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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Air Force										Date: February 2019		
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P)					PE 0604002F I Air Force Weather Services Research							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	0.772	0.000	0.772	0.870	1.002	0.804	0.832	0.000	4.280
643560: AF Weather Services Research	-	0.000	0.000	0.772	0.000	0.772	0.870	1.002	0.804	0.832	0.000	4.280
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program, BA 4, PE 0604002F, project 643560, Space Weather Analysis and Forecast Radiation Exposure Model (SWAFS-RadEx), is a new start.
This program, BA 4, PE 0604002F, project 643560, Space Weather Analysis and Forecast Energetic Charged Particle Hazard Assessment (SWAFS-ECP HAS), is a new start.

In FY2020, a portion of PE 0305111F, Weather Services, Project 672738 efforts were transferred to PE 0604002F, Air Force Weather Services Research, Project 643560 in order to properly align Advanced Component Development and Prototype activities with the correct funding source.

A. Mission Description and Budget Item Justification

This budget activity funds development necessary to evaluate integrated technologies and models for future operationalization into segments of the Air Force Weather Services (AFWS) in support of the 2018 National Defense Strategy (NDS) lines of effort. To improve readiness for a more lethal force, AFWS 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), combatant commands, and other government agencies. AFWS capabilities at home station and deployed provide critical support to the full spectrum of air and space combat operations. AFWS development enhances the lethality, effectiveness, and survivability of AF 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, AFWS development efforts integrate DoD, government agency, and commercial and international partner environmental data with AFWS information system equipment for processing, storing, exploiting and disseminating multi-domain weather information for analysis, forecasting, mission integration and greater interoperability. Funding for AFWS development also ensures greater performance and affordability through improvements to architecture and system efficiency, cybersecurity, C4ISR integration, migration to cloud computing, and expanding agile software development practices.

AFWS aligns activities under four capability areas: Weather Data Collection, Weather Data Analysis and Dissemination, Weather Forecasting, and Product Tailoring/Warfighter Applications. This alignment ensures an integrated and systems-oriented approach to program management decisions. A portion of the Weather Forecasting capability is addressed by APPN 3600, BA 04, PE 0604002F, Project 643560- Air Force Weather Services Research.

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

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and space weather impact assessments. Weather Forecasting includes activities for Numerical Weather Modeling (NWM); Weather Services - Live, Virtual, Constructive (WS-LVC), and Space Weather Analysis and Forecast System (SWAFS).							
As directed in the FY 2018 NDAA, Sec 825, amendment to PL 114-92 FY 2016 NDAA, Sec 828 Penalty for Cost Overruns, the FY 2018 Air Force penalty total is \$14.373M. The calculated percentage reduction to each research, development, test and evaluation and procurement account will be allocated proportionally from all programs, projects, or activities under such account.							
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Previous President's Budget		0.000	0.000	0.000	0.000	0.000	
Current President's Budget		0.000	0.000	0.772	0.000	0.772	
Total Adjustments		0.000	0.000	0.772	0.000	0.772	
• 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	0.772	0.000	0.772	
Change Summary Explanation							
Funding transferred from BA7 to BA4 activity.							
C. Accomplishments/Planned Programs (\$ in Millions)					FY 2018	FY 2019	FY 2020
Title: Space Weather Analysis and Forecast Radiation Exposure Model (SWAFS-RadEx)					-	-	0.400
Description: SWAFS-RadEx AFRL Analysis of Alternatives (AoA) and Modeling							
FY 2020 Plans:							
This is a new start in FY2020. In FY2020, a portion of PE 0305111F, Weather Services, Project 672738 efforts were transferred to PE 0604002F, Air Force Weather Services Research, Project 643560 in order to properly align Advanced Component Development and Prototype activities with the correct funding source.							

