EXHIBIT R-2, RDT&E Budget Item Justification						DATE: **February 2006**		
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA-4**				R-1 ITEM NOMENCLATURE PE 0603207N Air/Ocean Tactical Applications				
COST ($ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	
Total PE Cost	**24.561**	**31.187**	**31.778**	**30.895**	**31.868**	**31.122**	**32.009**	
2341 METOC Data Acquisition	**8.167**	**9.047**	**10.703**	**10.566**	**10.770**	**10.707**	**11.045**	
2342 METOC Data Assimilation and Modeling	**7.583**	**9.454**	**10.794**	**10.932**	**11.731**	**10.969**	**11.292**	
2343 Tactical METOC Applications	**6.598**	**6.902**	**8.685**	**8.187**	**8.105**	**8.134**	**8.360**	
2344 Precise Timing and Astrometry	**1.247**	**1.284**	**1.596**	**1.210**	**1.262**	**1.312**	**1.312**	
9999 Congressional Increases	**0.966**	**4.500**						

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Air Ocean Tactical Applications (AOTA) Program Element is fully aligned with Navy's Sea Power 21 concept to enhance the future mission capabilities of the Navy-Marine Corps Team. New state-of-the art Government and commercial technologies are identified, transitioned, demonstrated and then integrated into Combat Systems and FORCEnet-related programs of record and Tactical Decision Aids (TDAs) that determine in real-time and near-real-time the operational effects of the physical environment on the performance of combat forces and their new and emerging platforms, sensors, systems and munitions. The AOTA program element focuses on sensing and characterizing the littoral and deep-strike battlespace in the context of regional conflicts and crisis response scenarios. Projects in this program element transition state-of-the art sensing, assimilation, modeling and decision aid technologies from Government and commercial sources. Unique project development efforts include atmospheric and oceanographic data assimilation techniques, forecast models, data base management systems and associated software for use in mainframe, desktop and laptop computers. Global Geospatial Information and Services efforts within this program address the bathymetric and gravimetric needs of the Navy. Also developed are algorithms to process new satellite sensor data for integration into Navy and Marine Corps decision support systems and for display as part of the common operational and tactical pictures. In addition, the projects provide for demonstration and validation of specialized atmospheric and oceanographic instrumentation and measurement techniques, new sensors, communications and interfaces. Included are new capabilities to assess, predict and enhance the performance of current and emerging undersea warfare and mine warfare weapons systems. AOTA capabilities are designed to support the latest versions of the Global Command and Control System (GCCS), the new Joint Command and Control (JC2) system, and specific unit-level combat systems. This program also develops representations of the physical environment for incorporation into Navy and Marine Corps warfare trainers and simulations. Finally, this program develops technological upgrades for the U.S. Naval Observatory's Master Clock system to keep pace with the demands of modern military communications, cryptographic, intelligence, geolocation, and targeting systems; develops near-real-time earth orientation predictions; develops very precise determination of positions of both faint and bright stars; and supports satellite tracking and space debris studies. Funding increases in Projects 2341 and 2342 in FY06 reflect the development of a new networked sensor grid and accelerated data fusion/assimilation efforts in support of the Littoral Battlespace Sensing (LBS) program. These efforts will enhance Intelligence Preparation of the Environment (IPE) capabilities to meet Chief of Naval Operations (CNO) and Commander Fleet Forces Command (CFFC) requirements for remote autonomous, clandestine, littoral battlespace sensing in support of Sea Shield & Sea Basing.

Beginning in FY 2007, funding supports Sensors and Observing Systems (in-situ, unmanned, space, through the sensor); Assimilation and Prediction Models (Atmosphere, Ocean, Space); Database and Product Development (Atmosphere, Ocean, Acoustics, Geospacial Information and Services (GI&S)); Tactical Decision Aids (TDA) and Mission Planning; Precise Timing, Astrometry and Reference Frames; and METOC in the Information Technology (IT) Enterprise Environment.

FY05 includes Congressional Add for Marine Mammal Tracking and Mitigation. FY06 includes Congressional Adds for 3D-CMAPS, Gateway System and Littoral Acoustic Demonstration Center.

CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA 4**	R-1 ITEM NOMENCLATURE PE 0603207N Air/Ocean Tactical Applications

(U) B. PROGRAM CHANGE SUMMARY:

(U) Funding:	FY 2005	FY 2006	FY 2007
FY06 President's Budget	25.186	27.094	32.145
FY07 President's Budget	24.561	31.187	31.778
Total Adjustments	(0.625)	4.093	(0.367)
Summary of Adjustments			
Small Business Innovation Research (SBIR)	(0.300)		
Department of Energy Transfer	(0.019)		
Program Realignments	0.006		
Execution Realignments	(0.312)		
Sec 8125: Revised Economic Assumptions		(0.124)	
Congressional Action 1% Reduction		(0.283)	
Congressional Increases		4.500	
Contract Support Reduction			(0.371)
NWCF CIVPERS Efficiencies			(0.242)
Inflation Adjustments			0.144
CIVPERS Pay Raise Rate Change			0.102
Subtotal	(0.625)	4.093	(0.367)

(U) Schedule:

Not applicable

(U) Technical:

Not applicable.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2341 METOC Data Acquisition		

COST ($ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	
Project Cost	**8.167**	**9.047**	**10.703**	**10.566**	**10.770**	**10.707**	**11.045**	
RDT&E Articles Qty								

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The major thrust of the meteorology and oceanography (METOC) Data Acquisition Project is to provide future mission capabilities to warfighters that will allow them to detect and monitor the conditions of the physical environment throughout the entire battlespace. New sensor technologies (including unmanned vehicles, tactical sensor exploitation, in-situ sensors, etc.) are identified and the most promising candidates are transitioned from the Government's and Commercial Industry's technology base to this project. These new sensor technologies are then demonstrated, validated and integrated into operational programs of record for use by warfighters. These new sensor capabilities are to provide timely and accurate METOC data and products to Operational and Tactical level of war commanders. As the emphasis on Naval Warfare has evolved from blue water operations to the littoral and deep strike battlespace, METOC data requirements have likewise evolved. The littoral and deep strike regions are extremely dynamic and complex, characterized by strong and highly variable oceanographic and atmospheric conditions. As a result, the need to accurately characterize these conditions is more crucial than ever in planning and executing Amphibious Warfare, Mine Warfare, Special Operations, Anti-Submarine Warfare, and Strike Warfare operations. Routinely available data sources, such as climatology, oceanographic and meteorological numerical models, and satellite remote sensing are necessary but not sufficient to support these warfare areas in the littoral and deep strike regions. Current operational sensors, such as the standard balloon launched radiosonde, are deployed from platforms that are frequently located great distances from the target area of interest. The principal challenge is to provide a means for the collection and dissemination of METOC data in highly variable and dynamic littoral environmental conditions or in denied, remote or inaccessible areas over extended periods of time. The principal goals of this project are to: 1) provide the means to rapidly and automatically acquire a broad array of METOC data using both off-board and on-board sensors; 2) provide an on-scene assessment capability for the tactical commander; 3) provide the tactical commander with real-time METOC data and products for operational use; 4) demonstrate and validate the use of tactical workstations and desktop computers for processing and display of METOC data and products using latest networking technologies; 5) demonstrate and validate techniques which employ data compression, connectivity and interface technologies to ingest, store, process, distribute and display these METOC data and products; 6) develop new charting and bathymetric survey techniques necessary to reduce the existing shortfall in coastal hydrographic survey requirements; and, 7) develop an expanded database for predictive METOC models in areas of interest. In FY06 and FY07 a portion of project funding is directed towards the development of the USMC Meteorological Mobile Facility (Replacement) Next Generation (METMF(R) NG) due to emergent critical USMC capability requirements. These efforts will enhance Intelligence Preparation of the Environment (IPE) capabilities to meet CNO and CFFC requirements for remote autonomous, clandestine, littoral battlespace sensing in support of Sea Shield & Sea Basing.

