BREAKING THE PHALANX? AN EXAMINATION OF COLONEL DOUGLAS A. MACGREGOR'S PROPOSALS REGARDING U.S. NAVAL AVIATION

A MONOGRAPH
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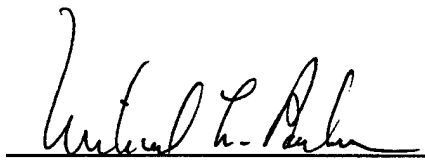

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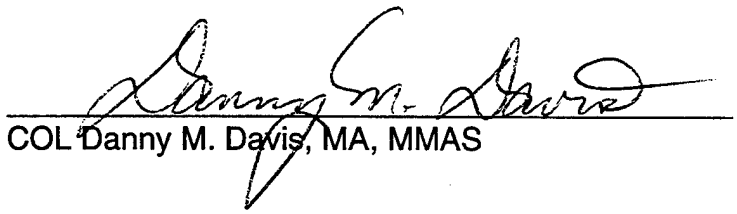

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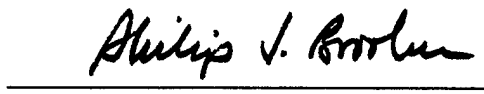

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ABSTRACT

BREAKING THE PHALANX?: AN EXAMINATION OF COLONEL DOUGLAS A. MACGREGOR'S PROPOSALS REGARDING U.S. NAVAL AVIATION by LCDR Brick R. Imerman, USN, 48 pages.

In his book *Breaking the Phalanx*, Colonel Douglas A. Macgregor raises important questions as to the future role of land power in the national strategy of the United States. Despite directing much of his discussion toward current Army corps/division restructuring, Colonel Macgregor forwards numerous arguments against funding current naval forces and the advisability of investing in future sea-based power projection platforms. Likening modern day America to the Roman Empire, Colonel Macgregor argues that security for the United States lies not in sea power, but in forward based armies akin to modern Roman Legions. He offers that today's navies are extremely vulnerable to cruise missile technology and land-based air power, as was evidenced in the Battle for the Falklands. In particular, Colonel Macgregor presents the argument that land-based aircraft can largely supplant aircraft carriers, which today are simply too expensive and vulnerable to warrant further funding. In the end, Colonel Macgregor argues that the military budget could be cut by $147 billion, with $102 billion coming directly from the cancellation of both the Navy's Nimitz-class aircraft carrier construction and it's F/A-18E/F Super Hornet program. The money saved from such cancellations could then be more prudently invested in new technologies and a stronger land-based force structure.

This monograph addresses the question: Do Colonel Macgregor's arguments as presented in *Breaking the Phalanx* regarding U.S. Naval Aviation, both in terms of fleet vulnerability and cost effectiveness, warrant the proposed restructuring of naval forces? In researching this question, the author presents a historical examination of the Battle of the Falklands, with lessons learned by the British applied, wherever possible, to U.S. naval forces today. Closely linked to this, the author examines the current cost/capabilities and future roles of CVBGs, seeking to answer questions regarding their survivability, their relationship to sealift assets, and their power projection capabilities ashore. This discussion leads directly to an analysis of cruise missile technology and its effects against ships at sea. Finally, Colonel Macgregor's arguments against sea-based air power and rejection of the F/A-18E/F Super Hornet are investigated.

In the end the author concludes that Colonel Macgregor's arguments pertaining to U.S. Naval Aviation, though well intended, miss the mark. Colonel Macgregor assumes that naval air exists for one purpose only: power projection over land. He ignores the fact that naval air exists to provide air superiority for naval fleets and sealift assets, and that power projection comes as a result of this air superiority. Colonel Macgregor never adequately addresses this fundamental aspect of naval warfare, indicating a lack of comprehension as to the importance of air superiority in wars at sea. Until an enormous space-based system capable of providing air superiority for ships at sea is fielded, aircraft carriers and their embarked air wings, despite their high costs, will remain vital naval warfare platforms.

TABLE OF CONTENTS

Chapter 1: Introduction

The 1997 release of *Breaking the Phalanx* rendered Colonel Douglas A. Macgregor an instant topic of conversation in Army circles. A veteran of the Gulf War Battle of 73 Easting, Colonel Macgregor subsequently served as Commanding Officer of the 1st Squadron, 4th Cavalry Regiment. His aggressive, unconventional style of tactics led his unit to an impressive record - three wins/one loss/one draw - against the opposition force at the Army's National Training Center (NTC), where, according to *U.S. News and World Report,* "most units typically lose four, draw one."[1] In military circles, the proposals set forth in his recent book appear as unconventional as the tactical style he displayed at the NTC, setting the stage for full scale debates from the academic halls of Fort Leavenworth to the banks of the Potomac River.

In *Breaking the Phalanx*, Colonel Macgregor raises important questions as to the future role of land power in United States' strategic thinking. "The inspiration," according to Colonel Macgregor, "for this strategic vision of reorganized American landpower is the Roman Legion."[2] Arguing that the Army's structure does not properly address the threat posed by today's adversaries, he proposes restructuring current corps/division forces into smaller, more responsive composite units. This lighter, more responsive Army, in Colonel Macgregor's view, should take a much more prevalent role in American strategic thinking. In Colonel Macgregor's own words, "Like it or not, the logic of international relations that positioned Rome at the center of world affairs also compels the United States to remain engaged in the world..."[3] This necessity for involvement means that, "America's ground forces will have to be prepared to perform the tasks Caesar assigned to his Legions - win wars, restore order, and preserve a stable and prosperous peace wherever direct American influence is required."[4]

Colonel Macgregor's unique approach to Army restructuring appeals to this author, a Navy pilot with limited Army experience. This appeal occurs because Colonel Macgregor's

proposed streamlined composite structure for Army forces parallels the composite structure of current Navy air wings and aircraft carrier battle groups (CVBGs). Further, Colonel Macgregor's plan for restructuring the Army's current training system is very familiar to any Naval Aviator. He proposes setting up three six-month operational readiness cycles through which units continuously rotate during peacetime - a "training cycle," which prepares units for deployment, a "deployment ready cycle," which sustains units at their highest readiness in preparation for real-world contingencies, and a "reconstitution cycle," which replenishes units in preparation for starting the entire process all over again.[5] While this training concept may in fact be new to the Army, a similar program has been standard operating procedure for Navy CVBGs for years.

Yet as a Naval Officer, despite my intuitions on the above subjects, I realize that I am little qualified to speak as to the validity of these proposals. Internal training and structure requirements for the Army are better argued by those with tactical experience in a land-based environment than through the well intended but tactically misguided approaches provided by sister services. Therefore, this paper will not address issues raised by Colonel Macgregor internal to the Army's structure and training cycle; rather, it will focus on other aspects of his proposals which relate directly to the U.S. Navy.

In the strategic arena, Colonel Macgregor argues that, "For the Army to play its role it must be proactive, coming into play before the peace is lost."[6] He argues that the policy of the U.S. in promoting democracy throughout the world in the past 70 years has proven a misguided failure.[7] He states, "Stable democracies do not suddenly appear. They develop."[8] It follows from this, in Colonel Macgregor's view, that American land power is necessary for the establishment and safeguarding of democracy throughout the globe. He states that, "Like invasion by the Roman Legions, the arrival of American landpower is synonymous with order,

stability, and democratic civilization."[9] For this reason, he proposes increased dependence on strategic alliances with other nations, coupled with increased basing of American soldiers on foreign soil.

Colonel Macgregor recognizes that land power assets alone cannot provide the complete solution to the strategic problems faced by America today. However, he feels that land power assets have been slighted by both their land-based air and, particularly, their sea-based counterparts to the extent that total force restructuring, beyond the internal scope of Army restructuring, needs to be addressed. Concluding that the U.S. needs, "an air-land structure with fewer sea-based air and sea-based landpower assets,"[10] he proposes restructuring the armed forces, cutting the defense budget by $147 billion - 80% from the Navy/Marines, 16% from the Air Force, 2% from the Army Reserve/National Guard, and 2% from the Army.[11]

In the "Roman diplomacy" envisioned by Colonel Macgregor's strategic analysis, sea-power is far too expensive and vulnerable to play a leading role. Colonel Macgregor believes that Desert Storm demonstrated the true role of sea-power, where sealift was the naval key to victory, and not the traditional sea power of CVBGs.[12] To support his argument, he cites the fact that fielding a CVBG costs over three times as much as fielding a 5,000 man light recon-strike group, and almost four times as much as fielding an F-16 air wing.[13] Further, cruise missile technology, as was evidenced in the Battle for the Falklands, holds what Colonel Macgregor contends is the trump card over CVBGs.[14] In future wars, nuclear tipped cruise missiles, according to Colonel Macgregor, will render aircraft carriers little more than vulnerable, floating, single-point targets.[15] He concludes that funding for Nimitz-class carrier construction should be immediately terminated, while further retiring (without replacement) the two oldest existing aircraft carriers in the Navy's inventory.[16] Additional savings could then be accrued by canceling the entire F/A-18E/F Super Hornet program.[17] The money saved from such

cancellations could then be more prudently invested in new technologies and a stronger land-based force structure.

Colonel Macgregor's proposals are indeed worth further examination. First and foremost, his arguments raise the theoretical question: Do the American people wish to follow the strategy of Rome and Caesar's Legions? President George Washington, who had considerable military experience in the French and Indian Wars and as General of the Continental Army, stated in his Farewell Address to Congress that alliances based on military presence should be approached with extreme caution:

> "Sympathy for the favorite nation facilitating the illusion of an imaginary common interest in cases where no real common interest exists, and infusing into one the enmities of the other, betrays the former into a participation in the quarrels and wars of the latter, without adequate inducement or justification."[18]

President Washington noted that our nation's unique geographical position in the world, "...invites and enables us to pursue a different course."[19] With few natural enemies on our immediate borders, "...we may choose peace or war, as our interest, guided by justice, shall counsel."[20] He concluded that, "Taking care always to keep ourselves, by suitable establishments, in a respectable defensive posture, we may safely trust to temporary alliances for extraordinary emergencies."[21]

Others have long warned against fielding large standing armies in times of peace, further questioning the example set by the Roman Legions. James Madison wrote in Federalist Paper No. 41 that though the Roman Legion's conquered the world, "Not less true is it, that the liberties of Rome proved the final victim to her military triumphs..."[22] Noting instead that American geography necessitates maritime strength as the "...principle source of her security against danger from abroad...,"[23] Madison went on to argue that, unlike large standing armies, "The batteries most capable of repelling foreign enterprises," meaning naval forces, "on our safety, are happily such as

can never be turned by a perfidious government against our liberties."[24] Lester Thurow went one step further, noting that though the Roman's amassed an empire, "...they did not accomplish this with our beliefs."[25] The empire did not protect individual rights, especially of conquered peoples, and a large class of slaves supported the Legions abroad. One needs only to read the New Testament of the Bible or study the Roman slave rebellion led by the gladiator Spartacus to realize that the *Pax Romana* was not enjoyed by numerous peoples under Roman influence, and that fundamental philosophical differences lie between the imposition of Caesar's Legions and the traditional view of individual rights held by American citizens today.

