

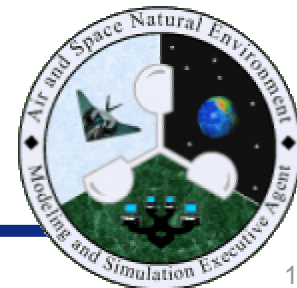


U.S. AIR FORCE

DoD Modeling & Simulation Executive Agent for the Air & Space Natural Environment



BGen David L. Johnson, USAF
Director, Air Force Weather



Integrity - Service - Excellence

REPORT DOCUMENTATION PAGE

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14. ABSTRACT
Vision: Establish capabilities & infrastructure for DoD M&S programs to obtain authoritative representations of the natural environment that are readily accessible and cost effective Develop physically consistent representations within and among the Air, Ocean, Space, and Terrain domains Deliver the environment when needed in a standardized format that promotes interoperability, re-use, and confidence (includes ?Just-in-Time? production)

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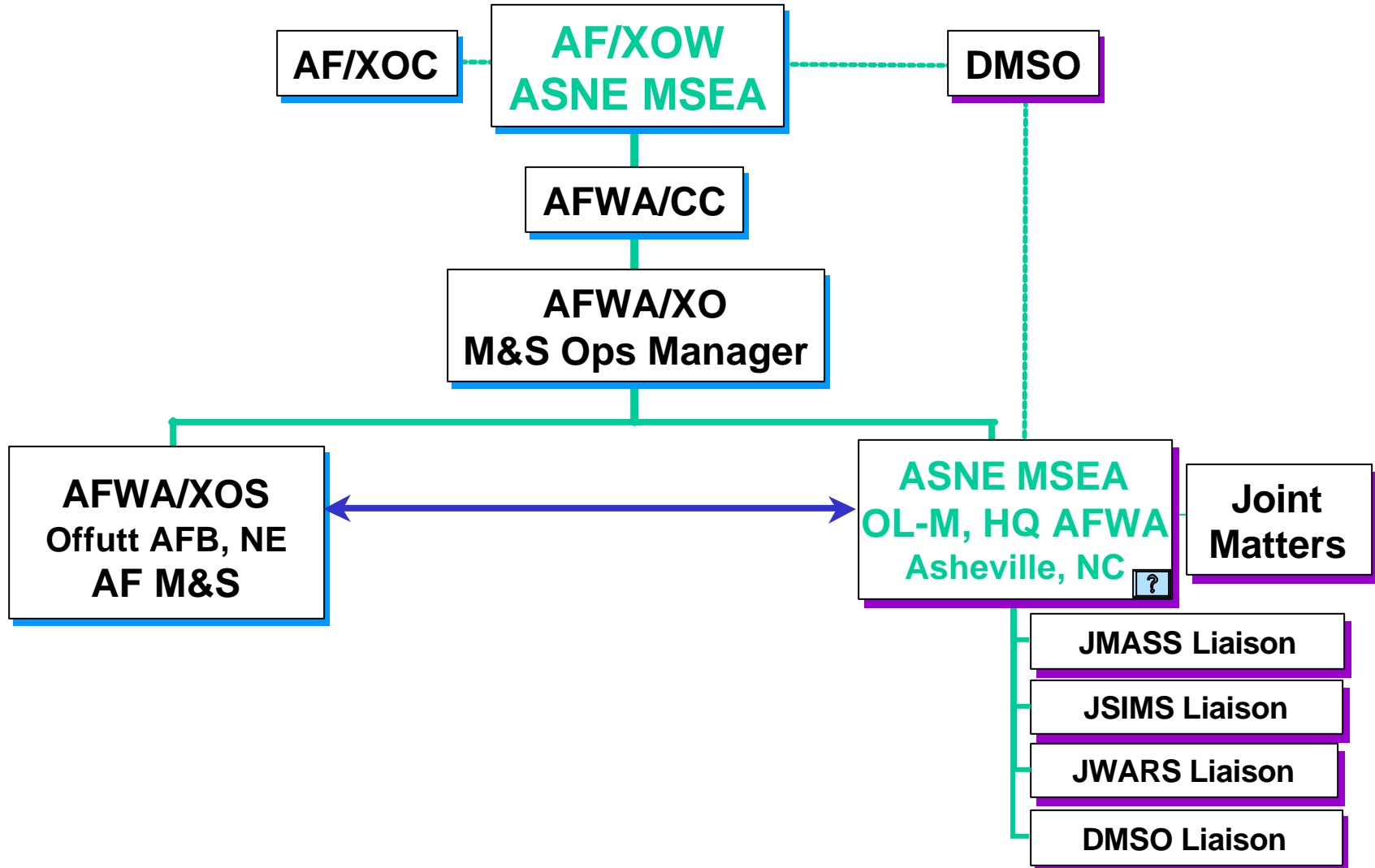
MSEA ORIGIN

- **DoD Modeling and Simulation (M&S) Management DoD Directive 5000.59 (Jan 94)**
 - Recommended designation of DoD Modeling & Simulation Executive Agents (MSEAs) with DoD-wide responsibilities
 - Defense Modeling and Simulation Office is DoD focal point for implementing the DoD M&S Master Plan, DoD 5000.59-P (Oct 95)
- **USD (AT&L) Memoranda**
 - **Air Force designated MSEA for Air & Space (9 Apr 96)**
 - Navy designated MSEA for Ocean (9 Apr 96)
 - National Imagery and Mapping Agency (NIMA) designated MSEA for Terrain (5 Apr 95)