R-1 SHOPPING LIST - Item No. 30

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2006
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2341 METOC Data Acquisition

(U) B. Accomplishments/Planned Program

Autonomous Sensors (AUV/UAV)/ Sensors and Observing Systems (Unmanned Vehicles)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.797	0.517	2.001	
RDT&E Articles Quantity				

FY05 - Tested/demonstrated communications connectivity of micro and miniaturized sensor suites for mini/micro UAV and AUV platforms.
FY06 - Deliver, test, demo prototype micro AUV. Conduct preliminary studies in support of Littoral Battlespace Sensing, Fusion, and Integration (LBSF&I) and develop ISS 60 command and control system interface. Conduct undersea vehicle modeling and simulation and engineering studies.
FY07- Deliver/test/demonstrate prototype Sensor Pod on operational UAVs of miniaturized sensor suites for mini/micro UAV platforms. Develop and test Network interoperability of miniaturized sensor suites for emergent UAV and AUV platforms (continued from autonomous sensors (AUV/UAV)). Rugedize vehicles and begin development of a common command and control system. Develop prototype Autonomous Undersea Vehicles (AUV) (buoyancy) and other in-situ sensors in accordance with study results. Integrate new sensing capabilities into prototypes as part of the LBSF&I program.

Acoustic Data Inversion/ Sensors and Observing Systems (Through-the-Sensor)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.258	0.517	1.637	
RDT&E Articles Quantity				

FY05 - Completed assessments of temporal and spatial variability of littoral environments for acoustic data inversions. Continued IV&V on Geophysical Acoustic Inversion Toolkit (GAIT) Version 2 algorithms. Development and demonstration of advanced acoustic inversion techniques incorporating expert systems technology.
FY06 -Continue development of the Geophysical Acoustic Inversion Toolkit (GAIT) Version 2 algorithms to Ocean Atmosphere Master Library (OAML). Begin development of advanced PUMA through-the-sensor inversion algorithms designed to collected volumetric sound velocity and bottom backscatter.
FY07 - Deliver Geophysical Acoustic Inversion Toolkit (GAIT) Version 2 to OAML. Begin integration into Fleet Combat Systems. Mature networked data sharing capabilities. (from acoustic data inversion). Continue investigation of PUMA volumetric sound velocity and backscatter inversion techniques. Complete integration of the AQS-20 inversion techniques into the CNMOC Mine Warfare Workstation and the Mine Warfare Environmental Decision Aids Library (MEDAL). Continue development of the SPS-48E weather radar and SPY-1 Tactical Environmental Processor (TEP) work. Demonstrate and validate automated data acquisition and assimilation efforts as part of the LBSF&I program. Begin integration into Fleet Combat Systems. Test and validate Modular Ocean Data Assimilation System-Light (MODAS-L) string data ingest capability and volumetric sound velocity assimilation algorithms for Ocean Atmosphere Master Library (OAML) approval. Begin integration of these algorithms into submarine combat systems. Begin development of web-based submarine ambient noise assimilation capability. (Acoustic Data Acquisition). Begin development of Military Aircraft Communications Addressing and Report System (ACARS).

Ambient Noise Data/TDA/Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.218	0.517	1.775	
RDT&E Articles Quantity				

FY05 - Conducted IV&V on Dynamic Ambient Noise Prediction System (DAPS) Version 2. Updated historical shipping noise (SN) database. Delivered Dynamic Ambient Noise Prediction System (DAPS) Version 2.
FY06 - Deliver updated historical shipping noise database to the Ocean Atmosphere Master Library (OAML).
FY07 - Integrate the Dynamic Ambient Noise Prediction System (DAPS) Version 2 and updated historical shipping noise database into Fleet ASW Combat Systems (specifically the Sonar Tactical Decision Aid Variants and USW DSS). Development of Network based on DAPS. Add real-time ship tail Ambient Noise (AN) observations to the Shipping Nose (SN) database (from Ambient Noise Data). Continue the development of the next generation Ambient Noise database modeled after the GDB-V database. Conduct annual pre-release technical analysis and research of new National Geospatial Agency (NGA) products used by the Navy for navigation systems and maritime safety for Quality Control, Suitability of Use, and Interoperability. (from Digital MC and G Analysis Program (DMAP)). Continue to develop Tactical Decision Aids (TDA) uncertainty algorithms (from Acoustic Data Acquisition).

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2006
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME	
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2341 METOC Data Acquisition	

(U) B. Accomplishments/Planned Program

Autonomous Clandestine Sensors/ Sensors and Observing Systems (Through-the-Sensor)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.306	0.517		
RDT&E Articles Quantity				

FY05 - Delivered final version of web enabled system. Development of follow on autonomous clandestine sensors for data acquisition in denied areas. Conducted Alternatives Analysis for CNMOC AUV procurement. Continued AQS-20 through-the-sensor inversion rapid transition process. Continued development of the SPS-48E through-the-sensor weather radar development. Began development of an automated sensor placement mission planner.
FY06 - Deliver prototype capable of automated data assimilation via the Network infrastructure and Tactical Environmental Data Services (TED Services).
FY07 - Efforts rolled into the Sensors and Observing Systems (Through-the-Sensor) investment line.

Data Connectivity/MetOc in the IT Enterprise	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.213	0.517	1.490	
RDT&E Articles Quantity				

FY05 - Completed development of data connectivity with Joint Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR). Deliver TED Services Version 2 prototype.
FY06 - Deliver TED Services Version 3 prototype.
FY07 - Demonstrate and validate TED Services Version 3 and continue Network (GIG ES) compatibility effort. (from Data Connectivity).

Acoustic Data Acquisition/ Sensors and Observing Systems (Through-the-Sensor)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.289	0.662		
RDT&E Articles Quantity				

FY05 - Delivered AQS-20 mine hunting sonar prototype Version 1 and conduct IV&V on Precision Undersea Mapper (PUMA) Version 2 software. Evolutionary development of expert system acoustic data acquisition techniques to directly ingest data obtained from tactical sensors. Began addressing acoustic uncertainty and development of advanced metrics.
FY06 - Deliver Modular Ocean Data Assimilation System-Light (MODAS-L) string data ingest algorithms. Deliver prototype volumetric sound velocity assimilation algorithms. Begin development of submarine ambient noise assimilation capability. Continue the development of the next generation Ambient Noise database modeled after the GDB-V database. Continue to develop TDA uncertainty algorithms.
FY07 - Efforts rolled into the Sensors and Observing Systems (Unmanned Vehicles) investment line.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME	
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2341 METOC Data Acquisition	

(U) B. Accomplishments/Planned Program

Digital MC and G Analysis Program (DMAP)/ Tactical Decision Aid and Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.086	0.400		
RDT&E Articles Quantity				

FY05 - 06 Conduct annual pre-release technical analysis and research of new National Geospatial Agency (NGA) products used by the Navy for navigation systems and maritime safety for Quality Control, Suitability of Use, and Interoperability.
FY06 - Deliver Annual Report.
FY07 - Efforts rolled into the Tactical Decision Aid (TDA) and Mission Planning investment line.

Littoral Battlespace Data Acquisition/ Sensors and Observing Systems (In-Situ)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost		1.000	2.400	
RDT&E Articles Quantity				

FY06 - Develop initial Integrated Littoral Battlespace Data Acquisition Plan. Complete the AQS-20 through the sensor inversion rapid transition process. Conduct AQS-20 end-to-end demonstration. Continue work on the development of automated adaptive survey algorithms. Complete development of the joint NOAA/USN International Oceanographic Observation System (IOOS). Continue development of an automated sensor placement mission planner. Begin development of a prototype upper air measurement system.
FY07 - Continue work on adaptive hydrographic survey work for transition to the T-AGS 60 class ships. Complete development of the joint NOAA/USN International Oceanographic Observation System (IOOS). Continue development of an advanced sensor placement mission planning system for Littoral Warfare Team (LWT) transition. Begin development of micro-miniature disposable wave and surf sensors. Complete development of a prototype upper air measurement system.

USMC Acquisition	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost		4.400	1.400	
RDT&E Articles Quantity				

FY06 - Continue development of METMF(R) NG Variant I EDM, Variant II prototype.
FY07 - Conduct METMF(R) NG software, hardware, radar, and communications upgrades. Deliver Variant I EDM and Variant II prototype.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2341 METOC Data Acquisition

(U) C. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

Not Applicable

RELATED RDT&E: PE 0604218N, Air/Ocean Equipment Engineering - AN/SMQ-11 satellite receiver/recorder system engineering to receive data from on-orbit Defense Meteorological Satellite Program (DMSP) sensors onboard selected ships and shore sites.

(U) D. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies are to support the meteorology and oceanography (METOC) Data Acquisition Project to develop, demonstrate, and validate METOC data collection methods and sensors, and to evolve the ability to provide timely and accurate METOC data and products to the Tactical Commander, all with management oversight by the Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEO C4I & Space).