The question as to whether America should follow the strategy of Caesar's Legions, the precepts of Washington's Farewell Address to Congress, or some point between is indeed worthy of debate, but is certainly more than can be addressed in a single monograph. However, these issues are presented here to remind readers that Colonel Macgregor's arguments must in the end stand the scrutiny of the American people, which harbors a much different opinion as to the proper function of the military than did the Roman citizens of old. Legions of American soldiers on foreign soil are certainly perceived differently today than are U.S. based air and sea-borne assets deployed in international waters. Questions regarding their proper employment in support of U.S. strategy are not easily answered.

This monograph will instead proceed by addressing the following more limited but closely related question: Do Colonel Macgregor's arguments in *Breaking the Phalanx* regarding U.S. Naval Aviation, both in terms of fleet vulnerability and cost effectiveness, warrant the proposed restructuring of naval forces? Certainly, as Colonel Macgregor claims, aircraft carriers and their battle groups are expensive and vulnerable

to attack from enemy forces. However, does it follow from this that Nimitz-class carriers are obsolete, and that the Navy should totally cancel its F/A-18E/F Super Hornet program? This is worth further examination, as $102 billion of Colonel Macgregor's proposed $147 billion defense budget cuts come directly from these two programs.[26]

In approaching this topic, I will present a more detailed analysis of Colonel Macgregor's naval arguments as they relate to aviation. In particular, I will examine Colonel Macgregor's analysis of the Battle of the Falklands and will apply lessons learned by the British, wherever possible, to U.S. naval forces today. Closely linked to this, I will examine the current cost/capabilities and future roles of CVBGs, seeking to answer questions regarding their survivability, their relationship to sealift assets, and their power projection capabilities ashore. This discussion will lead directly to an analysis of cruise missile technology and its effects against ships at sea. Finally, I will investigate Colonel Macgregor's arguments against sea-based air power and rejection of the F/A-18E/F Super Hornet, including discussions on stealth technology, long-range land-based bombers, the canceled A-12 Avenger program, and the future role of the Joint Strike Fighter (JSF) and F-22 Raptor.

Whatever one concludes from reading *Breaking the Phalanx*, it cannot be denied that Colonel Macgregor has opened the door for much needed broad-based debates on the future structure of our military. If for this reason alone, his thoughts are worth further examination.

Chapter 2: Sea Power, the Falklands, and Air Superiority

Colonel Macgregor opens the second chapter of *Breaking the Phalanx*, entitled *Landpower and Strategic Dominance*, with multiple historical examples where sea power has failed to be a truly decisive factor in warfare. As evidence, he first cites the British fleet's defeat over the French at the Battle of Trafalgar on 21 October 1805. Colonel Macgregor argues that within six weeks after Trafalgar, it was Napoleon, and not the British, who commanded dominance over the European continent, holding power for most of the next decade.[27] Historical evidence of such land power triumphs leads Colonel Macgregor to conclude that the preponderance of our forces today must be focused on land, as was the case in Caesar's Rome, and not on the sea or in the air.

Colonel Macgregor, however, does not totally dismiss the role of sea power and air power in military affairs - "The reorganization outlined in this work envisions an information age American Army rendered distinctly more mobile and effective by cooperation with American airpower and unchallenged American control of the sea."[28] It is clear, as the title of his second chapter suggests, that Colonel Macgregor feels that land power is the dominant arm of warfare - "...seapower and airpower tend to play enabling, rather than concluding executive roles in warfare; the human being is still a land animal."[29] Supporting this idea, he states that, "Bombardment from a distance can enable landpower to win, but...without landpower, airpower and seapower cannot be strategically decisive."[30] Colonel Macgregor tends to downplay the corollary, that, in today's world, without sea power and air power, land power alone cannot be strategically decisive (unless, of course, the desired goal is a forced march on Canada or Mexico).

The fact that military domination of a single environment - whether air, land, or sea - rarely wins wars has been recognized throughout U.S. history. In 1781, then General

Washington, recognizing that his army was time after time strategically and operationally outmaneuvered by the British Navy, stated that, "no land force can act decisively unless accompanied by a maritime superiority."[31] It was the subsequent arrival of the French fleet which ultimately secured General Washington's only major victory against British regular troops at the critical Battle of Yorktown. Historian Russell Weigley echoed Washington's sentiments, stating that, "British naval power had been the enemy's principal strategic asset in the War of the Revolution, a timely accession of allied naval power produced American victory at the end, and the major strategic preoccupations of the new United States almost inevitably became naval."[32]

Likewise, Colonel Macgregor's assertion that land power alone proved decisive over the European continent after the Battle of Trafalgar is an over-simplification of the historical record. Though it is true that Napoleon dominated much of the European continent for nearly 10 years after the Battle of Trafalgar - "All Europe, save England, was to some degree under his rule," stated the historians Joseph Strayer and Hans Gatzke[33] - he could not control the seas and the economic power England accrued through them. Napoleon's ultimate defeat was the result of his attempted enforcement of the Continental Plan, which was a European-wide land embargo designed to economically strangle England and her powerful navy. Napoleon used a political alliance with Spain in an attempt to enforce the Continental Plan on an unwilling Portugal. This alliance soon fell apart, and Napoleon found himself fighting not only a land war with Portugal, but a resource draining war against his Spanish "ally" as well. Farther to the east, Russia likewise continued to trade with England, leading to Napoleon's famed march on, and subsequent retreat from, Moscow. Strayer and Gatzke noted that after Napoleon's 10 years of attempted land domination of Europe, in the end it was England whom gained in world commerce and reputation, while "...for the first time in two centuries, France was no longer the richest and strongest European state."[34] In the long run, Napoleon's approach to diplomacy and

land power weakened his country, while Britain, combining sea power, the economic power of free trade, and the natural defenses of her geography, further strengthened her position as a world power. Colonel Macgregor's analysis ignores the fact that in the "11th" year it was Britain, and not Napoleon's France, whom emerged victorious.

Despite its overwhelming contribution to the U.S. victory in Desert Storm, Colonel Macgregor similarly dismisses the decisiveness of air power. Using Vietnam as an example, he notes that, "The Air Force lost 2,257 aircraft and 2,700 airmen while hundreds more endured torture in captivity. For all the expenditure of treasure, firepower, and lives, American airpower...was never decisive..."[35] This is, in the author's view, neither a new nor reasonably contestable notion. As aircraft carrier historian Norman Polmar stated in 1969, "Air power alone has not won any war and there is no reason to suppose that air power alone could win the war in Vietnam."[36] What is important to note is that beyond the Air Force losses cited by Colonel Macgregor, ground forces lost nearly 50,000 lives and over 4,500 helicopters[37] in the same conflict - and in the end were no more decisive than their air power counterparts.

The lessons learned from both the air power and sea power examples presented by Colonel Macgregor, of course, should be that it takes the strategic orchestration of all our assets, not just those of a single service, to create a decisive victory in a major war. Arguments over which form of warfare - whether land, sea, air, or even space - is truly decisive are, as President Washington and aircraft carrier historian Polmar alluded, hardly worth the paper on which they are printed.

However, it is in the Battle of the Falklands that Colonel Macgregor asks valid questions regarding the vulnerability of naval vessels and the wisdom of large expenditures in their purchase. Citing both the effectiveness of land-based aircraft and the vast improvements in today's cruise missile technology, he states that, "Land-based air forces can now dominate large

bodies of water...in the Falkland Islands, the vulnerability of surface combatants in littoral waters to these new technologies was demonstrated when three Exocet missiles sank two British warships and damaged a third."[38] He continues that recent cruise missile proliferation will have a "...similar effect on today's large industrial age billion dollar aircraft and amphibious carriers."[39]

These arguments deserve further examination. For this reason, I will present a brief analysis of the conflict between Argentina and Great Britain.

The Battle of the Falklands

Despite ruling the seas for over 400 years, by the mid 20th century, British colonialism and empire were in a state of rapid decline. As Britain's position in the world diminished, so changed her political climate, and, in the eyes of British politicians, the need for a strong Royal Navy as well. Authors Max Hastings and Scott Jenkins stated in *Battle for the Falklands* that, "As each patch of red faded from the globe, so did the need for aircraft carriers, amphibious landing ships, and overseas bases."[40] By 1966, British Secretary of State for Defence Denis Healey concluded in a white paper that he could foresee no operation in which Britain would undertake where aircraft carriers would be needed. He stated that, "...in the future, aircraft operating from land bases should take over the strike-reconnaissance and air-defence functions of the carrier...Airborne early warning aircraft will...subsequently operate from land bases."[41] In arguing his case before Parliament, Secretary Healey stated, "The fact is that the United States is the only country in the world which plans to maintain a viable carrier force around the world through the 1970s. Neither the Soviet Union or China has carriers or plans to have them..."[42] The political assault on the Royal Navy at the time was such that the Navy Minister, Christopher Mayhew, resigned in protest.[43] Although the Royal Navy was forced to abandon large deck

carriers, it recognized the need for air power in the fleet, and subsequently pushed the construction of cheaper small deck carriers to accommodate V/STOL aircraft.[44] However, the anti-carrier assault continued, reaching a peak in 1981, when John Nott, Healey's replacement, stated that even the function of small deck carriers could be more cheaply carried out by destroyers and frigates. Once again the Navy Minister, in this case Keith Speed, resigned in protest.[45] According to Hastings and Jenkins, "The whole tenor of Nott's 1981 review - inspired by the most sustained attack ever mounted by the Treasury on defence spending - was to curtail the role of the navy and reduce its need for costly surface warships."[46] To the delight of many contemporary military analysts, "Nott had finally called the Royal Navy's bluff. Set-piece sea battles...had finally been sent to the museum."[47]

By 1982, after 15 years of naval decline, and within a year of Nott's criticism of aircraft carrier utility, the 300 year old feud over possession of the Falkland Islands came to a head. Rear Admiral Sandy Woodward was called on to lead an invasion force from Great Britain across 8,000 miles of ocean to the Falklands, a mere 400 miles from his Argentinean opponents. With no airfields on or near the Falkland Islands capable of supporting British Royal Air Force fighters, Admiral Woodward had to rely totally on the support of the Royal Navy's two remaining aircraft carriers - the relatively small HMS Hermes, capable of carrying 12 Sea Harriers and 18 helicopters, and the even smaller HMS Invincible, capable of carrying 8 Sea Harriers and 15 helicopters.[48] Alone, these 20 Sea Harriers - which numbered fewer than 1/3 the jet aircraft available on a single U.S. Nimitz-class carrier - would be responsible for providing not only air superiority for the naval task force against 223 land-based Argentinean combat jets,[49] but for providing air superiority, air interdiction, and close air support (CAS) for the landing forces as well.

