FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space)

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R0524 Navy METOC Support (Space)	19,171							
X0524 Navy METOC Support (Space)	0	17,540	4,145	3,571	4,530	4,981	21,964	22,311
X1452 GEOSAT	1,722	1,784	821	900	928	1,122	1,144	1,165
X9282 Radiation Hardened Vector Processor System		2,927						
Total	20,893	22,251	4,966	4,471	5,458	6,103	23,108	23,476

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program element supports Navy requirements in meteorological and oceanographic (METOC) remote sensors. These interests include commitments to satellite, sensor, and operational demonstration/development activities associated with four satellite programs: 1) the Joint Service Defense Meteorological Satellite Program (DMSP), 2) The WindSat/Coriolis satellite funded by Navy, the National Polar-orbiting Environmental Satellite System (NPOESS) System Program Office, and the DoD Space Test Program (STP), 3) the Navy Geodetic/Geophysical Satellite (GEOSAT) follow-on (GFO) program, funded entirely by Navy and 4) the Indian Ocean METOC Imager program jointly funded by DoD, NASA and NOAA. Navy provides the spacecraft and the STP provides the launch vehicle/launch services, in conjunction with a Navy/NASA/NOAA partnership. The Navy (METOC) Support (Space) project provides for Navy participation in Navy/Air Force cooperative efforts leading to DMSP sensor development; specifically participation in the calibration and validation of instruments and delivery of satellite products to the Fleet. Both the GEOSAT and Navy METOC Support(Space) projects fulfill Navy's obligation to develop Navy-unique, mission critical Space-based METOC technology. A Congressional Add for Radiation Hardened Vector Processor System is provided for FY03.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space)

B. PROGRAM CHANGE SUMMARY:

	FY 2002	FY 2003	FY 2004	FY 2005
FY 2003 President's Submission:	22,294	19,801		
Adjustments from FY 2003 President's Budget:				
NWCF Adjustment				
SBIR Adjustment	-233			
Post Production				

Adjustments from FY 2003 President's Budget:				
Sec 313, PL 107-206 Revised Economic Assumption	-48			
BTR for Joint and Mission Planning Sys (JMPS) Combat One	-36			
Miscellaneous Department Adjustments	-934	-289		
Business Process Reform (SEC 8100)		-91		
Economic Assumptions (SEC 8135)	-61	-128		
IT Cost Growth (SEC 8109)		-42		
Miscellaneous Navy Adjustments	-89			
X9282 Radiation Hardened Vector Processor System		+3,000		
FY 2004 President's Budget Submission:	20,893	22,251	4,966	4,471

PROGRAM CHANGE SUMMARY EXPLANATION:

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0305160N
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space)

Schedule: As applicable
Technical: As applicable

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0305160N PROGRAM ELEMENT TITLE: Defense Meteorological Satellite (Space) Project Number: X0524 Project Title: Navy METOC Support (Space)

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
R0524 Navy METOC Support (Space)	19,171							
X0524 Navy METOC Support (Space)	0	17,540	4,145	3,571	4,530	4,981	21,964	22,311

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Navy Meteorological and Oceanographic (METOC) Support (Space) project provides for future Navy-unique sensor development efforts (WindSat and the Indian Ocean METOC Imager (IOMI)) and Navy participation in DMSP Special Sensor Microwave/Imager (SSM/I) and Special Sensor Microwave Imager/Sounder (SSM/IS) calibration efforts, in support of the Fleet operational requirements. The project ensures Navy operational requirements are satisfied primarily through demonstration of technologies for inclusion on operational constellations such as DMSP, the National Polar-orbiting Operational Environmental Satellite System (NPOESS) and the National Oceanic and Atmospheric Administration (NOAA) Geostationary Operational Environmental Satellites (GOES). These efforts fulfill Navy unique requirements that are not funded within the DMSP and NPOESS programs, and are in accordance with current inter-agency agreements. The project also provides for participation in efforts leading to operational improvements of satellite derived products and Navy participation as a voting member of the DMSP Configuration Control Board (CCB). Future funding plans respond to emerging Chief of Naval Operations requirements for Navy METOC data. Plans for FY 2002 and beyond address the requirement for high-resolution METOC imagery to ships, in particular the Indian Ocean and Arabian Gulf region.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY05
WindSat	11,001	14,530	3,101	2,843