(U) E. MAJOR PERFORMERS:

Not applicable

(U) F. METRICS:

Earned Value Management (EVM) is used for metrics reporting and risk management.

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)								DATE: **February 2006**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**			PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2341 METOC Data Acquisition						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	NRL	21.688	4.376	N/A	4.656	N/A	5.507	N/A	CONT	CONT	
	WX	NAWC-AD Lake	0.923		N/A		N/A		N/A	CONT	CONT	
	CP	ARL/APL	4.454	0.400	N/A	0.440	N/A	0.437	N/A	CONT	CONT	
	WX	NSWC	2.362	0.300	N/A	0.330	N/A	0.305	N/A	CONT	CONT	
	CP	New Age	2.528	0.705	N/A	0.775	N/A	0.807	N/A	CONT	CONT	
	CP	PSI/R.L. Phillips	1.555	0.500	N/A	0.550	N/A	0.548	N/A	CONT	CONT	
	CP	Neptune	1.415	0.400	N/A	0.440	N/A	0.436	N/A	CONT	CONT	
	WX	FNMOC	1.661		N/A		N/A		N/A	CONT	CONT	
	N/A	MISC	11.629	1.351	N/A	1.537	N/A	2.044	N/A	CONT	CONT	
Subtotal Software Development			48.215	8.032		8.727		10.083		CONT	CONT	
Remarks:												
Systems Engineering	CP	SSA/CSC	1.525	0.135	N/A	0.180	N/A	0.220	N/A	CONT	CONT	
Subtotal Support			1.525	0.135		0.180		0.220		CONT	CONT	
Remarks:												

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)								DATE: **February 2006**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2341 METOC Data Acquisition						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	PD	OPTEVFOR	0.000	0.000	N/A	0.140	N/A	0.400	N/A	CONT	CONT	
Subtotal Software Development			0.000	0.000		0.140		0.400		CONT	CONT	
Remarks: Increased funding in FY07 for testing to support delivery of the Next Generation Meteorological Mobile Facility prototypes.												
Subtotal Support			0.000	0.000		0.000		0.000		CONT	CONT	
Remarks:												
Total Cost			49.740	8.167		9.047		10.703		CONT	CONT	

CLASSIFICATION:

EXHIBIT R4, Schedule Profile | DATE: **February 2006**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N / BA-4**

PROGRAM ELEMENT NUMBER AND NAME: PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME: 2341 METOC Data Acquisition

Fiscal Year	2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Acoustic Data Inversion/ Sensors/Obs Sys (TTS)	GAIT Ver 1.0			OAML		GAIT Ver 2.0 PUMA																						
Auto Clandestine Sensors/ Sensors/Obs Sys (TTS)	Web-Enabled System				TED Services Int																							
Acoustic Data Acquisition/ Sensors/Obs Sys (TTS)	AQS-20 Prototype			Uncertainty, AN Database	MODAS SubCTD				GAIT V2.0 PUMA Inversions AQS-20 SPS048E				GAIT V3.0 PUMA Inversions SPS-48E				NITES NEXT Integration TED Services Integration GAIT V3.0 PUMA Inversions				NITES NEXT Integration TED Services Integration NEXGEN TTS				NEXGEN TTS Algorithms			
Sensors/Obs Sys (TTS)											GAIT V2.0 AQS-20				AQS-20				PUMA GAIT V3.0						NITES/TED Services		

R-1 SHOPPING LIST - Item No. 30

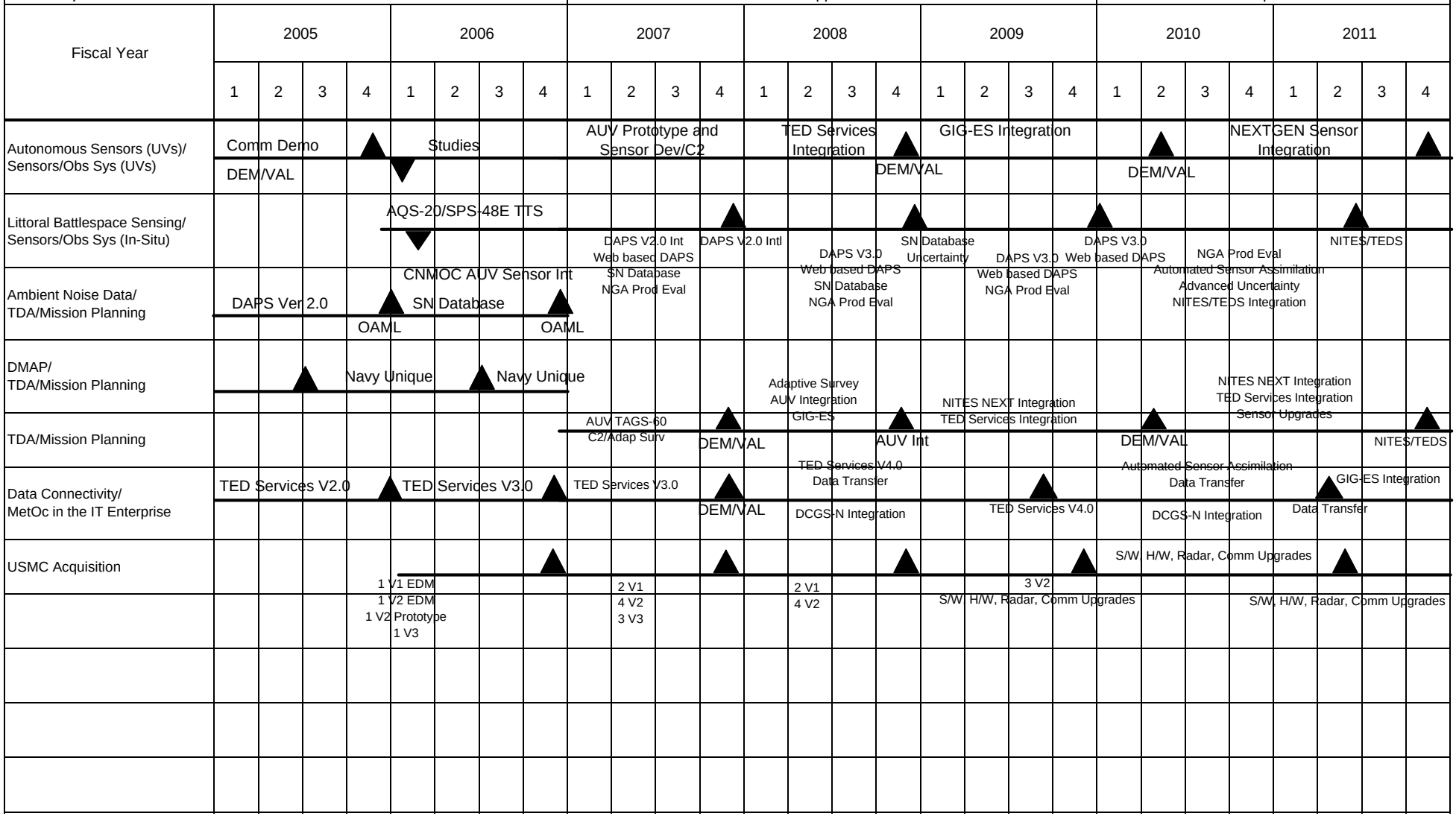
CLASSIFICATION:

EXHIBIT R4, Schedule Profile — DATE: **February 2006**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N / BA-4**

PROGRAM ELEMENT NUMBER AND NAME: PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME: 2341 METOC Data Acquisition



CLASSIFICATION:

Exhibit R-4a, Schedule Detail					DATE: **February 2006**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2341 METOC Data Acquisition			
Schedule Profile	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	
Acoustic Data Inversion/Sensors/Obs Sys (TTS)	4Q							
Auto Clandestine Sensors/Sensors/Obs Sys (TTS)	4Q							
Acoustic Data Acquisition/Sensors/Obs Sys (TTS)	4Q	4Q						
Sensors/Obs Sys (TTS)			4Q	4Q		Q1	Q3	
Autonomous Sensors (UVs)/Sensors/Obs Sys (UVs)	4Q			4Q		2Q	4Q	
Littoral Battlespace Sensing/Sensors/Obs Sys (in-Situ)			4Q	4Q		1Q	2Q	
Ambient Noise Data/TDA/Mission Planning	4Q	4Q						
DMAP/TDA/Mission Planning	3Q	3Q						
TDA/Mission Planning			4Q	4Q		2Q	4Q	
Data Connectivity/METOC in the IT Enterprise	4Q	4Q	4Q		3Q		2Q	
USMC Acquisition		4Q	4Q	4Q	4Q		2Q	

