Fiscal Year:	FY 2020	**Task Last Updated:**	FY 12/05/2020
PI Name:	Clement, Gilles Ph.D.		
Project Title:	Functional Task Tests in Partial Gravity during Parabolic Flight		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HHC**:Human Health Countermeasures		
Human Research Program Risks:	(1) **Sensorimotor**:Risk of Altered Sensorimotor/Vestibular Function Impacting Critical Mission Tasks		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	gilles.r.clement@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	281-244-5720
Organization Name:	KBR/NASA Johnson Space Center		
PI Address 1:	Neurosciences Laboratory		
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PI Web Page:			
City:	Houston	**State:**	TX
Zip Code:	77058-3711	**Congressional District:**	36
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2019 HERO 80JSC019N0001-FLAGSHIP & OMNIBUS: Human Research Program Crew Health. Appendix A&B
Start Date:	08/01/2020	**End Date:**	12/31/2022
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 JSC
Contact Monitor:	Stenger, Michael	**Contact Phone:**	281-483-1311
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Flight Program:			
Flight Assignment:	NOTE: End date changed to 12/31/2022 per PI; original end date was 9/30/2021 (Ed., 5/3/21)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Reschke, Millard Ph.D. (NASA Johnson Space Center) Rosenberg, Marissa Ph.D. (NASA Johnson Space Center)		
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Critical mission tasks that are required by crews immediately after landing on a planetary surface are seat egress, jump, and walk. To be able to define an effective and comprehensive countermeasure strategy for preserving crew performance during exploration-class missions, there is a need to understand how these functional tasks are actually performed in partial gravity such as on the Moon or Mars. We propose to analyze the execution of 4 critical mission tasks (Seat Egress and Walk, Recovery from Fall and Stand, Jump Down, Tandem Walk) during the partial gravity and hypergravity phases of parabolic flight by using the same equipment and procedures than those previously used on astronauts returning from the International Space Station (ISS) missions and ground-based subjects during axial body unloading. Our hypothesis is that the limits of stability for these activities get larger when the gravity level is reduced. The largest decreases in performance are expected at the lowest gravity level (0.25 g) because subjects will no longer be able to use the gravitational reference for their perception of upright. Ultimately, this information could be used to assess performance risks and inform the design of countermeasures for NASA exploration-class human missions. Twelve subjects will be tested during 3 flights of 30 parabolas, including 10 parabolas at 0.25 g, 10 parabolas at 0.5 g, and 10 parabolas at 0.75 g. Performance metrics will include (a) the time for the subject to complete the test (Seat Egress and Walk, Recovery from Fall and Stand); (b) the time elapsed between the start of motion and the stabilization of upright posture (Recovery from Fall and Stand, Jump Down); (c) the mean sway speed during quiet standing (Recovery from Fall and Stand, Jump Down); (d) changes in heart rate and blood pressure (Recovery from Fall and Stand); (e) the percentage of correct steps and torso acceleration (Tandem Walk); and (f) the severity of motion sickness symptoms. The deliverables will include (a) a dose-response relationship between these performance metrics versus gravity levels between 0 and 1; and (b) a better understanding of the gravity-threshold effects on human vestibular and sensorimotor sensitivity and function.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2020.
Bibliography Type:	Description: (Last Updated: 06/20/2023)