ASNE MSEA ORGANIZATION

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INTEGRATED NATURAL ENVIRONMENT

■ Vision:

- Establish capabilities & infrastructure for DoD M&S programs to obtain authoritative representations of the natural environment that are readily accessible and cost effective
- Develop physically consistent representations within and among the Air, Ocean, Space, and Terrain domains
- Deliver the environment when needed in a standardized format that promotes interoperability, re-use, and confidence (includes “Just-in-Time” production)

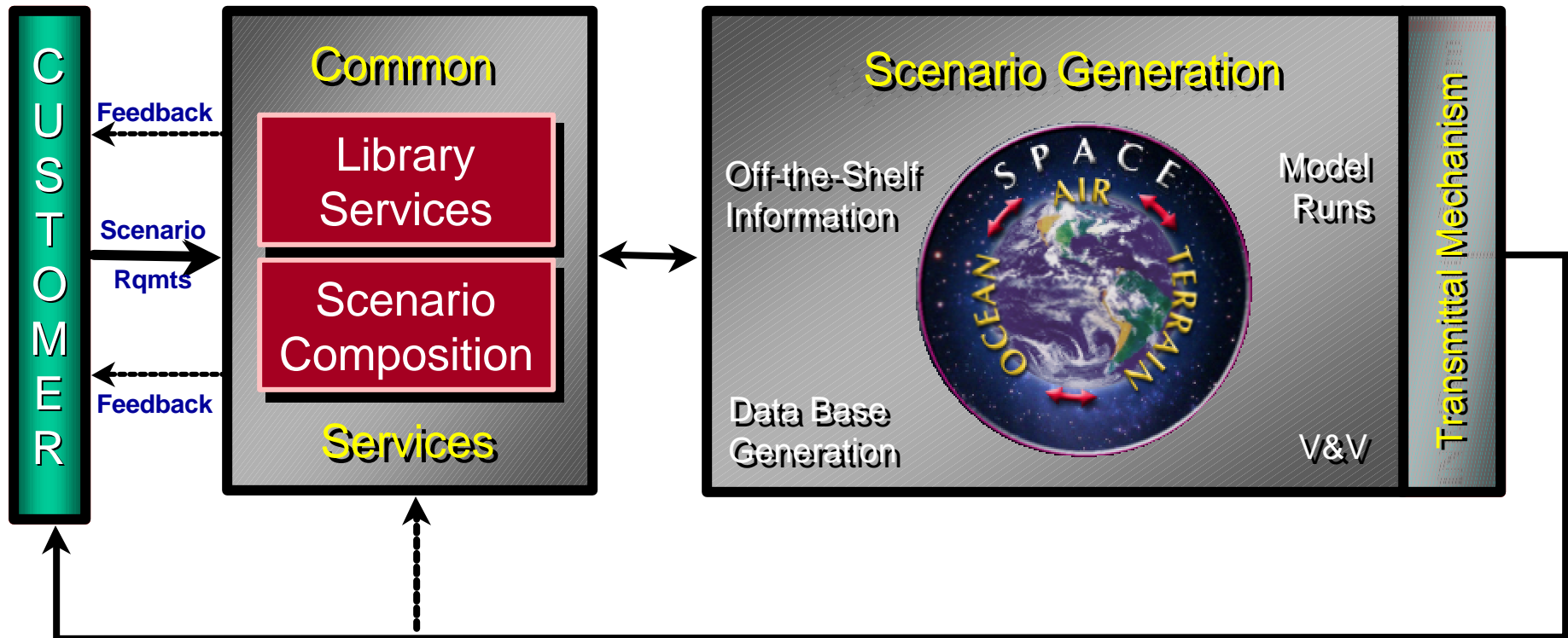


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DMSO Integrated Natural Environment Strategy

The Challenge

Create a physically consistent, cross-domain, authoritative “ground truth” of the natural environment that meets user requirements





ASNE MSEA IMPLEMENTATION

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- Establish capabilities & infrastructure for DoD M&S
 - Designated the Air Force Combat Climatology Center as the Air Force production center for M&S environmental data
 - **Fielded Advanced Climate Modeling and Environmental Simulation (ACMES)** to generate required atmospheric data
 - Host data and conduct intelligent search (mine) with the Environmental Scenario Generator (**ESG**) by end of CY01
 - Expand capabilities to meet JWARS, JSIMS, and JMASS parameter requirements by end of CY01
 - Field online capability to view weather impacts on weapons systems -- Warfighter Weather Effects (**WxFX**)
 - Develop **Coupled Land-Atmospheric** Terrestrial Weather model
 - Fund development of space weather environment **models**
 - Field capability to perform weapon effectiveness calculations supporting simulations running at 1000 times real time (**CSSMStats**)