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification						DATE: **February 2006**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling			
COST ($ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	
Project Cost	**7.583**	**9.454**	**10.794**	**10.932**	**11.731**	**10.969**	**11.292**	
RDT&E Articles Qty								

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The meteorological and oceanographic (METOC) Data Assimilation Project is a multi-faceted project that provides future mission capabilities for warfighters to characterize the physical environment within their battlespace. This project includes: 1) development, demonstration and validation of atmospheric and oceanographic data assimilation techniques, forecast models, database management systems, and associated software for use in both mainframe and tactical scale computers. Included are numerical oceanographic and atmospheric models for the Large Scale Computers at the Navy Fleet Numerical Meteorology and Oceanography Center, Monterey, CA and the Naval Oceanographic Office, Stennis Space Center, MS. These models, combined with a global communications network for data acquisition and distribution, form a prediction system which provides METOC data and products necessary to support naval operations worldwide in virtually every mission area; 2) other models, which focus on ocean thermal structure and circulation, and surf and tide prediction; 3) techniques to process and manage satellite remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder; 4) National Polar-orbiting Operational Environmental Satellite System (NPOESS) readiness and risk reduction preparations to develop hardware and software that will allow ground stations to receive, ingest and exploit the NPOESS Preparatory Project (NPP) data. These techniques allow for the integration and tactical application of significant oceanographic and atmospheric data derived from satellite-borne sensors. Included are techniques and algorithms for the processing of sensor measurements, conversion of raw signal data to geophysical information, analysis schemes encompassing Artificial Intelligence and Expert Systems, and other satellite data applications and field validation of end products; and, 4) a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products. As weapons and sensors become more sophisticated and complex, the marine environment has an increasingly significant impact on system performance. Operational limitations induced by the ocean and atmosphere must be understood, and the resulting constraints on mission effectiveness and system employment minimized. Hence, the operating forces require more accurate worldwide forecasts of METOC conditions with increased temporal and spatial resolution. An additional challenge is posed by the emergence of new satellite sensors, which are continually adding new sources of disparate data types. In order to fully exploit this dynamic and massive volume of data, modern data base management systems (DBMS) are required, and must be tailored for individual computer configurations. Improved representation of smaller-scale phenomena, particularly in the littoral, is also an important consideration. Intelligence Preparation of the Environment (IPE) Sensor R&D to meet CNO and CFFC requirements for remote autonomous, clandestine, littoral battlespace sensing in near shore areas in support of Sea Shield & Sea Basing.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2342 METOC Data Assimilation and Modeling

(U) B. Accomplishments/Planned Program

Modeling and Simulation (M&S)/Tactical Design Aids (TDA) and Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.431	0.450	1.993	
RDT&E Articles Quantity				

FY05 - CSG/ESG Environmental Simulator in support of Naval and Joint M&S efforts. Delivered progress report and Program Officer briefing.
FY06 - Deliver Version 1.0 of CSG/ESG Environmental Simulator to NAVOCEANO. Conduct demonstration and validation. Begin development of Version 2.0.
FY07 - Deliver Joint Modeling and Simulations support capabilities to Naval Oceanography Command (NAVOCEANO) (M&S). Continue development of Version 2.0 of the CSG/ESG Environmental Simulator. Begin development of automated quality control algorithms, sensor command and control interfaces, and communications interfaces in support of Littoral Battlespace Sensing, Fusion and Integration (LBSF&I). Participate in selected Naval Exercises and deliver post exercise strawman and final reports (from Fleet Exercises). New applications and data are delivered from the program and require verification and validation on an annual basis. Deliver annual report (from Fleet Applications and Data Verification and Validation). Continue development of automated ASW reconstruction and data collection efforts.

Coupled Data Assimilation/ Assimilation and Prediction Models (Atmosphere)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.505	0.550	1.992	
RDT&E Articles Quantity				

FY05 - Delivered NRL Atmospheric Variational Data System (NAVDAS) Version 2. Development of next generation coupled assimilation techniques incorporating Automated Expert Systems.
FY06 - Begin operational test of NRL Atmospheric Variational Data System (NAVDAS) Version 3. Re-code NAVDAS to conform to Weather Research and Forecasting (WRF) compatibility requirements. Development of next generation coupled assimilation techniques incorporating direct satellite derived radiance data.
FY07 - Complete NRL Atmospheric Variational Data System (NAVDAS) Version 3 OPTEST and deliver to FNMOC. Investigate and incorporate Automated Techniques into the next generation data assimilation system. Re-code NRL Atmospheric Variational Data System (NAVDAS) to conform to Weather Research and Forecasting (WRF) compatibility requirements (from Coupled Data Assimilation). Continue implementing Weather Research and Forecasting (WRF) compatibility requirements. Explore incorporation of high-resolution Aerosol analyses and forecasts (from High-Resolution Models). Begin development of COAMPS V4. Continue investigations into improved Tropical Cyclone forecasting techniques. Begin Development of Hi-Res (~27km) Global Model. Complete COAMPS Dust algorithm integration. Begin COAMPS OS/NOWCAST integration. Develop advanced data fusion algorithms for weather radars in support of the LBSF&I program.

Fleet Exercises/TDA and Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.500	0.550		
RDT&E Articles Quantity				

FY05 - Participated in selected Naval Exercises and deliver post exercise strawman and final reports. Expanded scope of fleet exercise participation to include integrated multi-sensor (data collection to application) demonstrations. Continued development of Automated ASW Reconstruction efforts.
FY06 - Participate in selected Naval Exercises and deliver post exercise strawman and final reports. Continue development of Automated ASW Reconstruction efforts.
FY07 - Efforts incorporated into the TDA and Mission Planning investment line.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2006
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME	
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2342 METOC Data Assimilation and Modeling	

(U) B. Accomplishments/Planned Program

High-Resolution Forecast Models/ Assimilation and Prediction Models (Atmosphere)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.756	0.928		
RDT&E Articles Quantity				

FY05 - Delivered prototype advanced land-surface modeling system for integration into Coupled Atmospheric Mesoscale Prediction Systems (COAMPS). Continued research directed towards improved Tropical Cyclone forecasts.
FY06 - Deliver Version 3 of Coupled Atmospheric Mesoscale Prediction Systems (COAMPS). Re-code Coupled Atmospheric Mesoscale Prediction Systems (COAMPS) to conform to Weather Research and Forecasting (WRF) compatibility requirements. Begin integration of COAMPS Dust algorithms. Continue research directed towards improved Tropical Cyclone forecasts.
FY07 - Efforts incorporated into the "Assimilation and Prediction Models (Atmosphere)" product line.

Basin Scale Ocean Models/ Assimilation and Prediction Models (Oceans)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.856	0.900	2.622	
RDT&E Articles Quantity				

FY05 - Developed prototype Adriatic Sea model. Completed development of next generation coastal and enclosed basin tactical scale oceanographic models. Completed validation of the EAS model. Began development of NCOM relocateable grid, dynamic MODAS, and HYCOM.
FY06 - Complete the transition of Adriatic Sea model. Transition rapid relocatability capability. Incremental development of coupled air/ocean models for selected geographical locations in response to emergent requirements. Complete development of NCODA MVOI. Continue development of NCOM relocateable grid, dynamic MODAS, and HYCOM. Begin development of NCODA Vert Cov.
FY07 - Incremental development of coupled air/ocean models for selected geographical locations in response to emergent requirements. Complete development of MODAS dynamic. Begin development of MODAS NEXGEN. Continue development of HYCOM. Complete development of NCOM relocateable. Begin development of NCOM Region A. Complete development of NCODA Vertical Cov. Begin development of NCODA Horizontal Cov. Continue development of advanced ADCIRC and coastal wave and surf algorithms. Develop advanced data fusion algorithms in support of the LBSF&I program.