Brief Description of Program Effort 1. WindSat, an initiative begun in 1997, is a partnered program that meets multiple Naval remote sensing requirements and provides a significant risk reduction for NPOESS, the converged Department of Commerce/National Oceanic and Atmospheric Administration/Department of Defense environmental satellite program. The Navy METOC Support (Space) project supports the Navy contribution to WindSat, which is fully funded via a formalized inter-agency agreement. The NPOESS Integrated Program Office has provided a portion of the funds for the WindSat sensor and the DOD Space Test Program (STP) is funding a portion of the satellite bus and providing the launch vehicle and launch services. WindSat launched in January 2003.

FY 2002 ACCOMPLISHMENTS:

- Completed WindSat sensor development.

- Began integration and testing with the Coriolis spacecraft.
- Continued development of algorithms and ground software for WindSat environmental data records.

FY 2003 PLANS:

- Ship WindSat flight payload to launch site for final integration with spacecraft and launch vehicle integration.
- Complete development and testing of algorithms and ground software for WindSat environmental data records.
- Support WindSat launch processing, launch operations, early orbit checkout and begin on-orbit calibration and validation.
- Provide engineering support for the evaluation of the Coriolis spacecraft and WindSat payload on-orbit performance and complete on-orbit calibration/validation of WindSat data.

FY 2004 PLANS:

- Support WindSat on-orbit payload to provide Fleet ocean wind speed and direction data.
- Perform data calibration and validation.

FY 2005 PLANS:

- Continue to support WindSat on-orbit payload to provide Fleet ocean wind speed and direction data.
- Perform data calibration and validation of environmental algorithms generated for Fleet use.

	FY 02	FY 03	FY 04	FY05
Indian Ocean METOC Imager	6,770	2,260	0	0

Brief Description of Program Effort 2. The Indian Ocean METOC Imager (IOMI) program will be executed cooperatively utilizing the NASA EO-3 New Millenium Program development of the Geostationary Imaging Fourier Transform Spectrometer (GIFTS) sensor. **The partnership with NASA for the GIFTS, provides Navy funding to extend the lifetime of the sensor to support the Navy Indian Ocean requirement for temporal resolution with real-time high resolution environmental data directly to the fleet at sea in additional to providing sounding and imaging products to Fleet centers. Navy participation in the NASA GIFTS program extends the lifetime of the GIFTS sensor and thereby provides NOAA significant risk reduction and allows the opportunity to transition the GIFTS technology to future GOES operational capabilities.** NOAA is participating in the partnership by developing the data products, providing calibration and validation of the data products and contributing the ground station during CONUS activities and check out period. This enhanced demonstration of an operational utility will promote a rapid

technology infusion into next generation Geostationary Operational Environmental Satellites (GOES) and allows Navy to have data sets in place to utilize the future NOAA/GOES capability. The DoD Space Test Program will provide the access to space, launch vehicle and launch services, under the ONR-STP Memorandum of Agreement. The IOMI program directly responds to the #1 priority, and two additional concerns, of the CINC's (2001 June) Top Five Maritime Concerns From Space and the Joint Typhoon Warning Center Mission Need Statement.

FY 2002 ACCOMPLISHMENTS:

- Supported the IOMI-GIFTS sensor development and spacecraft development trade studies.
- Successfully competed to obtain launch services for the IOMI-GIFTS payload from the DoD Space Test Program.
- Successfully completed sensor/mission Preliminary Design Review and Mission Confirmation Review.
- Identified secondary payloads to complete the mission sensor suite.

FY 2003 PLANS:

- Begin spacecraft and sensor development in support of IOMI-GIFTS project.
- Refine mission operations and ground segment development.
- Develop interfaces with STP Integrating Contractor for launch and launch services.