Despite his extreme lack of aircraft carrier experience,[50] Admiral Woodward immediately recognized that without the Hermes and Invincible, the British had no means with which to conduct an invasion. He noted that, "...if the Argentineans knew what they were doing and hit one of my carriers, we would not need a...reason to start a war. The war would already be over."[51] Lieutenant Colonel James R. McDonough, U.S. Army, reiterated this fact, observing simply that, "For the British, the center of gravity for the entire operation rested on the two aircraft carriers, Hermes and Invincible."[52]

Admiral Woodward's lack of air power in the Falklands was exceeded by his even greater lack of air defense for the entire operation, both for his ships and for the invasion force going ashore. Not only were the Sea Harriers few in number, but they also suffered from limited range and an inability to fire radar guided missiles as well. Beyond this, the small deck aircraft carrier design employed by the British was incapable of launching any sort of airborne early-warning aircraft, such as the U.S. Navy's E-2 Hawkeye, leaving the Harriers blind to any incoming threat. To quote Hastings and Jenkins, "...the lack of AWACs was the single most critical British deficiency of the war."[53] In the absence of early warning radar, the British resorted to the absurd but necessary practice of stationing submarines off the coast of Argentina's air bases to visually report sorties headed for the Falklands.[54]

Beyond aircraft limitations, the air defenses of Admiral Woodward's surface combatants were less than adequate, both in technological terms and in terms of doctrinal employment. From the technological aspect, the surface air defense of the fleet relied on the long-range Sea Dart missiles of the Type 42 destroyers. The Sea Dart had, unfortunately for the British, been sold to the Argentine Navy, so the opposition was well aware of "...its one overwhelming weakness: designed to meet high-flying Russian aircraft, it could not engage targets at low level."[55] The British did possess an effective short-range missile, the Sea Wolf, but it was

deployed on only two Type 22 frigates. Further, despite the fact that the Type 42 destroyers and Type 22 frigates were capable of providing their own limited personal air defense, they were incapable of linking together in unified defense for the entire task force, and further failed to train together in such a role.[56] It was not until after HMS Sheffield was sunk that the British decided to change their tactics and attempt to deploy a Type 42 and a Type 22 together to form a layered defense in an effort to meet the threat of incoming enemy air attacks.[57] Beyond these glaring technological and doctrinal shortcomings, active defensive counter-measures against weapons like the Exocet missile were present on only the two Type 22 frigates, leaving the fleet woefully low in terms of last-ditch defensive options against incoming cruise missiles.[58]

One can readily see Admiral Woodward's predicament. First, air superiority would have to be gained by a force of 20 Sea Harriers with neither early warning radar nor radar missile capability in the presence of an enemy possessing vastly superior numbers. If attacking aircraft slipped through the scant Sea Harrier defense, as they would likely do with no radar support, then the Sea Dart missiles would be required to defend the fleet. Yet the Sea Darts were woefully inadequate against low altitude targets, a fact which was well known to the Argentineans. These two factors combined to create a road map for Argentinean pilots attacking the fleet. Further exasperating the problem was the fact that individual British ships were incapable of linking their defenses together, greatly reducing their overall effectiveness. Finally, if an enemy aircraft or missile got through this already leaky defensive system, the vast majority of Admiral Woodward's surface ships were incapable of launching any active counter-measures in their own self defense.

Early in the war, without airborne early warning aircraft, Admiral Woodward realized that his situation was tenuous - "We had already seen the ability of the Argentinean bombers to fly straight through our defenses."[59] As a direct result of their inability to gain and maintain air

superiority over the fleet, let alone over the islands, by the end of the conflict the British had suffered six ships sunk and ten others damaged.[60] Although aircraft dropping conventional iron bombs were responsible for the vast majority of the damage, Exocet missiles, both air and land launched, were responsible for two sinkings and one damaged vessel.

HMS Sheffield, a Type 42 destroyer designed in Secretary Healey's budget cutting era, was the first British combatant sunk. A pair of low level Argentinean Super Entendards carrying Exocet missiles fired on the unsuspecting Sheffied at a range of six miles.[61] Although there is debate as to whether the warhead on the missile which struck Sheffield ever actually exploded, the Exocet's motor, according to Dr. Norman Friedman, a theoretical physicist and expert on ship design, continued to burn after impact. The motor ignited an oil fire in the galley, "...which subsequently spread along cable runs and piping, causing spontaneous combustion. Plastic partitions and furniture also burned...PVC insulation smoldered, releasing toxic fumes."[62] Black pungent smoke permeated the ship almost immediately, forcing the crew topside. To make matters worse, "There were only eight oxygen breathing apparatuses on the ship,"[63] Crew members "...found it difficult to fight the fire effectively because their polyester overalls were themselves flammable."[64] A faulty design in the ship's damaged water main rendered it so ineffective that the crew was "...reduced to dipping buckets in the sea to attack the flames."[65] Despite all this, the Sheffield remained afloat five days after being hit and abandoned by her crew, finally rolling over on her side due to flooding and a top-heavy mast design inherent to the Type 42 destroyers.

Although a single Exocet missile was undoubtedly responsible for the sinking of the Sheffield, Dr. Friedman points out that errors in ship design, crew training, and damage control, which were simply the result of forgetting or ignoring the lessons learned from World War II, were major contributors to the sinking of a ship that should have survived a single hit.[66] Dr.

Friedman suggests that perhaps those lessons were intentionally disregarded in an era of declining budgets in order to reduce ship construction costs.

Three weeks later, two more Super Enendards launched another Exocet missile attack on the HMS Invincible and her support ships. This time, however, the surface combatants detected the aircraft and fired chaff in self defense. At the chaff firing, one missile veered away from the warships and acquired the container ship Atlantic Conveyor, which possessed no chaff. Designed as a cargo vessel, the Atlantic Conveyor stood little chance against the attack and subsequently sank. It is not known for certain whether a second missile fired in the attack also hit the Atlantic Conveyor or completely missed the entire battle group.[67]

The third cruise missile attack of the war, this time from a land-based Exocet, was successfully conducted against the destroyer Glamorgan. Having concluded night bombardment for troops ashore, Glamorgan was steaming back out to sea when she was engaged 18 miles from shore. However, in striking contrast to the attack on Sheffield, the older and larger Glamorgan, although losing 13 men in the attack, escaped relatively undamaged, was never taken out of action, and "...was steaming at twenty-three knots within fifteen minutes of the attack."[68] Dr. Friedman notes that while the sinking of Sheffield attracted the attention of military analysts around the world, the survival of Glamorgan was just as worthy of note. In this case, not only were the differing designs between ships probably a factor in saving the Glamorgan, but the performance of her crew helped save her as well. Defensive tactics taken after missile detection combined with effective damage control in fighting the ensuing fire most certainly kept Glamorgan from joining Sheffield at the ocean's bottom.[69]

Least remembered of all the cruise missile firings was the last air-launched Exocet strike of the war on the frigate Avenger. This engagement is likely forgotten because the Avenger, which had 45 seconds of warning, shot the missile down with her 4.5-inch gun.[70]

Lessons from the Falklands

Although the above discussion has focused on the sea and air aspects of the conflict, it must not be forgotten, in the words of Bruce Watson and Peter Dunn, that, "Ultimately the foot soldier, well trained and capably commanded, was the key to victory."[71] Despite the contention that the Hermes and Invincible were the "center of gravity"[72] for the operation, it is clear that neither carrier could ultimately recapture the ground.

Nonetheless, it has been equally argued that the final task assigned the foot soldier in the Falklands was entirely facilitated by naval forces, including carrier aircraft:

> "Great Britain won by destroying enough of the Argentine air force and navy that further Argentine operations on the Falkland Islands were impossible. The Argentineans were beaten even though large ground forces were available on the mainland."[73]

It was the combined power projection capabilities of both naval and air assets which ultimately put British "boots on the ground." As Dr. James George noted, "...there is one general lesson that pertained to the Falklands conflict just as it pertained to any battle during World War II: air superiority is an absolute necessity."[74] The British, who counted 5 ships lost and 12 ships damaged directly by enemy air in the Falklands, learned that it is just as necessary to attain air superiority over naval vessels as it is to attain it over ground forces.

Due to the lack of allies in the area and the island geography of the Falklands, air cover for the British, scant though it was, was by necessity provided entirely by carrier aviation. As Admiral Woodward noted, due to the Argentinean's ability to interdict British forces with tactical aircraft from the mainland, carrier air power was the key to the entire operation: without it, there was no way the British could reclaim the Falklands.[75]

If the U.S. were today placed in a scenario similar to that of the British, the results would look much the same. Despite our outstanding Air Force, the U.S. could not have maintained air superiority in the Falklands without carrier air. The Air Force's ability to provide strategic

bombing differs significantly from its ability to provide long-range air superiority, a point which is often misunderstood by those unfamiliar with air power and its application. The relative ease of strategic bombing operations should not be confused with the massive logistics required to support 24 hour per day air superiority operations in a military conflict. Strategic bombers fueled by airborne tankers from the United States are capable of bombing targets around the world, assuming that over-flight rights and air superiority have been secured for both enroute. Yet these same bombers are totally incapable of providing air superiority for the naval combatants, sealift assets, and troops ashore required in a Falklands-like scenario.

