one or two. As an example, with foreign direct investment (FDI) as a key source of interstate relations, total damage and GDP are formative to changes in that dependent variable. As it relates to the USAID dependent proxy variable, we expect that aid days, total deaths, and total affected are formative to that dependent variable. This drove the need to conduct a multivariate analysis as opposed to a bivariate analysis. I conducted my regressions using specialized statistical software called Stata.

As mentioned above, I used OLS to conduct my analysis; this is the simplest of regression computations that attempts to relate the dependent variable to a set of independent variables providing the best line of estimation possible.[1] In an OLS regression, the goal is to minimize the sum of the squared errors of each variable's variation from the mean to provide a smooth estimation of the dependent variable given the independent variables.[2] The final product of an OLS regression is an attempt to find a mean change across the model that tells us how smooth or erratic our data is in comparison to the model.

Results

The overall results of the multivariate analysis are captured in the two primary tables below. These tables provide, in statistical parlance, what is known as the analysis of variance (ANOVA).[3] This data summary provides insight into the statistical measurements of the multivariate regression. I ran two primary regressions that excluded the GDP factor in the first model and then included it in the second. GDP was excluded from the first model to provide a look at natural disaster response regardless of economic disparities between the donor and recipient states. The expectation here is that there would be no significant differences in the changes to interstate relations between larger and smaller economies. However, one can never be sure, so GDP was included in the

[1] Michael Lewis-Beck, *Data Analysis: An Introduction*, (Thousand Oaks: Sage Publications, 1995), loc 615-621.
[2] Michael Lewis-Beck, *Applied Regression: An Introduction*, (Newbury Park: Sage Publications, 1980), loc 168-180.
[3] Oscar Torres-Reyna, "Linear Regression using Stata," Presentation, Princeton University, December 2007, 5-8.

second analysis to determine if economy-size was contributory to changes in interstate relations given disaster circumstances. Importantly, there was little difference in the *significance* of the models. It is important to recognize that even though the significance of the model was not different, it does not mean that GDP was not an important independent variable. I will discuss this later in the results.

Table 1: OLS Regression without GDP

Source	SS	df	MS	Number of obs	=	31
				F(4, 26)	=	1.74
Model	24459762.5	4	6114940.63	Prob > F	=	0.1714
Residual	91340365.4	26	3513090.98	R-squared	=	0.2112
				Adj R-squared	=	0.0899
Total	115800128	30	3860004.26	Root MSE	=	1874.3

InterstateRelatio~s	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
NumberofAidDays	177.6869	5523.664	0.03	0.975	-11176.37	11531.74
TotalDeaths	.0112241	.0077034	1.46	0.157	-.0046105	.0270586
TotalDamageMillions	-.0272793	.0160015	-1.70	0.100	-.0601708	.0056123
TotalAffected	.0000133	8.20e-06	1.63	0.116	-3.52e-06	.0000302
_cons	525.342	488.767	1.07	0.292	-479.333	1530.017

Source: Stata data analysis

Table 2: OLS Regression with GDP

Source	SS	df	MS	Number of obs	=	31
				F(5, 25)	=	1.64
Model	28564258	5	5712851.59	Prob > F	=	0.1869
Residual	87235870	25	3489434.8	R-squared	=	0.2467
				Adj R-squared	=	0.0960
Total	115800128	30	3860004.26	Root MSE	=	1868

InterstateRelatio~s	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GDPMillions	.0011635	.0010728	1.08	0.288	-.0010459	.003373
NumberofAidDays	682.3764	5524.667	0.12	0.903	-10695.89	12060.64
TotalDeaths	.0124331	.0077579	1.60	0.122	-.0035446	.0284109
TotalDamageMillions	-.0881886	.0583809	-1.51	0.143	-.2084263	.0320491
TotalAffected	.0000162	8.59e-06	1.89	0.071	-1.48e-06	.0000339
_cons	472.6719	489.5335	0.97	0.344	-535.5412	1480.885

Source: Stata data analysis

For each model, I will walk through several statistical tests that provide insight into various aspects of the theoretical premise and hypotheses. I will do several things: (1) regress the model with no control for heteroskedasticity[4], (2) regress the model with a control for heteroskedasticity, (3) discuss the ANOVA for the model with control of heteroskedasticity[5], (4) conduct a one-tail and two-tail test to determine the significance of the model[6], (5) display the Pearson correlation coefficients, (6) conduct a Breusch-Pagan test for heteroskedasticity, (7) test for omitted variables using the OVTEST, (8) conduct a test of multicollinearity for variables, (9) review the Cook's Distance to see if a case has outsized influence, (10) and conduct a leverage test.

Model 1 – Exclusion of GDP as an independent variable

ANOVA without robustness. An OLS regression of the dependent and independent variables indicates that the first model is not significant. I use the adjusted R^2 value from Table 1 to help determine the significance of the model because there is a high difference between the number of cases and the number of variables. This means that the independent variables only provide a 9% explanation of the dependent variable. Moreover, the Root Mean Square Estimate (MSE) is at such a high value—1824—as to indicate too much of a deviation from the desired 0 reading. In other words, this model is not very good at all at explaining variation of interstate relations and there is a need for more data and better independent variables to provide a better fitting model. Albeit with incomplete data, it seems that there is no correlation between a) how much aid is provided, the number of deaths, the total amount of people affected, or the amount of aid

[4] Heteroskedasticity refers to the circumstance in which the variability of a variable is unequal across the range of values of a second variable that predicts it.
[5] University of California Los Angeles Institute for Digital Research & Education Statistical Consulting, "Regression with Stata Chapter 1 – Simple and Multiple Regression," University of California Los Angeles, https://stats.idre.ucla.edu/stata/webbooks/reg/chapter1/regressionwith-statachapter-1-simple-and-multiple-regression/.
[6] University of California Los Angeles Institute for Digital Research & Education Statistical Consulting, "FAQ: What Are the Differences Between One-Tailed and Two-Tailed Tests," University of California Los Angeles, https://stats.idre.ucla.edu/other/mult-pkg/faq/general/faq-what-are-the-differences-between-one-tailed-and-two-tailed-tests/.

days in a natural disaster assistance mission and b) an increase or decrease in interstate relations.

Breusch-Pagan Test. A Breusch-Pagan test provides the ability to detect heteroskedasticity. This concept allows researchers to moderate significant variations in variables that swing wildly in value from case to case. For instance, the 1995 Congo epidemic has a recorded total damage value of $0 whereas the 2008 Chinese earthquake has a recorded total damage of $85 Billion. These swings cause significant distortions that the Breusch-Pagan Test can detect and determine whether those swings have a significant influence on the model fit. If they do, then we would need to use different data treatments to ensure we account for the heteroscedasticity. Once calculated, if the test value is below certain significance levels such as the 95% or 90% levels, then we fail to reject the null hypothesis and conclude that residuals are homogeneous (which is a key assumption of the OLS model). The Breusch-Pagan test in this study resulted in a value of zero; in this case we cannot reject the null hypothesis, which means that the model has elements of heteroskedasticity. Therefore, we should run our model, controlling for the significant swings we achieve with the robustness function in Stata.

ANOVA with robustness. When dealing with data that at first brush does not appear to have a lot of correlation, one problem could be heteroskedasticity or high differences in the mean for various independent variables; these differences can be treated and may provide different results. I re-ran the regression taking into account heteroskedasticity with little difference from the original results. The unadjusted R^2 significance test indicates that there is virtually no difference between the model controlled for heteroskedasticity and the one without. Considering the minimal differences in the models, I will use the original regression for further analysis of the dependent and independent variables to ensure that all of the original data is captured with as little alteration as possible. The next battery of tests and treatments will help determine the significance and viability of the model as well as individual variables.

One-Tail and Two-Tail Test. One way to test for the significance of individual variables within a model is to conduct a one-tail or two-tail test. These tests are designed to determine whether estimated values will fall within a given model at extremes. If we expect that values could be at the extreme of positive and negative values, as it relates to

interstate relations, then we would use the two-tailed test. If we expect that interstate relations are going to lean more heavily toward the positive end, then we would use a one-tail test. My expectation would be that a one-tail test on the positive end of the graph should be sufficient because, theoretically, we expect that there will be greater variance explanation with more aid days, deaths, total affected, and total damage; moreover, these should positively influence interstate relations. If the p-value of a variable is less than .10 or .05, standard statistical measures, then we can reject the null hypothesis and conclude that the value is significant. In other words, if the value is below .10 or .05, then we know that the coefficient for a given independent variable is statistically significant. In this model, as indicated by Table 3, none of the variables are statistically significant at the .1 or .05 significance levels. The only variable that comes close is total damage; however, its significance level is still too low and the model is still insignificant in determining variation on the dependent variable. One problem that could occur is if variables—independent or dependent—are correlating with each other, with endogeneity being an especially problematic factor for finding correlations.

Table 3: P-Values without GDP

InterstateRelatio~s	Coef.	Std. Err.	t	P>|t|
NumberofAidDays	177.6869	5523.664	0.03	0.975
TotalDeaths	.0112241	.0077034	1.46	0.157
TotalDamageMillions	-.0272793	.0160015	-1.70	0.100
TotalAffected	.0000133	8.20e-06	1.63	0.116
_cons	525.342	488.767	1.07	0.292

Source: Stata data analysis

Pearson Correlation Coefficients. One of the problems that could pop-up is that some of the variables may be highly correlative to other variables, indicating it would be difficult to understand which variable is causing variance in the independent variable. A Pearson Correlation test helps us highlight these observations. Values for the test range from -1 to 1, with 1 being highly correlative. Results from the test are listed in Table 4.

Table 4: Pearson Correlation Coefficients

	Inters~s	Number~s	Total~hs	Total~ns	TotalA~d
Interstate~s	1.0000				
NumberofAi~s	0.2002 0.2801	1.0000			
TotalDeaths	0.2672 0.1462	0.5358* 0.0019	1.0000		
TotalDamag~s	-0.2143 0.2469	-0.2044 0.2700	0.1060 0.5704	1.0000	
TotalAffec~d	0.1936 0.2966	-0.1353 0.4681	-0.0466 0.8033	0.2650 0.1497	1.0000

Source: Stata data analysis

As it relates to the dependent variable, none of the independent variables are highly correlative. This is good, because it means that there is no endogeneity between the dependent and independent variables, and we can be more confident that the dependent variable does not change in tandem with any of the independent variables. Another good sign is that none of the other variables are highly correlative to each other, either. This means that if a better model comes about that can more accurately correlate with the interstate relations variable, and it includes the variables I have selected, it will be easier to identify which independent variables cause more change. As a note, although total deaths and number of aid days show some correlation, this may change with additional data to less correlation but may be a relationship to keep an eye on in future studies. These future studies can also be guided by tests for omitted variables from the current model, which can be revealed using the OVTEST function from Stata.

Omitted Variables Test. Considering that our model is disconfirmed, given the failure of multiple significance tests, another measure that can give us additional data is to establish whether additional variables are needed to provide greater insight. We gain greater insight about the need for additional independent variables by conducting an OVTEST. For the OVTEST, the null hypothesis is that our model does not have any omitted variables bias as indicated by a p-value higher than the usual threshold of 0.05 or at a 95% significance level. In our model, there is omitted variable bias as indicated by a

p-value below the .05 level. This means that, given the independent variables provided, there is an increased likelihood that the model is missing an important or multiple important variables at a 98% significance level. This is a relatively obvious finding considering that the model itself is not significant, and, even within the model, the independent variables only provide limited indicators of variation on the dependent variable.

Test for Multicollinearity. Of the variables that I provide, it is important to understand whether they vary with each other, in other words: check whether there is collinearity. This concept is important because if two variables linearly vary with each other then it would be difficult to figure out which one is actually causing the change in the dependent variable. This is different than coefficient correlations because this test is for multiple, simultaneous, independent variable changes. The results from the multicollinearity test are below in Table 5.

Table 5: Multicollinearity Test

Variable	VIF	1/VIF
NumberofAi~s	1.56	0.642276
TotalDeaths	1.51	0.663630
TotalDamag~s	1.19	0.839350
TotalAffec~d	1.08	0.921772
Mean VIF	1.34	

Source: Stata data analysis

In a good sign, the multcollinearity test indicates that there is little multicollinearilty among the independent variables. We want to keep the VIF below 10 and the 1/VIF column should not be less than .1. This means that, in this model, the variables can be used independent of each other and potentially in another model iteration without the likelihood of intervening with other variables. This test completes the battery of inquiry about the individual variables. The next few tests provide insight into the actual cases and how they affect the results.