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0305160N Project Number: X0524
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite (Space) Project Title: Navy METOC Support (Space)

	FY02	FY03	FY04	FY05
Calibration and Validation Activities	1,400	750	959	642

The passive microwave instruments carried on Defense Meteorological Satellite Program (DMSP) and future National Polar-Orbiting Environmental Satellite Systems (NPOESS) provide global oceanic and atmospheric data of direct military operational relevance, including sea surface wind, sea ice, and precipitation; Geodetic/Geophysical Satellite (GEOSAT) altimeter data are used to observe significant wave height, ocean fronts and eddies, and internal acoustic structure. The calibration and validation (cal/val) activities provide for airborne sensor participation for data analysis, participation in the DMSP programs to support Navy required data and support for development of new METOC sensors.

FY 2002 ACCOMPLISHMENTS:

- Developed plan for SSM/I calibration and validation support pending launch of the DMSP satellite.
- Completed the integration, and begin flight testing of the Airborne Polarimetric Microwave Imaging Radiometer (APMIR) to use for cal/val of DMSP SSM/I and SSM/IS sensors and WindSat sensor.
- Began preparation for WindSat cal/val activities.

FY 2003 PLANS:

- Continue to monitor SSM/I performance and continue validation support effort associated with the DMSP SSM/IS.
- Conduct field experiments with APMIR to use for calibration/validation of DMSP SSM/I, SSM/IS sensors, and the WindSat sensor.

FY 2004 PLANS:

- Continue to monitor SSM/I performance and continue validation support effort associated with the DMSP SSM/IS and WindSat sensor.
- Conduct field experiments with APMIR to use for calibration/validation of DMSP SSM/I, SSM/IS sensors, and the WindSat sensor.

FY 2005 PLANS:

- Continue to monitor SSM/I performance and continue validation support effort associated with the DMSP SSM/IS and WindSat sensor.
- Conduct field experiments with APMIR to use for calibration/validation of DMSP SSM/I, SSM/IS sensors, and the WindSat sensor.

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 0305160N Project Number: X0524
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite (Space) Project Title: Navy METOC Support (Space)

	FY02	FY03	FY04	FY05
Doppler Altimeter	0	0	85	86

Brief Description of Program Effort 3. Navy requirements for geodetic and oceanographic information have been met by space-borne altimeters collecting the necessary information to support its environmental predictions and enhance its warfighting capability. Navy applications of altimetry include use of altimeter data in coastal oceanography, in mapping mesoscale fronts and eddies, and, in using basin-scale data for generating eddy-resolving global ocean models. The length and time scales of these processes are too large for conventional in-the-water oceanographic instrumentation configurations to measure. Satellite altimetry is the only known method by which oceanographers can precisely measure sea surface topography. Traditional altimeters accuracy significantly degrades near land due to ground reflections. Doppler altimetry with on-board processing will allow the Navy to accurately measure the sea surface topography in the increasingly important littorals.

FY 2004 PLANS:

- Begin support of Doppler Altimeter program development and trade studies.

FY 2004 PLANS:

- Continue support of Doppler Altimeter program development and trade studies.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E: Not applicable

NON-NAVY RELATED RDT&E:

PE 0605864F	DoD Space Test Program (STP)
PE 0305160F	Defense Meterological Satellite Program (SPACE)
PE SAT 809/00110 NASA 258-30	Science, Aeronautics, & Technology; Office of Earth Science Research and Technology
PE 0601103D	University Research Initiative

D. ACQUISITION STRATEGY: The WindSat provides risk reduction data and developmental technology that the NPOESS IPO will use in the development of the Conical Microwave Imager Sounder (CMIS). CMIS will collect global microwave radiometry and sounding data to produce microwave imagery and other meteorological and oceanographic data. It will be the primary instrument for satisfying 20 NPOESS Integrated Operational Requirements Document (IORD) Environmental Data Records (EDRs). These CMIS sensors will be acquired as part of the NPOESS architecture which

supports the Navy requirements in the future. The IOMI-GIFTS sensor technology development provides risk reduction data and developmental technology which will transition to the Next Generation GOES sensors, the Advanced Baseline Sounder. These operational sensors, aboard the future GOES satellites, will provide the operational support to meet many of the Navy's METOC requirements.