Without air superiority, all shore-based troops and naval vessels are at extreme risk to enemy aircraft. Friendly fighters must be based close enough to friendly forces to secure the skies from enemy air. Air refueling assets, though extremely valuable and capable, cannot do the impossible - they simply cannot provide the number of hoses and quantity of fuel necessary to feed fuel-guzzling fighters thousands of miles from friendly airfields. Further, though I will not present the mathematics here, land-based fighters cannot endure the transit time to and from combat stations in a Falklands-like scenario and still have time to maintain air superiority in their assigned sectors. The ample airfields and political alliances which so favored the Air Force in achieving air superiority during Desert Storm were simply not available to the British in the Falklands.

This discussion is not meant to denigrate the Air Force in any way, for they were certainly, as Colonel Macgregor notes, the dominant air factor in Desert Storm. Yet history reminds us that wars are often fought not in the sterile environment of the Iraqi desert, but rather on the see-sawing fronts of coastal nations like Korea or Vietnam, or on remote islands in the many oceans of the world, where airfields are neither as free from enemy ground intervention nor as readily available to friendly forces as they were in the Gulf War. Even Colonel John A.

Warden III, a noted Air Force proponent, states in *The Air Campaign* that, "indeed, in any conceivable major war fought by the United States, aircraft carriers will be a necessary part of the offensive needed to win the war."[76] Air Force and Naval Aviation assets each bring their own unique strengths and weaknesses to every engagement - they must be utilized accordingly.

Carriers and Cruise Missiles

Despite the vital air superiority role played by aircraft carriers in the Falklands, Colonel Macgregor argues that their usefulness today is overridden by their vulnerability to cruise missiles. Noting that an aircraft carrier's enormous size makes it an easy target, he concludes that, "The concentration of several thousand sailors, airmen, and Marines in an amphibious or Nimitz-class aircraft carrier risks single-point failure in future warfighting."[77]

Dr. Friedman, however, argues quite the opposite, noting that of the two warships struck in the Falklands (the Atlantic Conveyor is disregarded here as she was a merchant vessel), the larger Glamorgan survived while the smaller Sheffield did not. The Glamorgan, however, which displaced 6,200 tons, is a mere fraction the size of a 95,000 ton Nimitz-class carrier.[78] Large vessels which execute proper damage control are extremely difficult to sink, especially if specifically designed to World War II lessons learned, as are the Nimitz-class carriers. While the carrier's size indeed makes it more detectable than its smaller counterparts, it is a fact of naval warfare that on the open ocean there is no place to hide, even for smaller vessels. Dr. Friedman concludes that the survivability advantages of size, both in terms of damage control and in terms of layered defensive capabilities (which will be discussed shortly), far outweigh the disadvantages of detection when it comes to ships on the featureless terrain of the sea.

If size makes a carrier difficult to bring down, Colonel Macgregor offers simply that a bigger weapon be chosen - "Sea-based forces are ideal targets for weapons of mass

destruction(WMD)..."[79] In a mock scenario designed by Colonel Macgregor to show the decisiveness of land power,[80] the enemy fires every one of its 67 cruise missiles, some nuclear tipped, exclusively at carrier task forces.[81] This author will not deny that nuclear weapons, if able to detect their targets and survive to impact, are effective against ships at sea. However, assuming that tomorrow's cruise missiles will be used exclusively against sea targets rather than land targets is indeed myopic. First, the U.S. Navy has been preparing against such an attack for years and is, in fact, well prepared for such, as will be argued shortly. A CVBG's air defense system coupled with the featureless terrain of the ocean makes the job of destroying cruise missiles much easier for sea-based forces than for their land-based counterparts. It is worth noting that, unlike relatively immobile land forces, the targeting of a ship which is 50-100 miles from shore, cruising at speeds faster than the average M1A1 Abrams tank moves across the battlefield, is a very difficult task for all but the most sophisticated of enemies.

While it is true that the majority of cruise missiles in the world today are of the anti-ship variety,[82] that percentage is rapidly diminishing as manufacturers reconfigure for land attack.[83] The question then becomes, if a country has the capacity to purchase a limited number of WMD capable cruise missiles, should it invest in those capable of targeting aircraft carriers which may move up to 700 miles a day, or rather invest in those more capable against relatively stationary land targets, such as airfields containing AWACs and air refueling assets, or Army COSCOMs with 30,000 personnel assigned? The lucrative carrier target proposed by Colonel Macgregor might in fact not seem as lucrative when the above options are considered. Colonel Macgregor argues that since carriers are vulnerable to WMD, their development should no longer be considered. However, this line of reasoning applies equally to land-based airfields, COSCOMs, assembly areas and more as well. Logically applied, this argument would soon lead to the disestablishment of not only CVBGs, but to many current Army and Air Force structures as well.

While Colonel Macgregor contends that naval vessels sunk by Argentinean cruise missiles forebode the demise of U.S. aircraft carriers, it is important to note that the British fleet in the Falklands fell well short of U.S. Navy standards in terms of air defense. This factual omission must be addressed when considering Colonel Macgregor's argument. U.S. aircraft carriers, beyond being highly efficient power projection platforms, are among the most highly defended military assets in the world. Their defense is focused on defeating not only enemy surface navies and aircraft, but on defeating opposing cruise missile threats as well. The 20 Sea Harriers available to the British for the air superiority mission on two small aircraft carriers in the Falklands were a mere fraction of the fighter aircraft available on a single Nimitz-class carrier. Further, the Sea Harriers, though capable aircraft for a small carrier, would not even be considered for a fighter mission in the U.S. fleet due to their lack of air-to-air capability. Beyond fighter aircraft, the E-2C Hawkeyes, EA-6B Prowlers, and ES-3 Shadows of a U.S. carrier air wing provide additional long range defensive capabilities which could never be deployed off the small, non-catapult British carrier designs. These aircraft combine to create an air defense zone which stretches hundreds of miles from the carrier, providing a vital first layer to a defensive network which the British lacked. This lack of defensive air power was a major contributor to the sinking of the British ships.

With airborne radars linked to the surface combatants of the battle group, surface missile engagement zones, with different systems optimized from long to short-range, provide the next integrated layers of the CVBG's air defense. In close, active and passive countermeasures combine with highly accurate Phalanx gun systems to provide further protection which the British lacked. As a result of this layered defense, the probability of getting an Exocet launch platform within 30 miles of a U.S. aircraft carrier, although indeed a serious threat, is in fact extremely low. To equate the sinking of British vessels lacking any form of air superiority with

the sinking of a highly defended Nimitz-class carrier, as Colonel Macgregor does, ignores much of the tactical realities of U.S. naval warfare.

Colonel Macgregor argues throughout *Breaking the Phalanx* that the Navy and Air Force need to quit searching for "silver bullet" weapons which cannot be defended against,[84] as counter-measures to such will always be developed. Likewise, cruise missiles should not be viewed as "silver bullets" against ships. As was mentioned earlier, while most people remember the sinking of a surprised Sheffield, few remember the downing of an Exocet by a well prepared Avenger. Likewise, the U.S. Navy has destroyed numerous cruise missiles in exercises in recent years.

Cruise missile technology continues to evolve, as is evidenced today in the Russian SS-N-22 Sunburn missile, which far surpasses the capabilities of the Exocet missile fired on the British in the Falklands.[85] The U.S. Navy, however, has been training against this threat, and will continue to do so. Today, the Navy's ability to detect and track multiple cruise missiles at long range with either E-2C Hawkeyes or Aegis missile systems, followed by subsequent hand-over of the same information to the optimum defensive asset for target destruction, whether land or sea-based, remains unsurpassed.[86]

The Cost of a CVBG

Colonel Macgregor concludes that even if carriers and their battle groups are in fact survivable, they are simply too expensive to warrant further funding - "The enormous expense of replacing industrial age naval platforms and amphibious forces with a new generation of similar structures is one Congress should avoid."[87] He notes that a light reconnaissance-strike group of 5,000 soldiers costs only $145 million to field compared to $488 million for an entire CVBG.[88] Due to the vastly differing functions of these forces, such a comparison is extremely difficult to

assess. However, Brigadier General S.L.A. Marshall addressed such a proposal in a 1962 article entitled, "Naval Power as Understood by a Soldier."

> "...it is simply idle to speculate about whether one supercarrier would have more influence on operations, come war, than an additional army corps, which could be organized, equipped and paid for one year for a roughly equivalent sum. Enough to sum up then my view that the supercarrier afloat today has more restraining value...and is a more positive deterrent...than the 1961 call-up of two Army divisions."[89]

Though S.L.A. Marshall is by no means the expert on this subject, his thoughts are worthy of consideration.

Further, Colonel Macgregor argues, as did British Defence Secretary Healey prior to the Falklands, that land-based air power can today perform the functions assigned to carrier air wings.[90] He points out that a land-based F-16 wing, which contains roughly the same number of aircraft as a CVBG, costs only $124 million to operate, or $364 million less than its sea-based counterpart.[91] For this reason, Colonel Macgregor argues that carrier air should be supplanted with land-based air to the greatest extent possible due to cost effectiveness.

However, it must be noted that Colonel Macgregor attempts, as was the case with the light reconnaissance-strike group, to compare the costs of two items which are not readily comparable. Because a single air wing is attached to a CVBG does not mean that a CVBG is limited to performing only air wing-type missions. In the same manner that a Hawk or Stinger missile cannot perform all the missions of a more expensive Patriot missile, F-16 air wings cannot perform all the missions assigned to CVBGs - they are simply not as capable.

It is worth noting that in the fine print attached to Colonel Macgregor's F-16 wing cost figures is a disclaimer stating, "Ammo and basing costs not included."[92] There are other more important factors which are omitted from the cost analysis as well. For example, the presentation of figures implies that a CVBG's sole mission is to provide air power from a fixed location, as is the mission of its land-based wing equivalent. This is in fact quite deceptive and

false. The cost of operating a CVBG includes the costs of operating not only a single aircraft carrier, but of operating 1-2 cruisers, 1-4 destroyers/frigates, 2-3 submarines, and associated battle group supply ships as well. Utilizing the unique capabilities of these assets, the CVBG provides its own airfield and self defense wherever it deploys, allowing operations to be conducted continuously from the neutral terrain of international waters, regardless of alliances and over-flight rights. Conversely, the vast majority of land-based aircraft are heavily dependent on foreign airfields and host nation/Army ground forces for support and security. These defensive assets and facilities do not come for free. The U.S. spent over $1 billion in upgrading Saudi Arabian airfields prior to Desert Storm.[93] This may not be feasible in many instances, as was evidenced in the Falklands, due to geographic or political constraints. Colonel Macgregor's analysis does not reflect this cost..

