Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy												Date: March 2023
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603207N *I Air/Ocean Tactical Applications*							
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	559.235	26.972	60.737	40.653	-	40.653	37.814	36.606	35.018	35.721	Continuing	Continuing
2341: *METOC Data Acquisition*	193.388	3.102	9.078	8.979	-	8.979	7.983	8.019	7.665	7.822	Continuing	Continuing
2342: *METOC Data Assimilation and Mod*	331.598	18.366	19.182	18.640	-	18.640	20.028	19.742	18.617	18.989	Continuing	Continuing
2344: *Precise Time and Astrometry*	16.508	2.157	7.091	8.689	-	8.689	5.660	4.627	4.452	4.540	Continuing	Continuing
2363: *Remote Sensing Capability Development*	2.829	0.314	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.143
3207: *Fleet Synthetic Training*	3.487	0.000	0.002	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.489
3404: *Tactical Environmental Support*	7.880	1.913	3.168	3.100	-	3.100	2.878	2.929	2.975	3.035	Continuing	Continuing
3405: *Decision Support Products & Dissemination*	3.545	1.120	1.216	1.245	-	1.245	1.265	1.289	1.309	1.335	Continuing	Continuing
9999: *Congressional Adds*	0.000	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000

A. Mission Description and Budget Item Justification

Understanding and accurately predicting the maritime environment is a naval warfighting advantage. Effective meteorological and oceanographic modeling depends upon a network of advanced, reliable sensors below, on and above the world's oceans. Combined with state-of-the-art computational infrastructure, the Navy-Marine Corps Meteorological and Oceanographic (METOC) team delivers 24/7 observations, precise forecasts and operational recommendation to commanders. The Air Tactical Applications (AOTA) Program Element (PE) is aligned with the Navy's maritime strategy to enhance future METOC mission capabilities supporting naval warfighters worldwide. New state-of-the art government and commercial technologies are identified, transitioned, demonstrated and then integrated into Combat Systems and programs of record to provide capabilities that provide real-time and near-real-time 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 and predicting the littoral and deep-strike battlespace in the context of regional conflicts and crisis response scenarios.

Projects in this PE 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. Model data, products and services can be used by forward-deployed personnel or in a reach-back mode to optimize sensor placement and force allocation decisions. Global Geospatial Information and Services efforts within this program address the bathymetric 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

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603207N *I Air/Ocean Tactical Applications*

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 and specific unit-level combat systems. This PE develops technological upgrades for the U.S. Naval Observatory's Master Clock system to meet requirements of Department of Defense 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.

Major emphasis areas include the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) and the METOC Data Acquisition, the METOC Data Assimilation & Modeling, the Precise Timing and Astrometry, the Fleet Synthetic Training, the Tactical Environmental Support, Decision Support Products & Dissemination, the Earth System Prediction Capability projects, and the Remote Sensing Capability Development.

Advanced Component Development and Prototypes (ACD&P) efforts necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment are funded in this PE. Most of the work in this PE can be classified between Technology Readiness Level (TRL) 6 (system/subsystem model or prototype demonstration in a relevant environment) and TRL 7 (system prototype demonstration in an operational environment).

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

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	27.849	39.737	38.433	-	38.433
Current President's Budget	26.972	60.737	40.653	-	40.653
Total Adjustments	-0.877	21.000	2.220	-	2.220
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	21.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.001	0.000			
• SBIR/STTR Transfer	-0.876	0.000			
• Rate/Misc Adjustments	0.000	0.000	2.220	-	2.220

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 9999: *Congressional Adds*		
Congressional Add: *Infrared optimized telescope*	0.000	3.000
Congressional Add: *Maritime unattended sensors*	0.000	18.000
Congressional Add Subtotals for Project: 9999	0.000	21.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603207N *I Air/Ocean Tactical Applications*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Congressional Add Totals for all Projects	0.000	21.000

Change Summary Explanation

Funding: FY24 increase is primarily associated with the new U.S. Naval Observatory (USNO) Master Clock technologies.

Technical: No significant change.

Schedule: No significant change

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2341 / *METOC Data Acquisition*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
2341: *METOC Data Acquisition*	193.388	3.102	9.078	8.979	-	8.979	7.983	8.019	7.665	7.822	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The major work of the Meteorology and Oceanography (METOC) Data Acquisition Project is to provide future mission capabilities to warfighters allowing them to detect and monitor the conditions of the physical environment throughout the entire battlespace. The most promising new sensor technologies (including unmanned vehicles, tactical sensor exploitation, in-situ sensors) are transitioned from the government's and commercial industry's technology base. These new sensor technologies are demonstrated, validated and integrated into operational programs for warfighters. These new sensor capabilities provide timely and accurate METOC data to operational and tactical commanders. METOC data requirements have evolved with emphasis on naval warfare shifting to littoral and deep strike battlespace. The need to accurately characterize dynamic conditions are crucial in planning and executing warfare operations and effectively allocating force weapon and sensor systems. Routinely available data sources, such as climatology, oceanographic and meteorological numerical models are necessary but not sufficient to support the littoral and deep strike regions. Operational sensors are deployed great distances from the target area of interest. The challenge is to collect and disseminate METOC data in variable and dynamic littoral environmental conditions or in denied, remote or inaccessible areas over extended periods of time.

This project: 1) provides the means to rapidly and automatically acquire a broad array of METOC data using off-board and on-board sensors; 2) provides an on-scene assessment capability for the tactical commander; 3) provides the tactical commander with real-time METOC data and products for operational use; 4) demonstrates and validates the use of tactical workstations and desktop computers for processing and display of METOC data and products; 5) demonstrates and validates techniques which employ data compression, connectivity and interface technologies to obtain, store, process, distribute and display these METOC data and products; 6) develops new charting and bathymetric survey techniques necessary to reduce hazards to navigation and improve forecast accuracy.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Meteorological and Oceanographic (METOC) Data Acquisition	3.102	9.078	8.979	0.000	8.979
Articles:	-	-	-	-	-
Description: Efforts falling within the Meteorology and Oceanography (METOC) Collections Project provide future scientific and technological warfighting capabilities that detect and continuously monitor environmental (atmospheric, sea surface, oceanographic and seabed) conditions throughout the battlespace. The Navy's mission continues to require focus on blue-water operations, littoral and deep-strike (inland) battlespaces. Each of these operating areas (and the transitions between them) has its own dynamic and complex environmental characteristics and behaviors that require modifying METOC Collections and associated sensing strategies and methodologies. Without reliable characterization of ocean and atmosphere in these operating areas, the Navy risks ineffective allocation and employment of warfighters and weapon systems, and the sensors that					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
fully enable them. Fleet Naval METOC has updated the definition and structure of the METOC program along the lines of operational mission needs. This update focuses on the operational characteristics of Tasking, Collection, Processing, Exploitation, and Dissemination (TCPED) of METOC data and information. Identified efforts supporting METOC are realigned to projects and activities that align to the TCPED updated program structure. ***FY 2023 Plans:*** -Continue evaluation and integration of sea surface composition and structure by remote and inverted (or "through-the-sensor" means. Validate electro-optical, acoustic and synthetic aperture radar observations in an operational setting and as suitable for improved ocean model bathymetry. -Continue integration of acoustic oceanographic data and model components as components to tactical decision aids. -Continue to improve the Navy Coupled Ocean Data Assimilation-Forward (NCODAf) ocean observation collection and assimilation system, to include operationalizing the capability to ingest physical ocean observations other than traditional static vertical soundings. -Continue development, validation and operationalization of software that enables Navy numerical weather and ocean prediction models to ingest observations from new and emergent satellites, including commercial and partner nation instruments. -Continue to update and expand applications of refractivity from radio (RFR) projects, including extraction of atmospheric information from radar clutter. -Continue to develop, validate and integrate processes for inclusion of quantified atmospheric aerosol data into 1) calibration and correction algorithms for satellite retrieval of other environmental parameters, and into 2) tactical data aids supporting multiple weapons, sensors and decision systems. -Continue efforts in data compression and delivery. Specific efforts include evaluation and integration of single-value decomposition applications to forecast model output, application of automation-based compression					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
techniques. Objective is to enable delivery of timely and relevant environmental information to communications-limited assets.					
FY 2024 Base Plans: - Continue evaluation and integration of sea surface composition and structure by remote and inverted (or "through-the- sensor" means. Validate electro-optical, acoustic and synthetic aperture radar observations in an operational settings and as suitable for improved ocean model conditions, from wave state through bathymetry. - Continue integration of acoustic oceanographic data and model components as to tactical decision aids. - Continue to improve the Navy Coupled Ocean Data Assimilation-Forward (NCODAf) ocean observation collection and assimilation system, to include operationalizing the capability to ingest physical ocean observations beyond traditional static vertical soundings. - Continue development, validation and operationalization of software that enables Navy numerical weather and ocean prediction models to ingest and quality control observations from new and emergent satellites, including commercial and partner nation instruments. - Continue to update and expand applications of refractivity from radio (RFR) projects, including extraction of atmospheric information from radar clutter. - Continue to develop, validate and integrate processes for inclusion of quantified atmospheric aerosol data into 1) calibration and correction algorithms for satellite retrieval of other environmental parameters, and into 2) tactical data aids supporting multiple weapons, sensors and decision systems. - Continue efforts in data compression and delivery. Specific efforts include evaluation and integration of single-value decomposition applications to forecast model output, application of automation-based compression techniques. Objective is to enable delivery of timely and relevant environmental information to communications-limited assets. - Initiate validation and maturation of Ionospheric data collection and application programming interfaces important to forecasting the capabilities and limitations of long range communications.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Initiate advanced remote sensing retrievals of earth system characteristics, including using current and upcoming Satellite Based Environmental Monitoring (SBEM) frequencies available in optical, infrared and microwave spectral bands with a common processing software between sensors and applications. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** There is no significant funding change from FY 2023 to FY 2024.					
Accomplishments/Planned Programs Subtotals	3.102	9.078	8.979	0.000	8.979

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the Meteorological and Oceanographic (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 Navy.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2341 / *METOC Data Acquisition*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC (DATA) Collections	WR	NRL : Washington, DC	84.878	0.300	Nov 2021	0.800	Nov 2022	0.830	Nov 2023	-		0.830	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	WR	SSC PAC : California	23.363	0.200	Nov 2021	0.300	Nov 2022	0.200	Nov 2023	-		0.200	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	Various	Various : Various	45.516	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare (TOC USW)	Various	Various : Various	5.764	0.000		0.500	Nov 2022	0.510	Nov 2023	-		0.510	Continuing	Continuing	Continuing
Littoral Battlespace Sensing - Autonomous Undersea Vehicle	Various	Various : Various	8.422	0.000		0.500	Nov 2022	0.500	Nov 2023	-		0.500	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare (TOC USW)	WR	NSWC : Bethesda, MD	1.193	0.000		0.500	Nov 2022	0.500	Nov 2023	-		0.500	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	APPLIED SCIENCE ASSOCIATED : RHODE ISLAND	0.466	0.000		0.450	Nov 2022	0.436	Nov 2023	-		0.436	Continuing	Continuing	Continuing
METOC (DATA) Collections	C/FP	University of Washington : Seattle, WA	0.943	0.250	Oct 2021	0.400	Oct 2022	0.400	Oct 2023	-		0.400	Continuing	Continuing	Continuing
METOC (DATA) Collections	C/FP	METRON : Reston, VA	1.124	0.400	Oct 2021	0.500	Oct 2022	0.200	Oct 2023	-		0.200	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	SAIC : Virginia	1.781	0.000		0.000		0.200	Oct 2023	-		0.200	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	CSC : Virginia	1.831	0.000		0.000		0.200	Oct 2023	-		0.200	Continuing	Continuing	Continuing
METOC (DATA) Collections	WR	NRL : Montery,CA Stennis Space Center, MS	4.312	0.721	Oct 2021	2.156	Oct 2022	2.200	Oct 2023	-		2.200	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/CPFF	GDIT : Virginia	0.138	0.000		0.400	Oct 2022	0.200	Oct 2023	-		0.200	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC (DATA) Collections	C/FP	Penn State University : PA	4.204	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	183.935	1.871		6.506		6.376		-		6.376	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Future Mission Capabilities	C/CPIF	Various : Various	6.537	0.481	Nov 2021	1.222	Nov 2022	1.230	Nov 2023	-		1.230	0.000	9.470	-
Littoral Battlespace Sensing - Autonomous Undersea Vehicle	C/FP	SAIC : Virginia	0.600	0.000		0.000		0.000		-		0.000	0.000	0.600	-
Tactical Oceanography Capabilities / Undersea Warfare (TOC USW)	WR	SSC PAC : California	0.247	0.000		0.000		0.000		-		0.000	0.000	0.247	-
METOC Future Mission Capabilities	C/CPFF	PSS/BAH : California	0.066	0.000		0.000		0.000		-		0.000	0.000	0.066	-
		Subtotal	7.450	0.481		1.222		1.230		-		1.230	0.000	10.383	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation (DT&E)	Various	Various : Various	0.860	0.750	Nov 2021	0.700	Nov 2022	0.723	Nov 2023	-		0.723	0.000	3.033	-
		Subtotal	0.860	0.750		0.700		0.723		-		0.723	0.000	3.033	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2341 / *METOC Data Acquisition*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Acquisition Workforce	Various	Not Specified : Not Specified	0.243	0.000		0.150	Oct 2022	0.150	Oct 2023	-		0.150	0.000	0.543	-
METOC Future Mission Capabilities Management Support	C/FP	BAH : Virginia	0.900	0.000		0.500	Oct 2022	0.500	Nov 2023	-		0.500	0.000	1.900	-
		Subtotal	1.143	0.000		0.650		0.650		-		0.650	0.000	2.443	N/A

