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HQ AFSPACECOM



DESERT STORM  
"HOT WASH"  
12-13 JUL 1991

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Classified By: Multiple Sources  
Declassify On: OADR

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"AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED"

A. TITLE: "Space Contribution to Weather Support"

B. OBSERVATIONS:

- Launched DMSP satellite (F-10) on 1 Dec 90 as scheduled. Resulted in three healthy satellites available for weather support.
- User put high priority on rapid distribution of weather data to the field.

C. DISCUSSION:

- Accurate, real-time weather data was available to aid the tactical user in selecting the most effective aircraft weapons load for selected targets based on known weather conditions over target. This reduced missions aborted due to weapons load/weather condition mismatch particularly with precision-guided (laser and optical) ordnance.

D. LESSONS LEARNED:

- Space-based weather observations are critical in data-sparse areas.
- Timeliness of data delivery is critical to all aspects of airborne, ground and sea-based tactical operations.
- Need a mobile in addition to transportable DMSP receiver capability.
  - Existing DMSP terminals (Mark IV Vans) are difficult to move, very large and heavy, requiring a C-130 for transport.

E. RECOMMENDED ACTION:

- Assess worldwide weather satellite constellation coverage for tactical use.
- Expand capability for weather data dissemination to tactical users in the field.
- Continue High Gear effort to field a mobile DMSP receiver system -- did deliver a prototype mobile DMSP receiver system to theater.

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## "AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED"

- A. TITLE: "User Segment Procurement Critical"
- B. OBSERVATION:
- In a "come as you are" space war, our troops were not as prepared as possible.
    - Very few aircraft or troops arrived with GPS receivers
    - SATCOM radios/channels were stressed by the flood of communications
    - Initial demand for receiver equipment - comm, nav and weather - exceeded the available supply
- C. DISCUSSION:
- Southwest Asia presented severe challenges to navigation, communications, intelligence and weather dissemination.
- D. LESSONS LEARNED:
- Equipment must be integrated in the operator's force structure before hostilities erupt.
    - Exercises and training critical
    - Listed on TPFDL
  - Initial communications in-theater were inadequate - a repeat lesson learned.
    - By the outbreak of hostilities, communications capability was pretty good.
  - To optimize use of extensive space support, the requisite receive equipment must be available.
- E. RECOMMENDED ACTION:
- Accelerate acquisition of GPS receivers, DSCS terminals, DMSP terminals, Constant Source suites, and Intra-theater Imagery Transmission System.
  - Expand SATCOM Channels.

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"AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED"

A. TITLE: "SATCOM Indispensable"

B. OBSERVATION:

- Satellites provided 80 per cent of theater communications (intra and inter).
- Early problem areas existed
  - User knowledge, expectations, and discipline
  - Unit level (i.e. squadron) SATCOM connectivity

C. DISCUSSION:

- CINCENT Contingency Communications Plans underestimated communications connectivity demands of the actual deployment.
  - Identified requirement for 12 ground terminals -- 128 were actually deployed.
- Initial operator procedures needed improvement.
- Unit to Unit communication (i.e. ATO coordination) was not optimum.
  - STU III or field telephone was primary means
  - SATCOM either not available or very limited at squad or platoon level
  - Imagery transmission via other than SATCOM inadequate for short notice ATO changes

D. LESSONS LEARNED:

- All players, providers and users, need to reassess communication requirements and procedures.
  - SATCOM requirements need to be identified down to the lowest echelons
  - Exercises, education and training are key aspects of successful operations
- Continue to improve SATCOM ground assets to support operations
  - Availability at all levels of command
  - Driven by most demanding requirement - imagery transmission
  - Secure & jam resistant as required to meet user needs

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## "AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED"

- A. TITLE: "First Wide Spread Combat Use of Space-Based Navigation"
- B. OBSERVATIONS:
- GPS provided real-time, passive navigation updates to virtually every weapon system in theater.
- C. DISCUSSION:
- Over 4500 receivers deployed by end of hostilities on tanks, ships, planes, trucks, and with field units.
  - Due to initial shortfalls, industry shifted into high gear to meet the demand.
  - Selective Availability turned off during conflict
    - Limited number of crypto capable units
    - CENTCOM directed it not be used
  - 20 plus hours per day 3-D, 24 hours of 2-D coverage available
- D. LESSONS LEARNED:
- GPS receivers reliable and easy to use
    - Highly accurate navigation allowed us to bomb targets at night and bad weather, minimizing aborted missions due to conditions in the target area.
    - Over 200 AF aircraft GPS equipped (e.g. F-16s, B-52s, AC-130s, HH-53Js (Pave Low))
  - Some aircraft (F-16C Block 40) can not use 2D coverage - they require full 3-D coverage.
  - Turning off selective availability feature created potential for enemy forces having access to the same accurate raw navigation data.
- E. RECOMMENDED ACTION:
- Increase emphasis on equipping and training our forces with crypto capable GPS receivers.

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## "AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED"

A. TITLE: "Preplanning Essential"

B. OBSERVATION:

- Five month Desert Shield afforded needed planning
  - To integrate additional space capabilities
  - To coordinate requirements and to obtain vital space terminals and receivers

C. DISCUSSION:

- During Desert Shield, Space Applications personnel advocated prototype systems and on-line capabilities.
- Above effort was hampered by security constraints and lack of planning guidance.

