

Fiscal Year:	FY 2022	Task Last Updated:	FY 11/21/2022
PI Name:	Olson, Sandra Ph.D.		
Project Title:	Fundamental Research on International Standard of Fire Safety in Space - Subteam 1: Study of Flammability of Fabric Materials		
Division Name:	Physical Sciences		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	COMBUSTION SCIENCE--Combustion science		
Joint Agency Name:		TechPort:	No
Human Research Program Elements:	None		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Organization Type:	NASA CENTER	Phone:	216-433-2859
Organization Name:	NASA Glenn Research Center		
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City:	Cleveland	State:	OH
Zip Code:	44135	Congressional District:	9
Comments:			
Project Type:	FLIGHT,GROUND	Solicitation / Funding Source:	2012 Japanese Space Agency (JAXA) AO for Fundamental Research on an International Standard of Fire Safety in Space
Start Date:	07/01/2014	End Date:	03/31/2024
No. of Post Docs:	0	No. of PhD Degrees:	0
No. of PhD Candidates:	0	No. of Master' Degrees:	0
No. of Master's Candidates:	0	No. of Bachelor's Degrees:	0
No. of Bachelor's Candidates:	0	Monitoring Center:	NASA GRC
Contact Monitor:	Urban, David	Contact Phone:	216-433-2835
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Flight Program:	ISS		
Flight Assignment:	NOTE: End date changed to 3/31/2024 per PI (Ed., 10/29/21) NOTE: End date changed to 7/31/2022 per PI (Ed., 10/5/20) NOTE: Changed end date to 3/31/2021 per PI (Ed., 6/3/19)		
Key Personnel Changes/Previous PI:	Dr. Sandra Olson is U.S. Co-Investigator on Japan Aerospace Exploration Agency (JAXA)-sponsored project, "Flammability Limits At Reduced-g Experiment (FLARE)." JAXA Principal Investigator (PI) is Prof. Osamu Fujita, Hokkaido University.		
COI Name (Institution):			
Grant/Contract No.:	Internal Project		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	<p>The objective of the project is to develop a methodology to correlate material flammability limits in normal gravity and microgravity, which allows quantitative estimation of material flammability limit in microgravity based on the flammability data obtained on the ground. The project involves an international team including Japan Aerospace Exploration Agency (JAXA), NASA, ESA (European Space Agency), and universities in Japan, USA, and France. Dr. Olson is a U.S. Co-Investigator for the JAXA sponsored experiments to be conducted aboard the Japanese Experiment Module, Kibo.</p> <p>To establish global standards for fire safety in space, we seek to develop a fundamental understanding of how NASA's material flammability test, NASA-STD-6001.A Test 1, relates to the actual flammability of materials in micro and partial gravity.</p> <p>The investigation strategy is to perform extensive research via ground-based experiments, including 1g and parabolic flight tests, and via theoretical formulations. Flight experiments on orbit in International Space Station (ISS)/KIBO will be performed to verify the correlation. The flight experiments on orbit are expected in 2018 or later.</p> <p>By the end of the project, a new fire safety standard test method for screening spacecraft materials will be proposed that addresses the shortcomings of existing standard test methods such as NASA-STD-6001B.</p>
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	<p>Studying materials flammability in space allows us to accurately control the flow field and thus elucidate the importance of a critical Damkohler number (flow time /reaction time) on flame extinction. The anticipated improved methodology should reduce time and cost for the spacecraft material screening. Investigation and results have Earth benefits for terrestrial fire safety.</p>
Task Progress:	<p>Due to a central processing unit (CPU) failure, the hardware was stowed in 2021. A replacement CPU board and hard drive were launched in February 2022 and the hardware was reinstalled in the Multi-purpose Small Payload Rack (MSPR) in the Kibo module of the International Space Station (ISS). Experiments were started in May 2022. Experiments continued until October 2022 when the hardware was removed from the MSPR rack for a brief hiatus while another experiment was installed in the rack. Experiments are expected to resume in March 2023. Experiment 1-2 was conducted during the 2022 operations. I am receiving the data from the Japan Aerospace Exploration Agency (JAXA) for analysis in collaboration with the JAXA Principal Investigator, Hirosaki Torikai. I am also working on a manuscript of our parabolic aircraft test campaign collaboration. My experiment is 1-3 and will operate from June through August, 2023.</p> <p>The 2022 annual international Flammability Limits At Reduced-g Experiment (FLARE) workshop, originally planned to be held in Tsukuba, Japan, was held virtually again this year, from Sept. 6-8, 2022, due to the coronavirus pandemic. Participants were asked to record their talks to be viewed in advance of the scheduled workshop so that discussion during the workshop could focus on international collaboration efforts and discussion of the talks. The next workshop is scheduled for Sept. 2023 in Tsukuba, Japan.</p>
Bibliography Type:	Description: (Last Updated: 04/17/2024)
Abstracts for Journals and Proceedings	<p>Olson S. "Analysis of cheesecloth parabolic aircraft and drop tower tests to aid in planning on-orbit operations timing." Flammability Limits At Reduced-g Experiment (FLARE) Workshop, Virtual, September 6-8, 2022. Sponsored by Japan Aerospace Exploration Agency (JAXA).</p> <p>Abstracts. Flammability Limits At Reduced-g Experiment (FLARE) Workshop, Virtual, September 6-8, 2022. Sponsored by Japan Aerospace Exploration Agency (JAXA). , Sep-2022</p>