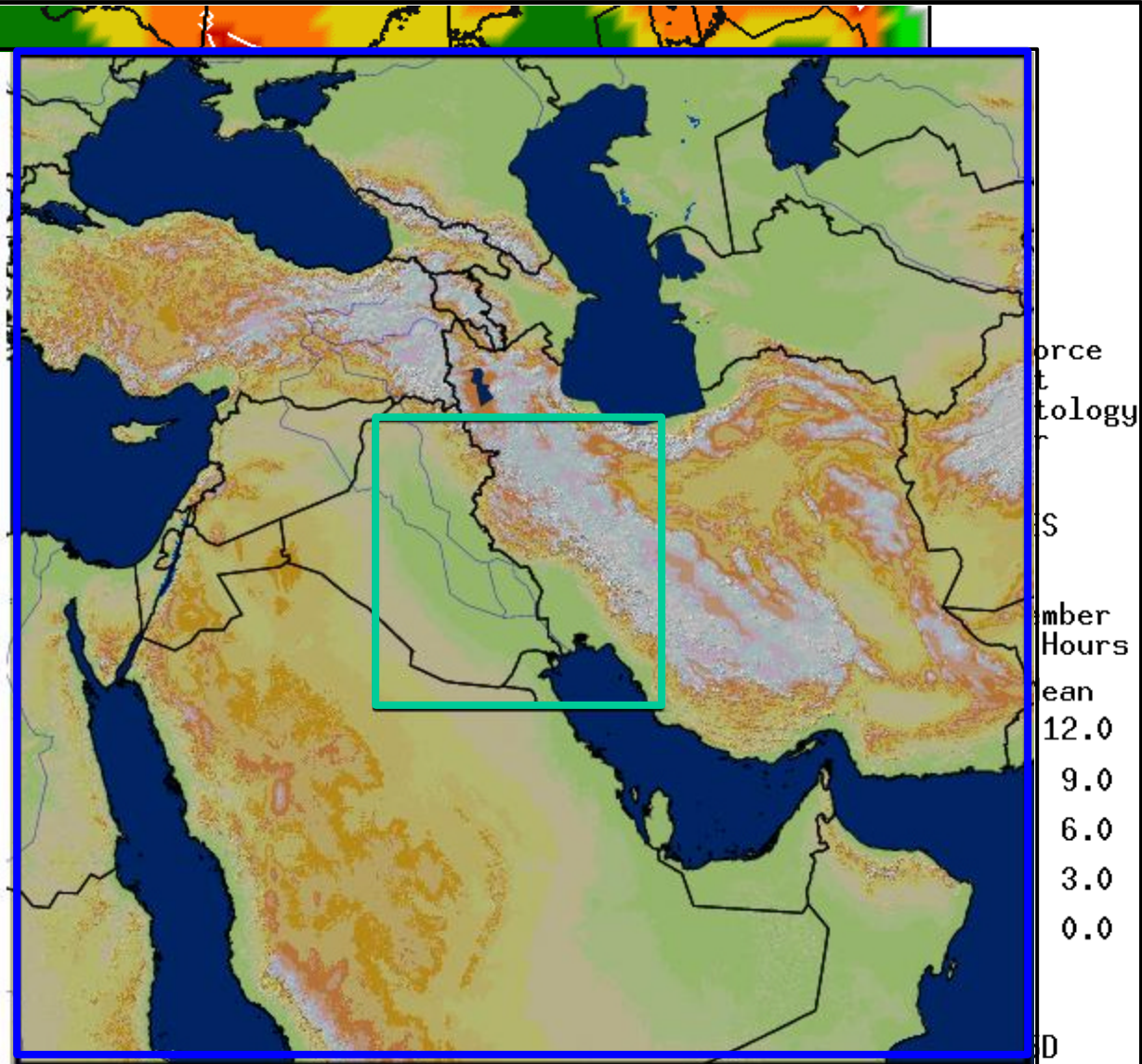


Advanced Climate Modeling & Environmental Simulations (ACMES)

ACMES
for data

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Terrain Data
Used for SW Asia



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ASNE MSEA IMPLEMENTATION

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Warfighter Weather Effects (WxFX)

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WxFX will deliver high resolution weather effects/impacts products to the warfighter for mission rehearsal and long-range planning.