Data Assimilation/ Assimilation and Prediction Models (Space)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.688	1.248	1.317	
RDT&E Articles Quantity				

FY05 - Transitioned applications using WindSat, Meteosat Second Generation (MSG), the Special Sensor Microwave Imager and Sounder (SSMIS), and MTSAT (Japanese replacement).
FY06 - Continue to transition applications using next generation WindSat, Meteosat Second Generation (MSG), the Special Sensor Microwave Imager and Sounder (SSMIS), and MTSAT (Japanese replacement). Begin development of the next generation of Satellite Workstations.
FY07 - Continue to transition applications using next generation WindSat, Meteosat Second Generation (MSG), the Special Sensor Microwave Imager and Sounder (SSMIS), and MTSAT (Japanese replacement). Incorporation of Automated Expert System techniques (from Data Assimilation). Continue improvements to the Satellite Workstation.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2342 METOC Data Assimilation and Modeling

(U) B. Accomplishments/Planned Program

Automated Objective Processing/ Assimilation and Prediction Models (Oceans)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.916	0.800		
RDT&E Articles Quantity				

FY05 - Delivered data assimilation upgrades.
FY06 - Deliver prototype global Navy Coastal Ocean Model (NCOM) prediction system upgrades to the Naval Oceanography Command for testing.
FY07 - Incorporated into the "Assimilation and Prediction Models (Oceans)" investment line.

Tide/Surf Data Visualization/ Assimilation and Prediction Models (Oceans)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.483	0.550		
RDT&E Articles Quantity				

FY05 - Developed and delivered documentation for Atmospheric Modeling Oversight Panel Transition to Naval Oceanography Command (NAVOCEANO) for approval.
FY06 - Finalize approved documentation and deliver Version 1 to Ocean Atmosphere Master Library (OAML). Begin development of advanced ADCIRC and coastal wave and surf algorithms.
FY07 - Incorporated into the "Assimilation and Prediction Models (Oceans)" investment line.

NEXGEN Acoustic Models/ Assimilation and Prediction Models (Acoustics)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.106	1.200	1.870	
RDT&E Articles Quantity				

FY05 - Delivered Semi-Empirical Surface Scattering Strength Algorithm (SESSS) Version 2. Began development of SESSS Version 3.0 (4-10 kHz gap). Incorporated Digital Bathymetric Database (DBDB) Version 5 APIs and consolidated existing databases, upgrade NAUTILUS run options. Continued annual upgrades to the STAPLE system.
FY06 - Incorporate variable range-step option in Range Acoustic Model (RAM) 4.0, consolidate disparate bottom databases into one consolidated database Geoacoustic Database Variable Resolution (GDB-V). Integrate latest acoustic models into the Geo Acoustic Inversion Toolkit (GAIT). Continue development of SESSS Version 3.0 (4-10 kHz gap). Continue annual upgrades to the STAPLE system.
FY07 - Demonstrate and validate RAM 4.0 3D and deliver to Ocean Atmosphere Master Library (OAML). Begin development of RAM 5.0 4D. Complete bottom database consolidation. Continue development of SOA GAIT. Begin development of active algorithms for the Geo Acoustic Inversion Toolkit (GAIT). Incorporate Automated Expert Systems model selection algorithms into the next generation Range Acoustic Model (RAM) (from NEXGEN Acoustic Models). Complete integration of initial uncertainty algorithms into Fleet Tactical Decision Aids (TDAs). Continue development of next generation mid-frequency bottom loss/bottom scatter models and databases for shallow water environments. Begin development of a fully automated version of Geophysical Acoustic Inversion Toolkit (GAIT) (from Shallow Water Acoustics). Continue annual upgrades to the STAPLE system. Complete SESSS 3.0 (4-10 kHz gap).

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2006
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2342 METOC Data Assimilation and Modeling

(U) B. Accomplishments/Planned Program

Shallow Water Acoustics/ Assimilation and Prediction Models (Acoustics)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.748	0.800		
RDT&E Articles Quantity				

FY05 - Completed final Comprehensive Acoustic System Simulation (CASS)/Active System Performance Model (ASPM) assessment and delivered final report. Integrated multistatics modeling and performance prediction techniques.
FY06 - Begin development of a Ship of Opportunity version of Geophysical Acoustic Inversion Toolkit (GAIT). Integration of uncertainty predictions into Fleet Tactical Decision Aids (TDAs).
FY07 - Incorporated into the "Assimilation and Prediction Models (Acoustics)" investment line.

Fleet Applications and Data Verification & Validation/ TDA and Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.594	0.450		
RDT&E Articles Quantity				

FY05 - New applications and data were delivered from the program and required verification and validation on an annual basis. Delivered Annual Report.
FY06 - Deliver Annual Report.
FY07 - Efforts incorporated into the TDA and Mission Planning investment line.

Sensors and Observing Systems (Unmanned Vehicles)	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost		1.028	1.000	
RDT&E Articles Quantity				

FY06 - Develop and deliver initial engineering documentation. Develop in-depth data assimilation methods to support various evolving littoral sensors such as the Next Generation Upper Air Sensor, Seaglider, and Helicopter and/or Unmanned Aerial Vehicle (UAV) specific sensors. Develop new sensors and/or reconfigure existing littoral sensors to support littoral Undersea Warfare (USW), Mine Warfare (MIW), Special Operations (SPECOPS) and other Naval Operations. Develop Next Generation Upper Air Sensor prototype. Conduct glider Alternatives Analysis, data compression and transmission investigations, system hardening, common control interface development, and automated trim and balance capability development.
FY07 - Develop in-depth next generation data assimilation methods to support various evolving littoral sensors such as the Next Generation Upper Air Sensor, UUV gliders, and Helicopter and/or Unmanned Aerial Vehicle (UAV) specific sensors. Demonstrate prototype sensors and deliver post-demonstration report (from Littoral Battlespace Sensor Data Assimilation). Continue development of UV data compression, system hardening, common control interface, and an automated balance and trim capability. Begin integration of a UUV acoustic sensor capability. Conduct demonstration of new capabilities in support of LBSF&I program.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2342 METOC Data Assimilation and Modeling

(U) C. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

Not applicable

(U) D. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies to support the meteorological and oceanographic (METOC) Data Assimilation Project which is a multi-faceted program which includes: 1) development, demonstration and validation of atmospheric and oceanographic data assimilation techniques, forecast models, database management systems, and associated software for use in both mainframe and tactical scale computers; 2) other models, which focus on ocean thermal structure and circulation, and surf and tide prediction; 3) techniques to process and manage satellite remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder; and, 4) a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products, all with management oversight by Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEO C4I & Space).

(U) E. MAJOR PERFORMERS:

Not applicable

(U) F. METRICS:

Earned Value Management (EVM) is used for metrics reporting and risk management.

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)								DATE: **February 2006**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	NRL	50.283	6.247	N/A	7.502	N/A	8.597	N/A	CONT	CONT	
	WX	NAWC-WD, Pax	1.520	0.208	N/A	0.253	N/A	0.285	N/A	CONT	CONT	
	PD	APL	0.985	0.290	N/A	0.353	N/A	0.397	N/A	CONT	CONT	
	Grant	Univ. S. Miss.	2.413		N/A		N/A		N/A	CONT	CONT	
	CP	Neptune	1.001	0.325	N/A	0.396	N/A	0.445	N/A	CONT	CONT	
	CP	New Age	0.700	0.325	N/A	0.396	N/A	0.445	N/A	CONT	CONT	
	N/A	MISC	12.033	0.188	N/A	0.554	N/A	0.623	N/A	CONT	CONT	
Subtotal Software Development			68.935	7.583		9.454		10.794		CONT	CONT	
Remarks:												
Systems Engineering	CP	SSA/CSC	0.295							CONT	CONT	
Subtotal Support			0.295							CONT	CONT	
Remarks:												
Total Cost			69.230	7.583		9.454		10.794		CONT	CONT	