	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	193.388	3.102		9.078		8.979		-		8.979	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

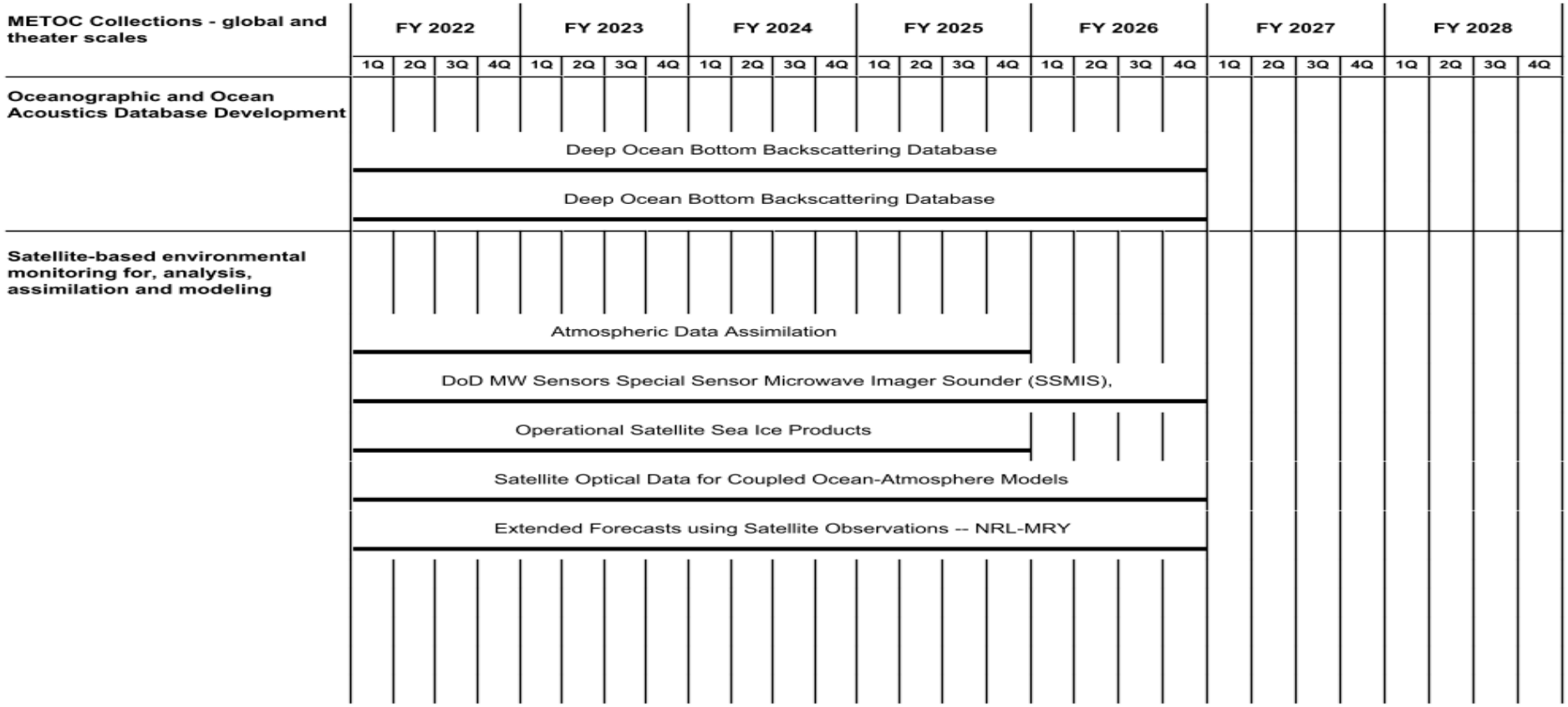

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

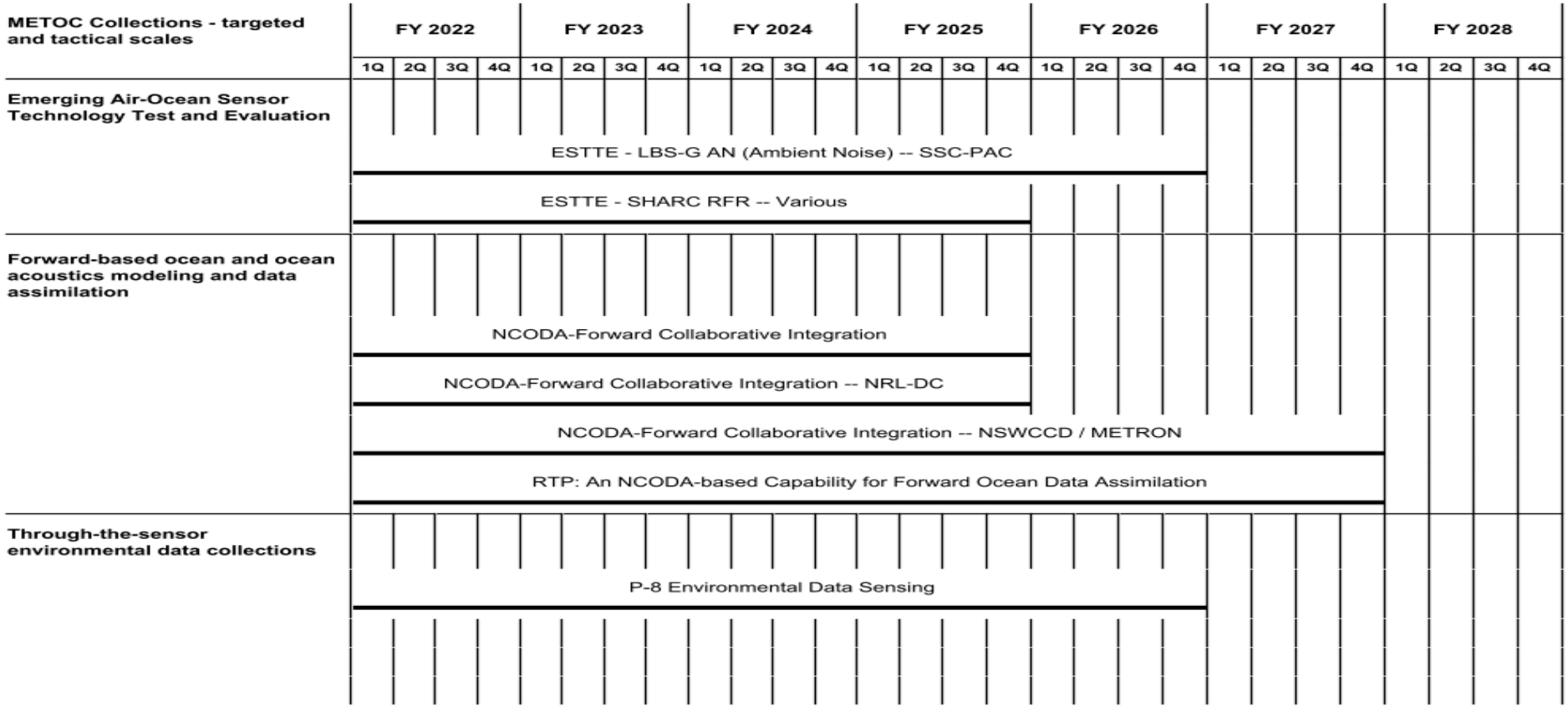

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Collections - global and theater scales				
Oceanographic and Ocean Acoustics Database Development: Deep Ocean Bottom Backscattering Database -- ARL-PSU	1	2022	4	2026
Oceanographic and Ocean Acoustics Database Development: Deep Ocean Bottom Backscattering Database -- NPS	1	2022	4	2026
Oceanographic and Ocean Acoustics Database Development: "Use of Mobile Acoustic Source for In-situ Transmission	1	2022	4	2026
Satellite-based environmental monitoring for, analysis, assimilation and modeling: Atmospheric Data Assimilation -- NRL-MRY	1	2022	4	2025
Satellite-based environmental monitoring for, analysis, assimilation and modeling: "DoD MW Sensors Special Sensor Microwave Imager Sounder (SSMIS),	1	2022	4	2026
Satellite-based environmental monitoring for, analysis, assimilation and modeling: Operational Satellite Sea Ice Products -- NRL-DC	1	2022	4	2025
Satellite-based environmental monitoring for, analysis, assimilation and modeling: Satellite Optical Data for Coupled Ocean-Atmosphere Models -- NRL-SSC	1	2022	4	2026
Satellite-based environmental monitoring for, analysis, assimilation and modeling: RTP: Flux Correction for Coupled System Extended Forecasts using Satellite Observations -- NRL-MRY	1	2022	4	2026
METOC Collections - targeted and tactical scales				
Emerging Air-Ocean Sensor Technology Test and Evaluation: ESTTE - LBS-G AN (Ambient Noise) -- SSC-PAC	1	2022	4	2026
Emerging Air-Ocean Sensor Technology Test and Evaluation: ESTTE - SHARC RFR -- Various	1	2022	4	2025
Forward-based ocean and ocean acoustics modeling and data assimilation: NCODA-Forward Collaborative Integration -- METRON Scientific Solutions, Inc.	1	2022	4	2025

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2341 / *METOC Data Acquisition*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Forward-based ocean and ocean acoustics modeling and data assimilation: NCODA-Forward Collaborative Integration -- NRL-DC	1	2022	4	2025
Forward-based ocean and ocean acoustics modeling and data assimilation: NCODA-Forward Collaborative Integration -- NSWCCD / METRON	1	2022	4	2027
Forward-based ocean and ocean acoustics modeling and data assimilation: RTP: An NCODA-based Capability for Forward Ocean Data Assimilation -- NRL-SSC	1	2022	4	2027
Through-the-sensor environmental data collections: P-8 Environmental Data Sensing -- SSC-LANT	1	2022	4	2026