WarWeather

File Run View Tools Help

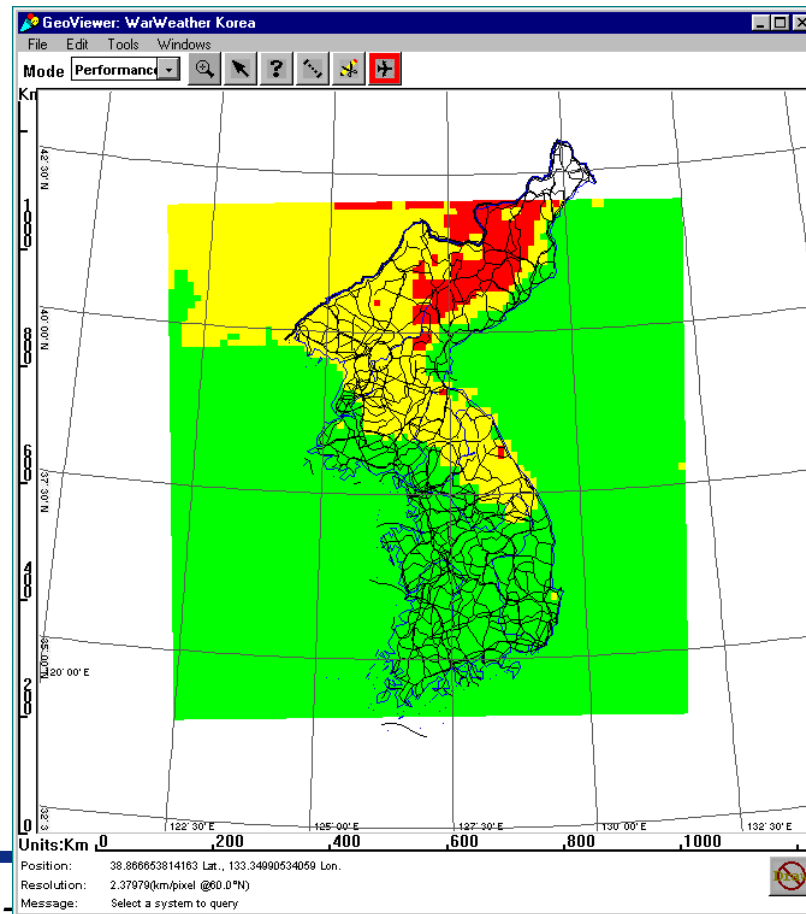
Previous System Component Previous Time

Korea - 10 km: Personnel Hours for Month: January

Favorable Marginal Unfavorable

	00	06	12	18
WATER CONSUMPTION	100%	100%	100%	100%
PERSONNEL MOVEMENT	17% 83%	9% 91%	61% 39%	57% 43%
AERIAL FORWARD OBSERVER	12% 88%	2% 98%	61% 39%	57% 43%
SOLDIER EFFECTIVENESS	81% 19%	82% 18%	88% 12%	82% 18%
GROUND FORWARD OBSERVER	12% 88%	2% 98%	61% 39%	57% 43%
MAINTENANCE FUNCTION	100%	100%	100%	100%

The performance of the PERSONNEL MOVEMENT is potentially impacted by freezingrain, blowingsand, temperature, rain, illumination, fog, surfacewindspeed, visibility, snowdepth, snow, and drizzle



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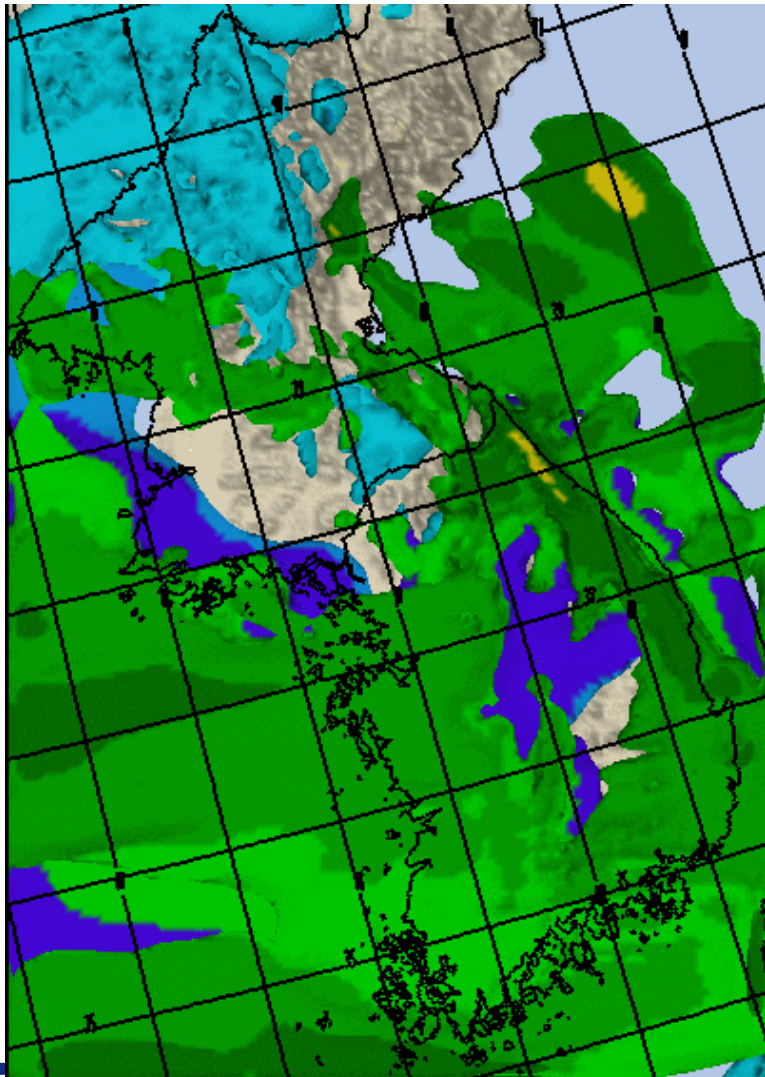
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High Resolution Atmospheric Model (MM 5)



Cloud Tops (MSL)

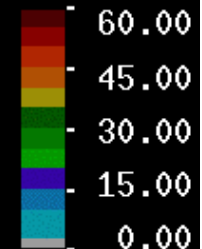
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Air Force
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MM5 5.0Km
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SPACE WEATHER

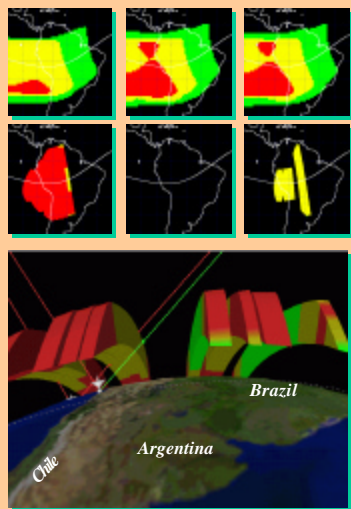
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- **Ionospheric Scintillation:** Model ionospheric disturbances that cause rapid phase and amplitude fluctuations of satellite signals and degrade or disrupt satellite-based nav and comm systems.