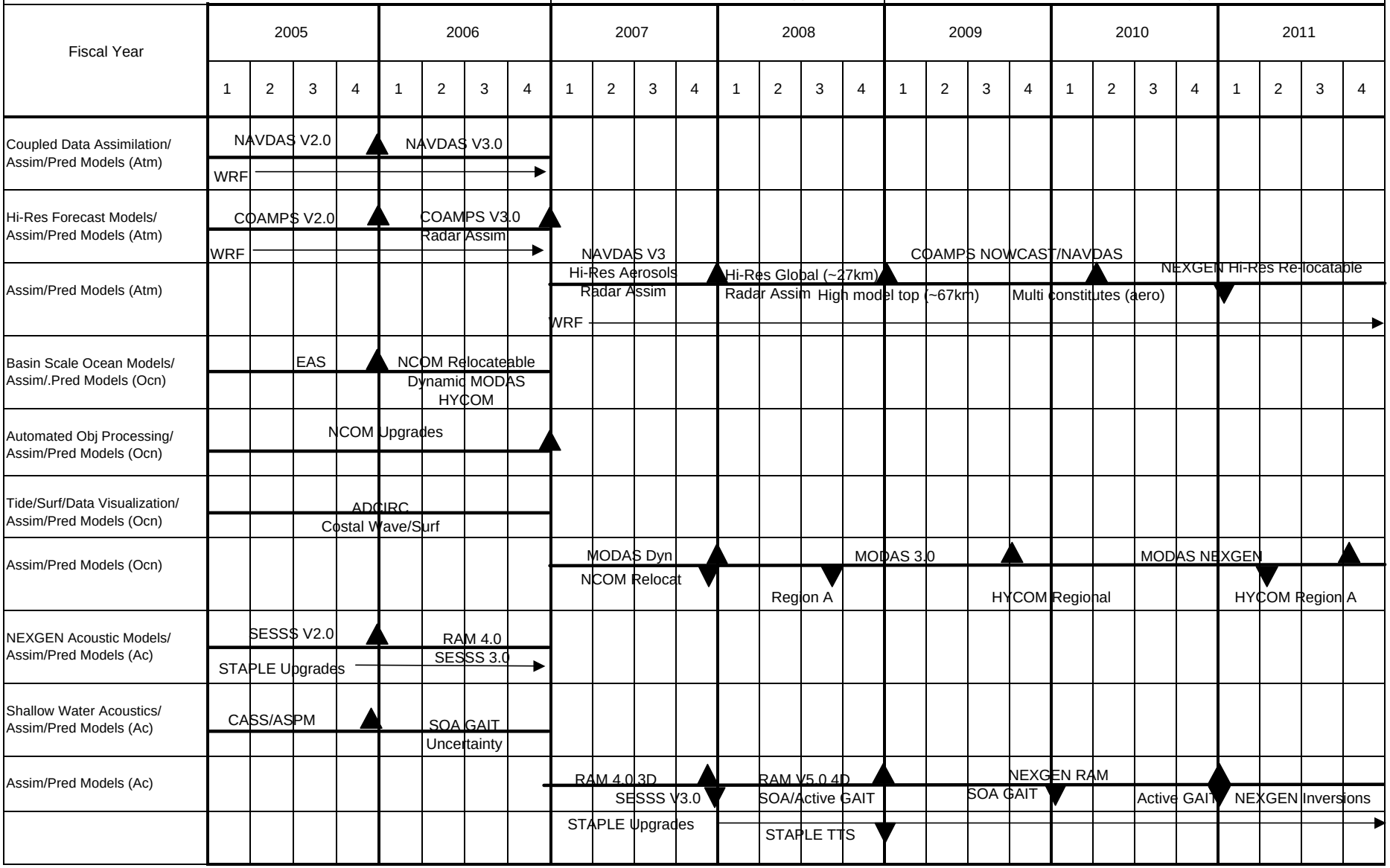
EXHIBIT R4, Schedule Profile

DATE: **February 2006**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N / BA-4**

PROGRAM ELEMENT NUMBER AND NAME: PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME: 2342 METOC Data Assimilation and Modeling



CLASSIFICATION:

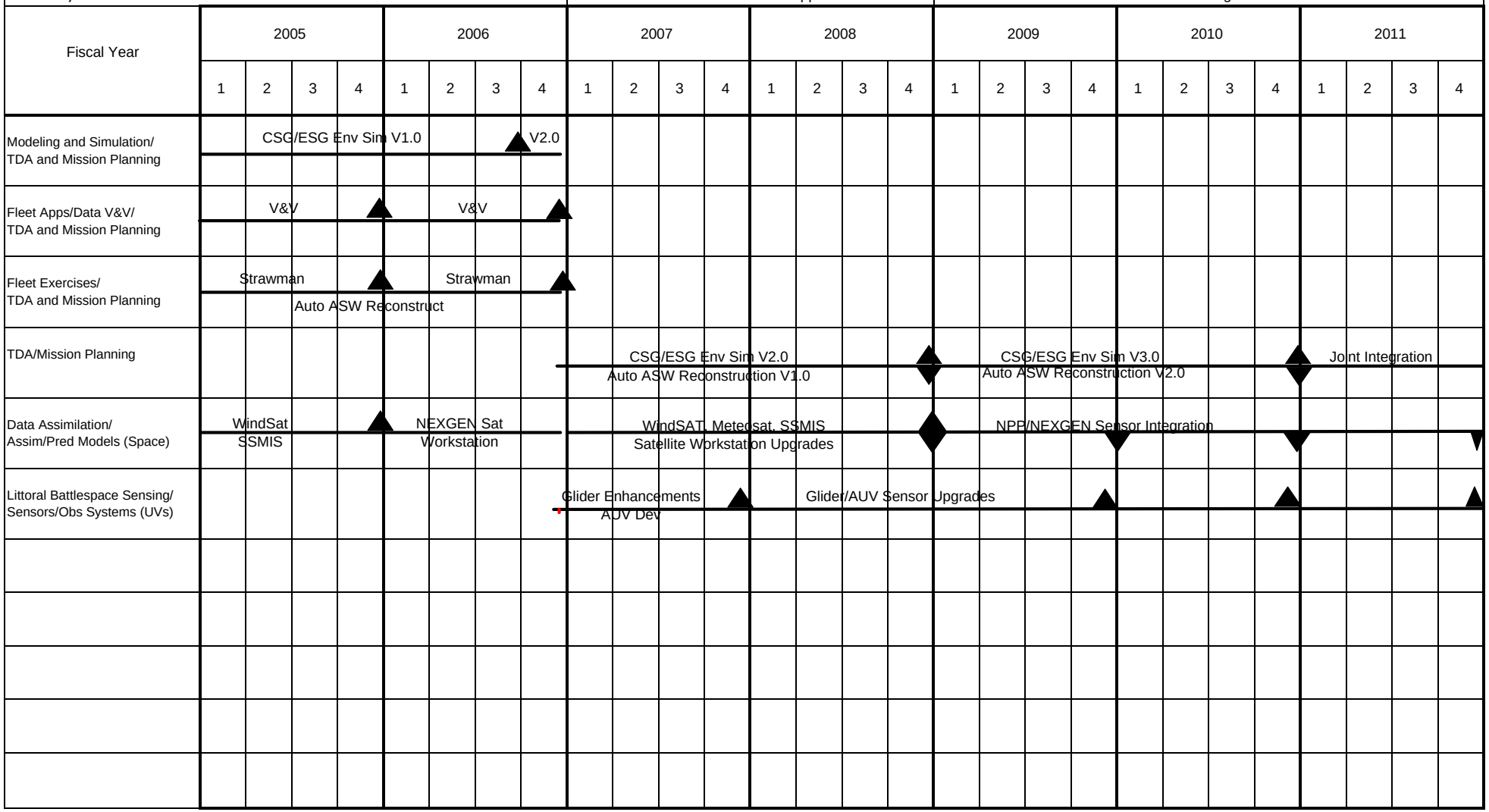
EXHIBIT R4, Schedule Profile

DATE: **February 2006**

APPROPRIATION/BUDGET ACTIVITY
RDT&E, N / BA-4

PROGRAM ELEMENT NUMBER AND NAME
PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME
2342 METOC Data Assimilation and Modeling



R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

Exhibit R-4a, Schedule Detail				DATE: **February 2006**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications			PROJECT NUMBER AND NAME 2342 METOC Data Assimilation and Modeling			
Schedule Profile	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Coupled Data Assimilation/Assim/Pred Models (Atmosphere)	4Q						
High-Resolution Forecast Models/Assim/Pred Models (Atmosphere)	4Q	4Q					
Assim/Pred Models (Atmosphere)			4Q	4Q		1Q	1Q
Basin Scale Ocean Models/Assim/Pred Models (Ocean)	4Q						
Automated Objective Processing/Assim/Pred Models (Ocean)		4Q					
Tide/Surf/Data Visualization/Assim/Pred Models (Ocean)							
Assim/Pred Models (Ocean)			4Q	3Q	4Q		1Q
NEXGEN Acoustic Models/Assim/Pred Models (Acoustics)	4Q						
Shallow Water Acoustics/Assim/Pred Models (Acoustics)	4Q						
Assim/Pred Models (Acoustics)			4Q	4Q	4Q	4Q	
Modeling and Simulation/TDA and Mission Planning		3Q					
Fleet Apps/Data V&V/TDA and Mission Planning	4Q	4Q					
Fleet Exercises/TDA and Mission Planning	4Q	4Q					
TDA and Mission Planning				4Q		4Q	
Data Assimilation/Assim/Pred Models (Space)	4Q			4Q			
Littoral Battlespace Sensing/Sensors/Observing Systems (UVs)			4Q		4Q	4Q	4Q