A CVBG also provides not only air power, but hundreds of ship launched, long-range Tomahawk cruise missiles for power projection ashore as well. This flexible firepower does not come for free, and is likewise not included in a standard F-16 package. Further ignored in the comparison is the cost of highly mission specific E-2C Hawkeyes for early warning radar, EA-6B Prowlers for suppression of enemy air defense systems, ES-3 Shadows and organic S-3 Viking air refueling assets, all of which are missing from an F-16 wing.

Beyond aircraft, a CVBG's costs also include its extensive air defense assets. These assets include the lethal Aegis radar missile systems and related missiles aboard the surface combatants of the entire battle group. Land-based airfields almost always lie within the protective envelope of similar missile systems; however the costs of such missile systems are not reflected in the F-16 wing analysis.

Beyond air defense, the cruisers, destroyers, and frigates of the CVBG ensure that vital sea lanes remain open as well. Attack submarines provide a potent threat to enemy fleets and

shipping assets. All these missions, which cannot be performed by an F-16 wing, are included in the cost of a CVBG.

Elements of CVBGs also routinely conduct ship boardings at the behest of our national government. The U.S. Navy performed over 21,000 such ship intercepts in the Arabian Gulf from 1990-1994.[94] F-16s, on the other hand, rarely board ships.

CVBGs also provide and protect most of their own sustainment forces, a function which F-16 wings are not required to perform. Navy supply ships and the defense required for them, like all of the aforementioned, do not come for free.

While arguments always tend to focus on carrier costs, and not missions performed, retired Admiral Leon Edney points out that there are likewise hidden costs to land-based air which are rarely raised:

> "...we have not lost any carriers to enemy action or geopolitical changes since World War II. This cannot be said of our overseas land bases. In such countries as Iran, Libya, Vietnam and the Philippines - to name a few - we not only lost airfields we paid for, but also lost the costly infrastructure to support maintenance, flight operations, and quality of life, which we also had paid for with billions of defense dollars."[95]

The listed problems with Colonel Macgregor's cost comparison between an F-16 air wing and a CVBG are not exhaustive; however, they are extensive enough to show that the argument should not be accepted as presented. Colonel Macgregor neglects the fact that a CVBG performs all the missions of a land-based air wing and much more as well. A CVBG is indeed expensive, but its cost must be more than that of an individual land-based air wing because an air wing is included as a component of the CVBG itself. In other words, a car costs more than its engine, but in turn is capable of doing more things. To compare the cost of the two shows a lack of understanding of the total capabilities and missions performed by CVBGs. As was stated earlier, CVBGs perform vital functions which cannot be quantified in terms of land-based air only.

Small Versus Large Carriers

Large carriers, though highly capable, are indeed expensive. This has led many critics to argue that the U.S. should instead procure smaller carriers like those employed by the British, as they are cheaper to produce. Senator Gary Hart presented such an argument to Congress in the period following the Falklands.[96]

Large carrier proponents contest this notion, drawing exactly the opposite lesson from the Falklands conflict. Then Secretary of the Navy John Lehman concluded that only large carriers capable of providing total air superiority for the fleet are worthy of future funding.[97] According to this argument, small carriers are incapable of providing fleet air defense, due to the inherent small number of aircraft carried, which in turn threatens the very existence of the fleet as a whole. Small carriers are further incapable, both now and in the foreseeable future, of launching large early warning radar aircraft or 4th and 5th generation fighters, which are both absolutely vital in attaining air superiority over enemy aircraft in today's maritime environment. Lack of such assets leaves small carriers and the fleets protected by them extremely vulnerable to land-based aircraft and missile systems, as was evidenced in the Falklands.

Though three small carriers might be bought for the price of a fleet carrier, they would require a proportionate increase in the purchase of surface support ships to protect them - a hidden cost which small carrier proponents often fail to realize. Despite having funded more ships, essential air superiority will still not have been attained. This indefensibility, in the eyes of large carrier proponents, combine to make the small carriers, and not the large, the wasteful expenditure.

Further, as Dr. Friedman argues, "One of the misfortunes of the current carrier debate is that many of those involved do not appreciate that ship size is the least expensive item. Electronics and aircraft cause the greatest expense."[98] Today, any carrier, large or small,

requires the same electronics suite. Dr. Friedman continues that, "As for aircraft, it is unfortunately customary to include their costs with that of the carrier, as though somehow a ship with sixty (or twenty) aircraft provides a similar capability to one with ninety, at a bargain price."[99] This, of course, is simply not the case.

These are important factors which must be understood when debating CVBG costs. What use is there in funding any navy if it is left without air superiority against long-range bombers and cruise missiles? As Dr. George explains, after all factors are taken into account, "...pound for pound a carrier is one of the cheapest ships afloat."[100]

Carriers and the International Community

Beyond carrier costs, Colonel Macgregor, again echoing the words of British Secretary for Defence Healey, states that the lack of international interest in aircraft carriers, "...would suggest that no other state in the world sees carrier-based aviation as an essential feature of power projection capability."[101]

Despite this claim, there is plenty of evidence to the contrary. Dr. George, writing in 1983 about the Soviet Navy, stated that while the British necessity for carriers and air superiority over naval operations in the Falklands, "...might at first seem an obvious lesson, it was ignored by the Soviet Navy for almost thirty years, and it will not be corrected until they start commissioning their CTOL (U.S. type conventional takeoff and landing) carriers."[102] In the 1980s, with full knowledge of the Falklands conflict, the Soviets dedicated themselves to the massive effort of building a power projection fleet of ten aircraft carriers, including four in the nuclear powered, steam catapult BLCKOM 5 Class, designed specifically for the Su-27 Flanker.[103] This effort, though thwarted by the breakup of their union, strongly suggests that the Soviets learned an entirely different lesson on the importance of naval air superiority and power

projection capability from the Battle of the Falklands than is contended by Colonel Macgregor. Further, this massive building effort took place in an era when cruise missile technology was well known to the Soviets. Today, despite financial difficulties, Russia continues to operate the highly capable Admiral Kuznetsov, which carries a full load of Su-27s.[104]

Beyond Russia, the international community continues to seek aircraft carriers in their fleets, despite the high costs involved. The French nuclear powered carrier Charles de Gaulle, with two recently purchased E-2C Hawkeye early warning radar aircraft, will begin sea trials this year, joining the older Foch and Clemenceau.[105] The Italians are currently constructing their second carrier, the Giuseppe Mazzini.[106] Great Britain is now seeking a design for up to three carriers to replace the Invincible and Illustrious.[107] Brazil is planning a large-deck twin catapult/arresting gear carrier to replace the aging Minas Gerais.[108]

However, David Foxwell of *Jane's* feels the true race for carriers may no longer be focused in the Western Hemisphere. "The anticipated naval expansion in the Pacific Ocean in the next 10-15 years means that by the middle of the next decade the region could become a focus of confrontation between opposing carrier powers."[109] Australia is acutely aware of this situation. The *Asia-Pacific Defence Reporter* recently stated that by 2040, "China will have achieved genuine super-power status in both economic and military terms, quite possibly with a blue-water navy operating carrier task forces that fly advanced derivatives of the Su-27."[110] China's Central Military Commission has in fact announced its intentions to build three large aircraft carriers and has identified the shipyards in which they will be built.[111] Further, a western shipbuilder has submitted a conventional takeoff carrier design to China, although construction has not yet commenced.[112] Likewise, India is pursuing new designs to replace her aging Vikrant and Viraat carriers, but is faced with limited funds. There is speculation that instead of buying

new carriers, India may purchase the Clemenceau from France, or perhaps the Admiral Gorshkov or incomplete Varyag from Russia.[113]

Although the Chinese and Indian carrier fleets are still in the conceptual phase, the Pacific expansion has in fact already begun. In 1997, Thailand joined the carrier club, commissioning the brand new Chakri Naruebet, which is similar in design to Spain's Principe de Asturias.[114] It seems unlikely that neighboring states will lag far behind.

Alas, as the old saying goes, the death of international interest in aircraft carrier development, as stated by both former British Secretary of Defence Healey and Colonel Macgregor, seems to have been greatly exaggerated. In Colonel Macgregor's defense, there are those who would note that this round of carrier building is merely indicative of "2nd wave" nations attempting to exert their position on the world stage.[115] However, it is worth noting that the French, like the U.S., who are on the cutting edge of many "3rd wave" military technologies, remain committed to nuclear powered aircraft carrier development. The size of carriers allows them to easily incorporate the latest technologies, including not only those of the "2nd wave," but those of the "3rd wave" as well.

Conclusions

Colonel Macgregor recognizes the military need for maintaining supremacy of the seas, even if only for the sake of supporting Army operations. However, he draws the lesson from Desert Storm that:

> "No opposing naval forces tried to challenge U.S. Naval Forces for control of the seas. Waves of enemy aircraft never attempted to attack the carriers. There was no submarine threat to the flow of men and material across the oceans. Forced entry from the sea was unnecessary."[116]

From this, Colonel Macgregor concludes that land power assets should supplant CVBGs, and that the Navy should focus its efforts on sealift.[117]

Book reviewer Murray Williamson notes that Colonel Macgregor "...clearly believes that U.S. military forces will have access to the ports and airfields from which to launch military campaigns..."[118] History records, however, that this will not always be the case. It is important to note that while sealift assets were never attacked during Desert Storm, that in no way implies that they will be safe in future conflicts. The one lesson that potential adversaries of the U.S. learned from the Gulf War was that American forces cannot be allowed to build up unimpeded for an attack at the time and place of their own choosing. Assuming that an adversary will allow the same unimpeded transfer of troops, such as sending them all via "commercial air"[119] as was done in the Gulf War, is perhaps a tragic assumption. Four airliners loaded with troops blowing up simultaneously enroute to theater might change our outlook on how we as a military conduct transportation. Likewise, drawing the conclusion from Desert Storm that more sealift assets are required at the expense of those naval forces which must protect them is an equally disastrous course of action.

Aircraft carriers are required first and foremost for establishing local air superiority over the fleet. Whereas land-based bombers can attack fleets from great distances, land-based fighters cannot protect them from the same. To fall into the trap of assuming such shows a near complete misunderstanding of naval operations and air superiority. When air superiority cannot be attained over the fleet, as was evidenced in the Falklands, all naval forces become prey. The dead crewmen of the Atlantic Conveyor would note that this holds especially true for sealift vessels.