Cook's Test. The Cook's Distance Test is meant to identify cases that have an outsized effect on the model. The test indicates that we have three cases that are likely

outliers to the overall model and one case that has outsized influence on the model. The outliers are China (3795), Indonesia (165708) and Haiti, while Myanmar is an outsized influence example. At first glance, one of the reasons these cases are outliers may be that China and Indonesia have high GDPs whereas Haiti's is extremely low. Upon further investigation, China and Indonesia are in the top 25 of states in terms of GDP where Myanmar is towards the middle of states and Haiti is in the bottom third.[7] Another interesting dynamic is the ratio of GDP to total deaths in these cases. It appears that in the case of China, the relative number of people would die is small when compared to GDP than when conducting the same ratio in Indonesia, Myanmar and Haiti. The latter cases have very high death rates—in excess of 125,000 taking GDP into account, when compared to the China case that is an extreme on the opposite end, low deaths with a high GDP. This may be a theoretical inroad to a change in future hypotheses and models. Namely, that there may be an importance of GDP to the model but only when factored for death and destruction. Identification of these cases could lead to other refinements of the model that excludes the outliers to determine if there is a better estimation given certain conditions that may be unique to the outliers or the outsized cases. It is also possible that future models may exclude these cases to determine a better fit.

Leverage Test. The final test is the Leverage Test, which gives us an example of just how much the cases influence the coefficients of each of our independent variables. Whereas the Cook's Test tells us which cases are outliers and which are high influence, the Leverage Test tells us to what degree. In our model, the outliers and the high influence cases exert several orders of magnitude influence over the model. This test reinforces the previously discussed proposal that we may need to remove the outliers and high influencers to get a better fit for the model. With enough time and resources, conducting additional tests with these changes may be fruitful.

Model 2 – Inclusion of GDP as an independent variable

ANOVA without robustness. As discussed above, a theoretical assumption is that GDP may affect large shifts in interstate relations when humanitarian relief is

[7] Knoema, "Historical GDP by Country, Statistics form the World Bank, 1960 – 2018," 10 March 2020, https://knoema.com/mhrzolg/historical-gdp-by-country-statistics-from-the-world-bank-1960-2018?country=Haiti.

provided and there is a significant disparity between the national output of a large donor state versus a smaller recipient state. Model 2 takes GDP into account. Again, using an OLS multivariate regression technique, I subjected this model to the same tests as the model above, while adding the GDP of the recipient state as a new independent variable. This variable was added to understand the effects that GDP might have on the model. Unfortunately, even with GDP added as a separate independent variable, this model seems to disconfirm the notion of a correlation of the dependent and independent variables. While the amount of how much the model explains increases to 25% from about 21% in the previous model, the Adjusted R^2 that takes into account the low number of cases and variables indicates only about 10% of the correlation between dependent and independent variables is explained. The overall results of the test are captured in Table 6, which provides the ANOVA for the model. As with the previous model, this first regression does not take into account the possibility for heteroskedasticity. Thus, we start by testing to see if there is a presence of homoskedasticity.

Table 6: Model 2 ANOVA Results

Source	SS	df	MS	Number of obs	=	31
				F(5, 25)	=	1.64
Model	28564258	5	5712851.59	Prob > F	=	0.1869
Residual	87235870	25	3489434.8	R-squared	=	0.2467
				Adj R-squared	=	0.0960
Total	115800128	30	3860004.26	Root MSE	=	1868

InterstateRelatio~s	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GDPMillions	.0011635	.0010728	1.08	0.288	-.0010459	.003373
NumberofAidDays	682.3764	5524.667	0.12	0.903	-10695.89	12060.64
TotalDeaths	.0124331	.0077579	1.60	0.122	-.0035446	.0284109
TotalDamageMillions	-.0881886	.0583809	-1.51	0.143	-.2084263	.0320491
TotalAffected	.0000162	8.59e-06	1.89	0.071	-1.48e-06	.0000339
_cons	472.6719	489.5335	0.97	0.344	-535.5412	1480.885

Source: Stata data analysis

Breusch-Pagan Test. Using the Breusch-Pagan test, we begin an analysis to determine the presence of heteroskedasticity. Again, our threshold is at the 95% and 90% confidence levels. Yet again, there is no significance of the residuals, meaning that we fail to reject the null hypothesis that the residuals are homogeneous. Thus, we assume

the presence of heteroskedasticity, which means we must accommodate for this in a new regression. I treat this problem with the robustness function in Stata.

ANOVA with robustness. In the second regression, I take heteroskedasticity into account using a robustness function yielding slightly different results. Again, even taking heteroskedasticity into account, the model only explains about 25% of the dependent variable's changes. Therefore, the model disconfirms the explanation that the independent variables provide significant explanation of variance on the dependent variable. An additional measure of the significance of the model, the Root MSE with an extremely high value of 1868, indicates that the model does not hold significance in explaining the desired phenomenon of rising interstate relations. Therefore, in general, the model is not useful in explaining changes in interstate relations. In general the findings do not differ significantly from the previous model. However, we can still use various tests to provide indicators of what things researchers might want to consider including in future models and perhaps excluding.

One-Tail and Two-Tail Test. Albeit an overall bad model, an evaluation of the variables is still appropriate to determine if anything can be salvaged from the inquiry; in this case, even the independent variables do not appear to be significant. The expectation for this model is that as the independent variables rise in value, the dependent variable is likely to rise. Thus, a one-tailed test would be appropriate to determine the independent variable's significance. In this case, only one of the independent variables reaches the 95% or 90% significance levels. With no control for heteroskedasticity it meets the 90% threshold while meeting the 95% threshold when controlled for robustness. This is important, as it seems to support hypothesis H2a that interstate relations increase as the total number of affected during natural disaster increase. None of the other variables are significant in correlation with the dependent variable in this model, including GDP.

Table 7: Model 2 P-Values with GDP

InterstateRelatio~s	Coef.	Std. Err.	t	P>|t|
GDPMillions	.0011635	.0010728	1.08	0.288
NumberofAidDays	682.3764	5524.667	0.12	0.903
TotalDeaths	.0124331	.0077579	1.60	0.122
TotalDamageMillions	-.0881886	.0583809	-1.51	0.143
TotalAffected	.0000162	8.59e-06	1.89	0.071
_cons	472.6719	489.5335	0.97	0.344

Source: Stata data analysis

Pearson Correlation Coefficients. Another way to analyze any possible ties between the dependent and independent variables is to conduct a Pearson Correlation Coefficients test to determine a more specific mathematical correlation of the dependent and independent variables as well as the independent variables among themselves. Again, the values range from -1 to 1 with 1 indicating a positive correlation. According to the data there is little to no correlation between the coefficients of the dependent and any of the independent variables. The only significant correlations that occur are between a few of the independent variables, an early indicator of multicollinearity. There is a slight correlation between the number of aid days and total deaths; this was characteristic of the first model as well. This is not as concerning as the correlation between Total Damage and GDP; these variables appear to almost perfectly correlate. This can be problematic in the determination of the specific variables that cause variance on the dependent variable, if any. As a matter of methodology, future research should use either total damage or GDP but not both in any models. Another important test is for omitted variables. At first glance it seems obvious that more or different variables are needed.

Table 8: Model 2 Pearson Correlation Coefficients with GDP

	Inters~s	GDPMil~s	Number~s	Total~hs	Total~ns	TotalA~d
Interstate~s	1.0000					
GDPMillions	-0.1971 0.2880	1.0000				
NumberofAi~s	0.2002 0.2801	-0.2408 0.1919	1.0000			
TotalDeaths	0.2672 0.1462	0.0482 0.7967	0.5358* 0.0019	1.0000		
TotalDamag~s	-0.2143 0.2469	0.9614* 0.0000	-0.2044 0.2700	0.1060 0.5704	1.0000	
TotalAffec~d	0.1936 0.2966	0.1797 0.3333	-0.1353 0.4681	-0.0466 0.8033	0.2650 0.1497	1.0000

Source: Stata data analysis

Omitted Variables Test. Before we test for multicollinearity, we will test the model to determine if there are any omitted variables. Given the low significance of the overall model, it is highly likely that there are variables missing. After conducting an OVTEST, interestingly the model indicates that there are no missing variables at the 90% significance level but that there are omitted variables at the 95% significance level. However, taken with the overall significance of the model, it is likely that there are missing variables in the model. Even though there are missing variables, it is important to understand aspects of the variables that we do have present.

Test for Multicollinearity. Again, we will test the variables for multicollinearity to determine if any of the variables are too closely related to another. The variance inflation factor (VIF) provides us a test of these measures. With the VIF test, two variables are cause for concern in this model: Total Damage and GDP. This was initially indicated by the correlation coefficient test. This means that there is significant collinearity of these independent variables with other independent variables, likely each other considering the results of the correlation coefficient test. This is not a good sign because it means that one or both of these variables can be misconstrued with another variable as it relates to variations of the dependent variable.

Table 9: Model 2 Multicollinearity Test Results

Variable	VIF	1/VIF
TotalDamag~s	15.97	0.062631
GDPMillions	15.27	0.065497
NumberofAi~s	1.57	0.637719
TotalDeaths	1.54	0.649927
TotalAffec~d	1.20	0.833499
Mean VIF	7.11	

Source: Stata data analysis

Cook's Test. Just as with the last test there could be cases that, in the context of the model, exert a significant amount of influence on the model. We use the Cook's Test to understand this relationship. In this model, there are two outliers and four cases with high influence on the model. Again the China and Haiti cases are the outliers for this model. Japan, India, Indonesia, and Myanmar exert a high level of influence on the model. Again, it is here that the model is beginning to demonstrate some interesting characteristics because, at first glance, this appears to show that nations with large GDPs relative to the pool and those with very small GDPs relative to the pool, exert high levels of influence on the model. This might drive a selection of GDP as the remaining important independent variable, in part because it is widely available data and it is verifiable relative to the total damage estimates provided in the EMDAT database.

Leverage Test. The final test, the Leverage Test, gives us a more in-depth understanding of just how much each case influences the model, specifically the regression coefficients. Depending on the level of significance, there are between three and seven cases that exert a high level of influence on the model coefficients. At the higher end, almost one third of the cases exert a high level of influence on the model coefficients. This means that a few cases may be distorting the model, making it less useful. Again, this could be a way to narrow the scope of the model in making attempts to provide insight about the majority cases as opposed to the more extreme cases.

Summary of Results and Suggested Ways Forward

Overall, the results from the analyses, indicates that the proposed models are poor fits for the selected dependent and independent variables. If the results were more significant, we would have a better indicator for greater confidence that certain variables

either contribute or do not contribute to interstate relations as it relates to disaster relief operations. For now, the results are inconclusive based on the regression analyses discussed above. However, there is a benefit to taking the results of this quantitative study to improve the development of models moving forward.

In terms of humanitarian assistance research, this type of analysis is significant because it provides a foundation upon which to build more robust quantitative data sets as well as more stringent qualitative cases that focus on aspects of natural disasters that military operations might address. Significantly, this research attempts to distill functional operational measures of interstate relations with as few proxy variables as possible. It is important to keep the number of proxy variables relatively low because, by increasing the number of proxy variables, we decrease our ability to make specific conclusions about which independent variables shape the dependent variable. Additionally, as it relates to independent variables, this research continues operationalization of some aspects of humanitarian operations by introducing total number days of aid to amplify our understanding of disaster relief operations. The more researchers are able to quantify important aspects of disaster relief, the better research can inform large-N studies that can draw observations from across cases. Future research can critique and improve upon the independent and dependent variables as appropriate.

There are several things that future researchers might consider exploring in additional studies given greater time and resources. A few ideas include changing the independent variable proxies, including other independent variables or changing independent variables, and potentially removing outlier cases to better fit the bulk of disaster relief operations. While a theoretical model should be able to account for extremes, a model that does not include the extremes might be able to provide a good starting point towards the ultimate model of the phenomenon.

To begin, another independent variable proxy that may be more appropriate than or additive to the two chosen for this research is total trade level. Trade requires a tremendous amount of interstate functionality and diplomacy to ensure that things operate effectively between the two states. If there is an increase in the amount of trade that occurs between the donor and recipient states following a disaster relief operation, it could be an indicator of improved interstate relations. This is because trade, while

between private parties, requires commitments and understandings between states to facilitate the trade. Importantly, the trade numbers should be the total of trade between state dyads, it should not be one state's imports or exports. While selection of this proxy is fraught with problems, it may still provide insight into the relationship between donor and recipient states.