E. MAJOR PERFORMERS:

N/A

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 305160N Project Number: X1452
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: GEO SAT

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
X1452 GEOSAT	1,722	1,784	821	900	928	1,122	1,144	1,165

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides a satellite-borne radar altimeter sensor to obtain ocean topography measurements from which tactically significant features such as ocean fronts, and eddies, wave heights, internal acoustic structure, and sea-ice edges are derived. Topography provides a unique and important data source in support of a number of Naval warfare areas such as anti-submarine and undersea warfare. It also provides other agencies, such as National Oceanic and Atmospheric Administration and National Aeronautics and Space Administration with valuable inputs to studies involving Pacific Ocean temperature oscillations, global warming and climate change (El Nino, La Nina effects). Ocean topography data was previously provided by the Geodetic/Geophysical Satellite (GEOSAT) from 1985 until the satellite failed in January 1990. The GEOSAT Follow-On (GFO) satellite provides altimetry data until altimetry data becomes available from a future national environmental satellite system.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY05
GEOSAT	1,722	1,784	821	900

FY 2002 ACCOMPLISHMENTS:

- Funded on-orbit performance incentive.
- Developed improved ground station satellite data processing techniques.
- Continued to assess on-orbit system performance, conducted payload calibration/validation, and refined orbits and resolved performance anomalies.

FY 2003 PLANS:

- Continue to fund on-orbit performance incentive.
- Continue to develop improved ground station satellite data processing techniques.
- Continue to assess on-orbit system performance, conduct payload calibration/validation, refine orbits and resolve performance anomalies.

FY 2004 PLANS:

- Continue to develop improved ground station satellite data processing techniques.

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 305160N Project Number: X1452
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: GEO SAT

- Continue to assess on-orbit system performance, conduct payload calibration/validation, refine orbits and resolve performance anomalies.

FY 2005 PLANS:

- Continue to develop improved ground station satellite data processing techniques.
- Continue to assess on-orbit system performance, conduct payload calibration/validation, refine orbits and resolve performance anomalies.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:
Not applicable.

NON-NAVY RELATED RDT&E:
Not applicable.

D. ACQUISITION STRATEGY: As Applicable

E. MAJOR PERFORMERS:

N/A

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 305160N Project Number: X1452
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: GEO SAT

COST: (Dollars in Thousands)

PROJECT NUMBER/ TITLE	FY 2002 ACTUAL	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	FY 2006 ESTIMATE	FY 2007 ESTIMATE	FY 2008 ESTIMATE	FY 2009 ESTIMATE
X9282 Radiation Hardened Vector Processor System	0	2,927	0	0	0	0	0	0

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project will enable signal processing to be performed onboard a satellite via the NPOESS Preparatory Project (NPP). This effort provides a critical technology needed by ongoing Navy satellite programs and other satellite programs that the Navy uses for warfighting. The Radiation Hardened Vector Processor (RHVP) will enable signal processing to be performed onboard a satellite rather than on the ground, thereby significantly reducing the bandwidth requirements of the downlink and increasing the data that can be provided by satellite payload.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 02	FY 03	FY 04	FY05
Radiation Hardened Vector Processor System	0	2,927	0	0

FY 2003 Plan:

- Develop and complete Radiation Hardened Vector Processor.

C. OTHER PROGRAM FUNDING SUMMARY:

NAVY RELATED RDT&E:
Not applicable.

NON-NAVY RELATED RDT&E:
Not applicable.