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2342 / *METOC Data Assimilation and Mod*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
2342: *METOC Data Assimilation and Mod*	331.598	18.366	19.182	18.640	-	18.640	20.028	19.742	18.617	18.989	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Battlespace Data Assimilation and Prediction Project (2342) enables the future warfighter to leverage observed environmental data gathered under Project 2341 (METOC Data Acquisition) by assimilating data into and fusing them with sophisticated high-resolution (spatial and temporal) assessment and prediction models made possible by high-performance computing. These models gain increasing importance as weapons and sensors grow in sophistication and complexity, making them all the more sensitive to the effects of the natural environment. Meteorology and Oceanography (METOC) Processing enables full understanding of the limitations and constraints imposed by ocean and atmosphere, in space and time, thus quantifying and minimizing their impact on weapons, sensors, and mission. However, METOC Processing itself is limited by the temporal and spatial resolutions at which data are collected and numerically analyzed and predicted. Thus Projects 2341 and 2342 must remain aggressive in delivering higher and higher resolutions, demanding greater and greater computational and database capacities. METOC Processing efforts must also rise to the challenge of assimilating smaller-scale phenomena, particularly in the littorals, and predicting their spatial and temporal effects, as stated by Fleet and Force Commanders who require remote autonomous, clandestine, littoral battlespace sensing in near-shore areas to enable Sea Shield & Sea Basing. This next step in the Information Warfare (IW) Tasking, Collection, Processing, Exploitation and Dissemination (TCPED) continuum, METOC Processing, is critical to fully characterize the physical battlespace environment in real-time and in predictive/forecasting modes, and gives the warfighter a decisive advantage in the complex blue-water, littoral and deep-strike battlespaces.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Battlespace Data Assimilation and Prediction	18.366	19.182	18.640	0.000	18.640
Articles:	-	-	-	-	-
Description: The Battlespace Data Assimilation and Prediction Project (2342) enables the future warfighter to leverage observed environmental data gathered under Project 2341 (METOC Collections) by assimilating data into and fusing them with sophisticated high-resolution (spatial and temporal) assessment and prediction models made possible by high-performance computing. These models gain increasing importance as weapons and sensors grow in sophistication and complexity, making them all the more sensitive to the effects of the natural environment. METOC Processing enables full understanding of the limitations and constraints imposed by ocean and atmosphere, in space and time, thus quantifying and minimizing their impact on weapons, sensors and mission. However, METOC Processing itself is limited by the temporal and spatial resolutions at which data are collected and numerically analyzed and predicted. Thus Projects 2341 and 2342 must remain aggressive in delivering higher and higher resolutions, demanding greater and greater computational and database capacities.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
METOC Processing efforts must also rise to the challenge of assimilating smaller-scale phenomena, particularly in the littorals, and predicting their spatial and temporal effects, as stated by Fleet and Force Commanders who require remote autonomous, clandestine, littoral battlespace sensing in near-shore areas to enable Sea Shield & Sea Basing. This next step in the TCPED continuum, METOC Processing, is critical to fully characterize the physical battlespace environment in real-time and in predictive/ forecasting modes, and gives the warfighter a decisive advantage in the complex blue-water, littoral and deep-strike battlespaces. ***FY 2023 Plans:*** -Continue improvements for the operational global forecast model, NAVGEM, with components (including ensemble development) that will inform development of the next generation atmospheric model NEPTUNE. Develop and aerosol global forecasting capability that will integrate into NEPTUNE, and develop NEPTUNE to operational readiness. -Continue development of the Earth Systems Prediction Capability (ESPC) ensemble global prediction mode via upgrades to physics subroutines and incorporation of high-altitude capabilities in the ESPC atmosphere model, NAVGEM. Additionally, continue development, validation and operationalization of ESPC deterministic version 2.0. -Continue development of the Navy Ionosphere Model for Operations (NIMO) towards a 24 hors forecast of atmospheric electron density, which will inform predictions for sensors, communications, and weapons performance. -Continue improvements to the regional coupled ocean-atmospheric model COAMPS to enhance ocean surface, sea ice and near shore accuracy. Improve capabilities in soil moisture and flux representation to facilitate boundary layer and convective skill upgrades. -Continue and expand intermodal data assimilation efforts to merge code bases and algorithm development across ocean and atmospheric applications, to gain efficiencies in development and implementation. -Continue the design and implementation of seafloor acoustic, and ambient noise databases that include vertical and temporal dependencies, with the objective of providing higher resolution data to USW tactical decision aids.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
-Continue to improve, validate and implement ocean acoustic prediction models, analysis tools and critical environmental parameter databases in preparation for future increments of shipboard tactical combat system software and capability updates. -Initiate improvements to the Global Ocean Forecast System to include a higher order advective scheme and an expanded data assimilation capability via improvements to the NCODA data assimilation system. -Continue improvements to autonomous-platform control software, including integration with ocean circulation models and platform-specific interfaces. -Continue to integrate specific capability upgrades to regional models. Projects will include using tropical cyclone structure as an indicator of development potential, with the objective of increasingly accurate forecasts of rapid intensification of tropical storms. -Continue improvements to ocean data assimilation systems for global models (NCODA 3DVAR) and regional models. (NCODA 4DVAR), with the objective of using more of the globally available data. -Continue to increase predictive capabilities of tactical acoustic models. Specific projects include upgrades to Navy Standard Parabolic Equation model in sound channel propagation and surface duct loss, and integration of uncertainty and confidence measures. ***FY 2024 Base Plans:*** - Conclude improvements for the deterministic operational global forecast model, NAVGEM, with components that will inform development of the next generation atmospheric model NEPTUNE. - Conclude improvements to autonomous-platform control software, including integration with ocean circulation models and platform-specific interfaces. - Continue improvements for the ensemble version of the operational global forecast model, NAVGEM, with components that will inform ensemble development of the next generation atmospheric model NEPTUNE.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Continue development of the Earth Systems Prediction Capability (ESPC) ensemble global prediction mode via upgrades to physics subroutines and incorporation of high-altitude capabilities in the ESPC atmosphere model, NAVGEM. - Continue development of the Navy Ionosphere Model for Operations (NIMO) towards a 24 hr forecast of atmospheric electron density, which will inform predictions for sensors, communications, and weapons performance. - Continue improvements to the regional coupled ocean-atmospheric model COAMPS to enhance ocean surface, sea ice and near shore accuracy. Improve capabilities in soil moisture and flux representation to facilitate boundary layer and convective skill upgrades. - Continue and expand intermodal data assimilation efforts to merge code bases and algorithm development across ocean and atmospheric applications, to gain efficiencies in development and implementation. - Continue the design and implementation of seafloor acoustic, and ambient noise databases that include vertical and temporal dependencies, with the objective of providing higher resolution data to USW tactical decision aids. - Continue to improve, validate and implement ocean acoustic prediction models, analysis tools and critical environmental parameter databases in preparation for future increments of shipboard tactical combat system software and capability updates. - Continue enhancements to the Global Ocean Forecast System to include a higher order advective scheme and an expanded data assimilation capability via improvements to the NCODA data assimilation system. - Continue to integrate specific capability upgrades to regional modeling systems. Projects will include using improved tropical cyclone indicators for rapid intensification forecasts and probabilistic storm surge capabilities. - Continue improvements to ocean data assimilation systems for global models (NCODA 3DVAR) and regional models. (NCODA 4DVAR), with the objective of using more of the globally available data.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Continue to increase predictive capabilities of tactical acoustic models. Specific projects include upgrades to Navy Standard Parabolic Equation model in sound channel propagation and surface duct loss, and integration of uncertainty and confidence measures. - Initiate development of a unified aerosol global forecasting capability (deterministic, ensemble and retrospective) that will integrate into the NEPTUNE processing suite., - Initiate improved coupled ocean-atmosphere modeling and validation strategies, including development of a common verification system between ocean and atmosphere modeling suites and targeted coupled modeling development and analysis focus areas (such as the Arctic.) ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** There is no significant funding change from FY 2023 to FY 2024.					
Accomplishments/Planned Programs Subtotals	18.366	19.182	18.640	0.000	18.640

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the Meteorological and Oceanographic (METOC) Data Assimilation and Modeling Project to develop, demonstrate, and validate METOC data assimilation and environmental prediction capabilities, enabling timely and accurate delivery of METOC prediction data and products to the Tactical Commander, all with management oversight by the Navy.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Future Mission Capabilities	WR	NRL : Washington DC	135.981	2.550	Nov 2021	2.295	Nov 2022	2.295	Nov 2023	-		2.295	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	Various	Various : Various	46.068	0.450	Oct 2021	1.117	Oct 2022	1.117	Oct 2023	-		1.117	0.000	48.752	-
METOC Space-Based Sensing Capabilities	WR	NRL : Washington, DC	17.092	0.650	Oct 2021	0.585	Oct 2022	0.585	Oct 2023	-		0.585	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	WR	NRL : Washington, DC	9.480	0.400	Oct 2021	0.360	Oct 2022	0.360	Oct 2023	-		0.360	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	University of Texas : TX	1.663	0.400	Oct 2021	0.360	Oct 2022	0.360	Oct 2023	-		0.360	0.000	2.783	-
Tactical Oceanography Capabilities / Undersea Warfare	WR	NSWC Carderock : West Bethesda, MD	2.590	0.350	Oct 2021	0.315	Oct 2022	0.315	Oct 2023	-		0.315	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	WR	NAVOCEANO : Mississippi	1.049	0.000		0.000		0.000		-		0.000	0.000	1.049	-
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	University of Washington : Seattle, WA	0.850	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	Johns Hopkins University : MD	0.594	0.200	Nov 2021	0.180	Nov 2022	0.180	Nov 2023	-		0.180	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	SAIC/QNA : Various	1.876	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	SAIC/QNA : Various	3.096	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	Penn Sate University : Pennsylvania	0.125	0.000		0.000		0.000		-		0.000	0.000	0.125	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Tactical Oceanography Capabilities / Undersea Warfare	WR	SSC LANT : North Charleston	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	SPA : Virginia	0.375	0.000		0.000		0.000		-		0.000	0.000	0.375	-
METOC SUPPORT SPACE-SOFTWARE DEVELOPMENT	WR	NRL : WASHINGTON DC	0.640	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	METRON : Virginia	0.685	0.000		0.000		0.000		-		0.000	0.000	0.685	-
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	Vencore : Virginia	0.239	0.000		0.000		0.000		-		0.000	0.000	0.239	-
METOC Battlespace Data Assimilation and Prediction	WR	NRL : Monterey, CAl Stennis Space Center,MS	25.483	4.550	Oct 2021	4.597	Oct 2022	4.370	Oct 2023	-		4.370	0.000	39.000	-
Earth Systems Prediction Capability (ONR)	WR	NRL : Washington DC	55.421	5.726	Oct 2021	5.670	Oct 2022	5.419	Oct 2023	-		5.419	Continuing	Continuing	Continuing
ESPC	Various	Various : Various	9.329	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
CHIEF OF NAVAL OPERATIONS SPEED TO FLEET INITIATIVE	WR	NRL : WASHINGTON DC	0.850	0.000		0.000		0.000		-		0.000	1.130	1.980	-
		Subtotal	313.536	15.276		15.479		15.001		-		15.001	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Future Mission Capabilities	Various	Various : Various	0.795	0.000		0.000		0.000		-		0.000	0.000	0.795	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2342 / *METOC Data Assimilation and Mod*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Littoral Battlespace Sensing - Autonomous Undersea Vehicle	C/FP	SAIC : Virginia	0.473	0.000		0.000		0.000		-		0.000	0.000	0.473	-
Tactical Oceanography Capabilities / Undersea Warfare	C/FP	SAIC : Virginia	0.634	0.000		0.000		0.000		-		0.000	0.000	0.634	-
METOC Future Mission Capabilities	C/FP	SAIC : VIRGINIA	0.915	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
METOC SUPPORT SPACE-PROGRAM SUPPORT	WR	SSC PACIFIC : SAN DIEGO, CA	1.256	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Earth System Modeling Framework - Common Software Architecture	Various	Various : Boulder, CO; Various	2.435	1.100	Dec 2021	1.000	Dec 2022	1.000	Dec 2023	-		1.000	0.000	5.535	-
Program Support and Subject Matter Expertise	Various	UW-APL : Seattle, WA	2.984	0.300	Oct 2021	0.270	Oct 2022	0.205	Oct 2023	-		0.205	Continuing	Continuing	Continuing
		Subtotal	9.492	1.400		1.270		1.205		-		1.205	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Developmental Test & Evaluation Not Funded FYDP (PYDT&E)	TBD	Charles River : Boston, MA	1.457	0.000		0.000		0.000		-		0.000	0.000	1.457	-
		Subtotal	1.457	0.000		0.000		0.000		-		0.000	0.000	1.457	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Acquisition Workforce	Various	Various : Various	0.090	0.000		0.000		0.000		-		0.000	0.000	0.090	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Space-Based Sensing Capabilities	Various	Various : Various	1.500	0.990	Oct 2021	0.783	Oct 2022	0.784	Oct 2023	-		0.784	0.000	4.057	-
Tactical Oceanography Capabilities / Undersea Warfare	WR	SSC PAC : San Diego, CA	1.468	0.700	Oct 2021	1.650	Oct 2022	1.650	Oct 2023	-		1.650	Continuing	Continuing	Continuing
METOC Future Mission Capabilities	C/FP	PSS/BAH : San Diego, CA	0.216	0.000		0.000		0.000		-		0.000	0.000	0.216	-
METOC Space-Based Sensing Capabilities	C/FP	BAH : VIRGINIA	0.892	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
METOC Space-Based Sensing Capabilities	WR	SSC PAC : SAN DIEGO, CA	2.202	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
METOC Acquisition Management	C/CPFF	PSS/BAH : SAN DIEGO, CA	0.745	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	7.113	1.690		2.433		2.434		-		2.434	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	331.598	18.366		19.182		18.640		-		18.640	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