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2006**	
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2343 Tactical METOC Applications			
COST ($ in Millions)	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	
Project Cost	**6.598**	**6.902**	**8.685**	**8.187**	**8.105**	**8.134**	**8.360**	
RDT&E Articles Qty								

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The METOC Data Applications Project provides future operational effects decision aid capabilities for Navy and Marine Corps warfighters in the context of Joint Operations. This project identifies and transitions state-of-the-art decision support software technologies from the Government's and Commercial Industry's technology base and then demonstrates and validates these capabilities before fielding. These future software decision support tools are intended to provide platform, sensor, communications, and weapon systems performance assessments for warfighters in terms of their littoral and deep-strike battlespace environments. These assessments allow mission planners and warfighters, from the unit to theater level, to optimize their sensor employment on airborne, surface, and subsurface platforms in support of all Naval Composite Warfare mission areas including Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), and Special Warfare. Performance assessments leading to improvements in operational and tactical control are conducted through a two-tiered approach: 1) METOC Decision Aids (MDAs); and, 2) Operational Effects Decision Aids (OEDAs). MDAs consist of a series of analysis tools which characterize the physical environment conditions of the battlespace based on the best set of physical environment data available at the time (i.e., some combination of historical and/or real-time (or near real-time) in-situ data. OEDAs then use the MDA information by fusing it with relevant, often-classified sensor and target data to predict how own-force weapons and sensor systems will perform against hostile targets. Performance results are displayed in tabular and graphic formats for use by mission planners and combat/weapon system operators to develop ASW and MIW search and localization plans, USW/AAW/ASUW screens, STW profiles, AMW ingress and egress points, and for other warfare considerations. MDAs and OEDAs typically use data derived from sensors developed in Project 2341 (METOC Data Acquisition) and assimilated by software produced by Project 2342 (METOC Data Assimilation and Modeling). MDAs and OEDAs also use data obtained through direct interfaces to Navy combat systems. A current emphasis area of the project is the development of new combat system and mine warfare performance prediction and MDA/OEDA capabilities required to characterize and/or predict sensor and weapons system performance in the highly complex littoral environments in support of regional conflict scenarios. It addresses multi-warfare areas, particularly Mine Warfare, shallow water ASW, and missile and air defense/strike capabilities.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2006
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME	
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2343 Tactical METOC Applications	

(U) B. Accomplishments/Planned Program

Electromagnetic and Electro-optical (EM/EO) Decision Aids/ TDA/Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.447	1.266	8.685	
RDT&E Articles Quantity				

FY05 - Completed development of Target Acquisition Weather Software (TAWS) and delivered Version 2.0 including new sensor data and backgrounds consistent with US Navy and US Marine Corp missions. Continued development of the TAWS 3.0 stand alone version, to include integration of DTED Terrain and JAWS targets.
FY06 - Complete development of Target Acquisition Weather Software (TAWS) Version 3.0 to include new sensor data and backgrounds consistent with Joint Operations. Continue development of TAWS 4.0 (web-enabled). Development of upgrades to next generation electromagnetic and electro-optical (EM/EO) performance prediction systems to include incorporation of new Naval and Joint Sensor Suites. Begin porting Advanced Refractive Effects Prediction System (AREPS) code to JAVA. Begin development of the Naval Integrated Tactical Environmental System Next Generation (NITES NG).
FY07 - Complete development of TAWS 4.0. Begin development of TAWS 4.4 Enterprise Portal. Complete development of AREPS JAVA port. Begin development of an advanced EM Model Server. Conduct annual update of MEDAL acoustic databases and models. Continue development of NITES NG (DCGS-N integration, etc.).

Mine Littoral Warfare Tactical Decision Aids (TDA)/ TDA/Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.447	1.567		
RDT&E Articles Quantity				

FY05 - Delivered Mine Warfare Environmental Data Applications Library (MEDAL) Build 10.
FY06 - Development to incorporate additional mine littoral warfare decision aids in applicable performance prediction systems. Develop Mine Warfare Environmental Data Applications Library (MEDAL) Build 11 to include the incorporation of the new Geoacoustic Database - Variable Resolution (GDB-V) as well as the incorporation of the new Battlespace Profiling System (BPS).
FY07 - Efforts rolled into the "TDA/Mission Planning" investment line.

Tactical Decision Aids (TDA) COTS Visualization/ TDA/Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.385	1.672		
RDT&E Articles Quantity				

FY05 - Delivered 4D-Vis prototype. Delivered technical reports. Incremental development of next generation multi-dimensional Tactical Decision Aid (TDA) COTS visualization techniques and integrate into appropriate platform Advanced Development Models (ADMs).
FY06 - Development of Network integration via Commercial Joint Mapping Tool Kit (CJMTK) and integration of evolving GIS based technology.
FY07 - Efforts rolled into the "TDA/Mission Planning" investment line.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2343 Tactical METOC Applications

(U) B. Accomplishments/Planned Program

Platform Vulnerability/TDA/Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.126	1.266		
RDT&E Articles Quantity				

FY05 - Delivered platform vulnerability assessment Tactical Decision Aid (TDA) Version 3 into surface ship, submarine and air ADMs to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluated functionality during at-sea tests. Deliver technical reports.
FY06 - Development of Tactical Decision Aid (TDA) Version 4 to include integration of new electromagnetic and electro-optical (EM/EO), Target Acquisition Weather Software (TAWS), and advanced visualization techniques such as 4D Visualization.
FY07 - Efforts rolled into the "TDA/Mission Planning" investment line.

Sensor Interface Capabilities/TDA/Mission Planning	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	1.193	1.131		
RDT&E Articles Quantity				

FY05 - Developed and deliver Build 3.0. Delivered technical reports. Incremental development of environmental sensor interface capabilities. Continued Integrated Ocean Observing System (IOOS) effort.
FY06 - Evolutionary development of Build 3.5. Evaluate functionality during at-sea tests and deliver technical reports. Complete Integrated Ocean Observing System (IOOS) effort.
FY07 - Efforts rolled into the "TDA/Mission Planning" investment line.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2343 Tactical METOC Applications

(U) C. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

Not applicable

RELATED RDT&E: PE 0604218N (Air/Ocean Equipment Engineering). TESS/NITES will incorporate METOC data applications.

(U) D. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies are to support the METOC Data Applications project to continue the development of state-of-the-art software capabilities that provide sensor, communication, and weapon system performance assessments across the full spectrum of open ocean and littoral operating environments, meteorology and oceanography , all with management oversight by Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEOC4I & Space).

(U) E. MAJOR PERFORMERS:

N/A

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)								DATE: **February 2006**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2343 Tactical METOC Applications						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	NUWC	1.400							CONT	CONT	
	WX	SSC SD	2.775	0.335	N/A	0.349	N/A	0.430	N/A	CONT	CONT	
	WX	NRL	1.761	0.285	N/A	0.297	N/A	0.366	N/A	CONT	CONT	
	CP	NAVSEA	30.167	5.603	N/A	5.982	N/A	7.539	N/A	CONT	CONT	
	CP	LOCKHEED	1.053							CONT	CONT	
	N/A	MISC	5.720	0.375	N/A	0.275	N/A	0.350	N/A	CONT	CONT	
Subtotal Product Development			42.876	6.598		6.902		8.685			65.061	
Remarks:												
	CP	IPD	0.595							CONT	CONT	
Subtotal Support			0.595							CONT	CONT	
Remarks:												
Total Cost			43.471	6.598		6.902		8.685		CONT	CONT	

CLASSIFICATION:

EXHIBIT R4, Schedule Profile

DATE: **February 2006**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N / BA-4**

PROGRAM ELEMENT NUMBER AND NAME: PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME: 2343 Tactical METOC Applications

Fiscal Year	2005				2006				2007				2008				2009				2010				2011				2012			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
EM/EO Decision Aids/ TDA/Mission Planning	TAWS 2.0				TAWS 3.0 JAVA AREPS																											
Mine Warfare TDAs/ TDA/Mission Planning	MEDAL Update				MEDAL Update																											
TDA COTS Visualization/ TDA/Mission Planning	4D Prototype				NITES NG																											
Platform Vulnerability/ TDA/Mission Planning	NITES II Upgrade				NITES II Upgrade																											
Sensor Interface Capabilities/ TDA/Mission Planning				IOOS																												
TDA/Mission Planning									TAWS 4.0 EM Server NITES NG MEDAL Upgrade				TAWS 4.4 NITES NG EM Server MEDAL Upgrade				TAWS 4.6 MEDAL Upgrade				NITES NG LBSI&F TAWS 5.0 MEDAL Upgrade				MEDAL Upgrade				NITES NG DCGS-N MEDAL Upgrade			