F. ACQUISITION STRATEGY: As Applicable

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-2a

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 305160N Project Number: X9282
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: Radiation Hardened Vector Processor System

G. MAJOR PERFORMERS:

N/A

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-3 Cost Analysis

BUDGET ACTIVITY: 7 PROGRAM ELEMENT: 305160N Project Number: X0542
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: Navy METOC Support (Space)

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-03 Cost	FY-03 Award Date	FY-04 Cost	FY-04 Award Date	FY-05 Cost	FY-05 Award Date	Cost To Complete	Total Cost	Target Value of Contract
			.									
Spacecraft Development	FF	Spectrum Astro, AZ	N/A	2.500	N/A	0.000	N/A	0.000	N/A		See Remark A	
Spacecraft Development	CP	TRW, Rondo Beach, Ca.	3.185	1.700	N/A	0.000	N/A	0.000	N/A	56.015	60.900	
Subtotal Spacecraft Development			3.185	4.200		0.000		0.000		56..015	63.400	
Remarks: Spacecraft Development includes both the WindSat (Spectrum Astro) and IOMI (TRW) Projects. The contract for the WindSat spacecraft is held by the DoD Space Test Program with Spectrum Astro; through FY03 Navy will provide ~$14M for the spacecraft development. A. The FY03 increment completes the Navy obligation per the interagency MOA of the STP Spectrum Astro development. B. The IOMI (TRW) spacecraft development contract currently reflects phasing for a 2004 launch; the DoD STP has moved the launch date to 2006. The phasing costs of this development is funded through an interagency agreement with Navy & NASA and will be re-phased. Contract value is FY03 10M; FY04 33.9M; FY05 15M and FY06 2M.											
Windsat PM & Systems Engineering	CP	Various	62.471	11.400	N/A	0.000	N/A	0.000	N/A		73.871	
Iomi pm & System Engineering	CP	Various	3.754	0.0	N/A	0.000	N/A	0.000	N/A		3.754	
Data Calibration, Validation and APMIR	CP	Various	5.126	1.940	N/A	4. 145	N/A	3.571	N/A		14.782	
Subtotal Support			71.351	13.340		4.145		3.571		0.000	92.407	
Total Cost			74.536	17.540	TBD	4.145	TBD	3.571	TBD	56.015	155.807	

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Exhibit R-3 Cost Analysis

Budget Activity 7 PROGRAM ELEMENT: 0305160N Project Number: X1452
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: GFO SAT

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-03 Cost	FY-03 Award Date	FY-04 Cost	FY-04 Award Date	FY-05 Cost	FY-05 Award Date	Cost To Complete	Total Cost	Target Value of Contract
			.									
Software Development	CP	Ball Aerospace	85.965	0.000	N/A	0.000	N/A	0.000	N/A		85.965	
Software Development	CP	Various	8.045	0.000	N/A	0.000	N/A	0.000	N/A		8.045	
Subtotal Product Development			94.010	0.000		0.000		0.000			94.010	
Remarks:												
Systems Engineering	CP	Ball Aerospace	1.082	1.126	N/A	0.563	N/A	0.664	N/A		3.435	
Systems Engineering	CP	Various	0.640	0.658	N/A	0.258	N/A	0.236	N/A		1.792	
Subtotal Support			1.722	1.784		0.821		0.900		0.000	5.227	
Remarks:												
Total Cost			92.732	1.784	TBD	0.821	TBD	0.900	TBD	0.000	5.227	

FY 2004 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2003
Exhibit R-3 Cost Analysis

Budget Activity 7 PROGRAM ELEMENT: 0305160N Project Number: X9282
PROGRAM ELEMENT TITLE: Defense Meteorological Satellite Program (Space) Project Title: Radiation Hardened Vector Processor System

Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-03 Cost	FY-03 Award Date	FY-04 Cost	FY-04 Award Date	FY-05 Cost	FY-05 Award Date	Cost To Complete	Total Cost	Target Value of Contract
			.									
Software Development		Valley Technologies, Inc. Tamaqua, PA		2.927	FEB 2003						2.962	
Subtotal Product Development				2.927								
Remarks:												
Systems Engineering												
Systems Engineering												
Subtotal Support												
Remarks:												
Total Cost				2.962								