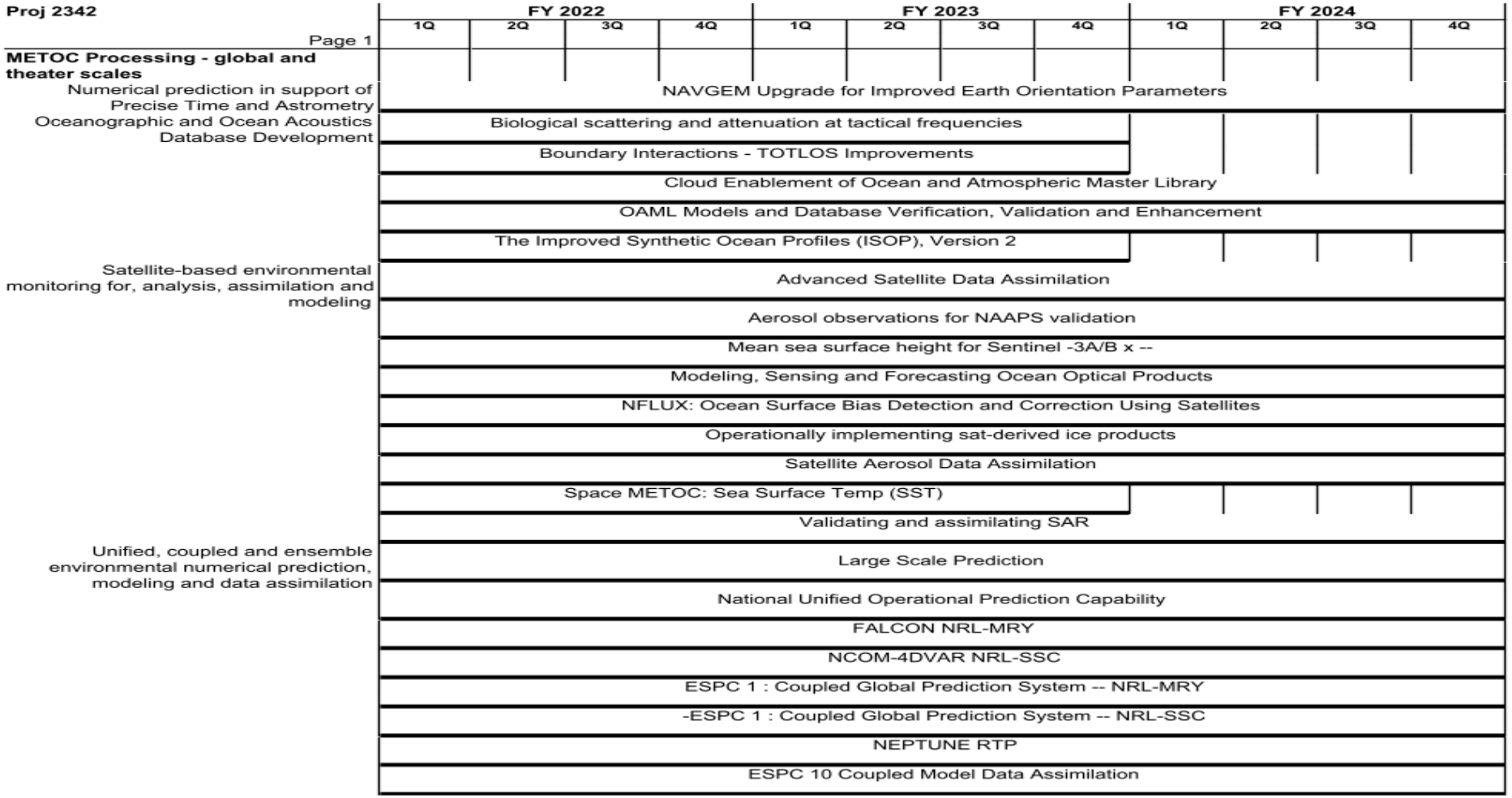


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

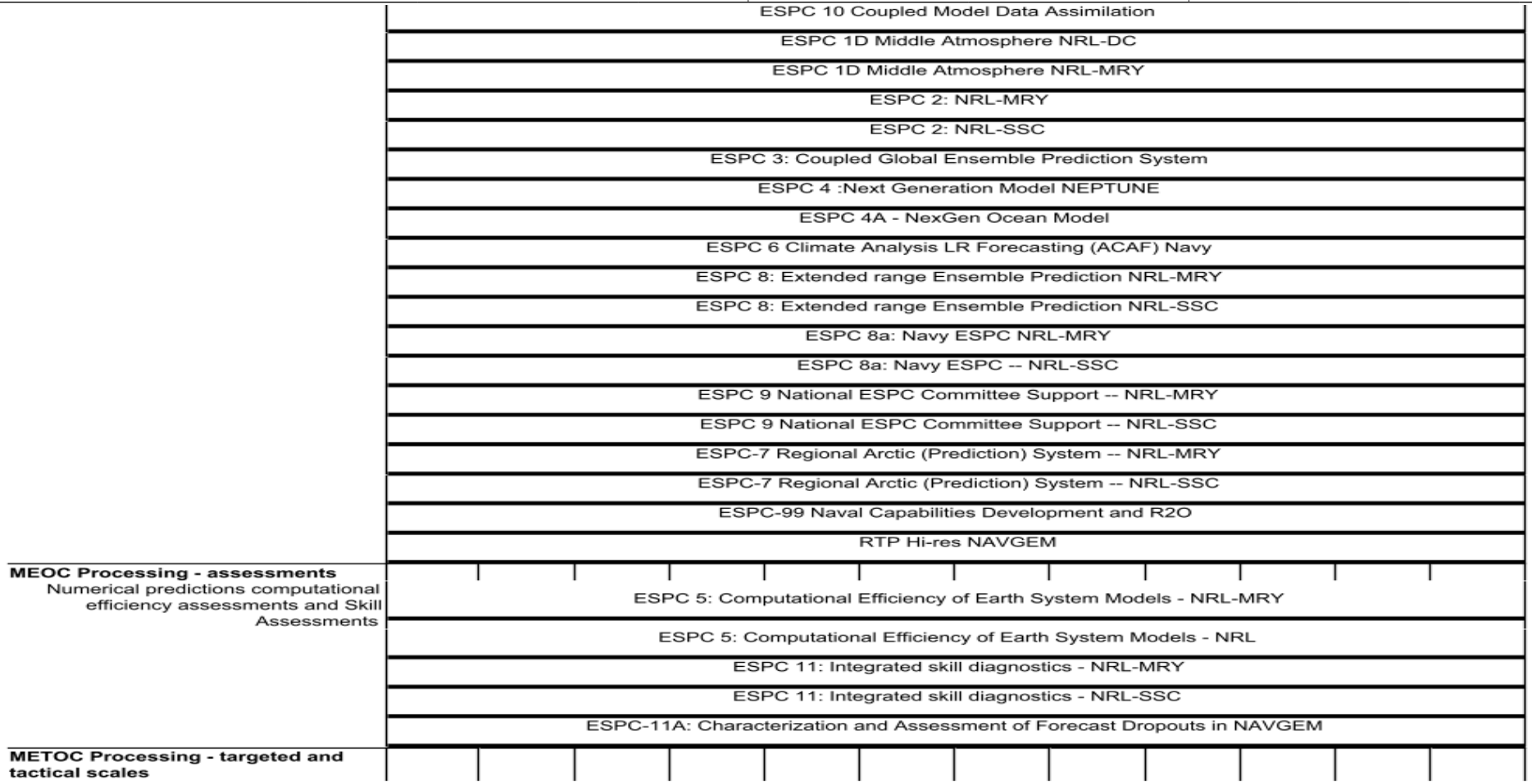
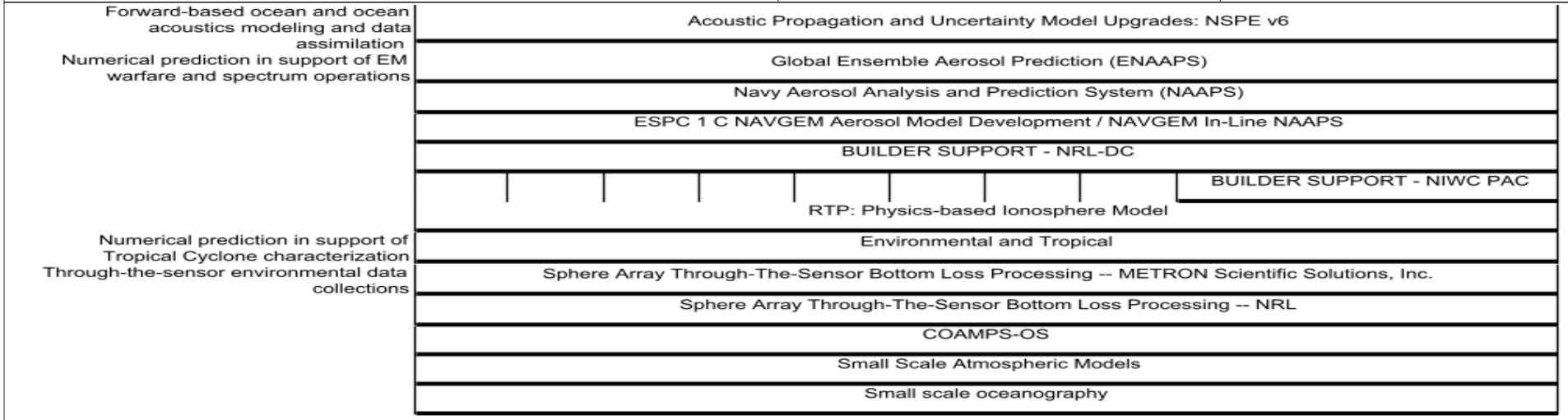


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*



2024OSD - 0603207N - 2342 Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2342				
METOC Processing - global and theater scales: Numerical prediction in support of Precise Time and Astrometry: NAVGEM Upgrade for Improved Earth Orientation Parameters -- NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Oceanographic and Ocean Acoustics Database Development: Biological scattering and attenuation at tactical frequencies -- APL-JHU	1	2022	4	2023
METOC Processing - global and theater scales: Oceanographic and Ocean Acoustics Database Development: Boundary Interactions - TOTLOS Improvements -- APL-UW	1	2022	4	2023
METOC Processing - global and theater scales: Oceanographic and Ocean Acoustics Database Development: Cloud Enablement of Ocean and Atmospheric Master Library -- NRL-SSC	1	2022	4	2026
METOC Processing - global and theater scales: Oceanographic and Ocean Acoustics Database Development: "OAML Models and Database Verification, Validation and Enhancement	1	2022	4	2024
METOC Processing - global and theater scales: Oceanographic and Ocean Acoustics Database Development: The Improved Synthetic Ocean Profiles (ISOP), Version 2 -- NRL-SSC	1	2022	4	2023
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Advanced Satellite Data Assimilation -- NRL-MRY	1	2022	4	2026
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Aerosol observations for NAAPS validation -- NRL-MRY	1	2022	4	2026

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Mean sea surface height for Sentinel -3A/B x -- NRL-SSC	1	2022	4	2025
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Modeling, Sensing and Forecasting Ocean Optical Products	1	2022	4	2024
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: NFLUX: Ocean Surface Bias Detection and Correction Using Satellites	1	2022	4	2024
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Operationally implementing sat-derived ice products	1	2022	4	2026
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Satellite Aerosol Data Assimilation -- NRL-MRY	1	2022	4	2026
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Space METOC: Sea Surface Temp (SST) -- NRL-SSC	1	2022	4	2023
METOC Processing - global and theater scales: Satellite-based environmental monitoring for, analysis, assimilation and modeling: Validating and assimilating SAR	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: Large Scale Prediction -- NRL-SSC	1	2022	4	2024
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: National Unified Operational Prediction Capability	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: FALCON NRL-MRY	1	2022	4	2026

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: NCOM-4DVAR NRL-SSC	1	2022	4	2024
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 1 : Coupled Global Prediction System -- NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 1 : Coupled Global Prediction System -- NRL-SSC	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: NEPTUNE RTP	1	2022	4	2026
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 10 Coupled Model Data Assimilation -- NRL-MRY	1	2022	4	2024
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 10 Coupled Model Data Assimilation -- NRL-SSC	1	2022	4	2024
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 1D Middle Atmosphere NRL-DC	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 1D Middle Atmosphere NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 2: NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 2: NRL-SSC	1	2022	4	2025

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 3: Coupled Global Ensemble Prediction System	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 4 :Next Generation Model NEPTUNE -- NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 4A - NexGen Ocean Model -- NRL-SSC	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 6 Climate Analysis LR Forecasting (ACAF) Navy	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 8: Extended range Ensemble Prediction NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 8: Extended range Ensemble Prediction NRL-SSC	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 8a: Navy ESPC NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 8a: Navy ESPC -- NRL-SSC	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 9 National ESPC Committee Support -- NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC 9 National ESPC Committee Support -- NRL-SSC	1	2022	4	2025

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC-7 Regional Arctic (Prediction) System -- NRL-MRY	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC-7 Regional Arctic (Prediction) System -- NRL-SSC	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: ESPC-99 Naval Capabilities Development and R2O	1	2022	4	2025
METOC Processing - global and theater scales: Unified, coupled and ensemble environmental numerical prediction, modeling and data assimilation: RTP Hi-res NAVGEM -- NRL-MRY	1	2022	4	2024
MEOC Processing - assessments: Numerical predictions computational efficiency assessments and Skill Assessments: ESPC 5: Computational Efficiency of Earth System Models - NRL-MRY	1	2022	4	2024
MEOC Processing - assessments: Numerical predictions computational efficiency assessments and Skill Assessments: ESPC 5: Computational Efficiency of Earth System Models - NRL-SSC	1	2022	4	2024
MEOC Processing - assessments: Numerical predictions computational efficiency assessments and Skill Assessments: ESPC 11: Integrated skill diagnostics - NRL-MRY	1	2022	4	2024
MEOC Processing - assessments: Numerical predictions computational efficiency assessments and Skill Assessments: ESPC 11: Integrated skill diagnostics - NRL-SSC	1	2022	4	2024
MEOC Processing - assessments: Numerical predictions computational efficiency assessments and Skill Assessments: ESPC-11A: Characterization and Assessment of Forecast Dropouts in NAVGEM - NRL-MRY	1	2022	4	2025
METOC Processing - targeted and tactical scales: Forward-based ocean and ocean acoustics modeling and data assimilation: Acoustic Propagation and Uncertainty Model Upgrades: NSPE v6	1	2022	4	2024

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2342 / *METOC Data Assimilation and Mod*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Processing - targeted and tactical scales: Numerical prediction in support of EM warfare and spectrum operations: Global Ensemble Aerosol Prediction (ENAAPS) -- NRL-DC	1	2022	4	2025
METOC Processing - targeted and tactical scales: Numerical prediction in support of EM warfare and spectrum operations: Navy Aerosol Analysis and Prediction System (NAAPS) -- NRL-MRY	1	2022	4	2025
METOC Processing - targeted and tactical scales: Numerical prediction in support of EM warfare and spectrum operations: ESPC 1 C NAVGEM Aerosol Model Development / NAVGEM In-Line NAAPS -- NRL-MRY	1	2022	4	2026
METOC Processing - targeted and tactical scales: Numerical prediction in support of EM warfare and spectrum operations: BUILDER SUPPORT - NRL-DC	1	2022	4	2027
METOC Processing - targeted and tactical scales: Numerical prediction in support of EM warfare and spectrum operations: BUILDER SUPPORT - NIWC PAC	1	2024	4	2027
METOC Processing - targeted and tactical scales: Numerical prediction in support of EM warfare and spectrum operations: RTP: Physics-based Ionosphere Model - Upgrades NRL-DC / APL-JHU / ARL-UT	1	2022	4	2027
METOC Processing - targeted and tactical scales: Numerical prediction in support of Tropical Cyclone characterization: Environmental and Tropical NRL-MRY	1	2022	4	2026
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: Sphere Array Through-The-Sensor Bottom Loss Processing -- METRON Scientific Solutions, Inc.	1	2022	4	2026
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: Sphere Array Through-The-Sensor Bottom Loss Processing -- NRL-DC	1	2022	4	2024
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: COAMPS-OS and NEPTUNE-OS- NRL-MRY	1	2022	4	2026
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: Small Scale Atmospheric Models -- NRL-MRY	1	2022	4	2024

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: Small scale oceanography -- NRL-SSC	1	2022	4	2024
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: Global aerosol forecasting capability and integration with NEPTUNE	1	2024	4	2027
METOC Processing - targeted and tactical scales: Through-the-sensor environmental data collections: Integrate improved coupled ocean-atmosphere modeling	1	2024	4	2027

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2344 / *Precise Time and Astrometry*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
2344: *Precise Time and Astrometry*	16.508	2.157	7.091	8.689	-	8.689	5.660	4.627	4.452	4.540	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Precise Timing and Astrometry (PTA) project funds research and development of improvements for the Master Clock (MC) System, the Department of Defense (DoD) Time Transfer capability, the Earth Orientation System, and the Astrometric Observation System. The MC System and Time Transfer provides precise time for use in modern military and National Technical Means (NTM) navigation, guidance, positioning, and tracking systems. The Earth Orientation System provides precise Earth Orientation Parameters (EOP) for use by the DoD and national civilian infrastructure to establish the specific orientation of the Earth and to provide input to the terrestrial reference frame. The Astrometric Observation System provides the basic data needed to generate the Celestial Reference Frame (CRF) which is the standard for calibrating all inertial navigation systems, satellite orbits, and earth rotation determinations. Improvement to the MC System, Time Transfer, Earth Orientation, and Astrometric Observation Systems are needed to ensure that new and upgraded DoD and NTM capabilities meet their performance requirements. The U.S. Naval Observatory (USNO), is responsible for coordinating Precise Time and Time Interval (PTTI) requirements and for maintaining a PTTI reference standard (astronomical and atomic) for use by all DoD, federal agencies, and related scientific laboratories. The Navy is also responsible for providing CRF data for military and NTM navigation, positioning, and guidance capabilities to all DoD.