D. LESSONS LEARNED:

- Must assume more of a "come as you are" war outlook for space equipment.
- Equipment required to exploit space systems data were not incorporated into the TPFDL as fully as possible.
  - DMSP transportable Mark IV vans
  - Constant Source suites
  - GPS receiver sets
  - DSCS terminals
- AFSPACECOM needs to work with operational commanders to translate and incorporate space capabilities.

E. RECOMMENDED ACTION:

- Start the space planning process early.
- Get the word out to CINCs and Component Commanders.
- AFSPACECOM assist in the development and incorporation of space support requirements into Annex N of OPLANS.
  - Currently working with PACAF/DO to develop a Space Annex for their warfighting capability and plans.

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## "AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED"

- A. TITLE: "Need an Advanced Multi-Spectral Imagery (MSI) Capability"
- B. OBSERVATION:
- One of the major complaints was the lack of wide area, multispectral coverage.
- C. DISCUSSION:
- Existing systems are not timely or accurate for mission planning, bomb damage assessment, or precision guided munitions.
    - Neither Landsat nor Spot combine adequate spectral and spatial capabilities.
    - National systems provide spatial resolution, but limited area, no MSI, and secret classification
    - Merging MSI data to get required resolution is not timely
  - To fill the need for MSI used for tactical planning and employed with the Mission Support System (MSS), 108 archived SPOT images were acquired from the French.
- D. LESSONS LEARNED:
- Need a U.S. system which provides wide area MSI, sufficient resolution, improved spectral coverage, direct downlink, and timely dissemination of data.
- E. RECOMMENDED ACTION:
- Advocate for an improved MSI system
    - Responsive to tactical user requirements
  - Defense Space Council continuing to debate DOD's role in follow-on Landsat (LS-7) -- requirements, funding, operations.

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"AFSPACECOM DESERT SHIELD/STORM LESSONS LEARNED" (U)

A. (U) TITLE: "CONSTANT SOURCE PROVED ITS WORTH, BUT NOT OPERATIONAL"

B. (U) OBSERVATION:

b(1) [REDACTED]

C. (U) DISCUSSION:

b(1) [REDACTED]

- U Some initial problems existed due to lack of prototype software stability and qualified operators.

b(1) [REDACTED]

b(1) [REDACTED]

- U Due to it's prototype status, civilian contractors were needed, in theater, for software and hardware maintenance. Part of the normalization process will transfer much of this function to the military.

D. (U) LESSONS LEARNED:

- (U) Desert Shield allowed us the time needed to field a prototype system and train the operators.

E. (U) RECOMMENDED ACTION:

- (U) AFSC (ESD) continue to work towards CS turn-over to users and ensure users evaluations/recommendations of the prototype systems be considered or incorporated.

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"AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED" (U)

A. (U) TITLE: "Flexibility to Reposition Satellites Vital"

B. (U) OBSERVATION:

- (U) Support to Operation Desert Shield/Storm required Defense Satellite Communications System (DSCS) and Defense Support Program (DSP) satellites to be repositioned.

C. (U) DISCUSSION:

- (U) To increase Desert Shield/Storm AOR coverage AFSPACECOM repositioned two critical overhead assets.
  - (U) The Western Pacific reserve DSCS satellite was repositioned to the Indian Ocean to increase SATCOM capacity.
  - (U) DSP Flight 15 was repositioned to provide an additional launch detection asset to the theater.

D. (U) LESSONS LEARNED:

- (U) Desert Storm proved that current on-orbit space assets have a significant element of flexibility to respond to global contingencies.
- (U) Broader tactical flexibility of our satellite systems would improve AFSPACECOM's ability to respond to contingencies.
  - (U) Need more reserve satellites
  - (U) Need more responsive launch capability
  - (U) Need to plan for residual fuel to reposition geosynchronous satellites

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"AFSPACECOM DESERT SHIELD/DESERT STORM LESSONS LEARNED" (U)

A. (S) TITLE: "CURRENT DSP SYSTEM CAN BE TAILORED FOR TACTICAL BALLISTIC MISSILE (TBM) WARNING"

B. (U) OBSERVATION:

- (U) DSP performance was excellent in detecting TBM launches [REDACTED]

[REDACTED]

C. (U) DISCUSSION:

- (U) The DSP system is designed to provide strategic missile warning but was optimized to include TBM detection.
- (U) DSP was optimized for theater TBM detection. Special software and updated TBM profiles were placed on-line. Special site coverage tasking and crew procedures were developed to increase coverage, launch warning message generation, and faster warning time lines.
- (U) The DSP Tactical Event Reporting System (TERS) alert messages were integrated into the theater Tactical Related Applications (TRAP) broadcast and into communications networks for theater alerting.
- (U) The DSP constellation was in transition at the start of Desert Storm. The newly launched DSP Flight 15 was moved into position to optimize viewing of the Arabian Peninsula, making a total of three DSP satellites over the theater at the outbreak of hostilities.

D. (U) LESSONS LEARNED:

- (U) There are inherent limitations with the current DSP system.
- (U) The performance of DSP in future conflicts may not be as effective.
- (U) Current ground station software and procedures can be optimized to improve TBM detection for specific areas.

E. (U) RECOMMENDED ACTIONS:

- (U) Pursue improvements/follow-on systems in response to recognized future threats.

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