Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Air Force											Date: April 2022	
Appropriation/Budget Activity 3620F: *Research, Development, Test & Evaluation, Space Force* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604002SF / *Space Force Weather Services Research*							
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	0.000	0.816	0.000	0.816	0.845	0.860	0.880	0.897	0.000	4.298
645353: *SF Weather Services Research*	-	0.000	0.000	0.816	0.000	0.816	0.845	0.860	0.880	0.897	0.000	4.298
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 4, PE 0604002SF, project 645353, Space Weather Analysis and Forecast System (SWAFS) Scintillation Nowcast and Forecast Technology (SNFT) software upgrade, is a new start.

In FY 2023, PE 0604002F Air Force Weather Services Research, Project 643560, AF Weather Services Research efforts were transferred to PE 0604002S, Space Force Weather Services Research, Project 645353, SF Weather Services Research in order to align current USAF ground-based space-sensing projects to the USSF.

A. Mission Description and Budget Item Justification

This budget activity funds the development necessary to evaluate integrated technologies and models for future operationalization into segments of the Space Force Weather Services (SFWS) in support of the 2018 National Defense Strategy's (NDS) three lines of effort. To improve readiness for a more lethal force, SFWS provides timely, accurate, resilient and relevant environmental information, to include space and terrestrial weather, for global battlespace situational awareness for Air Force (AF), Army, Special Operations Forces (SOF), Space Force (USSF), combatant commands, the Intelligence Community (IC), and other government agencies. SFWS capabilities at home station and deployed provide critical environmental information in support of decision makers to gain the asymmetric advantage during the full spectrum of air and space combat operations. SFWS development enhances the lethality, effectiveness, and survivability of AF & SF weapon systems and precision munitions by modernizing capability and seeking the military advantage to accurately predict friendly and foe environmental impacts to optimize mission execution and planning, targeting, weaponeering, battle damage assessment, and space systems operations. To strengthen alliances and partnerships, SFWS development efforts integrate Department of Defense (DoD), government agency, commercial, and international partner environmental data with SFWS information system equipment for processing, storing, exploiting, and disseminating all-domain weather information for analysis, forecasting, mission integration, and greater interoperability. To ensure greater performance and affordability for the AF and SF, SFWS systems are being modernized through improvements to architecture and system efficiency, cybersecurity, joint all-domain command and control (JADC2) and sensing grid integration, migration to cloud computing, and expanding agile software development practices.

SFWS aligns activities under four capability areas: Weather Data Collection, Weather Data Analysis and Dissemination, Weather Forecasting, and Product Tailoring/ Warfighter Applications (PTWA). This alignment ensures an integrated and systems-oriented approach to program management decisions. A portion of the Weather Forecasting capability is addressed by RDT&E, BA 04, PE 0604002S, Project 645353 - Space Force Weather Services Research.

Weather Forecasting provides global and regional advanced scientific numerical weather prediction capabilities for automated, high-resolution forecast products for mission planning and execution. Space weather modeling assists in characterizing and forecasting the near-earth environment to the sun and enables space weather

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anomaly and space weather impact assessments. Weather Forecasting includes activities for Numerical Weather Modeling (NWM) and Space Weather Analysis and Forecast System (SWAFS). SWAFS is a software suite of 47 models and applications to ingest, process, and store space environmental data, run space environmental models to specify and forecast the near-earth environment, and run space effects characterization applications.

This program element may include necessary civilian pay expenses required to manage, execute, and deliver SFWS for weapon system capability. The use of such program funds would be in addition to the civilian pay expenses budgeted in program elements 1206392SF and 1206398SF.

This effort is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P), because efforts are necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment.