Other independent variables or changes to the independent variables that I use may be appropriate, such as subtraction of the air operations price from the total aid provided. A future study may also benefit from including and analyzing several types of aid provided, including medical, rescue or food resources provided. The total aid dollar amount may be distorted by the delivery costs, or the amount of aid associated with the air operation. For instance, if the air delivery costs represented a large portion of the total aid then there is a possibility that the reason the independent variable of interstate relations increases is because of the higher amount spent on air delivery. At present they are subsumed in the USAID numbers. This means that we should make an effort to extract the actual air operations costs from the total aid provided, so that we can determine if there are any correlations to the amount of air aid provided versus the number of total aid. It would be yet another way for us to parse air-enabled disaster relief to see if there are any correlations with interstate relations.

Another independent variable that may be of interest is the type of relief provided, assistance of people with certain skills versus material or financial assistance. Perhaps a quantification of how many people and their expertise could be a way to analyze contributions to interstate relations. As an example would be a donor state providing medical and rescue aid instead of food or blankets. This plays into another argument by some researchers about the *visibility* of disaster relief.[8] Specifically, if relief is more visible, perhaps that can contribute to higher levels of interstate relations.

A final way that future research may be able to advance some of the gains in this research is to remove some of the outlier cases, which I did not do because of timing. Perhaps there is a different model for those cases that seem like outliers to a more standardized model. This suggests that there is diversity in model application or a

[8] Jamila Fitzpatrick, "Beyond Berlin: Air Mobility for Direct Strategic Effect in the 21st Century," Thesis, School of Advanced Air and Space Studies, 2019, 97-98.

normalization that can occur with various statistical treatments. If we can identify a model that applies to outliers and one that applies to the vast majority of cases, then perhaps the models can at some point be combined to provide an overarching model.

Despite the model's failure, researchers should not be discouraged in the search for connections between what practitioners do in disaster relief operations and the expected outcome of better interstate relations. This research is a major step towards operationalizing variables for large-N quantitative analysis that had not been explored in previous studies. While the research can be improved upon, it cannot or should not be the last attempt to make sense of how thousands of airmen and hundreds of millions of dollars are used in pursuit of US national interests during relief operations.

Different analytic methodologies allow us to explore various dimensions of an issue. Quantitative analysis helps us identify correlated elements in a situation using statistical methods over a relatively large number of cases. Qualitative analysis allows us to parse fewer cases with greater detail that may help us unveil aspects of an issue that can inform other analysis, perhaps revealing dependent or independent variables that are not apparent in large-N studies. The next chapter is a qualitative analysis of the 2004 tsunami that struck South and Southeast Asia. The analysis focuses on Thailand, where the United States conducted air-enabled disaster relief and staged assets for support to other states. I will use the analysis to help identify connections between the proposed dependent and independent variables as well as to identify potentially new dependent and independent variables.

Chapter 4

Case Study: Thailand Earthquake and Tsunami, 2004

Introduction

A case study is a tool that researchers can use to conduct various analyses of events, phenomena, or other theoretically related issues. Typically, they involve a greater focus on specific observable aspects of a phenomenon. One type of case study is an exploratory case study where not much is known about the phenomenon in question. I use this method to explore the specific case of donor-recipient relations when the United States provided disaster relief assistance to Thailand during the 2004 earthquake and tsunami that devastated south and southeast Asia. A closer look at the interaction between the US and Thai governments, as well as US military and air operations in the first seven days of the response revealed interesting requests for aid as well as later benefits exploited by the USAF. While the US motivation was to alleviate human suffering, incidentally, the response fulfilled many of Thailand's requests even before there was a clear understanding of the requirements themselves.

Case Selection

This single case study is a plausibility probe as it provides a preliminary inquiry into whether the theory and hypotheses provided thus far warrant further testing.[1] The 2004 tsunami provided an opportunity to discuss a case where all of the independent variables from the quantitative study were relatively high when compared to other cases in the population. Additionally, the quantitative study indicated increases in foreign direct investment (FDI) and US aid which should lead to improved interstate relations. The case study allows for a more nuanced inquiry into the data drawn from the quantitative study. While including additional cases with which to compare or contrast the case below might provide additional insight into the topic of study, time did not allow for additional cases. However this case does provide an opportunity to examine

[1] Alexander George and Andrew Bennett, *Case Studies and Theory Development in the Social Sciences*, (Cambridge: Massachusetts Institute of Technology Press, 2005), 75.

empirical data about the US military's ability to influence interstate relations as a result of disaster relief operations. There does not seem to be any literature, at least in peer-reviewed venues, that evaluates the improvement of interstate relations as a result of military (specifically air force) disaster relief operations.

Approach. I use the theoretical model introduced at the beginning of the study as a guide to analyze the case, event, and the US response. The case study will focus on the air response during the first seven days following the event beginning on December 26, 2004 through January 1, 2005, the day that the US Navy began rotary-wing operations. I will focus on Thai and US government diplomatic and military requests and responses as well as a few dynamics of the US air response, primarily carried out by USAF assets. The case begins with a brief review of US-Thai relations in 2004 with an emphasis on diplomatic and military relations. Next, I will briefly summarize the natural disaster in Thailand along with President Bush's stated intent and efforts to address the situation. The study then goes into detail about the USAF effort to enact the president's orders but reveals interesting dynamics about motivating factors for the military's participation in the event. Later, I describe how foreign direct investment (FDI) and US aid benefited the Thai government and led to increases in interstate relations resultant from events surrounding the natural disaster. Finally, I summarize some of the observations made based on this case study that may lead to future advances in more generalizable studies about interstate relations and natural disaster responses.

US-Thai Relations Before the Tsunami

The United States and Thailand have held diplomatic relations as independent states in some form since 1818. The US-Thai Treaty of Amity and Commerce concluded in 1833 made Thailand the first Asian country with which the United States formalized diplomatic relations.[2] Economic ties with Thailand deepened when America's Standard Oil Company established a branch office in Bangkok in 1894.[3] Even during the turmoil of World War II, the United States refused to declare war against Thailand despite Thailand's official declaration of war against the United States, forced by the Japanese

[2]U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand," United States Department of State, https://th.usembassy.gov/our-relationship/policy-history/io/.
[3] U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand."

occupiers; the Thai Ambassador to the US actually refused to deliver the declaration.[4] Military relations were formalized in 1953 when the Joint US Military Advisory Group established a presence in Bangkok.[5] Both states maintain an embassy and at least one consulate in each other's country. "The 1966 treaty of Amity and Economic Relations, the most recent iteration of the 1833 Treaty of Amity and Commerce, facilitates U.S. and Thai companies' economic access to one another's markets."[6]

Throughout the 1990s and early 2000s, the US maintained a cordial diplomatic relationship with the Thai government, though there were occasional spats over supporting what the US considered rogue regimes, like in Myanmar, and during as Thailand's coup in 1996.[7] The two countries regularly pursue bilateral commercial agreements that facilitate trade and business. The U.S. Agency for International Development (USAID) even uses Bangkok as a headquarters for regional, transnational, and bilateral programs for a variety of diplomatic and economic issues such as natural resource use, political conflict resolution, and human rights promotions.[8] Additionally, the United States engages in partnerships that help facilitate humanitarian assistance for displaced persons and preventative health efforts, among other domestic assistance initiatives. [9]

The US maintained a long-term military presence in Thailand between 1964 and 1976 though agreements and exercises maintained ties between the two militaries thereafter.[10] At the end of this period between 1975 and 1976, Thailand sought an "equidistance" whereby they wanted to look for relationships beyond the United States in

[4] U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand."
[5] U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand."
[6] Bureau of East Asian and Pacific Affairs, "U.S. Relations with Thailand: Bilateral Relations Fact Sheet," United States Department of State, 7 May 2020, https://www.state.gov/u-s-relations-with-thailand/.
[7] U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand;" Paul Chambers, "U.S.-Thai Relations After 9/11: A New Era in Cooperation?," *Contemporary Southeast Asia* 26, December 2004, 462; Lewis Stern, "Diverging Roads: 21st-century U.S.-Thai Defense Relations," *Strategic Forum* 241, June 2009, 3-4.
[8] Bureau of East Asian and Pacific Affairs, "U.S. Relations with Thailand: Bilateral Relations Fact Sheet."
[9] Bureau of East Asian and Pacific Affairs, "U.S. Relations with Thailand: Bilateral Relations Fact Sheet."
[10] U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand."

their own neighborhood, agreeing to the establishment of the Southeast Asian Treaty Organization (SEATO).[11] This effort did not last long with SEATO's demise in 1977.[12] Adopting a policy of "omnidirectionality" in the 1980s, Thailand began to re-establish connections with the United States.[13] For instance, in 1982 the first COBRA GOLD exercise was held in Thailand, a bi-lateral US-Thai operation.[14] This annual exercise focuses on humanitarian assistance and disaster relief operations though there were and remain many combat aspects and it is one of the largest multinational exercises in the world.[15] COBRA GOLD was also the basis of what would become an enduring logistics partnership allowing the US access to Thai facilities when necessary, beginning in 1993.[16]

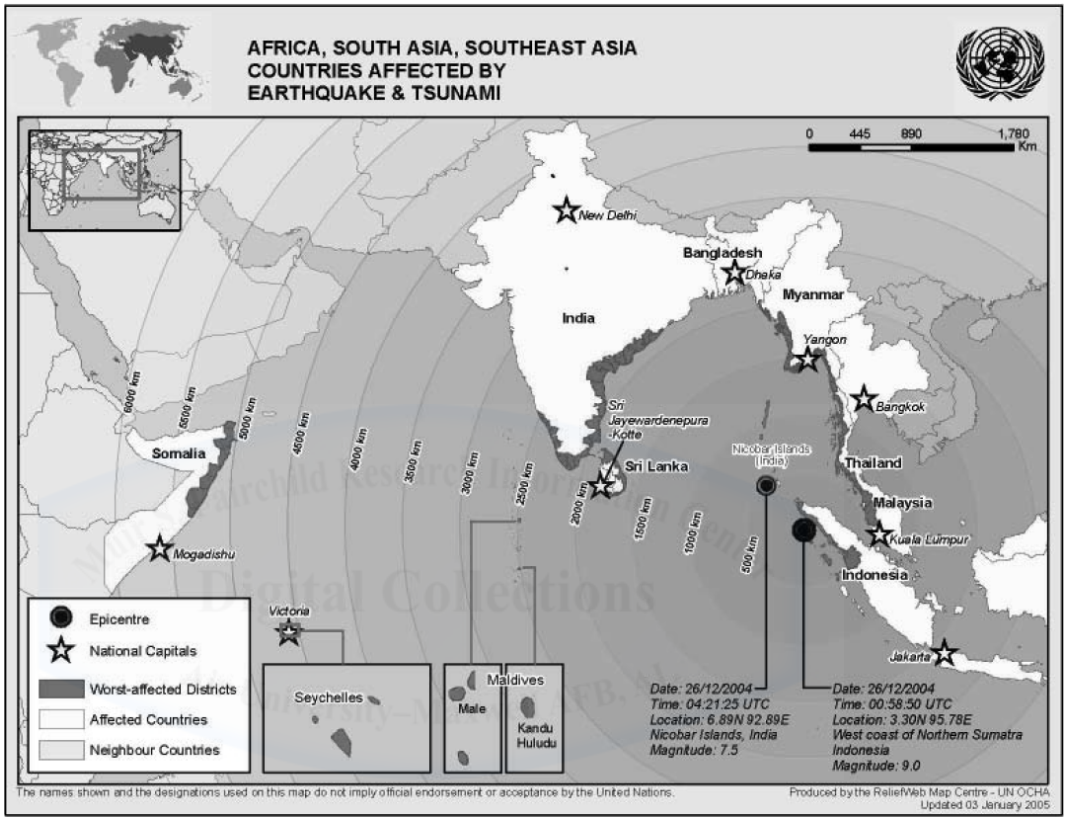
The Event and Aftermath

Geographically, Thailand is a partial isthmus nation in southeast Asia bounded on the west by the Andaman Sea that sits at the mouth of the Strait of Malacca and on the east by the Gulf of Thailand which leads to the Java Sea and South China Sea (insert map). The country is on the western edge of the Pacific Ocean 'Ring of Fire,' a series of volcanoes, fault lines and other geologically active features.[17] The fault west of the Andaman Sea is the source of the 2004 earthquake and tsunami that became the worst natural disaster in Thailand's modern history.[18]

[11] Paul Chambers, "U.S.-Thai Relations After 9/11: A New Era in Cooperation?," 461.
[12] Paul Chambers, "U.S.-Thai Relations After 9/11: A New Era in Cooperation?," 461.
[13] Paul Chambers, "U.S.-Thai Relations After 9/11: A New Era in Cooperation?," 461.
[14] U.S. Embassy & Consulate in Thailand, "History of the U.S. and Thailand."
[15] Carlos Vazquez, "Cobra Gold, one of world's largest multinational military exercises, kicks off in Thailand," Stars and Stripes, 13 February 2019, https://www.stripes.com/news/pacific/cobra-gold-one-of-world-s-largest-multinational-military-exercises-kicks-off-in-thailand-1.568443.
[16] Paul Chambers, "U.S.-Thai Relations After 9/11: A New Era in Cooperation?," 462.
[17] United States Geological Survey, "Ring of Fire," https://earthquake.usgs.gov/learn/glossary/?termID=150.
[18] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," February 2007, 1, https://www.adb.org/publications/adjustment-and-recovery-thailand-two-years-after-tsunami.