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C. Accomplishments/Planned Programs (\$ in Millions)							FY 2018	FY 2019	FY 2020		
-Continue AFRL Analysis of Alternatives (AoA) started under PE0305111F in FY19 for existing RADEX models and begin technology maturation efforts. -Perform and exploit new data ingest of space weather observations. -Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. FY 2019 to FY 2020 Increase/Decrease Statement: FY20 BA4 funding increased due to realigning BA7 funds to BA4 activities											
Title: Space Weather Analysis and Forecast Energetic Charged Particle Hazard Assessment (SWAFS-ECP HAS) Description: SWAFS-ECP HAS AFRL Analysis of Alternatives (AoA) and Modeling FY 2020 Plans: This is a new start in FY2020. In FY2020, a portion of PE 0305111F, Weather Services, Project 672738 efforts were transferred to PE 0604002F, Air Force Weather Services Research, Project 643560 in order to properly align Advanced Component Development and Prototype activities with the correct funding source. -Continue AFRL Analysis of Alternatives (AoA) started under PE0305111F in FY19 for existing ECP HAS models and begin technology maturation efforts. -Begin Magnetic Field Measuring (Magnetometer) AoA. -Perform and exploit new data ingest of space weather observations. -Rapidly respond to implement system resiliency and situational awareness necessary to operate in the contested space domain. Activities may include, but are not limited to program office support, studies, technical analysis, prototyping, etc. FY 2019 to FY 2020 Increase/Decrease Statement: FY20 BA4 funding increased due to realigning BA7 funds to BA4 activities							-	-	0.372		
Accomplishments/Planned Programs Subtotals							-	-	0.772		
D. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• RDTE 07 0305111F: WEATHER SERVICE	-	3.621	2.357	-	2.357	2.185	3.035	3.050	3.101	0.000	17.349
Remarks											

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<u>E. Acquisition Strategy</u> SWAFS will use individual 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.		
<u>F. Performance Metrics</u> Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Air Force												Date: February 2019			
Appropriation/Budget Activity 3600 / 4						R-1 Program Element (Number/Name) PE 0604002F / Air Force Weather Services Research						Project (Number/Name) 643560 / AF Weather Services Research			
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SWAFS RadEx Analysis of Alternatives	PO	AFRL : Wash, DC	-	-		-		0.181	Dec 2019	-		0.181	Continuing	Continuing	-
SWAFS ECP HAS Analysis of Alternatives	PO	AFRL : Wash, DC	-	-		-		0.486	Dec 2019	-		0.486	Continuing	Continuing	-
SWAFS Magnetic Field Measuring System Analysis of Alternatives	PO	AFRL : Wash, DC	-	-		-		0.105	Dec 2019	-		0.105	Continuing	Continuing	-
Subtotal			-	-		-		0.772		-		0.772	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		0.000		0.772		-		0.772	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Air Force			Date: February 2019		
Appropriation/Budget Activity 3600 / 4		R-1 Program Element (Number/Name) PE 0604002F / Air Force Weather Services Research			Project (Number/Name) 643560 / AF Weather Services Research

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SWAFS-RadEx																												
SWAFS-RadEx Analysis of Alternatives																												
SWAFS-ECP HAS																												
SWAFS-ECP HAS Analysis of Alternatives																												
Magnetic Field Measuring																												
Magnetometer Analysis of Alternatives																												
Scintillation Nowcast																												
Forecast Model Update Analysis of Alternatives																												
Solar Wind																												
Solar Wind Model Analysis of Alternatives																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Air Force			Date: February 2019
Appropriation/Budget Activity 3600 / 4	R-1 Program Element (Number/Name) PE 0604002F / <i>Air Force Weather Services Research</i>	Project (Number/Name) 643560 / <i>AF Weather Services Research</i>	

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>SWAFS-RadEx</i>				
SWAFS-RadEx Analysis of Alternatives	1	2020	4	2021
<i>SWAFS-ECP HAS</i>				
SWAFS-ECP HAS Analysis of Alternatives	1	2020	4	2021
<i>Magnetic Field Measuring</i>				
Magnetometer Analysis of Alternatives	1	2020	4	2020
<i>Scintillation Nowcast</i>				
Forecast Model Update Analysis of Alternatives	1	2021	4	2021
<i>Solar Wind</i>				
Solar Wind Model Analysis of Alternatives	1	2022	4	2024