The PTA research and development efforts are focused on several areas relating to timing and time transfer: (1) Fielding of Rubidium Fountain Atomic Clocks and development of improved Global Positioning System (GPS) Timing Receivers in order to meet the precise timing requirements for the GPS III system; (2) Research & development of the capability of distributing timing signals via Optical fiber lines, as an alternative and backup to GPS time distribution; and (3) Research & development (R&D) into Optical Clock technology, which is expected to be required for future DoD systems. The PTA research and development effort is also focused on the following areas related to EOP determination: (1) Upgrade of the Very Long Baseline Interferometry (VBLI) data acquisition system (2) Development of a Software (SW) Correlator for processing of VLBI data, necessary for the generation of EOP data; (3) Development of the capability for electronic transmission of the VLBI data from remote VLBI sites to the USNO correlator. The new SW Correlator and VLBI infrastructure upgrades are necessary in order to support daily updates of EOP data required by GPS III; (4) Development of an automated end-to-end EOP processing system, which combines input from multiple data sets (e.g. VLBI data, GPS orbit data, and laser ranging data, etc.). Automation is necessary to meet future DoD and GPS requirements; (5) Modifications to the EOP system for compatibility with the new international standard. PTA research and development for astrometry focuses on 1) Telescope research and deployment 2) research into the development of a GPS-denied reference frame as a navigation solution 3) instrumentation development across all wavelengths relevant to the DoD. These activities are necessary for producing CRF products in an era of new surveillance, targeting, intelligence, and reconnaissance technologies and instrumentation.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Precise Timing and Astronomy	2.157	7.091	8.689	0.000	8.689
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2344 / *Precise Time and Astrometry*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
FY 2023 Plans: - Continue development of the next generation GPS III receiver--move to operations in FY24 - Optical Time Transfer: Fiber and Free Space optical time transfer capability development - Optical Clock Development: Demonstrate laser trapping (lattice) - Operational Clock upgrades/advancements (laser upgrades, test monolithic optical assembly) - Earth Orientation Combination and Prediction Optimal Estimation Investigation: Validate R&D code implementation and test - Earth Orientation Monitoring of Foreign GNSS experiment: Refine current non-GPS Global Navigation Satellite System processing. - Begin the development of the next generation Infrared (IR) camera: ASTROCAM - Develop Cislunar instrumentation for cislunar orientation study - Fund team of Research, Development, Test & Evaluation (RDTE) researchers to progress Optical Clock Development, Optical/Radio offsets in Active Galactic Nuclei study (FRAMEX), and next generation GPS denied navigation studies - Fund post-doctoral program to support basic research in Precise Time and Astrometry					
FY 2024 Base Plans: - Finalize development of GPS III receiver--move to operations with Other Procurement Navy (OPN) tail in late FY24 - Optical Time Transfer: Fiber and Free Space optical time transfer capability development - Optical Clock Development: Demonstrate cooling and develop final version of vacuum chamber - Operational Clock upgrades/advancements (laser upgrades, test slow atomic beam, component testing) - Earth Orientation Combination and Prediction Optimal Estimation Investigation: Validate R&D code implementation and test - Earth Orientation Monitoring of Foreign GNSS experiment: Begin validation operational implementation. - Continue the development of the next generation IR camera: ASTROCAM - Fund team of RDTE researchers to progress Optical Clock Development, Optical/Radio offsets in Active Galactic Nuclei study (FRAMEX), and next generation GPS denied navigation studies - Fund post-doctoral program to support basic research in Precise Time and Astrometry					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2344 / *Precise Time and Astrometry*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
$1.598K increase from FY23 to FY24 funds new U.S. Naval Observatory (USNO) Master Clock technologies.					
Accomplishments/Planned Programs Subtotals	2.157	7.091	8.689	0.000	8.689

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The included technology developments are lead in-house with selected contractor participation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2344 / *Precise Time and Astrometry*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Primary HW Development (NPOI) 1.8m Telescope Project (1)	SS/FFP	Lowell Observatory : Flagstaff, AZ	0.200	0.000		0.000		0.000		-		0.000	0.000	0.200	-
Primary HW Development (NPOI) 1.8m Telescope (2)	SS/FFP	AZ Embeded System : Not Specified	0.500	0.000		0.000		0.000		-		0.000	0.000	0.500	-
Ancillary HW Development 1	Various	U.S. Naval Observatory : Washington, DC	0.309	0.089	Dec 2021	0.125	Dec 2022	0.187	Sep 2024	-		0.187	0.000	0.710	-
Ancillary HW Development 2	Various	U.S. Naval Observatory : Washington, DC	0.308	0.089	Jan 2022	0.125	Jan 2023	0.174	Jan 2024	-		0.174	0.000	0.696	-
Ancillary HW Development 3	Various	U.S. Naval Observatory : Washington, DC	0.346	0.090	Apr 2022	0.125	Apr 2023	0.174	Apr 2024	-		0.174	0.000	0.735	-
Ancillary HW Development 4	Various	U.S. Naval Observatory : Washington, DC	0.251	0.090	Jul 2022	0.125	Jul 2023	0.174	Jul 2024	-		0.174	0.000	0.640	-
Next Generation Secure Time Transfer	TBD	TBD : Not Specified	1.865	0.000		0.000		0.000		-		0.000	0.000	1.865	-
1.8 meter infrared camera development	TBD	NAVSEA : University of Hawaii	2.008	0.000		0.000		0.000		-		0.000	0.000	2.008	-
Primary Hardware Development (Antenna Receiver Electronics)	C/FFP	NASA : GSFC	1.000	0.000		0.000		0.000		-		0.000	0.000	1.000	-
Primary Hardware Development (Site Prep)	SS/FFP	NASA/GSFC : HI	0.100	0.000		0.000		0.000		-		0.000	0.000	0.100	-
1.8 meter Telescope Enclosure	C/FFP	NAVFAC SW : Not Specified	2.153	0.000		0.000		0.000		-		0.000	0.000	2.153	-
Advanced Time and Frequency Tranfer Upgrade	C/FFP	TBD : Not Specified	0.900	0.307	Apr 2022	0.850	Apr 2023	0.837	Apr 2024	-		0.837	0.000	2.894	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2344 / *Precise Time and Astrometry*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Optical Lattice Clocks	C/FFP	U.S. Naval Observatory : Washington, DC	0.710	0.100	Jul 2022	0.500	Jul 2023	0.698	Jul 2024	-		0.698	0.000	2.008	-
GPS III Receiver	Various	NAVSEA: University of Texas : Austin, Texas	1.239	1.000	Jan 2022	1.265	Jan 2023	0.307	Jan 2024	-		0.307	0.000	3.811	-
TST Replacement	Various	U.S. Naval Observatory : Washington, DC	0.135	0.000	Jul 2022	0.000		0.000		-		0.000	0.000	0.135	-
Modem	TBD	NAVSEA: APL : Not Specified	0.000	0.000		0.250	Jan 2023	0.349	Jan 2024	-		0.349	0.000	0.599	-
Astrocam	C/FFP	TBD: NAVSUP Contracted : Not Specified	0.000	0.000		0.452	Mar 2023	1.725	Jan 2024	-		1.725	0.000	2.177	-
ARGOS/Cislunar Instrumentation	C/FFP	TBD:NAVSUP-Contracted : Not Specified	0.000	0.000		0.449	Mar 2023	0.000		-		0.000	0.000	0.449	-
		Subtotal	12.024	1.765		4.266		4.625		-		4.625	0.000	22.680	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support (All PTA - Labor) 1	Allot	U.S. Naval Observatory (Civilian Labor) : Washington, DC	0.603	0.000		0.363	Dec 2022	0.536	Dec 2023	-		0.536	Continuing	Continuing	Continuing
Development Support (All PTA - Labor) 2	Allot	U.S. Naval Observatory (Civilian Labor) : Washington, DC	0.603	0.000		0.363	Jan 2023	0.536	Jan 2024	-		0.536	Continuing	Continuing	Continuing
Development Support (All PTA - Labor) 3	Allot	U.S. Naval Observatory (Civilian	0.603	0.000		0.363	Apr 2023	0.536	Apr 2024	-		0.536	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Labor) : Washington, DC													
Development Support (All PTA - Labor) 4	Allot	U.S. Naval Observatory (Civilian Labor) : Washington, DC	0.603	0.000		0.363	Jul 2023	0.536	Jul 2024	-		0.536	Continuing	Continuing	Continuing
Development Support (ALL PTA - Labor) 1 CTR	Allot	U.S. Naval Observatory : Washington, DC	0.000	0.000		0.600	Jan 2023	0.888	Jan 2024	-		0.888	0.000	1.488	-
EOP Optimal Estimation	C/FFP	U.S. Naval Observatory : Washington, DC	0.607	0.224	Feb 2022	0.250	Jan 2023	0.349	Jan 2024	-		0.349	0.500	1.930	-
Foreign GNSS	C/FFP	U.S. Naval Observatory : Washington, DC	0.612	0.168	Jan 2022	0.250	Jan 2023	0.349	Jan 2024	-		0.349	0.500	1.879	-
SLAC Software Upgrade	C/FFP	Classified : Not Specified	0.230	0.000		0.000		0.000		-		0.000	0.690	0.920	-
Primary Hardware Development (NPOI) 1.8m Telescope Project (2)	SS/FFP	NASA : Varies	0.342	0.000		0.000		0.000		-		0.000	0.000	0.342	-
SIBR Placeholder	SS/FFP	NASA : Varies	0.281	0.000		0.273	Mar 2023	0.334	Mar 2024	-		0.334	0.000	0.888	-
		Subtotal	4.484	0.392		2.825		4.064		-		4.064	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Development Services	Various	Classified-4 : Not Specified	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Engineering and Development Services	Various	Classified : Not Specified	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2344 / *Precise Time and Astrometry*	

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	16.508	2.157		7.091		8.689		-		8.689	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2344 / *Precise Time and Astrometry*