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	0.000	0.000	0.000	0.000	0.000
Current President's Budget	0.000	0.000	0.816	0.000	0.816
Total Adjustments	0.000	0.000	0.816	0.000	0.816
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	0.000			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	0.000	0.816	0.000	0.816

C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Title: Space Weather Analysis and Forecast System (SWAFS) Scintillation Nowcast and Forecast Technology (SNFT) software upgrade	0.000	0.000	0.816
Description: SWAFS SNFT AFRL AoA to upgrade software allowing use of model algorithms that utilize sensor packages on the Constellation Observing System to monitor Meteorology, Ionosphere, and Climate (COSMIC II) to understand space environment conditions affecting satellites and communications.			
FY 2022 Plans: N/A			
FY 2023 Plans:			

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C. Accomplishments/Planned Programs ($ in Millions)	FY 2021	FY 2022	FY 2023
Develop and integrate an upgrade to the SET4D Ovation Prime 2013 Auroral boundary model. This model informs pilots of the hazards to radio communication operations when flying near the poles and it supports early warning radar operators in determining environment impacts to operate their radars during high peak aurora times. Complete Spiral 2 development of the Radio Frequency Ionospheric Scintillation Analysis Tool (RISA) upgrade applications for data exploitation of advanced data Integrity tools that include: Wideband Satellite Communication Support (Mobile User Objective System (MUOS); Constellation Observing System for Meteorology, Ionosphere, and Climate (COSMIC-2) electron density Ion Velocity Meter (IVM) Algorithm; Global-scale Observations of the Limb and Disk/Ionospheric Connection Explorer (GOLD/ICON) Ultraviolet Variability Data Assimilation; Global Navigation Satellite Systems (GNSS) Integration, and Rate of Total Electron Content Index (ROTI) exploitation. ***FY 2022 to FY 2023 Increase/Decrease Statement:*** Funds transferred from USAF to USSF.			
Accomplishments/Planned Programs Subtotals	0.000	0.000	0.816

D. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• RDTE 07 0305111F: *Weather Service*	4.099	4.362	-	-	-	-	-	-	-	0.000	8.461
• RDTE 07 1203940S: *Space Situation Awareness Operations*	-	-	3.144	-	3.144	3.816	3.022	3.113	3.175	0.000	0.000

Remarks

E. Acquisition Strategy

SWAFS will use individual Federal Acquisition Regulation (FAR) based and rapid acquisition contracting methods, as well as AFRL for development works (Technology Readiness Level (TRL) 6 and below) to develop AoA, design solutions, and prototype code.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Air Force			Date: April 2022
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SWAFS Scintillation Nowcast Forecast Model Update AoA	PO	AFRL : Kirtland AFB, NM	-	-		-		0.816	Jan 2023	-		0.816	Continuing	Continuing	-
		Subtotal	-	-		-		0.816		-		0.816	Continuing	Continuing	N/A

	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		-		0.816		-		0.816	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Air Force		Date: April 2022
Appropriation/Budget Activity 3620F / 4	**R-1 Program Element (Number/Name)** PE 0604002SF / *Space Force Weather Services Research*	**Project (Number/Name)** 645353 / *SF Weather Services Research*

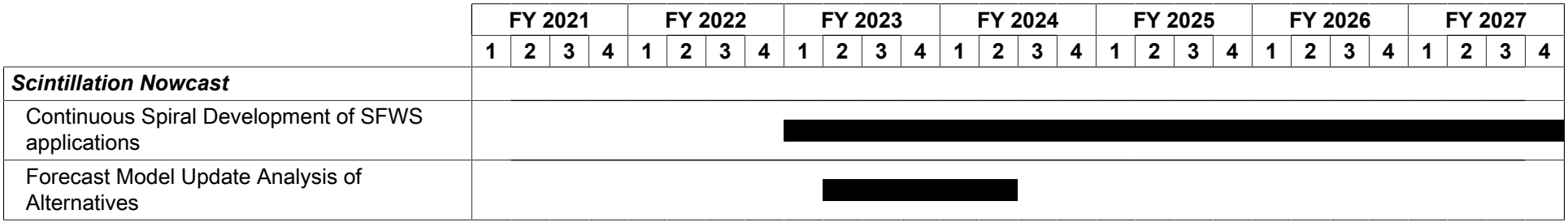

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Air Force		Date: April 2022
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Scintillation Nowcast				
Continuous Spiral Development of SFWS applications	1	2023	4	2027
Forecast Model Update Analysis of Alternatives	2	2023	2	2024