On 26 December 2004 at 0058 UTC—approximately 0758 local times—a magnitude 9.0-9.3 earthquake struck about 100 miles off the northwest coast of North Sumatra at a depth of 19 miles.[19] The events are depicted in Figure 3, below.

Figure 3: District Around the Indian Ocean with Tsunami Damage Areas Shaded.



Source: United Nations

Scientists indicate this was the third largest earthquake ever recorded.[20] Within 20 minutes of the initial shock, the first tsunami, reaching 50-100 feet in height, struck the

[19] Agence France-Presse, "Timeline: The 2004 Indian Ocean Tsunami," Rappeler, 26 December 2014, https://www.rappler.com/world/specials/79016-timeline-2004-indian-ocean-tsunami; Shigekatsu Kondo, "East Asian Strategy Review 2006, Chapter 2: Indian Ocean Tsunami and International Cooperation," Japan National Institute for Defense Studies, 38, http://www.nids.mod.go.jp/english/publication/east-asian/e2006.html.
[20] United States Geological Survey, "20 Largest Earthquakes in the World," https://www.usgs.gov/natural-hazards/earthquake-hazards/science/20-largest-earthquakes-world?qt-science_center_objects=0#qt-science_center_objects.

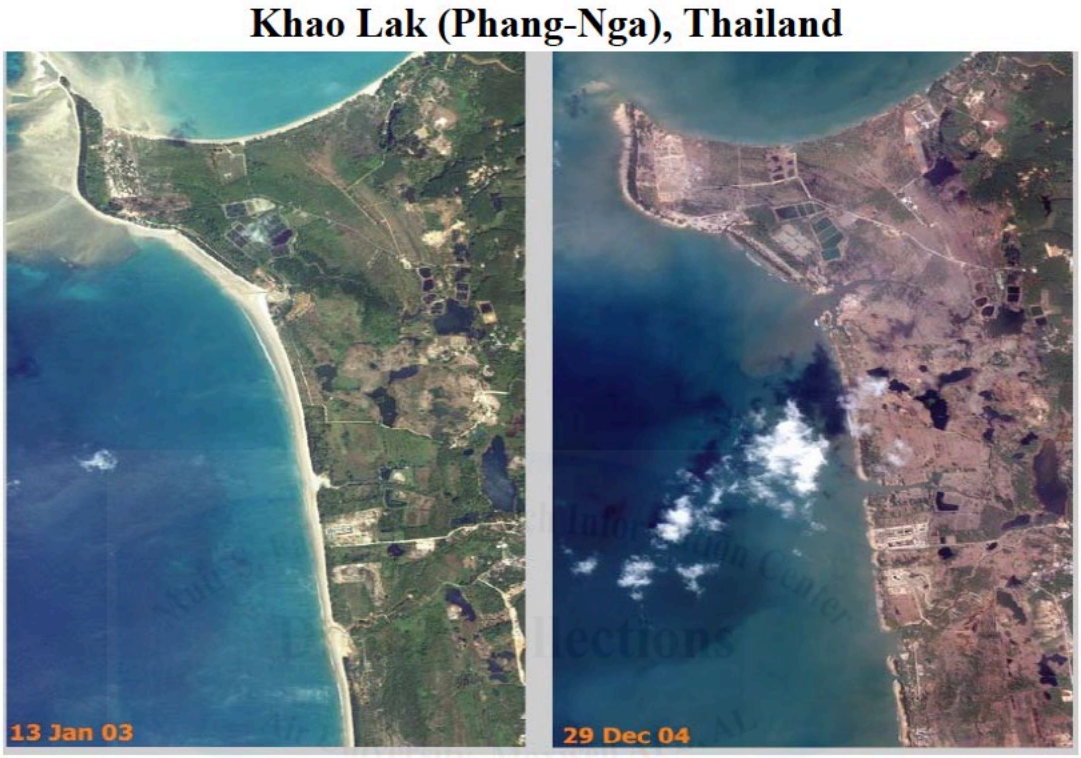
west coast of North Sumatra with Aceh, Indonesia as the epicenter of devastation.[21] The first of several tsunami waves struck the southwest coast of Thailand, over 300 miles away, approximately one and a half hours after the earthquake.[22] The wall of water reached more than 64 feet in height at the western-most reaches of Thailand at Ban Thung Dap.[23] Other locations along the western beaches of the Thai isthmus saw wave heights range between 20 and 50 feet.[24] Importantly, the waves reached as far as a mile inland, which increased the levels of devastation.[25]

Though the human and economic toll of the tsunami was greater in Indonesia, Sri Lanka, and India, there were approximately 8,345 people killed in Thailand with over 500,000 more people injured or rendered homeless.[26] The tsunami impacted six Thai provinces: Phuket, Phang, Phang Nga, Krabi, Ranong, Trang, and Satul.[27] Tourist and resort areas were the epicenter of casualties and a central reason for the economic losses in these regions. Phang Na, depicted below in Figure 4, and Krabi were the hardest hit provinces in terms of loss of life and first and third in terms of economic loss—5,880 and 1,265 dead or missing and $179,825,236 and $70,027,184 total damage, respectively.[28]

[21] Agence France-Presse, "Timeline: The 2004 Indian Ocean Tsunami."
[22] Agence France-Presse, "Timeline: The 2004 Indian Ocean Tsunami."
[23] Yoshinobu Tsuji, Yuichi Namegaya, Hiroyuki Matsumoto, Sin-Iti Iwasaki, Wattana Kanbua, Mongkonkor Srwichai, and Vorawit Meesuk, "The 2004 Indian Tsunami in Thailand: Surveyed Runup Heights and Tide Gauge Records," *Earth, Planets and Space* 58, 2006, 225.
[24] Yoshinobu Tsuji et al, "The 2004 Indian Tsunami in Thailand," 225.
[25] Witold Szczucinski, Grzegorz Rachlewicz, Niran Chaimanee, Darunee Saisuttichai, Thawatchai Tepsuwan, and Stanislaw Lorenc, "26 December 2004 Tsunami Deposits Left in Areas of Various Tsunami Runup in Coastal Zone of Thailand," *Earth, Planets and Space* 64, 2012, 844.
[26] The Economist Intelligence Unit, "Asia's Tsunami: The Impact," January 2005, 4, http://graphics.eiu.com/files/ad_pdfs/tsunami_special.pdf; Dipa Singh Bagai, *Tsunami Thailand One Year Later: National Response and Contribution of International Partners*, (New York: United Nations, 2005), 13-14. I draw this number from the EM-DAT database however there are varying estimates that do not differ much from the EM-DAT figure.
[27] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 14.
[28] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 18; Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 2.

In addition to tourism, the nation's west-coast fishing operations were devastated with over $138.6 Million in losses to the country's second largest industry.[29]

Figure 4: Phang-Nga Before and After the Tsunami.



Source: Headquarters, Pacific Air Forces

While Thailand sustained significant human and economic damage, the state's infrastructure remained largely intact.[30] The more costly infrastructure damage came from piers and fishing related items.[31] Total road and bridge damages were less than $5 million allowing for emergency relief and assistance delivery immediately following the

[29] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 20.
[30] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 5.
[31] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 5.

tsunami.[32] Additionally, Phuket airport remained operational allowing for use of the airport as a major assistance distribution point close to the damaged areas.[33] These aspects of the event shaped the Thai government's response amid overwhelming support from the international community.

Thai Requests

At the time of the disaster, Thaksin Shinawatra was the Prime Minister of Thailand and leader of the Thai government's response.[34] His administration was overshadowed by multiple corruption scandals and an insurgency in the southern part of the country that began in early 2004.[35] Although religion did not play a large part in the insurgency, it did play a part in Shinawatra's response to the tsunamis. The affected areas have a large Muslim population, close to 20% in some areas, in comparison to the remainder of the country, which averages about 5%.[36] According to the Center of Excellence in Disaster Management & Humanitarian Assistance, the Thai government was initially reluctant to accept international aid because of sensitivities about the Muslim population in the area.[37] For several days, the Thai government refused to accept aid but later acquiesced to assistance.

On the day of the disaster, Shinawatra established a Tsunami Victim Relief Center that served as a coordinating location for physical and financial assistance efforts, both domestic and international.[38] The Thai Department of Disaster Prevention and

[32] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 5.
[33] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 6.
[34] Thaksin Shinawatra served as the Prime Minister of Thailand from 2001 – 2006.
[35] Jayshree Bajora and Carin Zissis, "The Muslim Insurgency in Southern Thailand," Council on Foreign Relations, 10 September 2008, https://www.cfr.org/backgrounder/muslim-insurgency-southern-thailand.
[36] Royal Thai Embassy, Riyadh, Kingdom of Saudi Arabia, "Muslim in Thailand," http://www.thaiembassy.org/riyadh/th/organize/29025-Muslim-in-Thailand.html.
[37] Center of Excellence in Disaster Management & Humanitarian Assistance, "Indian Ocean Earthquake & Tsunami Emergency Update," 31 December 2004, 16.
[38] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 5-6.

Mitigation was put in charge of specific relief efforts.[39] The eventual requests for assistance (not aid--an important distinction by the Thai government) was three-pronged: financial, technical, and material.

Interestingly, the Thais did *not* ask for immediate, direct financial assistance or recovery assistance; their government "declined foreign financial assistance stating that it could fend for itself financially."[40] Although there were hundreds of millions of US dollars donated toward aid from international entities, the Thai government required limited financial assistance due to the response of the country's own private sector donations.[41] Instead, they requested "the lifting of barriers that prevented access to donor markets for Thailand's exports."[42] They argued that access would help the country with a sustainable recovery.[43] Although Shinawatra did not request financial assistance, there was more emphasis on technical and material support.

Officially, the Thai government requested individuals with certain technical skills such as forensic pathology and mass disaster relief while asking for materials like medical supplies, medicines and non-perishable food items.[44] Additional items included power generation, heavy moving equipment and mass casualty supplies. The diplomatic request was sent five days after the disaster, on December 31, 2004, to governments around the world through the Humanitarian Relief and Assistance Coordination Task Force of the Thai Ministry of Foreign Affairs.[45] Other, more specific, requests such as

[39] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 6.
[40] Shigekatsu Kondo, "2006 East Asian Strategy Review," 44.
[41] Elizabeth Scheper and Smruti Patel, "Impact of the Tsunami Response on Local and National Capacities: Thailand Country Report," Tsunami Evaluation Coalition, April 2006, 6, 14-15; Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 6.
[42] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 38.
[43] Bhanupong Nidhiprabha, "Adjustment and Recovery in Thailand Two Years After the Tsunami, Asian Development Bank Institute," 38.
[44] Center of Excellence in Disaster Management & Humanitarian Assistance, "Indian Ocean Earthquake & Tsunami Emergency Update," 31 December 2004, 17.
[45] Center of Excellence in Disaster Management & Humanitarian Assistance, "Indian Ocean Earthquake & Tsunami Emergency Update," 31 December 2004, 17.

those through military channels did not occur until assistance units were on the ground in Thailand.

These were the early indicators of what the *Thai* government considered to be contributory to better relations. For Thailand, improving interstate relations involved providing people with relevant skills to facilitate disaster relief, as well as material that could assist the government's response to a national mobilization aiding Thai citizens. If the US response was going to be effective in terms of improving relations with Thailand, it would need to focus on these issues.