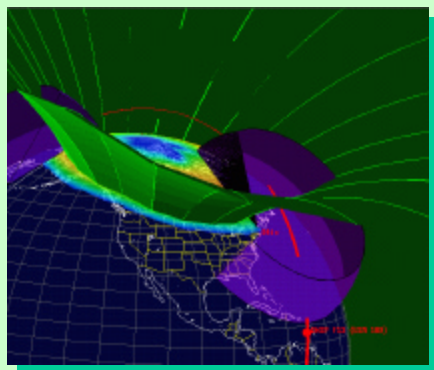
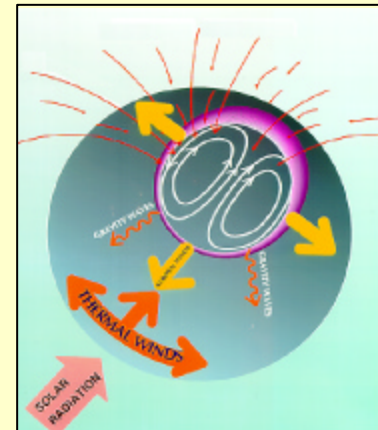
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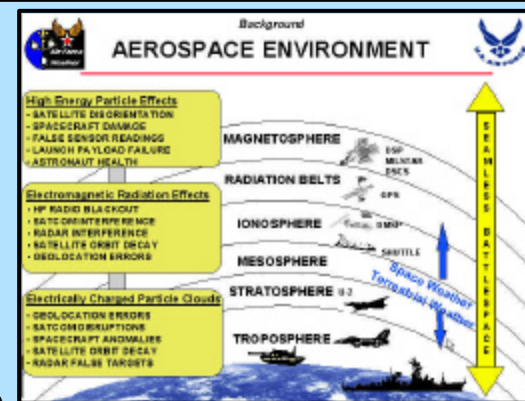


- **Neutral Density:** Simulate changes in mesosphere and thermosphere neutral density, temperature, and winds so changes in the satellite-drag environment can be determined easily.



- **GEOspace:** Incorporate IonScint and NeutDens models and effects on space- and ground-based systems. Will provide dynamic scenarios to simulate impacts of Scintillation and satellite drag instead of using climatology.

- **Space Wx Historical Archive:** Create a consistent, integrated historical record of the near-Earth space environment of three solar cycles (weak, moderate, strong).



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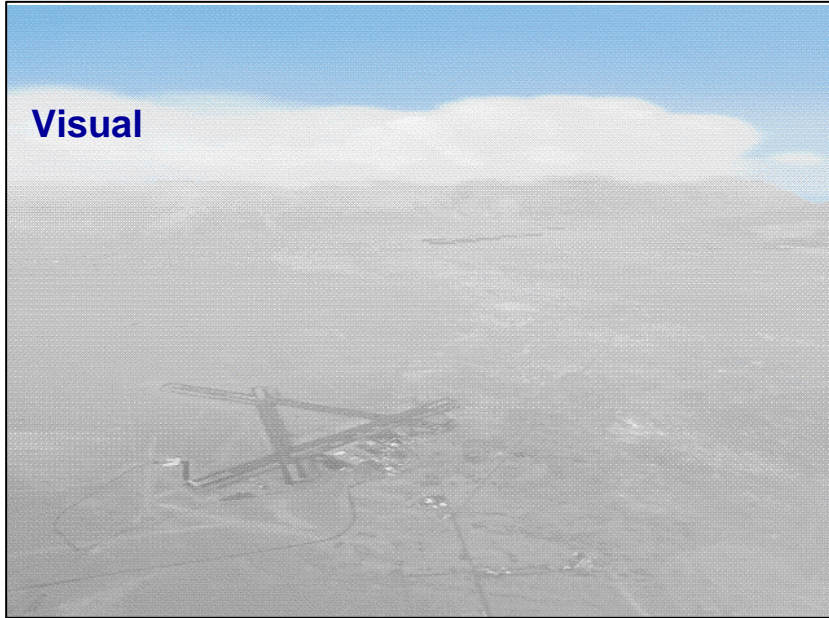
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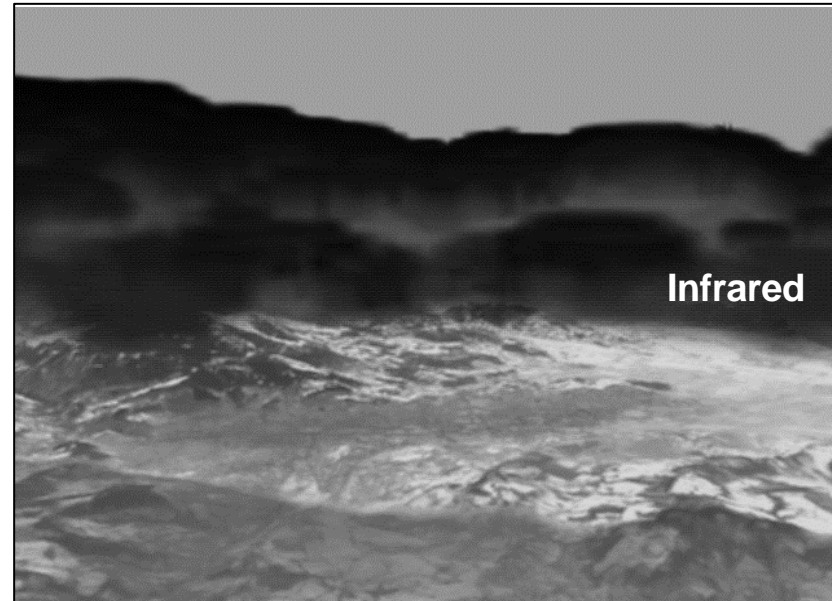
Cloud Scene Simulation Model Statistics (CSSMStats)