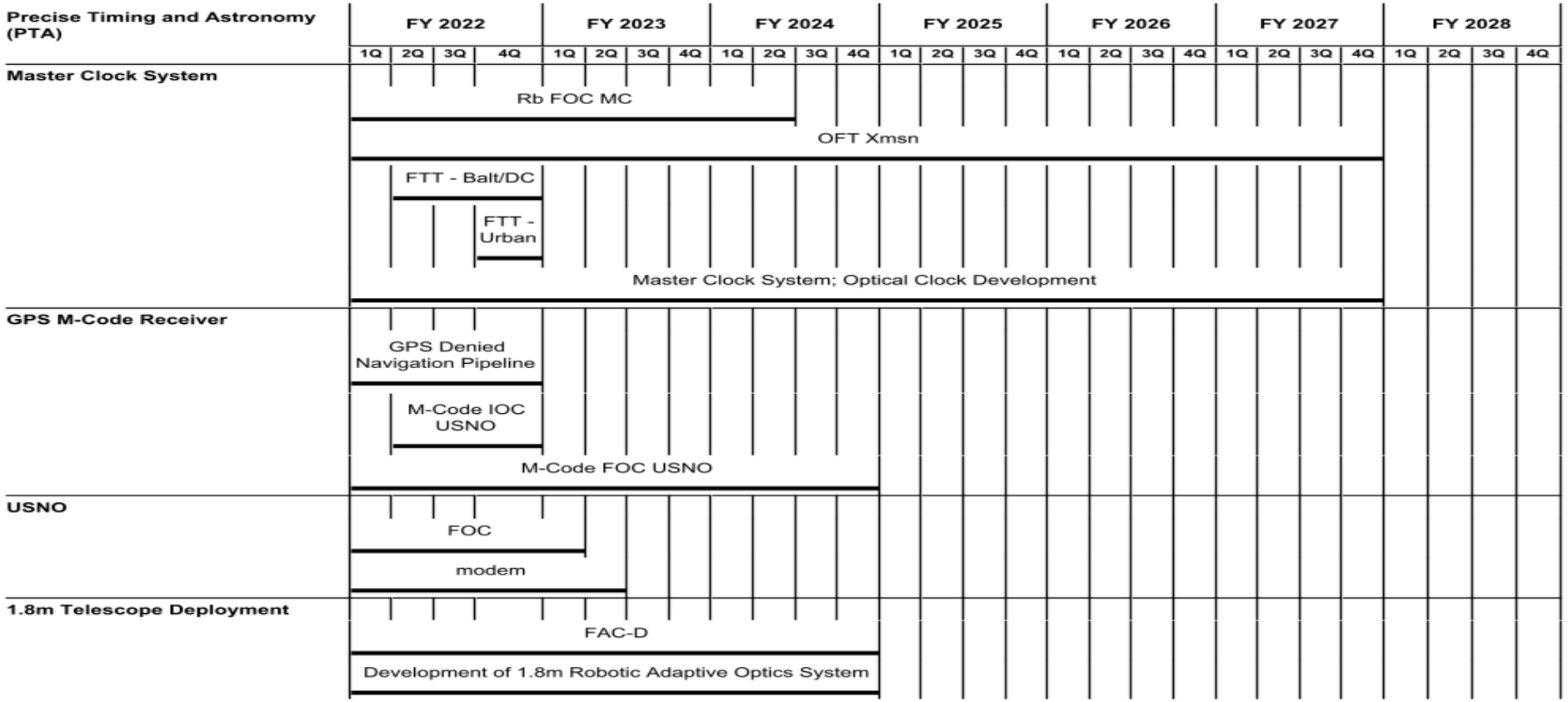

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2344 / *Precise Time and Astrometry*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Precise Timing and Astronomy (PTA)				
Master Clock System: Rb Full Operational Capability (FOC) - AMC	1	2022	2	2024
Master Clock System: Optical Fiber Time (OFT) Transmission	1	2022	4	2027
Master Clock System: Fiber Time Transmission (FTT) in Baltimore/DC Area	2	2022	4	2022
Master Clock System: Fiber Time Transmission - Urban Demo	4	2022	4	2022
Master Clock System: Master Clock System; Optical Clock Development	1	2022	4	2027
GPS M-Code Receiver: GPS Denied Navigation Pipeline	1	2022	4	2022
GPS M-Code Receiver: M-Code IOC at USNO	2	2022	4	2022
GPS M-Code Receiver: M-Code FOC at USNO	1	2022	4	2024
USNO: Transition Earth Orientation Parameters (EOP) Automation software to operations (FOC)	1	2022	1	2023
USNO: Next Generation Time Transfer Transceiver (modem) CDR, transition to operations	1	2022	2	2023
1.8m Telescope Deployment: FAC-D Development for Telescope Enclosure	1	2022	4	2024
1.8m Telescope Deployment: Development of 1.8m Robotic Adaptive Optics System	1	2022	4	2024
1.8m Telescope Deployment: GPSIII development	1	2022	2	2025
1.8m Telescope Deployment: EO Optimal Estimation	2	2022	4	2027
1.8m Telescope Deployment: EO Foreign GNSS	1	2022	4	2027

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2363 / *Remote Sensing Capability Development*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
2363: *Remote Sensing Capability Development*	2.829	0.314	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.143
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Remote Sensing Capability Development characterizes the ocean environment using a variety of remote sensing techniques that provide that capability to discriminate atypical oceanographic phenomena from the natural environment that will greatly improve undersea dominance capabilities. The Naval Oceanographic Office will employ oceanographic data to refine and extend environmental characterization of the phenomena and disseminate data to the Fleet.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Remote Sensing Capability Dev.	0.314	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Collect remote sensing and ground truth data in various weather and sea states to broaden the range of environmental conditions and reduce uncertainty in environmental prediction. Develop and enhance software algorithms to automatically detect oceanographic phenomena. Integrate algorithms for access over the network. Enhance existing toolsets to provide users robust applications to assist in their daily tasks. Develop training to provide the user community education on using the different tools and applications. (Details held at a higher classification)					
FY 2023 Plans: N/A					
FY 2024 Base Plans: N/A					
FY 2024 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	0.314	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2363 / *Remote Sensing Capability Development*

C. Other Program Funding Summary ($ in Millions)

Remarks

D. Acquisition Strategy

Remote Sensing Capability Development is being managed as a PEO Project leveraging the Rapid Development and Deployment (RDD) construct for rigor and discipline.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 2363 / *Remote Sensing Capability Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
REMOTE SENSING CAPABILITY DEVELOPMENT DATA COLLECTION	Various	VARIOUS : VARIOUS	1.211	0.314	Nov 2021	0.000		0.000		-		0.000	5.176	6.701	-
		Subtotal	1.211	0.314		0.000		0.000		-		0.000	5.176	6.701	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation (DT&E)	WR	SSC Pacific : SAN DIEGO, CA	1.081	0.000		0.000		0.000		-		0.000	0.375	1.456	-
		Subtotal	1.081	0.000		0.000		0.000		-		0.000	0.375	1.456	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Remote Sensing Capability Development Data Collection	C/FP	BAH : VA	0.537	0.000		0.000		0.000		-		0.000	0.374	0.911	-
		Subtotal	0.537	0.000		0.000		0.000		-		0.000	0.374	0.911	N/A

	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.829	0.314		0.000		0.000		-		0.000	5.925	9.068	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2363 / *Remote Sensing Capability Development*

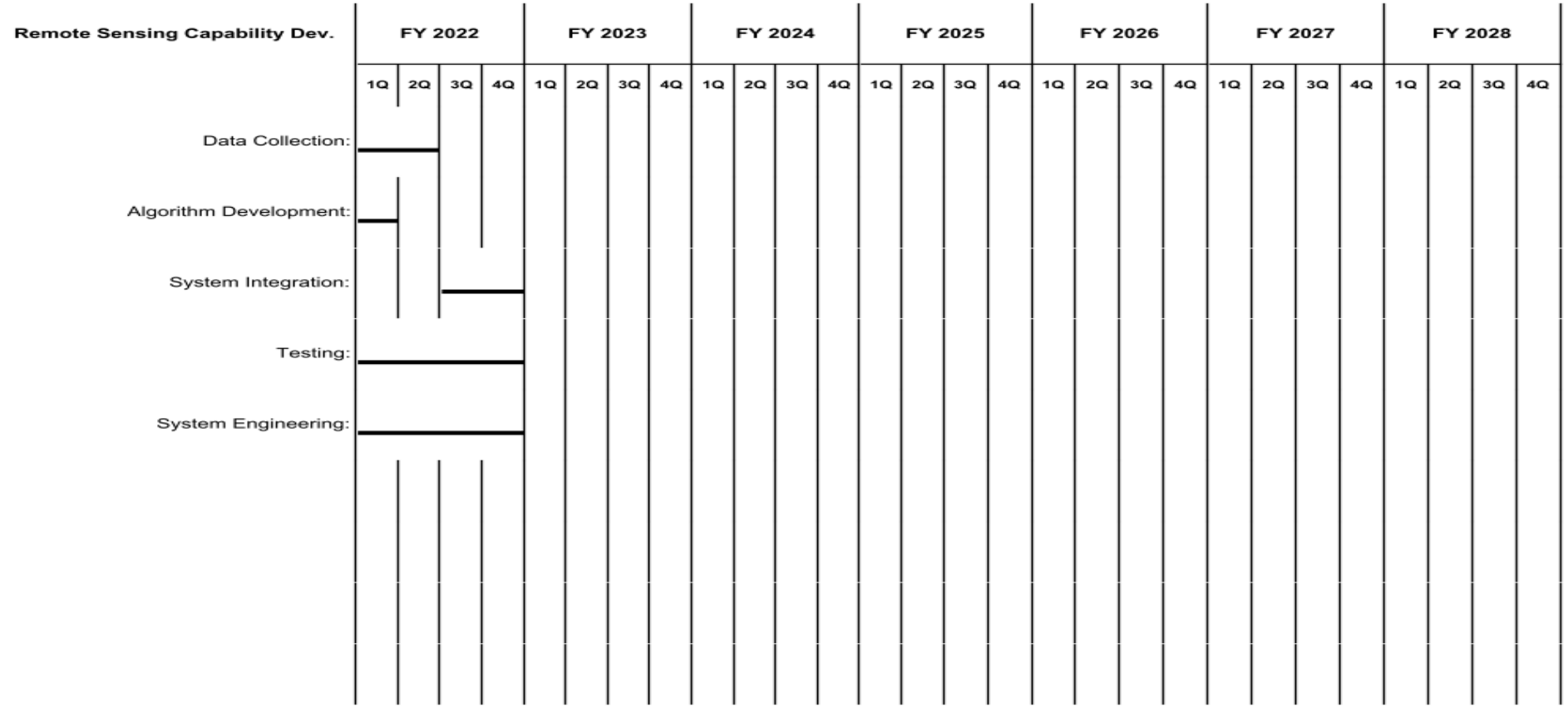

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 2363 / *Remote Sensing Capability Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Remote Sensing Capability Dev.				
Data Collection:: Schedule Detail	1	2022	2	2022
Algorithm Development:: Schedule Detail	1	2022	1	2022
System Integration:: Schedule Detail	3	2022	4	2022
Testing:: Schedule Detail	1	2022	4	2022
System Engineering:: Schedule Detail	1	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3207 / *Fleet Synthetic Training*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
3207: *Fleet Synthetic Training*	3.487	0.000	0.002	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.489
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Fleet Synthetic Training (FST) provides Naval Forces with an enhanced in-port training capability. This effort provides more effective training for our deploying naval forces by integrating embedded shipboard training devices, aircraft, and submarine simulators into an interoperable network with joint, coalition, and interagency partners.

The required training is based on realistic characterizations of the physical environment, a key factor in achieving this new way of training Naval Forces. This project develops and delivers software that characterizes the ocean and atmospheric environments; adjusts to meet fleet-required training scenarios; allows synthetic training to be conducted in areas of planned and contingency operations and provides sufficient detail to simulate the real-world conditions of the physical environment in those areas of interest.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Fleet Synthetic Training	0.000	0.002	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Ballistic Missile Defense (BMD) Fleet Synthetic Training (FST) at sea effort will provide the capability to conduct integrated Live, Virtual, and Constructive (LVC) single or multi-ship exercises with ships at sea using the Navy Continuous Training Environment (NCTE). This capability will support BMD mission area Fleet training and mission rehearsal in theater, allow ships to participate in Combatant Command (CCMD) mandated BMD exercises while pier-side or underway, as well as enhance BMD training objective accomplishment in current Optimized Fleet Response Plan (O-FRP) underway training events such as Composite Training Unit Exercises (COMPTUEX) and Joint Task Force Exercises (JTFEX). The NCTE and FST directly support Fleet training readiness, strike group and BMD platform deployment certifications.					
FY 2023 Plans: FY23 completion of FST/LVC providing integrated live, virtual, and constructive single or multi-ship exercises in support of Ballistic Missile Defense (BMD). FY23 funding in amount of $0.002M provided to ensure final project closeout					
FY 2024 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3207 / *Fleet Synthetic Training*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** FY24 reduction due to final project closeout.					
Accomplishments/Planned Programs Subtotals	0.000	0.002	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The included technology developments are primarily in-house with contractor participation through existing vehicles.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3207 / *Fleet Synthetic Training*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Support	C/FFP	AER : VA	0.874	0.000	Sep 2022	0.002	Sep 2023	0.000		-		0.000	0.000	0.876	-
Software Development	C/FFP	AER : VA	0.367	0.000		0.000		0.000		-		0.000	0.000	0.367	-
Configuration Management	C/FFP	AER : VA	0.482	0.000		0.000		0.000		-		0.000	0.000	0.482	-
Studies and Analysis	C/FFP	AER : VA	0.582	0.000		0.000		0.000		-		0.000	0.000	0.582	-
Award Fees	C/FFP	NAWC TSD (Orlando, FL) : FL	0.146	0.000		0.000		0.000		-		0.000	0.000	0.146	-
Technical Data	C/FFP	N/A : N/A	0.119	0.000		0.000		0.000		-		0.000	0.000	0.119	-
		Subtotal	2.570	0.000		0.002		0.000		-		0.000	0.000	2.572	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prior Year Developmental Test & Evaluation Not Funded FYDP (PYDT&E)	C/FFP	AER : VA	0.917	0.000		0.000		0.000		-		0.000	0.000	0.917	-
		Subtotal	0.917	0.000		0.000		0.000		-		0.000	0.000	0.917	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.487	0.000		0.002		0.000		-		0.000	0.000	3.489	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3207 / *Fleet Synthetic Training*