Land-based air is incapable of performing the myriad of missions assigned to sea-based forces; therefore, a cost comparison between the two serves little purpose. The cost of a CVBG includes not only the cost of an aircraft carrier, but also the cost of a composite air wing of 70 aircraft, a half dozen surface combatants, submarines, supply ships, air defense assets, cruise

missiles, and much more. In the end, Colonel Macgregor's comparison between the cost of a CVBG and 70 land-based fighters proves, at best, misleading.

Colonel Macgregor concludes that cruise missiles forebode the demise of "industrial age naval platforms."[120] Dr. Friedman, however, summarizes the counter argument:

> "There is something attractive about an inexpensive weapon which appears to make investment in large warships unnecessary. Alas, the Falklands battles prove nothing of the sort. What they do show is that surface ships are necessary to project power at a great distance, and that the same surface ships can be sunk by a determined enemy. That is not exactly a new lesson, but it is one too often forgotten: the surface navy exists, not merely to float, but to accomplish missions which no other platform or set of platforms can accomplish."[121]

In order for "the surface navy to exist," it requires air superiority, which today can only be effectively provided by large aircraft carriers. While Colonel Macgregor fails to recognize the overall utility of CVBGs, recent Commander-in-Chief (CinC) of U.S. Central Command, Army General Binford Peay, sees things quite differently:

> "Because of their limited footprint, strategic agility, calculated ambiguity of intent, and major strategic and operational deterrent capability, naval forces are invaluable...the carrier battle group, in particular, has been an unmistakable sign of U.S. commitment and resolve in the Central Region."[122]

General Joseph P. Hoar, former CinC, likewise noted that, "When CinCs get together to discuss what we ought to be sharing among ourselves, we don't argue about submarines and bombers...We argue about carriers and amphibs. We need them out front."[123]

Chapter 3: The Super Hornet

Colonel Macgregor's arguments against aircraft carriers in general lead him to a more specific argument against the Navy's new multi-mission strike fighter, the F/A-18E/F Super Hornet. While Colonel Macgregor recognizes the fact that the Navy will continue to operate CVBGs in the future, he finds little justification in buying the Super Hornet, which he feels offers little improvement over the current model of Hornet, the F/A-18C.

Citing the fact that there are insufficient funds to support the three major tactical fighter projects currently underway in the U.S. - the Super Hornet, the F-22 Raptor, and the Joint Strike Fighter (JSF) - Colonel Macgregor proposes canceling the entire F/A-18E/F program. An important factor in his decision is the contention that, "...trendlines in military affairs suggest that the long-term contribution of carrier-based aviation to a major land campaign is likely to be marginal."[124] Noting the fact that the Super Hornet has less range and carries a smaller payload of bombs than the plane which it is designed to replace, the A-6E Intruder, and that it costs more than the existing version of the Hornet, Colonel Macgregor concludes that the Navy would save money if it elected to "...transition direct to the Joint Strike Fighter and F-22 variant if required from a joint perspective."[125]

In order to further assess Colonel Macgregor's arguments, it is first necessary to determine why the Navy feels it needs a new fighter - or more correctly, a new multi-mission aircraft - in the first place. The Super Hornet program initially evolved from the Navy's need to replace the A-6 Intruder medium-range bomber, which was originally designed in the late 1950s. The Intruder, though extremely capable for its era, was by the 1980s too slow and too old to keep pace with modern threats. By 1990, it had been upgraded and redesigned multiple times, including once because an A-6's aging wings completely sheared off in a high-G maneuver.[126]

The ensuing debate over a replacement for the Intruder was not only long, but heated as well. Vincent Grimes of *Jane's* suggests that many recent criticisms against the Super Hornet are expressed by those unfamiliar with the program's long evolution:

> "Such turbulence is nothing new for the U.S. naval-aviation community, which has seen successive plans to replace the aging A-6 Intruder scrapped. Six years (now seven) of turmoil have seen the cancellation of the A-12 Avenger II...and the follow-on A/F-X (navalized F-22)...the A-6F, A-6G and A-6H programs...a navalized version of the F-117 stealth fighter, and a heated debate as to the relative merits of an improved Hornet or enhanced F-14D Tomcat."[127]

The initial replacement for the A-6E Intruder was to be the A-12 Avenger, which was designed as the Navy's first all aspect stealth bomber. In 1987, however, McDonnell Douglas designed the F/A-18E/F Super Hornet as a cost effective backup in the event the Avenger program failed.[128] The technology laden Avenger soon ran into severe problems reminiscent of the 1960s F-111B program. Secretary of Defense Dick Cheney canceled the Avenger program in 1991 after it became mired in weight problems, numerous delays and cost overruns.[129]

During this same time period, lessons learned from Desert Storm were having an impact on the Navy's leadership as well. One such lesson was the affirmation of the F/A-18C Hornet's multi-mission capability. The Hornet proved it could not only perform both air-to-air and air-to-ground missions individually, but that it could perform them simultaneously as well, destroying enemy fighters while enroute to enemy ground targets.[130] Further, Hornets were also routinely scheduled as HARM missile shooters in the suppression of enemy air defenses. The ability of a single airframe to perform three distinctly separate missions led many Navy planners to re-evaluate their ideas on buying expensive single-mission aircraft like the Avenger. After intense debate, the Navy decided to purchase the F/A-18E/F Super Hornet, which would be a larger, more advanced version of the combat proven F/A-18C Hornet. The Super Hornet would replace not only the A-6E Intruder, but the F-14 Tomcat and possibly the EA-6B Prowler as well.

The Contenders

With the historical setting established, I will examine Colonel Macgregor's proposed cancellation of the Super Hornet with the JSF as a substitute. In particular, I will focus on Colonel Macgregor's contention that the JSF will be more economical for the American taxpayer than the Super Hornet. In order to answer these questions, I will briefly look at the three tactical aircraft programs underway in the U.S. today- the F-22, the JSF, and the Super Hornet.

The F-22

The F-22 Raptor is the Air Force's all aspect stealth replacement for the F-15 Eagle. Designed to carry American air superiority into the 21st century, it will be the first fighter equipped totally with internal weapons carriage. Since external weapons carriage greatly increases radar reflectivity, internal weapons bays will allow the Raptor to remain stealthy. Likewise, internal weapons bays will greatly reduce external aerodynamic drag, thereby allowing the Raptor to achieve supersonic speeds without using fuel consuming afterburners.

The tradeoff for carrying stores internally (you never get something for free in the world of aviation design) is the Raptor's reduced total weapons carrying capability - there is limited space available inside any fighter-type aircraft. However, since the Raptor is designed almost entirely as a single mission air superiority fighter, this is not a notable shortcoming, as it can easily carry a full complement of air-to-air munitions internally. However, if called on to perform in the air-to-ground role, it will only be capable of carrying two precision-guided bombs. Although extremely accurate, these munitions are intended almost exclusively for interdiction missions - the Raptor will not be used in a CAS environment.

The high-tech Raptor will not be cheap. The current Clinton Administration estimate for the cost of a single F-22 is $91 million. However, the Congressional Budget Office (CBO), in its

study evaluating the F-22, JSF and Super Hornet, suggests that this figure is in fact low, and that a price tag of $108 million is more accurate. The study also indicates that the F-22 is likely to be subject to future delays in development, due to the nature of the technology involved, which will further raise its unit price.[131]

The Joint Strike Fighter

There are great hopes for the JSF. The idea behind it is simple: design an aircraft which meets the combined needs of the Air Force, Navy and Marine Corps, and then reap the economic benefits associated with mass production. As the CBO states, "The Joint Strike Fighter is expected to replace a number of aircraft including the Air Force's relatively inexpensive, multipurpose F-16 aircraft, the Navy's A-6 attack plane, and possibly its F-14 fighter, and the Marine Corps' AV-8B jumpjet."[132] It is worth noting that there is little in common between the aforementioned aircraft, as each was designed with a specific mission in mind. In concept, the JSF will overcome these differences by utilizing a single airframe with 80% common parts - the remaining 20% will then be used by the services for individual mission tailoring.

Of the three fighter designs in question, the CBO states, "The JSF is...the least well defined of those programs, since it is the youngest."[133] As a result, it is also the highest risk of the three, as there are:

> "...doubts about the ability of the JSF program to deliver a family of aircraft that can meet the distinctly different requirements for each of the services - namely, an inexpensive, multirole fighter for the Air Force; a very stealthy, longer-range, carrier-based, ground-attack plane for the Navy; and a multipurpose fighter for the Marine Corps that will be able to take off from the short deck of an amphibious ship and land vertically."[134]

There is historical precedent for the above skepticism which can be traced back to the design and production of the F-111.[135] Designed in 1961 at the request of then Secretary of Defense Robert McNamara, the F-111 was to be fielded together by both the Navy, who needed

a fighter to succeed the F-4 Phantom, and the Air Force, who needed a strike aircraft to replace the F-105 Thunderchief. The F-111B, which was the naval version of the aircraft, immediately ran into difficulties, falling behind schedule due to weight problems and failure to meet performance standards in flight tests. Despite intensive efforts to fix the problems, which resulted in enormous cost overruns, the F-111B was canceled in July 1968. The Air Force, which faced many of the same delays and cost overruns, reluctantly brought the plane into service in October 1967. Once in service, the airframe continued its lackluster performance until its fourth version, the F-111F, was finally procured in 1973.[136]

Currently, the first test flights for the JSF are scheduled for the 2004-2005 time frame, with operational flights to follow in 2008.[137] If the JSF can overcome the aforementioned design problems, sheer production numbers will indeed reduce its costs. However, designed with a high degree of stealth in mind, the JSF is not predicted to be a cheap aircraft. Current estimates for the naval version of the JSF, according to Department of Defense figures, run $81 million per copy.[138] However, given the infancy of the program and the historic record of other fighter programs at this stage of development, the CBO warns that the actual cost of the JSF, if fielded, is likely to be 36% higher than current estimates, or $110 million per copy.[139] It is worth noting that, if this is in fact the case, the "cost effective" naval version of the JSF will be more expensive than the $108 million F-22.