Visual



- Develop cloud scene inputs for simulations that run 25 - 1000 times faster than real time
- CSSMStats delivers probability curves enabling rapid, on-the-fly “calculations” for target acquisition

Infrared



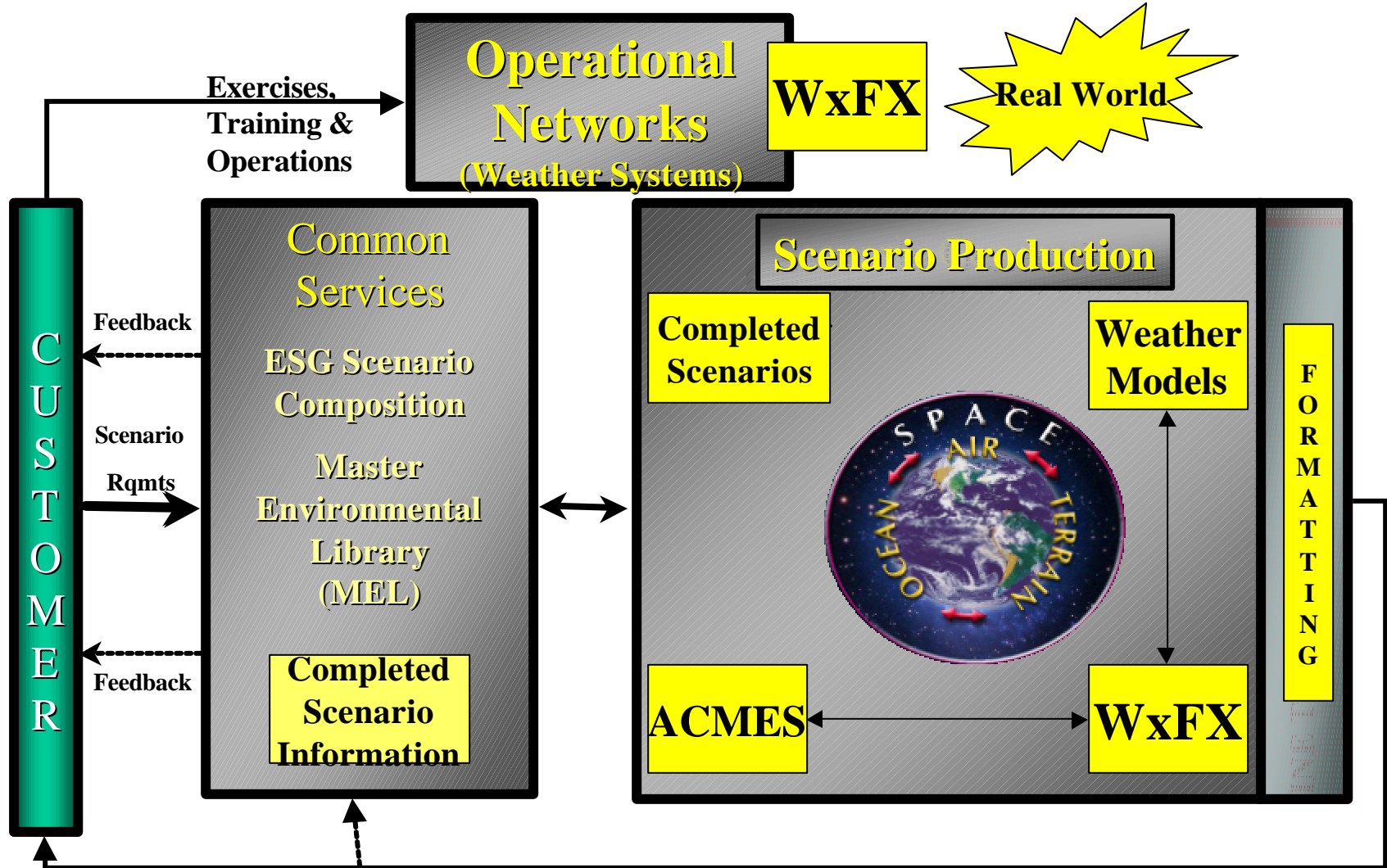
- Conducted numerous computer runs for a variety of air/space platforms using a variety of targets
- Created probability tables using statistical results of weapon systems' MOEs