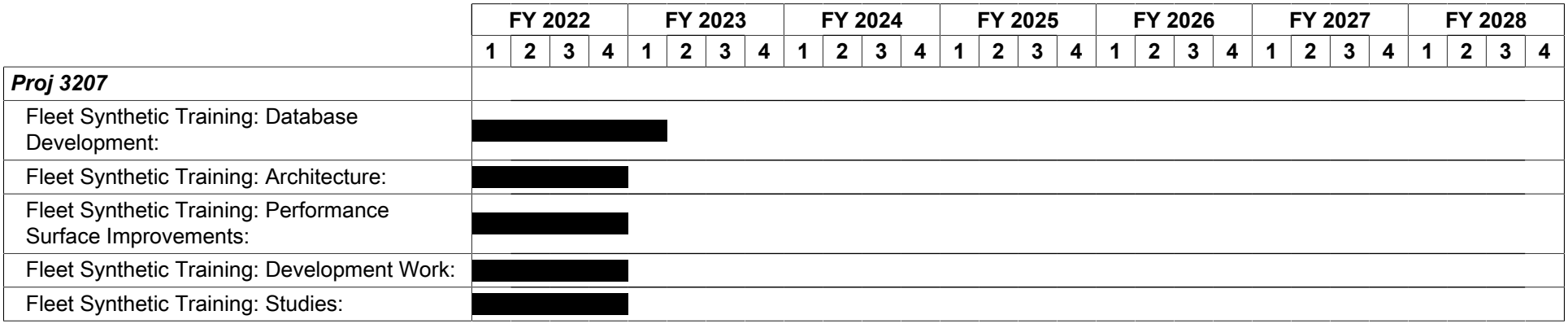

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3207 / *Fleet Synthetic Training*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3207				
Fleet Synthetic Training: Database Development:	1	2022	1	2023
Fleet Synthetic Training: Architecture:	1	2022	4	2022
Fleet Synthetic Training: Performance Surface Improvements:	1	2022	4	2022
Fleet Synthetic Training: Development Work:	1	2022	4	2022
Fleet Synthetic Training: Studies:	1	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3404 / *Tactical Environmental Support*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
3404: *Tactical Environmental Support*	7.880	1.913	3.168	3.100	-	3.100	2.878	2.929	2.975	3.035	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Tactical Environmental Support Project (3404) enables the future warfighter to leverage environmental data gathered, assimilated and predicted under Projects 2341 (METOC Collections) and 2342 (METOC processing) by incorporating them into warfighting technological, net-centric applications that shape the way in which commanders engage the enemy, take full advantage of environmental conditions (and their impacts on systems and sensors) and complete the mission in the most efficient manner feasible. These software decision support tools complement the capabilities found in the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) Program of Record, and provide platform, sensor, communications, and weapon systems performance assessments for littoral and deep-strike warfighters. The following warfighting disciplines benefit directly from these METOC Exploitation capabilities: (1) Undersea Warfare(USW), Anti-Submarine Warfare(ASW), Mine Warfare(MIW), Amphibious Warfare(AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare, (AAW), Strike Warfare(STW), Expeditionary Warfare(EXW), Electronic Warfare (EW), Information Operations (IO), Intelligence Operations(INT), Non-Combat Operations (NCO), Command, Control, Communication (CCC), and Naval Special Warfare(NSW).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Tactical Environmental Support	1.913	3.168	3.100	0.000	3.100
Articles:	-	-	-	-	-
Description: The Tactical Environmental Support Project (3404) enables the future warfighter to leverage environmental data gathered, assimilated and predicted under Projects 2341 (METOC Collections) and 2342 (METOC processing) by incorporating them into warfighting technological, net-centric applications that shape the way in which commanders engage the enemy, take full advantage of environmental conditions (and their impacts on systems and sensors) and complete the mission in the most efficient manner feasible. These software decision support tools complement the capabilities found in the Naval Integrated Tactical Environmental System Next Generation (NITES-Next) POR, and provide platform, sensor, communications, and weapon systems performance assessments for littoral and deep-strike warfighters. The following warfighting disciplines benefit directly from these METOC Exploitation capabilities (1) Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare, (AAW), Strike Warfare (STW), Expeditionary Warfare (EXW), Electronic Warfare (EW), Information Operations (IO), Intelligence Operations (INT), Non-Combat Operations					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
(NCO), Command, Control, Communication (CCC), and Naval Special Warfare (NSW). Accomplishments and plans described below are examples for each effort category. ***FY 2023 Plans:*** -Continue to add capability to the Interactive Scenario Builder Tactical Decision Aid (BUILDER). Specific elements including improved boundary layer characteristics (focused on vertical refractivity profiles), integration of expanded METOC numerical model information, and demonstration of probabilistic ensemble information to better inform uncertainty range of applications given environmental variability. -Continue to transition ocean acoustic prediction and database innovations via the Scalable Tactical Acoustic Propagation Loss Engine project, which leverages ties to USW programs of record via the APB/CPB incremental build processes. -Continue to transition Ocean-Atmosphere Master Library (OAML) model and database improvements into the Scalable Tactical Acoustic Propagation Loss Engine (STAPLE). The objective is to provide state-of-the-art propagation models and tactical environmental information to ASW units. -Continue to Leverage lessons learned from NAVSLaM to create a holistic approach to atmospheric boundary larger turbulence observation, data-basing and modeling, as they pertains to Navy tactical problems. -Continue enhancements to newly fielded RF and EO capabilities per fleet feedback, including efforts to transition tactical EMW and undersea warfare environmental information dissemination systems, and adoption of new tactical decision aid capabilities. -Completion and demonstration of integrating the High Frequency skywave propagation code into the BUILDER EM/EW tactical decision aid. ***FY 2024 Base Plans:*** - Continue to add capability to the Interactive Scenario Builder Tactical Decision Aid (BUILDER). Specific elements including improved boundary layer characteristics (focused on vertical refractivity profiles), integration of expanded METOC numerical model information, and demonstration of probabilistic ensemble information to better inform uncertainty range of applications given environmental variability.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Continue to transition ocean acoustic prediction and database innovations via the Scalable Tactical Acoustic Propagation Loss Engine (STAPLE) project, which leverages ties to USW programs of record via the APB/CPB incremental build processes. - Continue to transition Ocean-Atmosphere Master Library (OAML) model and database improvements into the Scalable Tactical Acoustic Propagation Loss Engine (STAPLE). The objective is to provide state-of-the-art propagation models and tactical environmental information to ASW units. - Continue enhancements to newly fielded RF and EO capabilities per fleet feedback, including efforts to transition tactical EMW and undersea warfare environmental information dissemination systems, and adoption of new tactical decision aid capabilities. - Conclude incorporating lessons learned from NAVSLaM to create a holistic approach to atmospheric boundary layer turbulence observation, data-basing and modeling. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** There is no significant funding change from FY 2023 to FY 2024.					
Accomplishments/Planned Programs Subtotals	1.913	3.168	3.100	0.000	3.100

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the Tactical Environmental Support Project to develop, demonstrate and validate products and decision aids to understand and predict the impact of the environment on military operations.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Tactical Environmental Support	WR	NRL : Washington, DC	4.436	0.300	Nov 2021	1.230	Nov 2022	1.138	Nov 2023	-		1.138	0.000	7.104	-
METOC Tactical Environmental Support	WR	NRL : Monterey, CD Stennis Space Center,MS	2.903	0.592	Nov 2021	0.854	Nov 2022	0.832	Nov 2023	-		0.832	Continuing	Continuing	Continuing
METOC Tactical Environmental Support-Staple Transitions	WR	NSWC Carderock : West Bethesda, MD	0.541	0.400	Nov 2021	0.000		0.000		-		0.000	2.500	3.441	-
METOC Tactical Environmental Support	C/FFP	Various : Various	0.000	0.621	Oct 2021	1.084	Oct 2022	1.130	Oct 2023	-		1.130	0.075	2.910	-
		Subtotal	7.880	1.913		3.168		3.100		-		3.100	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	7.880	1.913		3.168		3.100		-		3.100	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

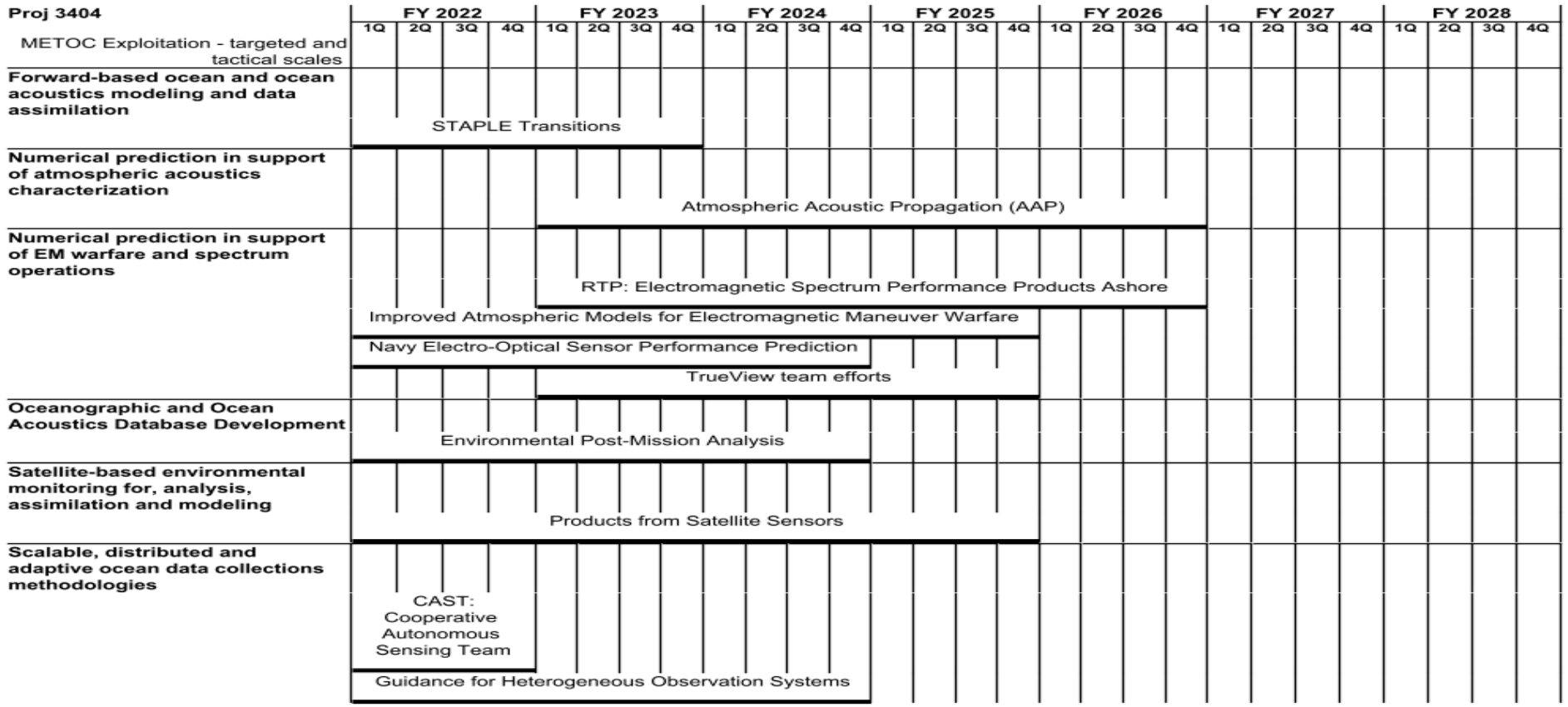

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3404 / *Tactical Environmental Support*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3404				
Forward-based ocean and ocean acoustics modeling and data assimilation: STAPLE Transitions -- NSWCCD	1	2022	4	2023
Numerical prediction in support of atmospheric acoustics characterization: Atmospheric Acoustic Propagation (AAP) -- NRL-MRY	1	2023	4	2026
Numerical prediction in support of EM warfare and spectrum operations: RTP: Electromagnetic Spectrum Performance Products Ashore -- NRL-MRY / NRL-DC / NIWC-PAC	1	2023	4	2026
Numerical prediction in support of EM warfare and spectrum operations: Improved Atmospheric Models for Electromagnetic Maneuver Warfare -- NPS	1	2022	4	2025
Numerical prediction in support of EM warfare and spectrum operations: REFRACTIVITY PROFILE SUPPORT -- NRL-MRY	1	2022	4	2024
Numerical prediction in support of EM warfare and spectrum operations: NEOSPP and EMSPPA and SSCPAC Code 55280 TrueView team efforts -- SSC-PAC	1	2023	4	2025
Oceanographic and Ocean Acoustics Database Development: Environmental Post-Mission Analysis - TTS ocean and atmosphere data collection -- NRL-SSC	1	2022	4	2024
Satellite-based environmental monitoring for, analysis, assimilation and modeling: Preparing Tactical Optical Ocean Products from Satellite Sensors -- NRL-SSC	1	2022	4	2025
Scalable, distributed and adaptive ocean data collections methodologies: CAST: Cooperative Autonomous Sensing Team -- APL-UW	1	2022	4	2022
Scalable, distributed and adaptive ocean data collections methodologies: Guidance for Heterogeneous Observation Systems (GHOST) -- NRL-SSC	1	2022	4	2024