The Super Hornet

Chief of Naval Operations Admiral Jay Johnson has stated that, "The JSF, while it looks wonderful to all of us, it's just paper right now."[140] On the other hand, the F/A-18E/F Super Hornet, which has already performed over 1000 test flights, will begin initial operations in 1999, with first squadron deployments beginning in 2001, seven years ahead of the JSF.[141] Concerned

with the JSF's paper status and already growing cost estimates, Vice Admiral Donald Pilling, the Navy's senior budgeting officer, has noted that the Pentagon must, "...come up with a cheaper way to develop this aircraft."[142]

No one in the Navy today claims that the multi-mission Super Hornet will be as capable in the air-to-air arena as the single-mission F-22. Likewise, if the JSF lives up to all its expectations when finally fielded in 2008, no one will claim the Super Hornet its superior as well. Rather, purchasing the Super Hornet has been a conscious decision by the Navy to balance the foreseen threats of the next 20 years with the budgetary considerations of today.

While the naval version of JSF will cost $110 million per copy and the F-22 will cost $108 million per copy, the F/A-18E/F Super Hornet, according to the same CBO analysis, will cost only $61 million per copy.[143] Further, this cost is not expected to rise - "According to CBO's analysis, only one plane - the F/A-18E/F - has costs that reflect historical cost-estimating relationships."[144] As a result of this fiscal discipline, Mike Sears, the head of the Super Hornet program at McDonnell Douglas, has received accolades from the likes of *Aviation Week and Space Technology*[145] and *Business Week*[146] for doing what no other corporation has done in the recent history of fighter acquisition: deliver a product below cost, ahead of schedule, while exceeding the performance standards specified by the buyer.

Instead of starting entirely from scratch after the Avenger program was canceled, the Navy adopted the fiscally conservative approach of upgrading the combat proven F/A-18 Hornet, which was initially designed in the 1970s. Despite discounting the Super Hornet, Colonel Macgregor argues that expensive new aircraft designs should be rejected when more economical solutions are available. In making his case, he quotes Eliot Cohen - "A modernized 30 year-old aircraft armed with the latest long-range air-to-air missile, cued by an airborne warning plane, can defeat a craft a third its age but not so equipped or guided."[147]

This is precisely the approach the Navy has adopted in pursuing the Super Hornet - they have upgraded the 30 year old design of the existing Hornet. Rather than purchasing a more expensive single-mission all aspect stealth aircraft with limited air-to-ground capabilities, the Navy has opted for a more cost effective solution. The Super Hornet will be more than capable of maintaining fleet air superiority against enemy threats in the immediate future, while providing significantly enhanced air-to-ground performance in terms of range and loiter time over the current version of the Hornet. As Rear Admiral Riley Mixon states, "The administration and Congress supported the plan because of its soundness...the Navy was the first service to step up to the plate and face the reality of how best to maintain combat capability in the face of declining budgets."[148]

While the Super Hornet's cost is low in relation to the JSF and F-22, its price tag is still $10 million higher than a new F/A-18C Hornet. However, the Super Hornet is designed with a notable increase in capabilities over its predecessor. The Super Hornet offers, "35% more range for fighter escort missions, 40%-50% additional range for interdiction sorties, and a recovery payload that is 60% above that of the existing Hornet."[149] The Super Hornet will also be equipped with cost effective stealth upgrades, towed decoys, helmet mounted sights, two additional weapons stations, tanker stores for refueling other aircraft, and other lesser fixes not available on the existing Hornet.

However, the Super Hornet is not an all aspect stealth aircraft, mainly due to its external carriage of weapons, which has led to its derision by some critics. Admiral Mixon notes, however, that, "All aspect stealth is expensive and difficult to maintain, as seen in land-based F-117 and B-2 stealth rework programs. It would be especially expensive to maintain such a capability on board ship."[150] The problems in mixing all aspect stealth with a carrier plane were apparent early in the doomed Avenger program.

Nonetheless, the Super Hornet is still designed with extensive stealth features. These features, according to Bill Sweetman of *Jane's*, "are more extensive than was apparent from early impressions."[151] In fact, the larger Super Hornet has a smaller radar cross section than its Hornet predecessor, which is only 3/4 its size. Utilizing a cost effective approach to stealth design, Sweetman states, "To some observers, the F/A-18E/F may seem the model for future combat aircraft."[152] As technology slowly erases away today's stealth advantages, spending billions on all aspect stealth may soon appear less than prudent.

Ten years ago, the Nimitz-class aircraft carrier Carl Vinson cruised with two A-7 Corsair attack squadrons, one A-6 Intruder attack squadron, two F-14 Tomcat fighter squadrons, one EA-6 Prowler electronics squadron, one S-3 Viking anti-submarine warfare squadron, and one E-2 Hawkeye early warning radar squadron. Ten years from now, that same carrier will likely deploy with F/A-18s of differing types and E-2 Hawkeyes. This will represent a tremendous decrease in operating costs for the carrier and the Navy as a whole, as the reduction in airframe types will significantly reduce maintenance facilities and personnel training requirements, both sea and shore-based. Further, as Under Secretary of Defense Paul Kaminski has pointed out, the Navy won't be looking for additional new airplanes in ten years to replace the other fighters, bombers, jammers, and tankers of the air wing, as they will all have been replaced in the single acquisition of the Super Hornet.[153] Critics of the Super Hornet often overlook this front-loading of costs, which will lead to economic dividends in the future.

Close Air Support

It is clear that Colonel Macgregor feels the Army has been abandoned by the Air Force when it comes to the mission of CAS, resulting in an increased reliance on its own attack helicopters to compensate for the loss.[154] However, at the same time he derides the Navy for

claiming that CAS is still an important facet of air warfare, noting that it is simply a ploy aimed at, "...maintaining the relevance of aircraft carriers."[155] It must be noted that even during the Cold War, the Navy never abandoned its commitment to CAS, as is suggested by Colonel Macgregor. Historically, the Navy has been called on repeatedly to deliver CAS, whether during World War II, Korea, Vietnam, or Desert Storm. For example, despite a minority of airplanes in theater during the Korean War, 53% of the total CAS missions flown were by Navy air, representing 24% of their total sorties.[156] As evidence of this, a North Korean prisoner, when asked what weapon his troops feared most, replied, "the blue airplanes."[157] Today, the Navy continues its commitment in the critical warfare element of CAS.

Although Colonel Macgregor contends that Navy air will have little effect in future land conflicts, it is worth noting that 60% of the world's population lives within 100 miles of a coastline, a figure which is expected to rise to 75% by 2025.[158] All these areas lie within easy CAS range of the Super Hornet, which, according to *Jane's*, has an unrefueled air-to-ground combat radius of 449 miles.[159]

Regarding the Super Hornet and CAS, Admiral Mixon notes that it "can provide, like no other aircraft in the inventory - including the F-22, F-117, and JSF - sustained over-the-battlefield support for ground forces."[160] An examination of the military's joint publication on CAS reveals that the current version of the Hornet is capable of delivering more weapons types in the CAS environment than any other airframe in the U.S. inventory, including both the AH-64 Apache and the A-10 Thunderbolt.[161] Given the Super Hornet's increased range, loiter time, quantity of ordnance carried, and enhanced defensive capabilities, coupled with the Navy's continued commitment to CAS, the Super Hornet appears to be this country's most capable fixed-wing CAS airframe for the future.

Conclusions

At the CBO's estimate of $108 million per copy, the single-mission F-22, though unbeatable in the air-to-air arena, is incapable of providing the multi-mission requirements demanded by the Navy in its current and future carrier air wings. Likewise, at the estimate of $110 million per copy, the JSF does not appear to be the cost effective solution required by the Navy during this period of budgetary constraints, as is argued by Colonel Macgregor. On the other hand, the $61 million Super Hornet appears capable of balancing the Navy's multi-mission requirements against fiscal constraints and future enemy air threats at a fraction of the cost of the other two alternatives.

However, it is important to note that the Secretary of Defense has already weighed in on the above argument and has set the military's course of action. Shortly after the release of *Breaking the Phalanx*, the Quadrennial Defense Review (QDR) presented its plan to cut $30 billion from the military's requested budget for new fighters.[162] The QDR cut the Air Force's proposed buy of F-22s from 438 to 339, and extinguished any plans of pursuing a naval variant of the aircraft. Rather than canceling the Super Hornet program, as is suggested by Colonel Macgregor, the Navy's proposed buy of Super Hornets was cut from 1000 to 548-785.[163] The exact number of Super Hornets produced will be dependent on the success of the JSF: if the JSF is not fielded, the Navy will receive 785 Super Hornets, and if it is, the buy will be cut to only 548. However, while the QDR cut the total number of Super Hornet's, it increased the allocation of the more expensive JSF from 300 to 480, making up for much of the Super Hornet cuts.[164] It is worth noting that the QDR recognized the Navy's immediate need for a replacement for the A-6 Intruder and the F-14 Tomcat, leaving the bulk of the Super Hornet program intact. Further, the combined Super Hornet/JSF buy shows the QDR's recognition of the continuing need for naval aviation in U.S. military strategy.

Colonel Macgregor's impression that Navy air will have little effect in future land conflicts ignores the fact that an ever increasing majority of the world's population and centers of economic power, as was previously mentioned, fall easily within the range of carrier aviation and the Super Hornet. As the Air Force continues to purchase aircraft incapable of supporting CAS missions, the Navy may well become increasingly more critical to the Army in future conflicts. The AH-64 is indeed an impressive aircraft, but one need only look at the aforementioned 4500+ helicopters lost in Vietnam to recognize the advisability of maintaining a fast moving, fixed-wing alternative to the Apache in the CAS environment.

Chapter 4: Conclusions

As Colonel Macgregor acknowledges, the United States today remains, like it or not, the world's lone super power. Our place in history is now dependent upon how we as a nation approach the world as a whole. As a super power, our approach to the world must include not only military means, but diplomatic, informational, and economic means as well. As Napoleon's France learned, reliance on only one of the aforementioned means may lead to stunning short term victories, but in the long run is likely to result in failure.

Few would argue that a world-class military can be maintained by a nation over the long run without a strong economy. Economic power is an enabler in maintaining not only a visible standing military, but in maintaining strong diplomatic leverage over other nations as well. This economic power, even in the "information age," is still largely attained through world trade. While it is true that the medium for such transactions will increasingly occur in the ether of information technology, the tangible products traded between nations will continue to be transported in the same manner that they have been transported for thousands of years - via the sea. As Admiral Edney states:

> The United States is a maritime nation dependent on the seas for its economic prosperity and security. There was good reason why our founding fathers determined the need for the nation to *maintain* naval forces...We occasionally should remind ourselves of this reality, because it is the geopolitics and not the geography of the world that has changed."[165]

Although information age technology dominates the thoughts of today's "radical military thinkers," the fact remains that 90% of the world's trade[166] and 99% of America's import-export trade tonnage[167] is conducted via the sea. While it may be argued that gross tonnage figures are not as important a factor as are the value of total commodities traded, U.S. Commerce Department figures support the fact that no other medium of import/export trade, whether airborne, land hauled, or "information age," can match the dollars traded via the sea.[168] Until the

advent of *Star Trek* quality "transporters," tangible products will continue to be traded via tangible means. As the world's population moves daily toward the coasts, this dependence on the seas is likely to increase rather than decline. As a result, the oceans will remain the world's highways for many years to come.