The US Government's Response

In the United States, disaster response falls under the purview of the Department of State. This responsibility fell to the Undersecretary of State for Political Affairs, Marc Grossman.[46] Typically, State receives formal requests for assistance from other countries and is the principal coordination element for those requests across the US government. Each disaster response is different, requiring coordination with different agencies. In the case of the Thai response, there were a few key organizations and players. At State, Secretary Colin Powell was a critical public face for the initial US diplomatic response. At the Department of Defense (DoD), United States Pacific Command (USPACOM) was responsible for the military's oversight of operations in the area under the command of Admiral Tom Fargo.[47] Later, Admiral Fargo would change the command structure as military assets and subordinate commanders were constituted under what would eventually become Operation UNIFIED ASSISTANCE (OUA). Finally, President George W. Bush as the US chief executive retained oversight overall US government

[46] Marc Grossman and James Conway, "Coordination of Relief Assistance for Victims of the Recent Tsunamis," United States Department of State, 29 December 2004, https://2001-2009.state.gov/p/us/rm/40108.htm.

[47] Marc Grossman and James Conway, "Coordination of Relief Assistance for Victims of the Recent Tsunamis." USINDOPACOM, "Area of Responsibility," United States Department of Defense, https://www.pacom.mil/About-USINDOPACOM/USPACOM-Area-of-Responsibility/. USPACOM was renamed USINDOPACOM on 30 May 2018. "As a geographic combatant command, USINDOPACOM is in charge of using and integrating US Army, Navy, Air Force and Marine Corps forces within the [organization's] area of responsibility to achieve U.S. national security objectives while protecting national interests."

activities including State, Defense, and the appointment of Mr. Grossman as the principal coordinator for the response.[48]

In the United States, it was Christmas Day, where end-of-year holiday celebrations were still in full swing.[49] Consequently, the American presidential administration as well as members of State and Defense were enjoying the festivities with family and friends.[50] Indeed, President Bush was vacationing with his family in Crawford, Texas when he received word about the disaster. It is important to note that, at this point, the extent of the devastation was not well understood.[51] The day after the tsunami, on behalf of the president and the American people, the White House press secretary issued an initial statement expressing condolences and promising to support aid and relief efforts where appropriate, including aid for Thailand.[52]

On 27 December 2004, Secretary Powell had a conversation with the president about the tsunami situation; following the call, Secretary Powell was the first public face of the US response. [53] Powell held a publicly televised briefing to discuss the US appraisal of the situation as well as initial steps taken in response.[54] Again, he expressed condolences and spoke of some of the efforts that the Department of State undertook to limit human suffering and provide general relief to the people affected by the complex

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[48] Marc Grossman and James Conway, "Coordination of Relief Assistance for Victims of the Recent Tsunamis."
[49] Because of the international dateline, it was still December 25th in the United States.
[50] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope: The Story of Operation Unified Assistance," January 2006, 5-6; Bruce Elleman, *Waves of Hope: The U.S. Navy's Response to the Tsunami in Northern Indonesia*, Naval War College Newport Papers, February 2007, 17-18.
[51] Bruce Elleman, *Waves of Hope*, 18-20.
[52] Office of the Press Secretary, "Statement on Bay of Bengal Earthquake and Tsunami," The White House, 26 December 2004.
[53] United States, President (2001 – 2009: Bush), *Public Papers of the Presidents of the United States, George W. Bush, Book 3, October 1 to December 31, 2004*, (Washington, DC: Office of the Federal Register, National Archives and Records Administration), 3160, https://play.google.com/books/reader?id=Q-LZAAAAMAAJ&hl =en&pg=GBS .PA3160.
[54] Colin Powell, "Briefing With Assistant Administrator for United States Agency for International Development Ed Fox," United States Department of State, 27 December 2004, https://2001-2009.state.gov/secretary/former/powell/remarks/40057.htm.

disaster.[55] Almost immediately, Secretary Powell turned the conversation over to Mr. Ed Fox, the Assistant Administrator of USAID. Secretary Powell said that he was handing over the briefing to Administrator Fox for "some details." The State Department allocated $4 million to the Red Cross to assist affected countries and an additional $10 million for the general relief effort.[56]

Also on December 27th, USPACOM was charting its own course. "Although the trigger point for humanitarian operations lies with the Department of State, the main problem was the same all action officers were facing—it was the holiday season and nobody was at home—including the State Department."[57] Despite the lack of guidance, the USPACOM staff began drafting what is known as an Execution Order (EXORD), giving mission, objectives, and guidance to subordinate forces from the commander. Often, an EXORD is driven by directives from national authorities, such as the President of the United States or the Secretary of Defense, in response to a situation around the world. Multiple documents point to internal deliberations within the military with little or no direction from Washington. In a later interview, Admiral Walter Doran, Commander of Pacific Fleet, disclosed that it was a good thing that no one from Washington was looking over their shoulders giving direction to their actions.[58]

Admiral Fargo issued EXORDS to both naval and air units. In the absence of guidance from Washington, Fargo and Doran decided to authorize ship movements toward the disaster scene.[59] Still unsure of where the vessels would go, they ordered "all available naval assets to begin to flow toward Southeast Asia."[60] The same was done for air assets with a specific direction to move C-130 transport aircraft to Thailand where they would be staged to support a larger relief effort.[61] These were the first asset

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[55] Colin Powell, "Briefing With Assistant Administrator for United States Agency for International Development Ed Fox."
[56] Colin Powell, "Briefing With Assistant Administrator for United States Agency for International Development Ed Fox."
[57] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 40.
[58] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 18.
[59] Bruce Elleman, *Waves of Hope*, 18-20.
[60] Bruce Elleman, *Waves of Hope*, 18.
[61] USPACOM, *USPACOM C-130 EXORD ISO EARTHQUAKE RELIEF*, 1-2.

movements for what would become OUA. The EXORD gave a mission to "assist in rapidly reducing loss of life, mitigate suffering, and reduce the scope of the disaster."[62] The EXORD's overall guidance: "In coordination with the country team (Jusmagthai), US forces will provide mobility and logistics support capabilities to enhance regional efforts in response to the crisis."[63] Noticeably absent was any strategic objective for the United States other than preventing the further loss of life. On December 27th, only after assets were already on the move, did President Bush authorize the Pentagon to initiate a humanitarian disaster relief operation.[64]

On December 28th, at his Crawford ranch, the president had a briefing specifically about the tsunami and began to set in motion a rollout of the official US response.[65] Bush did not publicly comment on the tsunami until after a National Security Council meeting on the morning of December 29th.[66] At the briefing, later that day, President Bush conveyed further condolences and highlighted efforts to work with regional partners to provide relief to disaster victims.[67] Repeatedly throughout the prepared statement and subsequent question and answer session, the US president emphasized America's generosity. His comments likely reflected criticism from Jan Egeland, a United Nations official who sparked controversy in the two days after the tsunami, highlighting the frugality of wealthy states aiding poorer states.[68] Although the president was speaking about the totality of the response, importantly he discussed the three things

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[62] USPACOM, *USPACOM C-130 EXORD ISO EARTHQUAKE RELIEF*, 2.
[63] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 281.
[64] Bruce Elleman, *Waves of Hope*, 20-21.
[65] United States, President (2001 – 2009: Bush), *Public Papers of the Presidents of the United States, George W. Bush, Book 3, October 1 to December 31, 2004*, 3160.
[66] John Harris and Robin Wright, "Aid Grows Amid Remarks About President's Absence," Washington Post, 29 December 2004, https://www.washingtonpost.com/archive/politics/2004/12/29/aid-grows-amid-remarks-about-presidents-absence/dff20ddc-548e-45b4-8e57-79fff2aded53/.
[67] George W. Bush, "President Discusses Support for Earthquake and Tsunami Victims," Speech, 29 December 2004, https://georgewbush-whitehouse.archives.gov/news/releases/2004/12/20041229-1.html.
[68] Steven Weisman, "Irate Over 'Stingy' Remark, U.S. Adds $20 Million to Disaster Aid," New York Times, 29 December 2004, https://www.nytimes.com/2004/12/29/world/worldspecial4/irate-over-stingy-remark-us-adds-20-million-to-disaster.html.

the Thai government valued in terms of building interstate relations from this event: financial (albeit limited), technical, and material assistance. At that point, the president said the US had pledged $35 million and deployed technical experts and relief supplies to the region, including Thailand.[69] By all measures, the US was doing what was asked by other states.

Despite the discussion of what the US was doing, there were few words devoted to why Bush decided to assist with *this* disaster despite the fact that many others, although not as extensive, had happened during the administration's first few years.[70] In fact, as far as air assets were concerned, the US only responded to four natural disasters in the first three years of the Bush administration: earthquakes in India (2001), Algeria (2003), Iran (2003) and Morocco (2004). It is likely that the general lack of significant support to relief operations during the first few years after 9/11 was due to the US' anti-terror focus and dealing with insurgencies in both Iraq and Afghanistan. During his December 29th briefing there was never an explicit, public mention of strategic aims beyond helping where America could do so. Indeed, this general approach was reflected in Fargo's EXORD for USPACOM and Secretary Powell's comments about monetary and technical assistance, even though there is no evidence of coordination between any of the parties prior to the publication of their individual statements. This is important because it seems to suggest that the president did not have a specific reason why he was using US funds or deploying US forces other than to assist with relief. If that was his only reasoning, this could have been applied to the aforementioned disasters.

More importantly, Bush's, Powell's and Fargo's statements seemed to be par for the course for US natural disaster responses, and a motivating factor for this study: a focus on *what* the US government and military was doing rather than *why* they were doing it. After a review of various statements from senior US officials, the first time the reason for US relief efforts came up was during an interview between Secretary Powell

[69] George W. Bush, "President Discusses Support for Earthquake and Tsunami Victims."
[70] The Guardian, "A Decade of Disasters – Get the Key Data," 18 March 2011, https://www.theguardian.com/global-development/datablog/2011/mar/18/world-disasters-earthquake-data; According to the EM-DAT database, there were dozens of natural disasters between 2001-2004 during the first three years of the Bush administration.

and journalist Huw Edwards from the British Broadcast Company (BBC), 3 days after Powell's initial briefing. [71]

In his final question during the December 29th broadcast, Mr. Edwards asked "To what extent are you aware of the sensitivities of your relationships with some of these countries, given what happened in the world over the last two years?"[72] The interviewer's reference was to US relations with Muslim states while being in the middle of counter-insurgency operations in Iraq and Afghanistan. The implication here was that interstate relations with the Muslim world may have waned, due to the US involvement in Middle Eastern contingencies. Powell's response was an appraisal of relations with Indonesia as the largest Muslim nation in the world and the state most affected by the disaster. He assessed the relations as "very good" and suggested the Indonesian government would "welcome the assistance that the United States" would provide.[73]

For his part, President Bush seemed to discuss the importance of the relief efforts toward interstate relations at a March 8, 2005 press conference following a joint mission to the disaster areas by former presidents George H.W. Bush and William Clinton. He said "I think the world is beginning to see a different impression of America. One of the things the [Indonesian] President[s] reported to me is there was an outpouring of great kindness everywhere they went. I'm heartened that the good folks of Indonesia, for example, see a different America now when they think about our country."[74] Here, the president seems to acknowledge that there may have been another dimension to the

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[71] Colin Powell, "Archive: Former Secretary of State Colin L. Powell, Speeches and Remarks," Interview, United States Department of State, https://2001-2009.state.gov/secretary/former/powell/remarks/c13508.htm; George Bush, "US Support For Earthquake and Tsunami Victims," The White House, 3 January 2005, https://georgewbush-whitehouse.archives.gov/infocus/tsunami/.

[72] Colin Powell and Huw Edwards, "Interview on BBC's The Great Wave with Huw Edwards," Interview, United States Department of State, 29 December 2004, https://2001-2009.state.gov/secretary/former/powell/remarks/40101.htm.

[73] Colin Powell and Huw Edwards, "Interview on BBC's The Great Wave with Huw Edwards."

[74] United States, President (2001 – 2009: Bush), *Public Papers of the Presidents of the United States: George W. Bush, Book I – January 1 to June 30, 2005*, "Remarks Following a Meeting With Former President George H.W. Bush and Former President William J. Clinton," (Washington, DC: Office of the Federal Register, National Archives and Records Administration), 385.