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3405 / *Decision Support Products & Dissemination*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
3405: *Decision Support Products & Dissemination*	3.545	1.120	1.216	1.245	-	1.245	1.265	1.289	1.309	1.335	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Decision Support Products & Dissemination efforts enable the future warfighter to leverage environmental data gathered, assimilated, predicted and exploited by optimizing data formatting, compression, packaging, depiction, data-basing and transfer methodologies that permit the rapid dissemination of actionable battlespace environmental (METOC) information over tactical and reach-back networks. This project ensures warfighters, commanders and those who support them are fully synchronized in terms of environmental data products shared among a multitude of platforms, systems and common operating pictures (COPs). METOC information is highly dynamic. Just as time synchronization is essential to navigation principles, timely METOC knowledge and information are vital to battlespace environmental exploitation, placing the warfighter and support elements in spatial and temporal synchronization, and at a collective advantage, in terms of the current and predicted states of the ocean and atmosphere.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Decision Support Products and Dissemination	1.120	1.216	1.245	0.000	1.245
Articles:	-	-	-	-	-
Description: The Decision Support Products and Dissemination Project (3405) enables the future warfighter to leverage environmental data gathered, assimilated, predicted and exploited under Projects 2341 (METOC Collections), 2342 (METOC processing) and 3404 (METOC exploitation) by optimizing data formatting, compression, packaging, depiction, data-basing and transfer methodologies that permit the rapid dissemination of actionable battlespace environmental (METOC) information over tactical and reach-back networks. This project ensures warfighters, commanders and those who support them are fully synchronized in terms of environmental data products shared among a multitude of platforms, systems and common operating pictures (COPs). METOC information is highly dynamic. Just as time synchronization is essential to navigation principles, timely METOC knowledge and information synchronization is vital to battlespace environmental exploitation, placing the warfighter and all of those who support him on the "same sheet of music" and at a collective advantage, in terms of the current and predicted states of the ocean and atmosphere. Accomplishments and plans described below are examples for each effort category. ***FY 2023 Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3405 / *Decision Support Products & Dissemination*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
-Continue development of modeling and simulation capabilities for maritime targeting into BUILDER's Target Acquisition Weather Software (TAWS) replacement feature, mitigating a gap in capability created by TAWS reaching program end-of-life. -Continue to operationally evaluate and integrate automated mission environmental forecast briefings for unmanned aircraft. Specific projects will address large unmanned aircraft and will develop the capability to rapidly generate NATOPS compliant flight weather briefs. -Continue development of enhanced visualization of meteorology and oceanography products for improved support to multiple mission areas. -Continue development of data compression and reduced-bandwidth transmission techniques to enable timely receipt of relevant environmental assessment and prediction data to forward platforms in strict communications environments.					
FY 2024 Base Plans: - Continue development of modeling and simulation capabilities for maritime targeting into BUILDER's Target Acquisition Weather Software (TAWS) replacement features, with increasing focus on next generation software integration, maturation, and verification/validation. - Continue to operationally evaluate and integrate automated mission environmental forecast briefings for unmanned aircraft. Specific projects will address large unmanned aircraft and will develop the capability to rapidly generate NATOPS compliant flight weather briefs. - Continue development of enhanced integration/visualization of meteorology and oceanography products for improved support to multiple mission areas. - Continue development of data compression and reduced-bandwidth transmission techniques to enable timely receipt of relevant environmental assessment and prediction data to forward platforms in strict communications environments.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3405 / *Decision Support Products & Dissemination*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Initiate improvements of aviation METOC services and integration into aviation decision tools, including integration into the next generation replacement for the Joint Mission Planning System (JMPS). ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** There is no significant funding change from FY 2023 to FY 2024.					
Accomplishments/Planned Programs Subtotals	1.120	1.216	1.245	0.000	1.245

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Acquisition, management and contracting strategies are to support the Decision Support Products & Dissemination Project to develop, demonstrate and validate products and decision aids to provide environmentally based recommendations to commanders at the Strategic, Operational, and Tactical levels of military operations.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 3405 / *Decision Support Products & Dissemination*	

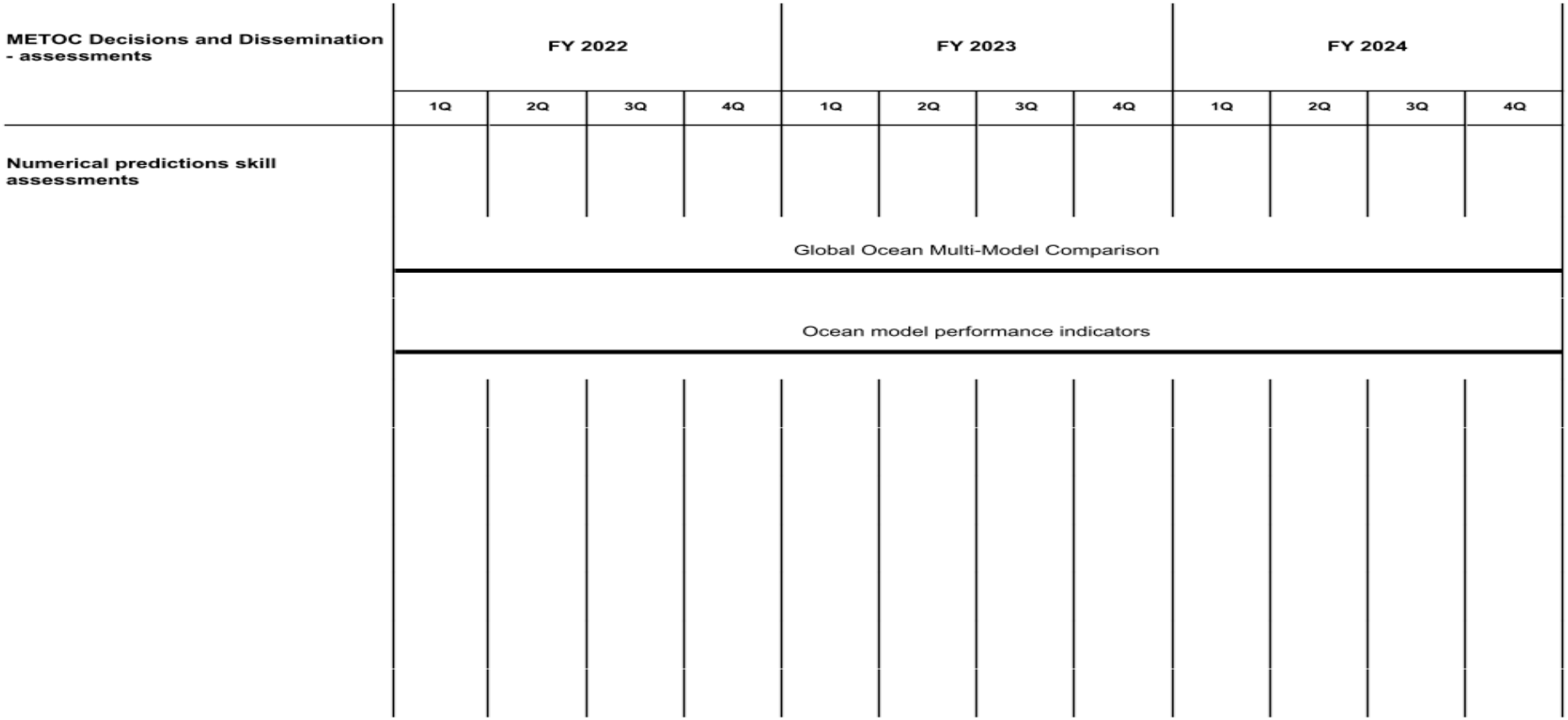
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
METOC Tactical Environmental Support	WR	NRL : Washington DC	1.087	0.300	Nov 2021	0.340	Nov 2022	0.365	Nov 2023	-		0.365	0.000	2.092	-
METOC Tactical Environmental Support	WR	NRL : Monterey, CA; Dtennis Space Center, MS	0.868	0.400	Nov 2021	0.413	Nov 2022	0.420	Nov 2023	-		0.420	Continuing	Continuing	Continuing
METOC Tactical Environmental Support	C/FFP	Various : Various	1.590	0.420	Nov 2021	0.463	Nov 2022	0.460	Nov 2023	-		0.460	0.000	2.933	-
		Subtotal	3.545	1.120		1.216		1.245		-		1.245	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.545	1.120		1.216		1.245		-		1.245	Continuing	Continuing	N/A

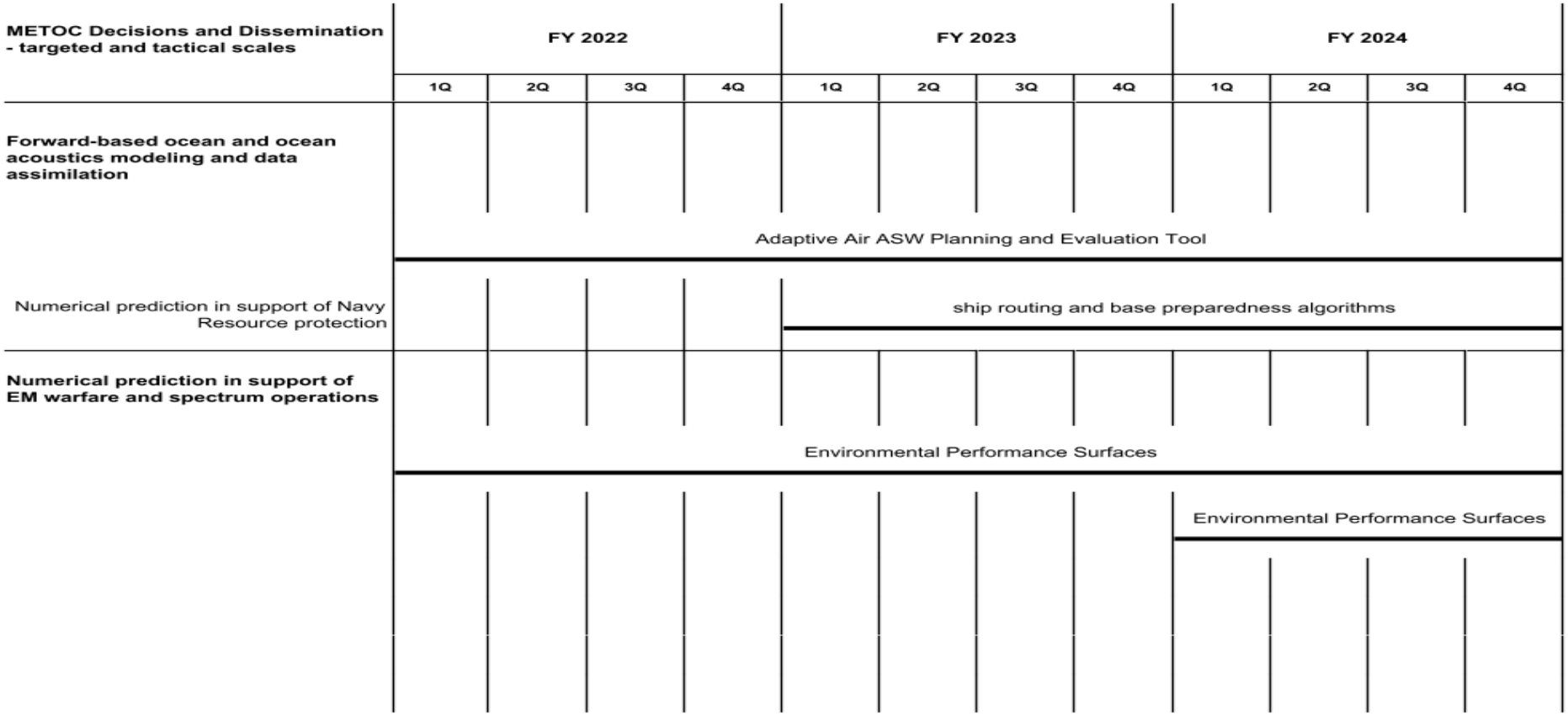
Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3405 / *Decision Support Products & Dissemination*



2024OSD - 0603207N - 3405

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3405 / *Decision Support Products & Dissemination*



2024OSD - 0603207N - 3405

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 3405 / *Decision Support Products & Dissemination*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
METOC Decisions and Dissemination - assessments				
Numerical predictions skill assessments: Global Ocean Multi-Model Comparison -- NRL-SSC	1	2022	4	2024
Numerical predictions skill assessments: Ocean model performance indicators for operational Navy ocean and acoustic model assessment -- NRL-SSC	1	2022	4	2024
METOC Decisions and Dissemination - targeted and tactical scales				
Forward-based ocean and ocean acoustics modeling and data assimilation: Adaptive Air ASW Planning and Evaluation Tool	1	2022	4	2024
Forward-based ocean and ocean acoustics modeling and data assimilation: Numerical prediction in support of Navy Resource protection: ADVANCED ship routing and base preparedness algorithms	1	2023	4	2026
Numerical prediction in support of EM warfare and spectrum operations: Environmental Performance Surfaces for OTH Radars and HF Communications (AKA, Pearman OTH RADAR Exploitation) -- NRL-SSC	1	2022	4	2024
Numerical prediction in support of EM warfare and spectrum operations: Improve aviation METOC services and integration into aviation decision tools, including integration to for replacement JMPS.	1	2024	4	2027

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	21.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Conduct research in infrared optimized telescope and maritime unattended sensors.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Infrared optimized telescope ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Conduct research in infrared optimized telescope.	0.000	3.000
Congressional Add: Maritime unattended sensors ***FY 2022 Accomplishments:*** N/A ***FY 2023 Plans:*** Conduct research in maritime unattended sensors.	0.000	18.000
Congressional Adds Subtotals	0.000	21.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603207N / *Air/Ocean Tactical Applications*	Project (Number/Name) 9999 / *Congressional Adds*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Need Item Text	C/BA	Not Specified : Not Specified	0.000	0.000		21.000	Jul 2023	0.000		-		0.000	0.000	21.000	-
		Subtotal	0.000	0.000		21.000		0.000		-		0.000	0.000	21.000	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		21.000		0.000		-		0.000	0.000	21.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 9999 / *Congressional Adds*

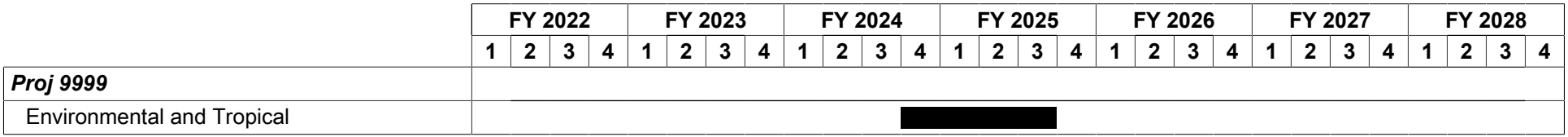


Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603207N / *Air/Ocean Tactical Applications*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Environmental and Tropical	4	2024	3	2025