In words that vary little from the thoughts expressed by President George Washington over 200 years ago, President William Clinton has stated that, "Even with all the changes in the world, some basic facts endure...We are a maritime nation...As long as these facts remain true, we need naval forces that can dominate the sea, project power, and protect our interests."[169] In the United States today, economic empire and national power derive from the markets of free economic trade, and not from new forms of "manifest destiny," nor new colonialism based on conquering Roman Legions. Today, and in the foreseeable future, as was argued by President Washington, this necessitates a continued defensive posture coupled with a strong maritime presence.

Colonel Macgregor recognizes the need for maintaining a strong U.S. Navy, but concludes that in recent years the Navy's priorities for tactics and spending have gone awry:

> "The U.S. Navy and the U.S. Marine Corps continue to maintain the world's third largest air force at sea in a maritime environment dominated by land-based aircraft and missiles. Apparently, nothing in national defense is doomed to extinction merely because we don't need it or it costs too much!"[170]

Colonel Macgregor's argument implies that carrier air exists for one purpose only: power projection over land. However, as was learned during World War II, and relearned during the Falklands, air superiority over the fleet is always the primary mission of carrier air - the power projection mission cannot be effectively accomplished until air superiority has been attained. As Fleet Admiral "Bull" Halsey testified to Congress over 50 years ago, "...if you want to go anywhere in modern war, in the air, on the sea, on the land, you must have command of the air."[171] The carriers and sea-based aircraft derided by Colonel Macgregor as useless

expenditures are in fact required by the Navy, not for power projection, but for providing fleet air superiority in times of war against foreign navies and the land-based aircraft and missile systems which he presents in his own arguments. Colonel Macgregor never adequately addresses this fundamental aspect of naval warfare, indicating a lack of comprehension as to the importance of air superiority in wars at sea. As has already been presented, while land-based aircraft can readily attack a fleet, they can not readily defend it. Power projection from the sea occurs as an outcome of carriers maintaining local air superiority, not in spite of it.

Though heavily defended, naval fleets, like all other military assets, are subject to attack from enemy forces. As Dr. Friedman points out, a determined enemy can sink even the most heavily defended surface combatant. This does not by itself negate the purpose of navies. What is required is that a military platform be capable of defending itself with an acceptable degree of risk against enemy threats at an acceptable cost. It is worth noting that since World War II, not a single American life has been lost to enemy forces on what Colonel Macgregor deems "vulnerable industrial age platforms," a fact which cannot be claimed by many combat tested division-sized forces.

Regarding aircraft carriers and their vulnerability to cruise missiles, Admiral Edney points out that:

> "Certainly advanced technology has increased the threat posed by these systems, but far less than the threat of terrorism and missile attack against fixed, land-based forces. Any would-be adversary trying to attack a CVBG must coordinate sophisticated, long-range targeting solutions on a target that can move 30 nautical miles in any direction in one hour and can change its location by 700 miles in any 24-hour period. This is not an easy target. When we combine that mobility with sophisticated CVBG electronic-warfare deception packages, radar blip enhancers, target decoys, and the air defenses provided by the battle group's Aegis...cruisers and...destroyers - as well as the...carrier's own tactical aircraft - the vulnerability becomes quite manageable."[172]

Colonel Macgregor maintains that, "...America's future adversaries in areas of strategic importance are continental powers."[173] However, even continental powers, such as Napoleon's

France, are not immune to the influence of sea power and the national strength provided through sea-borne trade. It must be remembered that most continental powers have significant maritime interests as well, and are just as committed to advancing those interests as is the United States. Whether these interests be economic, territorial, or matters of prestige, they have driven many nations to conclude that aircraft carriers are viable platforms for achieving their goals.

For example, China may be a continental power, but she is also actively pursuing the construction of three large aircraft carriers. Russia, despite her weak economy, remains committed to the carrier Kuznetsov. With minimal effort, a more hard-line government in Russia could quickly field the aircraft carriers Gorshkov and Varyag - loaded with 60 aircraft, the majority being Su-27 Flankers - to join the Kuznetsov in influencing a wide range of military events from the Mediterranean Sea to the Western Pacific Ocean.[174] Likewise, France , a major exporter of some of the world's finest military technologies, remains committed to nuclear powered aircraft carrier development. It must be noted that the French, who designed the Exocet missile and maintain a nuclear weapons capability, did not take away the lesson from the Falklands that aircraft carriers are obsolete.

Aircraft carriers and the air wings deployed on them continue to play a crucial role in the post-Cold War era. It is a historical fact that 90-95% of all military supplies arrive in theater via sealift.[175] Given the advances in land-based bombers and cruise missile technology, that percentage could be decimated in future wars waged by intelligent adversaries if the U.S. abandons carrier air power. The fate of the Atlantic Conveyor should serve as a strong reminder as to the importance of air superiority over sealift assets in future wars. If military supplies are unable to reach their assigned destinations, not only will our ground forces fail, but friendly shipping and trade will fall hostage as well. We cannot ignore these serious threats to our national security.

Today, as the author writes, the Navy has three CVBGs, led by the carriers USS George Washington, USS Nimitz, and USS Independence, stationed in the Persian Gulf in an escalating crisis over Saddam Hussein's refusal to abide by United Nations' weapons inspections. This conflict, played out in the identical geography of the Gulf War, presents an entirely different set of geopolitical factors than were faced by the U.S. in 1991. Thus far, no amount of diplomatic pressure has reconstructed the fragile alliance forged by President George Bush prior to Desert Storm. Coalition allies, such as Saudi Arabia, Bahrain, Turkey, and others, will not allow military strikes of any type to be conducted into Iraq from their soil. The preponderance of useable firepower in the Persian Gulf today, due to political considerations beyond the military's control, remains in Navy and Marine Corps hands. This will likely remain the case in the foreseeable future, unless diplomatic factors change dramatically. If military strikes eventually prove necessary, "...unlike in Desert Storm - this time Navy F/A-18s and F-14s...in the gulf will do most of the bombing."[176]

Today, tight military budgets and an increasing operational tempo continue to strain all the armed forces. Noting his service's increased tempo, Colonel Macgregor argues that the Army's share of the budget should increase proportionally to the other services, a factor which likely weighs in his decision to slash aircraft carrier and Super Hornet funding. He states:

> "Because landpower is the glue that holds alliances together, Army forces are engaged in peace support operations as well as enlargement and engagement activities at a much higher rate than the USAF, USN and USMC forces. At this writing, 40% of the Army's combat troops are forward deployed."[177]

While this author does not deny the fact that the Army has witnessed an increase in operational tempo in recent years, it does not stand alone. At this writing, 51% of the Navy's ships are at sea,[178] a figure which has remained constant in recent years. Certainly the Army's number of deployments is increasing, but that does not mean that its share of the burden is any greater than the load carried by its sea-based counterparts.

As Chief of Naval Operations Admiral Jay Johnson recently stated, "We're out of the 'do more with less business.' We can do less with less, or we can do more with more, but we can no longer do more with less."[179] Admiral Johnson's words provide a valuable lesson to all branches of the armed forces. When a service vehemently argues against a sister service's weapons systems, such as the Navy's aircraft carriers or F/A-18E/F Super Hornets, the military as a whole loses. While I have made the point in this monograph that the Super Hornet is better suited for the Navy's immediate needs than the F-22, I have never argued that the Air Force should cancel the Raptor and instead buy the F/A-18E/F. The Air Force's needs and the missions it performs are different than the Navy's. Likewise, though I have stated that land-based airfields and Army COSCOMs are vulnerable to WMD, I have never suggested that funding for either be cut or canceled. Each service needs to make fiscally sound decisions regarding its own appropriations based on the tactical realities of its own respective battlefields.

In the end, Colonel Macgregor's proposals regarding Navy restructuring, though well intended, miss the mark. The U.S. requires naval forces to protect the sea and the economic assets embarked upon it. Naval forces, in turn, require air superiority in the sky above them in order to safely accomplish their missions. Air superiority provides safe passage for not only surface combatants, but for the sealift of all the armed forces and for the commercial trade so vital to our nation's economic strength as well. Without air superiority, all ships become targets in times of war against a determined enemy, as was learned in World War II and relearned in the Falklands. Today and in the foreseeable future, 24 hour per day air superiority for ships at sea can only be effectively provided by large aircraft carriers.

This of course does not imply that aircraft carriers and their battle groups are impervious to attack, and further that their designs cannot be improved upon. What it does imply is that, if much of our national strength relies on shipping, then that shipping must also be protected. Until

the capability exists to perform such operations over the entire globe through alternative means, likely through an enormous space-based system, the aircraft carrier will remain a vital platform in naval warfare.

It follows from this that if the Navy must maintain aircraft carriers in the foreseeable future, then it must also maintain front-line multi-mission aircraft capable of meeting potential enemy threats faced around the world. This does not mean that the Navy needs $108 million Raptors flying from its decks, but it does indicate a need for aircraft advanced beyond the capabilities of the 1950s Intruder, the 1960s Tomcat, and the 1970s Hornet. In this regard, the $61 million F/A-18E/F Super Hornet seems the cost effective solution capable of providing both the air superiority and power projection capabilities required by the Navy against foreseeable future threats. If the relatively expensive JSF is fielded as advertised, the Navy will further benefit from its advanced capabilities when it reaches the fleet in the next decade.

Naval forces are not cheap, but are a necessity given the economic aims of our nation. Repeating the words of Dr. Friedman, they are required because they "...accomplish missions which no other platform or set of platforms can accomplish."[180] Our national strength is derived from the economy, and that economy is inherently linked to the sea. As such, the Navy will continue to play a major role in our national security strategy. Aircraft carriers and their embarked air wings will remain absolutely necessary in the foreseeable future to provide critical air superiority and power projection capabilities required by naval forces.

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