ASNE NEAR TERM OPPORTUNITIES -- FUNCTIONAL VIEW

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THE WAY AHEAD

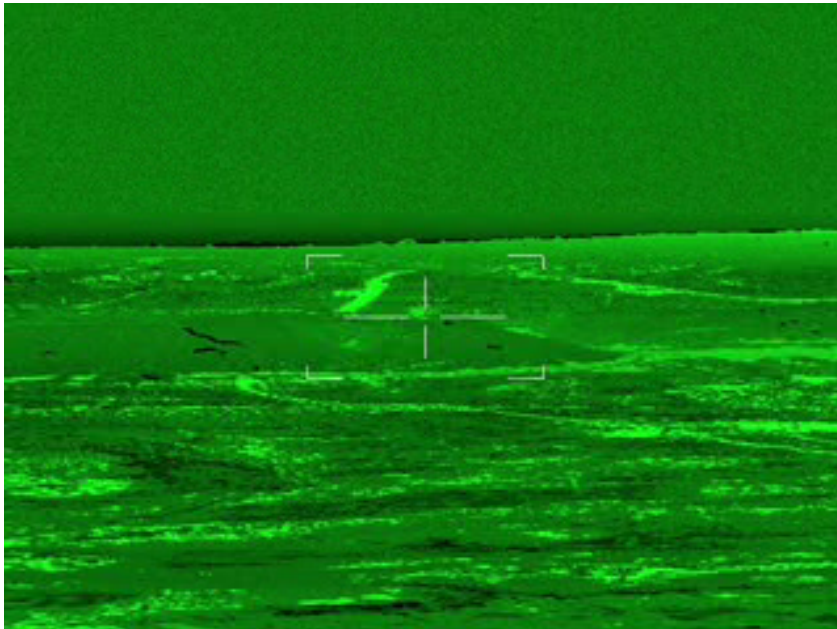
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- **Continue Air and Space M&S efforts**
- **Physically consistent representation both within and among the Air, Ocean, Space, and Terrain domains**
 - **Integrate Ocean and Terrain segments of the authoritative representation with Atmosphere**
 - **Use ACMES to initialize Ocean models**
 - **With development of dynamic terrain technology, atmospheric influences reflected in terrain**
- **Deliver in a standard format that promotes interoperability, re-use, and confidence**
 - **Migrate to SEDRIS Transmittal Format to meet customer needs**
 - **Exploit existing post-processing software to meet operational needs**
- **Next Battlefield**



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Modeling & Simulation Executive Agent for the Air & Space Natural Environment



Contact Information:

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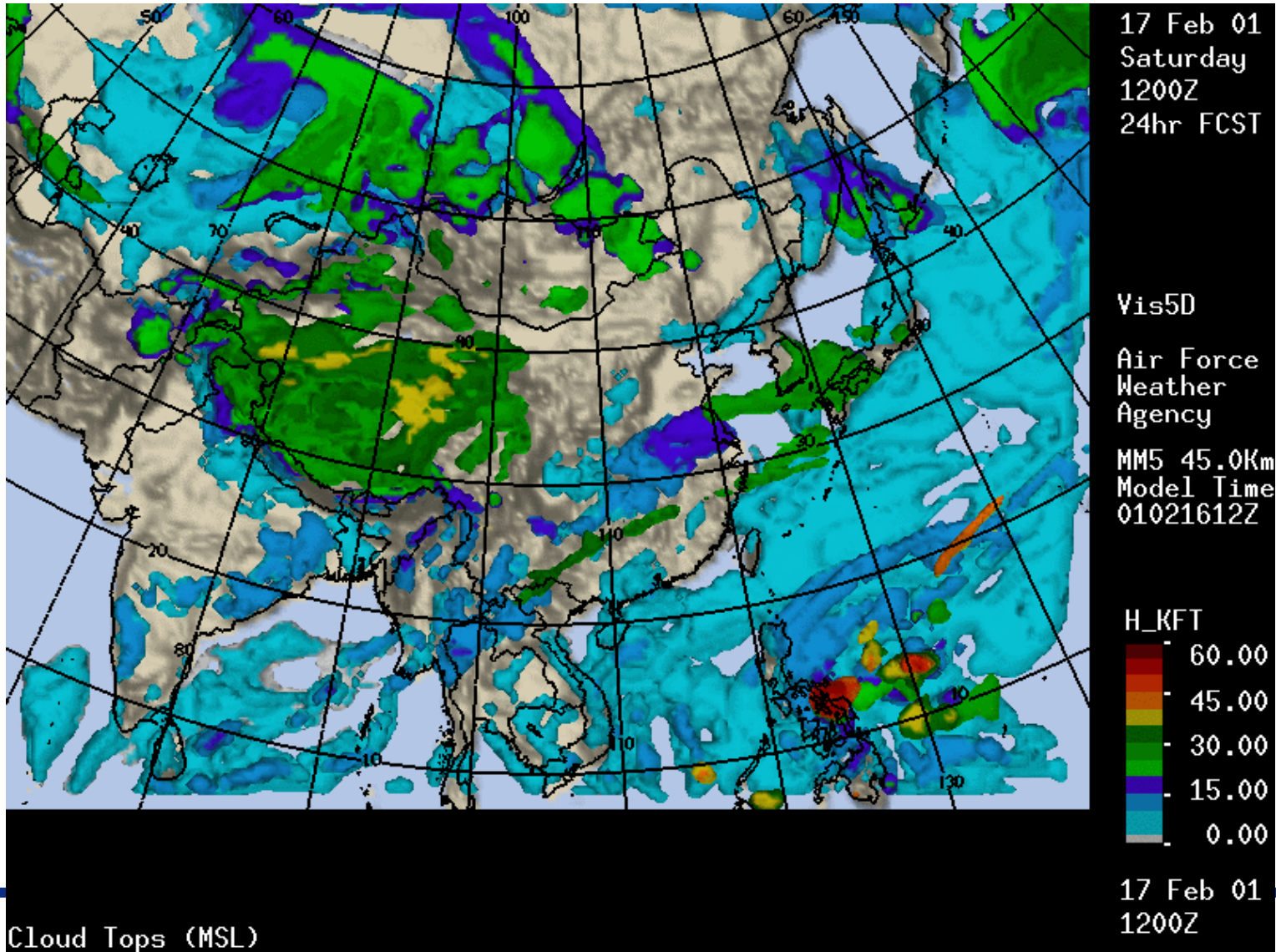
Web site: <http://msea.afccc.af.mil>

