Fiscal Year:	FY 2014	**Task Last Updated:**	FY 12/02/2013
PI Name:	Mancinelli, Rocco Ph.D.		
Project Title:	Elucidating The Nitrogen Cycle of Eu:CROPIS (Euglena: Combined Regenerative Organic-food Production In Space)		
Division Name:	Space Biology		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	SPACE BIOLOGY--Cellular and molecular biology		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	(1) Cell & Molecular Biology (2) Microbiology		
Space Biology Cross-Element Discipline:	(1) Reproductive Biology		
Space Biology Special Category:	(1) Cell Culture (2) Translational (Countermeasure) Potential (3) Bioregenerative Life Support		
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Zip Code:	94035	**Congressional District:**	18
Comments:			
Project Type:	FLIGHT	**Solicitation:**	Space Biology Unsolicited
Start Date:	10/01/2013	**End Date:**	09/30/2017
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA ARC
Contact Monitor:	Smith, Jeffrey	**Contact Phone:**	650-604-0880
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Flight Program:	Small Satellites		
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Hauslage, Jens (DLR (German Aerospace Center))		
Grant/Contract No.:	Coop Agreement via NNX12AD05A		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Editor's Note (12/2/2013): Funding is for Dr. Mancinelli's participation as Co-Investigator on the German Aerospace Center (DLR)'s Eu:CROPIS (Euglena with Combined Regenerative Organic-food Production In Space) mission and the Principal Investigator of the nitrogen cycling portion of the mission, entitled "Elucidating The Nitrogen cycle of Eu:CROPIS (Euglena: Combined Regenerative Organic-food Production In Space)". The objective of the proposed study is to determine the effect of different gravity levels on the nitrogen cycle leveraging experiments to be flown on DLR's Eu:CROPIS mission. This is of importance to NASA because The National Research Council's Plant and Microbial Biology Decadal Survey (2011) states that there is a need for understanding the role of gravity on microbe-microbe interactions and microbe-plant interactions. The research proposed here will do just that. Nitrogen is an essential element for life. It is present in all living systems, occurring in several important molecules including proteins and nucleic acids. Without nitrogen life as we know it could not exits. Thus, the nitrogen cycle is important to supporting life whether it is on Earth, in space, or on other planets or moons. Because only Earth has a 1 x g environment understanding how the nitrogen cycle operates as a function of gravity is key to sustaining life off of Earth. To change the gravity levels the spacecraft will be maneuvered (by spinning) to produce three different gravity regimes during the courser of the mission. The three gravity regimes will be 0.01 x g - 0.1-x g (essentially microgravity); 0.16 x g (Moon gravity); and 0.38 x g (Mars gravity). Each gravity regime will last for six months. Eu:CROPIS will be used in reducing organic waste and in the development of efficient life support systems. Its core element is a microbiological trickling filter of lava rock –the habitat of a multitude of microorganisms that purify and decontaminate water. The development aims at a wet composting system that may be used in closed life support systems such as waste water recovery. A key component of the system is the nitrogen cycle. So, modeling the nitrogen cycle of the system is essential to understanding how the system functions. It will be the first time nitrogen-transformation reactions will be measured as a function of gravity. NASA has an excellent opportunity to participate in the DLR's Eu:CROPIS mission that allows us to obtain data by leveraging their laboratory work and hardware at a fraction of what it would cost if supported solely by NASA.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2014.
Bibliography Type:	Description: (Last Updated: 02/21/2020)