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

Exhibit R-4a, Schedule Detail						DATE: **February 2006**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2343 Tactical METOC Applications			
Schedule Profile		FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
EM/EO Decision Aids/TDA and Mission Planning		4Q	4Q					
Mine Warfare TDAs/TDA and Mission Planning		4Q	4Q					
TDA COTS Visualization/TDA and Mission Planning		4Q						
Platform Vulnerability/TDA and Mission Planning		4Q	4Q					
Sensor Interface Capabilities/TDA and Mission Planning			4Q					
TDA and Mission Planning				4Q	4Q	4Q		1Q

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT NUMBER AND NAME PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry		

COST ($ in Millions)	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	
Project Cost	**1.247**	**1.284**	**1.596**	**1.210**	**1.262**	**1.312**	**1.312**	
RDT&E Articles Qty								

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The major thrust of the Precise Timing and Astrometry Project is to provide future capabilities that directly support the mission of the U.S. Naval Observatory (USNO). These future mission capabilities are intended to:
1) address DoD requirements for needed increases in positioning accuracies of modern weapons systems by the determination of star positions (including objects at other than optical wavelengths) and the stellar inertial reference system (to which all navigation, guidance, and positioning systems are ultimately referred); 2) develop techniques for the prediction of the Earth's instantaneous orientation with respect to the stellar inertial reference system; 3) oversee the determination and dissemination of precise time information using the Navy/DoD Master Clock System and precise time distribution networks; and, 4) develop advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of the positions of both faint and bright stars, satellite tracking, and space debris studies. DoD Instruction 5000.2 assigns to the Navy the responsibility for coordinating Precise Time and Time Interval (PTTI) requirements and for maintaining a PTTI reference standard (astronomical and atomic) for use by all DoD Services, Federal agencies, and related scientific laboratories. The Navy is also responsible for providing astronomical data for navigation, positioning, and guidance, including space. Some operational and many emerging requirements surpass current support capabilities. In response to these DoD requirements, this project transitions Research (6.1) and Exploratory Development (6.2) efforts, as well as developments in the civilian sector, into the operational capabilities of the USNO.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME	
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2344 Precise Timing and Astrometry	

(U) B. Accomplishments/Planned Program

Time Transfer/ Precise Timing, Astrometry, & Reference Frames	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.437	0.391	1.596	
RDT&E Articles Quantity				

FY05 - Delivered technical reports, incremental developments of time transfer techniques. Completed production of six SAASM Rx units Began development of M Code Timing Rx.
FY06 - Development of next generation GPS Independent Time Transfer. Complete design of preliminary Prototype M Code Timing Rx.
FY07 - Begin development of the algorithm for the atomic fountain timescale. Begin a 24/7 demonstration of the Ensemble Fountain Clock Systems. Complete and demonstrate the Prototype M Code GPS receiver. Begin development of the USNO Robotic Astrometric Telescope (URAT) Focal Plane Array (FPA). Conduct a pre-operational demonstration of the CCD array for the USNO Robotic Astrometric Telescope.

Earth Orientation/Astrometry/ Precise Timing, Astrometry, & Reference Frames	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.349	0.430		
RDT&E Articles Quantity				

FY05 - Evolutionary developments of next-generation earth orientation techniques. Delivered technical reports. Demonstrated Complex Focal Plane Array for Astrometry.
FY06 - Complete Orion Array Prototype Detector. Incremental development of next generation earth orientation techniques (Astrometric Telescope). Begin development of radiation mitigation techniques for space operations.
FY07 - Efforts rolled into the "Precise Timing, Astrometry & Reference Frames" Investment line.

Master Clock/ Precise Timing, Astrometry, & Reference Frames	FY 05	FY 06	FY 07	
Accomplishments/Effort/Subtotal Cost	0.461	0.463		
RDT&E Articles Quantity				

FY05 - Performed initial testing of next generation Master Clock. Exploitation of emergent Master Clock technologies (Rubidium Fountain). Completed Rubidium Fountain Prototype (pre-operational status).
FY06 - Perform initial testing and complete initial Technical Reports. Demonstrate 24/7 operational capability of Rubidium Fountain Clock. Begin development of Ensemble Fountain Clock Systems.
FY07 - Efforts rolled into the "Precise Timing, Astrometry & Reference Frames" Investment line.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2006**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA-4	PE 0603207N Air/Ocean Tactical Applications	2344 Precise Timing and Astrometry

(U) C. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name

Not applicable.

(U) D. ACQUISITION STRATEGY:

Acquisition, management and contracting strategies are to support the Precise Timing and Astrometry Project in direct support of the U.S. Naval Observatory (USNO) in: 1) addressing DoD requirements for needed increases in positioning accuracies of modern weapons systems by the determination of star positions and the stellar inertial reference system ; 2) developing techniques for the prediction of the Earth's instantaneous orientation with respect to the stellar inertial reference system; 3) overseeing the determination and dissemination of precise time information using the Navy/DoD Master Clock System and precise time distribution networks; and, 4) developing advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of the positions of both faint and bright stars, satellite tracking, and space debris studies, all with management oversight by Program Executive Officer for Command, Control, Communications, Computers, and Intelligence and Space (PEOC4I & Space).

(U) E. MAJOR PERFORMERS:

N/A

R-1 SHOPPING LIST - Item No. 30

CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)								DATE: **February 2006**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**		PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry						
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Software Development	WX	Naval Observatory	8.115	1.247	N/A	1.284	N/A	1.596	N/A	CONT	CONT	
	N/A	MISC	0.094							CONT	CONT	
Subtotal Software Development			8.209	1.247		1.284		1.596		CONT	CONT	
Remarks:												
Subtotal Support												
Remarks:												
Total Cost			8.209	1.247		1.284		1.596		CONT	CONT	

CLASSIFICATION:

EXHIBIT R4, Schedule Profile

DATE: **February 2006**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N /** **BA-4**

PROGRAM ELEMENT NUMBER AND NAME: PE 0603207N Air/Ocean Tactical Applications

PROJECT NUMBER AND NAME: 2344 Precise Timing and Astrometry

Fiscal Year	2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Time Transfer/ Precise Timing, Astrometry, & Reference Frames	SAASM Rx				M Code Timing Rx																							
Earth Orientation/ Precise Timing, Astrometry, & Reference Frames	Focal Plane Array				Radiation Mitigation Demo																							
Master Clock/ Precise Timing, Astrometry, & Reference Frames	Rubidium Prototype				Rubidium Demo Ensemble Fntn Clck																						Optical Atomic Clock	
Precise Timing, Astrometry, & Reference Frames									M Code Demo Atomic Fountain URAT FPA Ensemble Clk Demo						Ens Clk Demo URAT FPA Demo				GPS III Timing Rx						Space Focal Plane Array	

CLASSIFICATION:

Exhibit R-4a, Schedule Detail					DATE: **February 2006**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA-4**	PROGRAM ELEMENT PE 0603207N Air/Ocean Tactical Applications				PROJECT NUMBER AND NAME 2344 Precise Timing and Astrometry		
Schedule Profile	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Time Transfer/Precise Timing, Astrometry & Reference Frames	4Q						
Earth Orientation/Precise Timing, Astrometry & Reference Frames	4Q						
Master Clock/Precise Timing, Astrometry & Reference Frames	4Q						
Precise Timing, Astrometry & Reference Frames			4Q		4Q		3Q

R-1 SHOPPING LIST - Item No. 30

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2006
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NUMBER AND NAME	PROJECT NUMBER AND NAME
RDT&E, N / BA 4	PE 0603207N Air/Ocean Tactical Applications	Various Congressional Increases

(U) B. Accomplishments/Planned Program

9204 Marine Mammal Tracking and Mitgation	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.966	0.000	0.000
RDT&E Articles Quantity			

9890 3D-CMAPS	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	2.500	0.000
RDT&E Articles Quantity			

9891 Gateway System	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	1.000	0.000
RDT&E Articles Quantity	0	0	0

9892 Littoral Acoustic Demonstration Center	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	1.000	0.000
RDT&E Articles Quantity			