Fiscal Year:	FY 2022	**Task Last Updated:**	FY 06/21/2022
PI Name:	Galazka, Jonathan Ph.D.		
Project Title:	Responses of Microbes and Microbial Communities to Prolonged Exposure to Space Radiation		
Division Name:	Space Biology		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	(1) Microbiology		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	jonathan.m.galazka@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	605-604-3950
Organization Name:	NASA Ames Research Center		
PI Address 1:	Space Biosciences Research Division		
PI Address 2:	Bldg. N239, Rm. 265, MS239-11		
PI Web Page:			
City:	Moffett Field	**State:**	CA
Zip Code:	94035	**Congressional District:**	18
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2020 Space Biology NNH20ZDA001N-SB E.12. Flight/Ground Research
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No. of Bachelor's Candidates:		**Monitoring Center:**	NASA ARC
Contact Monitor:	Loftus, David	**Contact Phone:**	650-604-1011
Contact Email:	david.j.loftus@nasa.gov		
Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Barrick, Jeffrey Ph.D. (University of Texas, Austin)		
Grant/Contract No.:	Internal Project		
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Performance Goal Text:			

Task Description:	The built environment of spaceships is host to a microbial community that affects crew and craft alike. While the static composition of this community has been characterized, and its temporal dynamics examined, the mechanisms controlling its make-up and evolutionary trajectory are not understood. Systematic analyses of microbial diversity such as the "Earth Microbiome Project" and the "Human Microbiome Project" have shown consistent patterns in community composition and function. Understanding the ecological origins of these patterns remains a major challenge, as it requires connecting processes that occur at varying temporal and spatial scales. However, it is clear that the state and trajectories of microbial communities are in-part determined by their physical environments. In this regard, the spaceflight environment includes numerous interacting factors that differentiates it from Earth environments, including an altered atmospheric composition, reduced gravity (and thus altered fluid dynamics), and increased ionizing radiation. These factors impart selective pressures on microbial communities that effect their evolutionary trajectories and thus, the risks and benefits these communities represent to crew and craft. The radiation environment of space leads to chronic exposure to low doses (<0.1 Gy/hr) and is difficult to mimic on Earth. Thus, little is known about how microbial communities in spacecraft will respond and evolve. Therefore, given the limitations of existing studies, we propose to empirically determine how exposure to low doses of ionizing radiation for thousands of cell divisions affects rates of mutation accumulation in microbes and the trajectory of microbial evolution. In this way, we will provide a critical set of data for the design of safe and robust space missions.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2022.
Bibliography Type:	Description: (Last Updated:)