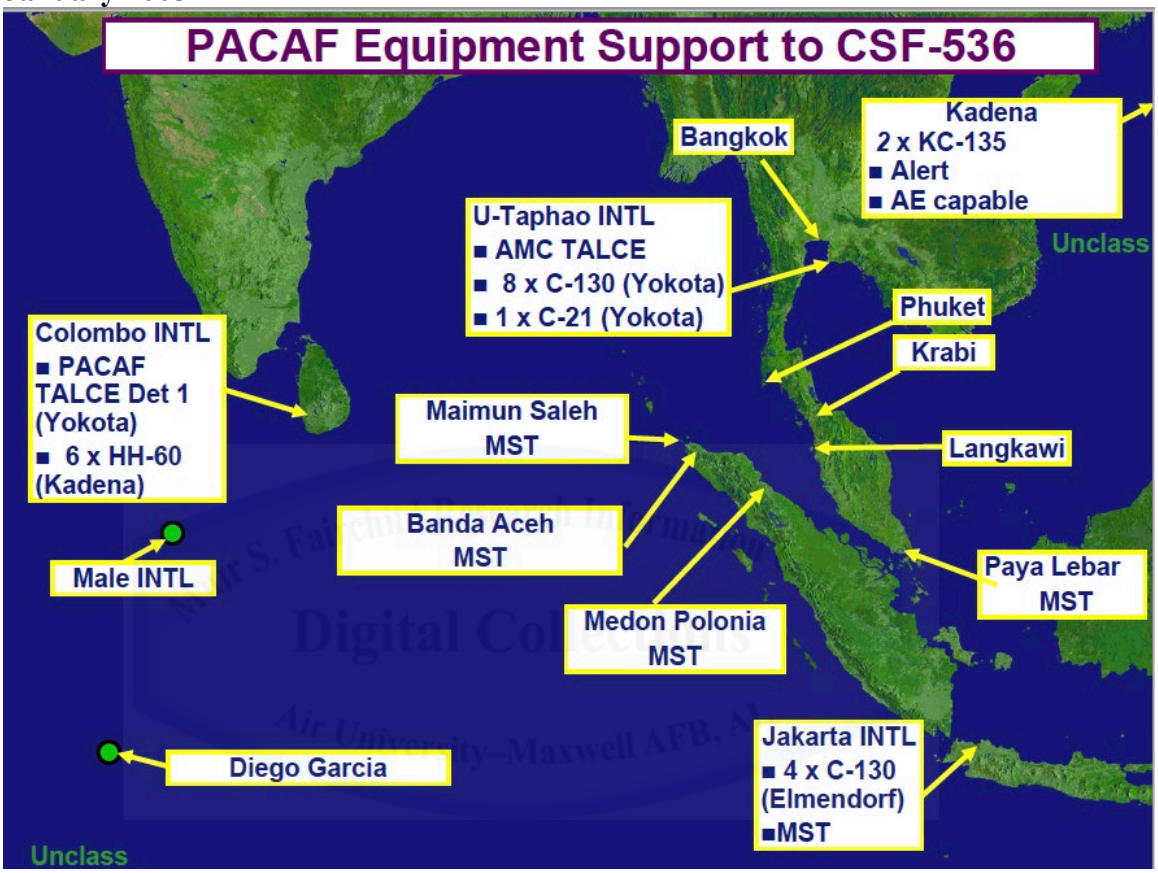
disaster response commitment: improving relations, even just bettering the perception of the United States in those countries that were assisted and maybe beyond. Whether to save lives, improve interstate relations, or perhaps both, the US made a significant commitment to the relief effort. One of the major contributions was through air-enabled disaster relief.

The Air-Enabled Disaster Response

The US military's response was overseen by USPACOM and its commander, Admiral Fargo. In cases like the tsunami and other contingencies, a geographic command, such as USPACOM, typically delegates authority and responsibility for day-to-day operations to lower level organizations. The day after the tsunami, December 27th, Admiral Fargo ordered units to either move or prepare to move to the affected areas. Through Admiral Doran, Pacific Fleet moved naval assets towards Southeast Asia. Marine assets were directed to prepare to deploy to the area and the senior Marine in the command, Lieutenant General Robert Blackman, was directed to standup a joint task force that would provide command and control and oversee the day-to-day operations of the relief effort.[75] However, Pacific Air Forces were directed to immediately deploy no less than five but not more than eight C-130s to Utapao, Thailand, stocked with relief supplies.[76] Utapao's centrality to the emerging operation is depicted below in Figure 5.

[75] Bruce Elleman, *Waves of Hope*, 8, 18.
[76] USPACOM, *USPACOM C-130 EXORD ISO EARTHQUAKE RELIEF*, 2.

Figure 5: Pacific Air Force Assets and Their Locations During Relief Operations, January 2005



Source: Headquarters, Pacific Air Forces

The quick deployment was made possible because of a query made the day prior by General Gary North, the USPACOM J-3 to the PACAF staff, about the availability of intra-theater C-130s to send on a moment's notice. [77] In discussions with General David Deptula, who was the Director of PACAF's Air Operations Center (AOC), General North was able to get the C-130s he wanted from Yokota Air Base in Japan.[78] The imprecise

[77] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 9.
[78] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 10.

number of C-130s was due to a report from PACAF's Air Mobility Operations Center (AMOC) that listed six aircraft immediately available and two undergoing periodic maintenance that would be available on December 27th.[79] The PACAF Commander, General Paul Hester, commented that there was no real clarity of the requirements for what was needed in the affected areas in the days immediately following the event. [80] Thus, availability was the driving factor for the quick deployment of the aircraft, not an understanding of the requirements from the affected countries.

Even though there was confusion about what was needed, PACOM and PACAF continued efforts to understand the specific requirements so that they could more appropriately apply relief assets. "Few understood exactly what supplies were on hand, few understand exactly what supplies were needed, and even fewer understood the needs of the affected countries including the host nation governments themselves."[81] The PACOM EXORD would be purposefully vague to source whatever and whomever the units could get there.[82] On the evening of December 26th into the early morning hours of December 27th crews went into crew rest and the scouring for relief supplies began.[83] There were no pre-packaged relief pallets so the units at Yokota built them from scratch including water, plastic sheeting for shelter, and body bags.[84] After the EXORD for air assets was issued later in the day, PACAF contacted defense attaches in each country to get a better understanding of their needs.[85] Additionally, while PACAF's primary responsibility was getting supplies into and throughout the theater, orders from USPACOM further allowed PACAF to airlift civilians (including foreign nationals) on

[79] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 10.
[80] Paul Hester, Interview. Conducted by Timothy Keck and Bill Harris, 12 January 2005, 1-2.
[81] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 10.
[82] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 10.
[83] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 10.
[84] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 11.
[85] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 14.

military aircraft, which standard procedures did not allow.[86] This is significant, emphasizing the extent to which the US was willing to provide assistance to a recipient nation. Unbeknownst to Generals North and Hester, as well as their staffs, the initial number of C-130s and the supplies would largely fall in line with what the Thai military requested.

For instance, the Royal Thai Air Force requested a minimum of two C-130s for airlift missions collocated at Bangkok International Airport at Muang Royal Thai Air Force Base (RTAFB).[87] Later requests included transport of coffins, medical supplies, food, water, and body bags into the country.[88] As decried by the devastated states and the World Health organization, food and potable water were meant to stave off hunger and disease. Food had been contaminated or destroyed and many water sources were contaminated by body waste, salter water and water-borne bacteria.[89] These military-specific requests were largely in-line with what the Thai Foreign Ministry requested and represented the technical and material prongs of the Thai government's view of helpful assistance.

Simultaneous to PACAF's efforts, USPACOM began the process of establishing Joint Task Force 536 (JTF-536). Lieutenant General Robert Blackman, Commanding General of the Third Marine Expeditionary Force (III MEF), was designated as the JTF commander.[90] Even though the lead organization was US Marine Forces of the Pacific (MARFORPAC), the task force's primary mission was to "provide command and control of intra-theater airlift and reconnaissance in support of regional humanitarian and disaster relief operations in Sri Lanka, Thailand, and Indonesia."[91] According to the military's

[86] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," ix.
[87] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," xiv.
[88] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," xiv.
[89] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 58.
[90] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 9.
[91] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," viii.

joint doctrine, this also means that the task force would have an air component commander so that air assets be under the control of a single entity.[92] At this time the operation was still small in scope so General Deptula "tentatively appointed Colonel Gregory Sanders, Thirteenth Air Force Director of Operations and Plans, to be the Joint Force Air Component Commander (JFACC).[93] Another key personality was Colonel Mark Anderson who became the Direct of Mobility Forces (DIRMOBFOR), which is a position critical to the coordination and integration of intra-theater assets tasked to PACOM and those coming from outside the theater normally tasked to US Transportation Command (USTRANSCOM).[94] Together these individuals formed the nexus of the USAF's leadership team that ran day-to-day operations. The senior leaders' combined efforts and those of the 374th Airlift Wing's 36th Airlift Squadron allowed for all eight C-130s, crews, and supplies to be ready for deployment on December 27th.[95] However, because of confusion about routing, authorities, and the beddown situation for the C-130s in Thailand, the units stood-down through December 28th.[96]

The delay stemmed from an order by the 5th Air Force Commander, Lieutenant General Waskow. There was confusion about misperceptions of what resources were headed where and by whose authority.[97] According to an interview with Colonel Mark Schissler, Commander of the 374th Air Expeditionary Wing, leaders at Yokota and also at Kadena Air Base, a stopover point, were largely left out of the loop regarding the plan for the aircraft.[98] The confusion trickled to 5th Air Force where General Waskow delayed the C-130 deployments until December 29th. Under ideal conditions, air assets would

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[92] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 15.
[93] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 15.
[94] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 15.
[95] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 16.
[96] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 16-17.
[97] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 16.
[98] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 16-17.

have been ready to deploy the day after the tsunami, which is a critical factor for saving lives in the immediate aftermath of a disaster. Rapid deployment is also a unique capability for air-enabled disaster relief when compared with other modes and methods of transportation over long distances and in austere conditions. However, due to delays about the plan and who was in charge, it took three days for air units to respond in this operation.

Although the Yokota C-130s were the heart of the initial relief effort addressing Thai needs, other units that were part of the larger relief operation arrived a little earlier or nearly simultaneous to the C-130s on December 30th.[99] In many cases, these units responded in less than 24 hours to deployment orders, more characteristic of the speed with which air units can respond to a crisis. The first elements of JTF-536 arrived by air from Kadena Air Base on December 29th to Utapao, Thailand which served as the hub for US relief operations in Southeast Asia.[100] Another element of the Air Force's contribution to the joint operations headquarters arrived by KC-135, an aerial refueling and mobility aircraft, to Utapao on December 29th from Andersen Air Force Base on Guam.[101] Additionally elements of the US Disaster Relief Assessment Team (DRAT) and the USN's P-3 reconnaissance aircraft arrived on the same day ready to provide technical assistance to the Thai relief workers.[102] While there were Disaster Relief Assessment Teams (DRATS) deployed to Thailand, Sri Lanka, and Indonesia, the Forward Control Element was centered at Utapao in Thailand.[103] Utapao was chosen as the hub for operations because of the airfield's proximity to the damaged area, specifically as it related to air capabilities.[104] One of the first units to provide direct airlift was from PACOM's special operations arm.

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[99] Bruce Elleman, *Waves of Hope*, 9.
[100] Bruce Elleman, *Waves of Hope*, 9.
[101] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 65-66.
[102] Bruce Elleman, *Waves of Hope*, 9.
[103] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," x.
[104] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 14.