Backup Slides



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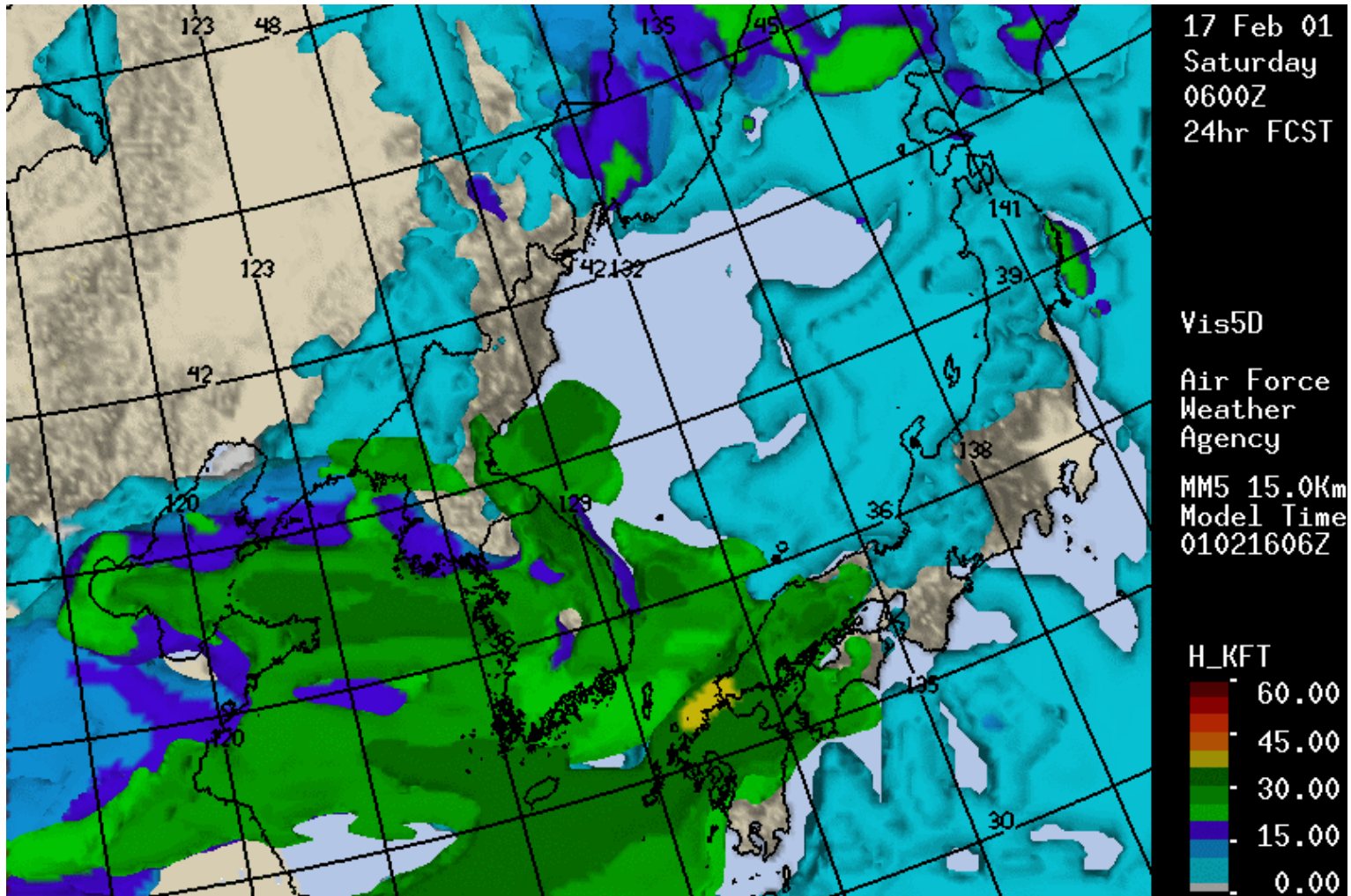
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