Special Operations Command, Pacific directed the 17th Special Operations Squadron to deploy as "a first responder in Thailand."[105] They arrived via a KC-135 and two MC-130 aircraft on December 29th into Don Muang Air Base, collocated with Bangkok International Airport instead of Utapao because of the massive amounts of donations piling up at the airport that required distribution.[106] According to two US exchange officers already working with the Thai Royal Air Force, Maj Chris Vogel and Capt Raleigh Alaho, "all of the supplies came from donations made by the Thai people," and the operations at this base focused on relief within Thailand.[107] Although the special operations MC-130s are not normally configured for people or cargo transport, the unit's commander, Lieutenant Colonel Mobley, and his staff did so to support the relief effort.[108] With two additional 17 SOS aircraft that arrived later in the day on December 29th, the unit was able to transport 235,000 pounds of supplies and medevacs over the first three days of operations.[109]

Moreover, the Thai military benefited from the US technical assistance response by enhancing their own C-130H hauling capabilities and showed appreciation in meaningful, albeit small ways. As Lt Col Mobley noted, a healthy competition developed with the Thai Air Force, which was also flying relief missions from Bangkok. The Thais, who flew the newer C-130H models, could hold more cargo but they "couldn't load stuff fast enough," as Mobley put it, because they usually did not use pallets. But the Thais were learning. With the help of Lt Col Jernigan, his exchange officers, and, later, seven aerial port squadron personnel from Kadena, the Thais were learning how to use pallets and cargo nets, create pallets, and set up coordination

[105] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 75.
[106] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 75.
[107] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 75.
[108] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 75.
[109] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 75-76.

elements. The Thais were very appreciative of their support and of the USAF aircraft that arrived on the 29th and 30th and began flying
cargo. Jernigan noted that since the start of the relief effort out of Bangkok he had not paid for anything he ate or drank there, "and I'm eating pretty well," he later said.[110]

These and similar air operations were made possible in the first few days after the disaster because of the inherit speed and flexibility of air assets, particularly mobility-related aircraft. Helicopters are another highly sought after commodity during disaster operations. One of the very first things that the Thai government asked was for the US to help conduct rescue operations as early as 29 December. "Helicopter operations, which would ultimately prove very important, required serious consideration since the areas most affected were coastal areas and would not be suitable for airdrops, similar to those conducted in Iraq, Bosnia, and Albania."[111] However, the main naval presence carrying many of these assets did not arrive until January 1st, 2005, six days after the event.[112] On New Years Day the USS Abraham Lincoln took up station off the west coast of Indonesia and began helicopter operations.[113] By this time, fixed-wing aircraft like the C-130 and C-17 had delivered nearly 1 million pounds of relief supplies across affected areas.[114] By comparison, rotary wing aircraft—helicopters—based on the naval assets were not able to reach significant levels until mid-January 2005.[115] Fixed-wing operations of air mobility assets like C-5, C-17 and the C-130 greatly outstripped anything that the helicopters could bring to the theater.[116]

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[110] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 76.
[111] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 15.
[112] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," xviii.
[113] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," xviii.
[114] Combined Support Force-536 (CSF-536) Joint Forces Air Component Commander (JFACC), "Operation unified Assistance Highlights, Challenges, and Potential Implications," Briefing. USINDOPACOM, 23-24.
[115] CSF-536 JFACC, "Operation unified Assistance Highlights, Challenges, and Potential Implications," 23-24.
[116] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 478, 479.

What would become Operation UNIFIED ASSISTANCE (OUA) became the largest air-enabled foreign humanitarian relief operation since the Berlin Airlift.[117] Over 24 million pounds of cargo were moved, averaging about 241 short tons per day over 47 days.[118] By comparison, the Berlin airlift totaled approximately 1.5 million pounds of cargo over 462 days.[119] Other modern foreign relief efforts such as in Europe and Africa were also smaller by comparison in terms of tons of cargo flown.[120]

In the first few days of operations, before the Abraham Lincoln Carrier Task Force arrived in January, there were several successes and failures in advancing interstate relations as a result of air-enabled relief. In terms of success, air assets addressed many of the Thai technical and material assistance requirements. Aircraft flew in food, water, and medical supplies as well as personnel for rescue and medevac capabilities within the first 72 hours of the disaster, all requested by the Thai government. Additionally, the military brought in command and control, logistics, and aerial port experts that greatly increased relief for the Thai people, as well as enabling the Thai military to provide assistance. In terms of 'failures', by Major General Deptula's measurement, the air effort had challenges with "misunderstandings with respect to command relationships, and inefficiencies in the air mobility and relief cargo distribution operations."[121] This can be largely attributed to the confusion about who was in charge and where orders were coming from during the first 24-48 hours after the disaster. Additionally, the task force's JFACC position changed between three people within the first 72 hours of the operation before settling on Deptula.[122] Moreover, there was not a consolidated air command and control function. Air relief and distribution operations were conducted by four separate elements: the task force's JFACC, naval assets, international partners, USTRANSCOM,

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[117] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 2.
[118] CSF-536 JFACC, "Operation unified Assistance Highlights, Challenges, and Potential Implications," 3.
[119] Daniel Haulman, *Wings of Hope: The U.S. Air Force and Humanitarian Airlift Operations*, (Maxwell AFB: Air Force History and Museums Program, 2007), 4.
[120] Daniel Haulman, *Wings of Hope*, 16-17.
[121] CSF-536 JFACC, "Operation unified Assistance Highlights, Challenges, and Potential Implications," 17.
[122] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 23.

and the USAF's Air Mobility Command (AMC), which was responsible for some of the larger aircraft like the C-5s and C-17s.[123]

In addition to the successes and failures associated with the US meeting Thailand's requirements, there was at least one benefit for US forces, particularly air units: trial of what PACAF described as its Warfighting Headquarters (WFHQ) construct. The operation provided PACAF an opportunity to operate in a joint environment and evaluate Air Force and joint doctrine. Additionally, it allowed the organization to evaluate its on-going WFHQ construct and its newly completed [AOC]."[124] This was PACAF's attempt to envision how it would support a unified combatant commander.[125] At the direction of General Hester—PACAF's commander—the organization began execution of the concept.[126] He used his staff as the Air Force Forces (AFFOR) staff and tasked them with working with the AOC as well as the units stationed in Thailand.[127] There were growing pains with executing the framework that had been in development for years, but General Hester seized on the opportunity to benefit US forces in terms of learning lessons they may not have otherwise learned in coordination and integration as well as introducing joint forces to large airlift operations.

USAID Programs and FDI as Contributors to Interstate Relations

As discussed above, the military can contribute to interstate relations between the donor and recipient states; aid programs and FDI can also contribute to improved relations. As an example, USAID helped Thai fishing villages get back on their feet, also a desire of the Thai government. During the recovery, the USAID initiated "The Sustainable Coastal Livelihood Project," which was meant to revitalize villages struck by tsunamis and "to demonstrate a model program of coastal communities that are resilient

[123] CSF-536 JFACC, "Operation unified Assistance Highlights, Challenges, and Potential Implications," 13.
[124] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 32.
[125] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 32.
[126] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope," 33-34.
[127] Office of the History Headquarters Pacific Air Forces, "With Compassion and Hope,"34-35.

to both economic and environmental shocks."[128] Essentially, the program was meant to demonstrate how, with a little help, the Thais could help themselves.

The Sustainable Coastal Livelihoods Project has had several significant achievements in restoring livelihoods. "Boats were constructed, equipped with engines and gears for affected fisherfolk."[129] Several cash-for-work programs were instituted for planting food and cleaning up sewer lines. Additionally, microfinancing allowed for starting businesses like freshwater aquaculture, a green learning center, and water treatment facilities.[130] Two Crisis Corps Volunteers (CCVs), returned Peace Corps personnel who may have retired, also arrived in the project communities and supported the micro-finance program and a village greening initiative."[131] Although the Thai government wanted access to trade markets, their goal was to create a sustainable recovery. The mechanisms differed, but USAID's initiatives are a few examples of how the US could build relations by meeting Thailand's needs.

The idea of FDI as a benefit to the recipient state stems from a long debate about the stimulative or contractive effects of natural disasters, referenced in the literature review. While, in broad terms, economists cannot agree that natural disasters either stimulate or dampen the economy, scholars acknowledge that there does seem to be a stimulative effect on developed economies that are provided assistance to reconstruct after the natural disaster.[132] Thailand met these stipulations prior to and even after the 2004 tsunami as the country with the 33rd largest GDP of 230 sovereign states and

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[128] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 50-51.
[129] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 106.
[130] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 106.
[131] Dipa Singh Bagai, *Tsunami Thailand One Year Later*, 105-106; The Peace Corps, *Reaching Around the Globe One Community at a Time: Peace Corps Congressional Budget Justification Fiscal Year 2008*, 31, https://www.yumpu.com/en/document/read/30141423/fy-2008-peace-corps; "The Crisis Corps is a program within the Peace Corps that mobilizes returned Peace Corps Volunteers (RPCVs) to provide short-term humanitarian assistance to countries worldwide."
[132] "Natural Disasters: Economically Speaking Are They Net Contractionary or Stimulative Events?," *International Economy*, Summer 2011, 38-40.

territories in the world in 2005.[133] Of the more than $6.5 billion pledged to help countries affected by the tsunami, Thailand used just $29.8 million.[134] Thailand had access to millions of dollars in aid funds, opting primarily to ask for access to international trade markets. The economic impact of the natural disasters on Thailand presented an opportunity for individual and corporate spending in the form of FDI. There are multiple aspects of a nation that attracts FDI.[135]

As tragic as natural disasters may be, they do offer lots of opportunity for economic growth as a result of the damages. And although natural disasters are considered a risk by donor states investing in recipient states, it is usually estimated to be a lower risk than, for instance, political and economic factors.[136] For Thailand, FDI was a significant element of the nation's growth from 1986 onward,[137] although the record was somewhat mixed. For instance, after record flooding in 2011, FDI inflows to Thailand decreased by 35%; yet outflows increased by 45%.[138] However, after the 2004 tsunami, Thai FDI inflows increased by approximately 35%.

Conclusion

There were several takeaways from the case study that could not be uncovered in the more generalizable quantitative study. First, military aspects of interstate relations should be included in the general proxy representation of the dependent variable in this study. For both Thailand and the United States, military relationships and capabilities

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[133] Knoema, "Historical GDP by Country, Statistics from the World Bank, 1960 – 2018;" Wikipedia, "List of Countries by Population in 2005," https://en.wikipedia.org/wiki/List_of_countries_by_population_in_2005.
[134] The Guardian, "Where did the Indian Ocean tsunami aid money go?," https://www.theguardian.com/global-development/2014/dec/25/where-did-indian-ocean-tsunami-aid-money-go; Office for the Coordination of Human Affairs, "Financial Tracking Service, Thailand, 2005," United Nations, 2005, https://fts.unocha.org/countries/222/flows/2005.
[135] Anita Macek, Vito Bobek, Tina Vukasovic, "Foreign Direct Investment as a Driver of Economic Development in Thailand," *International Journal of Euro-Mediterranean Studies* 8, 2015, 50.
[136] Anita Macek et al, "Foreign Direct Investment as a Driver of Economic Development in Thailand," 51.
[137] Anita Macek et al, "Foreign Direct Investment as a Driver of Economic Development in Thailand," 52.
[138] Anita Macek et al, "Foreign Direct Investment as a Driver of Economic Development in Thailand," 52.

mattered in building interstate relations. For the Thai government it mattered that the United States could bring the capabilities it boasted during regional exercises like COBRA GOLD. Rescue operations and technical training achieved the eventual objective of boosting interstate relations. For the United States, the ability to validate military capabilities was a contributing factor to interstate relations albeit, not explicitly provided by the Thai government to the US government. Thailand's cooperation helped achieve the US military's goal.

A second observation is that direct financial aid and aid through specific programs matter when considering increases in interstate relations. In Thailand's case, direct financial aid may have had a negligible effect on US-Thai interstate relations, but the program-specific aid was what the Thai's desired . Moreover, characteristics about what might improve interstate relations into the future revealed by the case study was a potential focus on interstate trade. Again, this was revealed by Thailand's request for market access as opposed to financial aid. Perhaps both FDI and trade should be used in future estimates of interstate relations.

As discussed at the beginning of the chapter, there are various dynamics of the theoretical proposition that a quantitative analysis could not reveal that a more focused, qualitative case study could achieve. With a nuanced look at the US military, and specifically the Air Force's response to the 2004 disaster, as well as a review of USAID and FDI influences on interstate relations, this study garnered additional perspectives on the model. First, military relations should be included as a proxy for interstate relations. This can be represented by personnel or capabilities participating in exercises or those personnel and resources that can generally meet recipient state expectations such as significant terrain restrictions or technical assistance. Second, foreign aid should be disaggregated to include dimensions for programs and direct financial assistance. Additionally, trade should generally be used as another indicator of interstate relations due to market access being one dynamic of agreement that can be generalizable across multiple states. The case study illuminated some potential insights about the relationship between interstate relations and various aspects of natural disasters and air-enabled relief operations. However, neither the quantitative nor qualitative results of this study can

conclusively support any correlation between humanitarian operations and interstate relations.

Chapter 5

Conclusion

Summary of Results

Through a mixed-methods analysis, this thesis is inconclusive concerning correlations between various aspects of natural disasters, air-enabled disaster responses, and interstate relations. However, the study highlights a seeming lack of clarity about the motivations for US involvement in disaster relief operations beyond the desire to alleviate human suffering, a global condition that far outstrips America's capacity to respond. Furthermore, the work strives to augment a thin research program of analytically rigorous analysis of HADR operation outcomes that go beyond amounts of aid delivered.

Quantitative Analysis

This thesis proposed a theoretical model whereby the level of interstate relations between a donor state and recipient state of disaster relief assistance is affected by two broad categories of variables: first, the severity of the natural disaster in terms of total deaths, total recipient state population affected by the disaster, and total damage caused by the disaster; and second, the provision of air-enabled relief represented by the number of aid days. This study operationalizes the idea of interstate relations by combining the change in FDI between the two states with the amount of monetary aid provided by the donor state to the recipient state. Further, data from the EM-DAT database, as well as primary sources from USAF units, provide insight into disaster related deaths, number of people affected, the extent of disaster damage, and the number of aid days.

Three hypotheses were generated. First, I expected that as the number of aid days increased, so too interstate relations grow. Here the underlying logic is that recipient states would be more likely to increase trust of those states that spend more time tending to the needs of the devastated citizens than those that do not send assistance. Similarly, theoretically donor states are likely to commit more resources over longer periods of time towards those states where they intend to bolster relations. The next hypothesis argued that the greater the number of disaster related deaths, the more interstate relations should

be strengthened by the disaster aid, the idea being that more death endears recipient states to those donor states that help. Similarly, the greater the number of persons affected by the disaster, the more interstate relations should be strengthened by the disaster aid. The expectation was that the more people impacted by the natural disaster, the more prone the recipient state would be to build relations with those donor states that help with larger catastrophes.

Data selection against which the hypotheses were tested was driven by whether a natural disaster occurred according to EM-DAT specifications or not, and if the USAF responded with air assets to the disaster. The study focused on certain disaster typologies including: epidemics, earthquakes, volcanic activity, floods, landslides, and storms, which constitute the bulk of disasters that typically exceed the capacity of states to handle internally. Further the study focused on the timeframe between 1992 and 2017. These years help control for the post-Cold War environment. I ended the study in 2017 because this was the last year of accurate year-to-year comparative data. For instance, changes in FDI for 2017 and 2018 were available but some calculations were still not finalized for 2019. Due to data availability, of the 42 possible events, the study included 31.

Using an OLS multiple regression along with various treatments, I test the three hypotheses and provide observations of the theoretical model. Overall, the analysis does not support any of the hypotheses nor does it support the general premise of the model. Controlled for robustness, the regression indicates the independent variables account for just 10% of variation of the dependent variable. Although the independent variables did not explain much, further testing indicated that the variables did not co-vary, which is important if researchers decide to use any of the variables for future study. Additionally, there were a few events in China, Indonesia, Haiti, and Myanmar that were either outliers or had outsized influence on the model. A review of their global GDP rankings indicated a potential connection between extremely high or low ratios of GDP to number of deaths. Exclusion of these events in future studies might be beneficial for insight into their impact on the initial model.

However, the study included a second review of the model including GDP as another dependent variable. Although the results do not differ much from the original model, testing indicates that GDP varies closely with total damage. So for future studies,

researchers should avoid including both variables in their models. And again, the same outliers and high-influence events exerted similar effects on this model with Japan added as another outlier event. Ultimately the quantitative analysis indicates that the proposed model is a poor fit to the theoretical premise. Further, the model cannot confirm or disconfirm the notion that interstate relations increases as it relates to any aspect of natural disasters or disaster assistance provided.

Qualitative Analysis

A case analysis was used to augment the quantitative findings, providing greater levels of detail about an event than would be available in a quantitative analysis. In this study, I explored how Thailand and the US articulated what aspects of a relief operation contributed to increasing interstate relations from the recipient and donor perspective. Additionally, I discussed various ways in which the two states tried to increase trust towards better relations. Of the 31 cases with complete information in this study, I chose the 2004 tsunami that struck Thailand for several reasons.

First, existing disaster diplomacy literature indicates that interstate relations may be improved but not necessarily initiated when relief assistance is provided by a donor state to a recipient state. Thailand and the United States have formal relations that date back to at least 1818, over the years the two states have concluded treaties for a variety of topic areas, which indicates the strength of the relationship. Second, the 2004 tsunami was the most devastating natural disaster that the US mobilized to support during the study period. Although Thailand did not suffer the most casualties or damage of all the states affected by the tsunami, its case has not been covered as much as others such as India, which is where the most devastation occurred. Third, there was a general availability of data regarding Thailand, in English that could be used to support the analysis. In other words, if there were going to be a case that should show connections between the selected dependent and independent variables, this should be one of the strongest indicators.

In the case of Thailand, an interesting issue occurred: none of the US senior civilian or military leaders ever explicitly mentioned strengthening interstate relations as a goal of the US response to the disaster. Neither President George W. Bush, Secretary of State Colin Powell, nor Admiral Tom Fargo, the USPACOM Commander, mentioned

improving relations with the Thai government as a reason for the response. In virtually every public appearance, the reasons these figures provided for the US response was to preserve human life and mitigate human suffering. While an important reason, I do not assess it is sufficient to justify the application of US foreign aid and air-enabled disaster relief considering that there were dozens of other disasters during the first three years of the Bush administration. Though scant, there are indications that the President and Secretary Powell at least considered the idea that the operations could be a boon for relations between the US and recipient states like Thailand. However, these comments were made only when prompted. If there were other motivations, this research was unable to uncover them whether due to lack of access to classified material or to first-hand accounts at the most senior levels not captured in speeches or interviews provided by senior US officials.

Nevertheless, even without an explicit desire to improve state relations, the US fulfilled what Thailand argued was sufficient and necessary to improve relations from their perspective. They identified three prongs to the response: financial, limited technical, and material assistance. The Thai government did not ask for direct financial assistance following the tsunami. Rather, they petitioned international partners, including the United States, to open up trade markets so that the relief provided to Thailand could be more sustainable. It is unclear whether the United States made any formal trade concessions in the immediate aftermath of the tsunami, however, FDI and import and export trade levels increased appreciably in the year following the disaster. Regarding technical and material assistance, the US responded with an air-enabled relief capability.

Beginning with EXORDs from USPACOM issued on December 27th, 2004, the United States deployed air and naval forces to Southeast Asia to support Thailand, among other states like Indonesia, Sri Lanka and India. Air forces constituted the bulk of support to operations for several weeks before naval capacity could be sustained. The US provided medical, forensic and logistical technicians to assist the Thai government in recovery and relief efforts. Additionally, over a dozen surveillance and cargo aircraft were immediately deployed to support Thailand and other regional states with various information and logistics requirements. Further, the Thai government requested medical

supplies, non-perishable food items and heavy equipment for recovery efforts, all provided by the United States among other donors.

An interesting dynamic that emerged during the relief operation is that the military could test and improve various dynamics of its command and control structure during the relief operations, which turned out to be a potential aspect for improved relations with the recipient state. PACAF sought to try out a command and control dynamic that had not been used in a live contingency operation, UNIFIED RESPONSE provided an opportunity to do so. As a result of the disaster relief operations, the US military gained an opportunity to learn real-world lessons that used to refine a developing command framework.

Dynamics that seemed to support the idea of improving relations, according to the theoretical model, included increases in targeted aid programs from the State Department that assisted the Thai fishing industry, the country's second largest income-producer, as well as increases in FDI. These two indicators are the selected interstate relations proxies and although quantitatively they did not show correlation with the dependent variables, the qualitative case study does show a relationship. US financial aid increased, FDI increased after the disaster, the total number of aid days were high relative to other disaster response operations in the study period, and all of the natural disaster dynamics of deaths, total affected, and total damage were high.

Conclusions

While the results of the overall analysis are mixed, generally this thesis does not provide strong support to any existing disaster diplomacy research. The quantitative analysis is inconclusive because the presented models are not significant in terms of the ability to relate interstate relations with the independent variables. The qualitative analysis does seem to demonstrate loose ties between the provision of air-enabled aid, significant disaster-related deaths, affected populations, and damage as well as interstate relations. However, in the case study, there are no concrete indications that improving interstate relations are what the government decided was important regarding this disaster. So even if interstate relations improved, that was not the stated goal of the donor state, the United States, in this case.

Implications. If scientific estimates about the effects of climate change hold, the US military and specifically the USAF will be called upon to assist with a growing number of international relief operations. If US decision-makers do not have a guide to help make choices about when and why committing air-enabled assets to a disaster is appropriate, there is a strong chance that high-demand low-density assets, like our mobility forces, may be overwhelmed. An equally concerning outcome is that the US makes unprincipled choices about when to help that could alter perceptions among key allies that we choose not to aid and wasting assets helping where they do not bring benefits to the country in general. This is not to imply that the US did not make a principled choice, at least in the case of Thailand. It is to say that motivations for action should be explicit and should go beyond the reason of mitigating human suffering because there will be a lot of human suffering that will go unmitigated because resources are scarce. The US may be placed into situations that can hurt key relationships because of seemingly contradictory or waffling motivations. This study is meant to take part in the conversation that moves the US closer to a framework of decision-making that applies assets where they can be most beneficial to US national interests.

The Thai case study suggests that, even in a large-scale disaster scenario, US leaders should not necessarily be quick to react by deploying assets to a particular region in anticipation that a state will want help or a particular type of help. For Thailand, their requirements were specific and issued only after several days of assessing their own capabilities. It so happened that Shinawatra wanted the technical and material assistance that the US had already dispatched. This may not be the case in the future, where assets may be wasted deploying to an area where the host government does not need the assistance. This also reveals that the idea of improving relations between states as a result of natural disaster assistance is probably more nuanced than the study demonstrates with the two proxy variables of FDI and aid. Moreover, interstate relations may not be the goal of the donor or recipient state at all.

It is possible that interstate relations may not be as important a goal as this thesis and other research holds, perhaps there are other objectives that are more salient to the research. In the case study, the principal and civilian leaders consistently highlighted saving lives and alleviating suffering as their goals. Undoubtedly there are numerous

ways to measure rescues, reconstituted homes and other important lifesaving and preserving factors. However, these measures can apply to many other disasters where the US did not respond, so it leaves open the question, why this disaster and not others? What disasters rise to the level of military and, specifically, air-enabled disaster response and why?

Further Research. Perhaps these and other relevant questions can be answered with a wider pool of data and perhaps negative cases may offer much more insight than was revealed with the positive cases. The idea of interstate relations as a dependent variable is drawn from existent disaster diplomacy research. Although the Thai case did not seem to support that idea, more cases with a similar framework of analysis could provide greater insight into the motivations for states as they pursue natural disaster responses. There are 41 possible cases for study using the database developed in this thesis. Perhaps a larger pool of cases with a structured focused comparison could reveal that there is another motivating factor characteristic of US disaster response, among other issues. There are a variety of social scientific methods that could be applied to the data and each may provide a different fidelity of the phenomenon in question. The goal would be to identify better variables for analysis in future studies.

Researchers using quantitative methods should also consider analyzing the negative cases, i.e., where HADR and air-supported HADR did not occur, in the post-Cold War environment. There may be data in the negative cases that help better estimate a model that the positive cases could not approximate alone. Using a dummy variable for whether a response occurred or not, allows for aggregation of the positive and negative cases. There are many more negative cases than positive cases, which is why this task may be most appropriate for quantitative analysis. However, it is possible that qualitative analyses of negative cases may occur if sources allow for analysis of decision-making concerning why US leaders decided not to engage in a disaster response. These cases could be included in a structured focused comparison as well.

One of the biggest areas for further research is in the selection of proxy variables for the dependent variable and various aspects of the independent variables. For instance, instead of focusing on FDI and aid, perhaps a better measure of interstate relations are public opinion polls (if available), air travel data between the recipient and donor states

or trade data. Each of these proxies provides a window into interstate relations with their own drawbacks. For instance, although public opinion polls may provide good snapshots of relations between average citizens, this is not always reflective of governmental relations between states. For instance, US citizens may have high public opinions of the Iranian public but those may break down as it relates to US citizen opinions of the Iranian government and vice versa. Like the dependent variable, additional independent variables should be considered that are characteristic of an air-enabled response.

For instance, it may be appropriate to measure air-enabled disaster response in terms of the number of sorties flown, the number of pallets of certain materials delivered, or the number of recipient state persons rescued or relocated. These may be more specific and more appropriate indicators about an *air-enabled* response. This data is almost always captured in air mission reports but is not always released to the public. Additional sources of information may be in force development and acquisition documents that may revel personnel skills and training as well as expected asset capabilities. If the variables prove to be fruitful, more requests can be made to release this type of information to bolster analysis of the topic.

Finally, the most important leap forward that can be made on this topic is to broaden the dataset to include all US military disaster response, air-enabled or otherwise. This would be a large project more suitable for a dissertation or third-party research like Rand. However, the fruits this type of research may bare can be far reaching because it does not focus on one capability of the US military but all elements. Like this research, the intent would be to help US leaders come to grips with increasing demands for natural disaster assistance in the context of limited assets. US policymakers can effectively deal with calls for more help with a better understanding of why assets are applied to HADR operations and when they are most appropriate for advancing US national interests.

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