Fiscal Year:	FY 2020	Task Last Updated:	FY 10/05/2020
PI Name:	Olson, Sandra Ph.D.		
Project Title:	Fundamental Research on International Standard of Materials	Fire Safety in Space - Subteam 1: S	tudy of Flammability of Fabric
Division Name:	Physical Sciences		
Program/Discipline:			
Program/Discipline Element/Subdiscipline:	COMBUSTION SCIENCECombustion 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		
PI Email:	Sandra.Olson@nasa.gov	Fax:	FY 216 977-7065
PI Organization Type:	NASA CENTER	Phone:	216-433-2859
Organization Name:	NASA Glenn Research Center		
PI Address 1:	LTX, Combustion Physics and Reacting Systems B	ranch	
PI Address 2:	MS 77-5, 21000 Brookpark Rd.		
PI Web Page:			
City:	Cleveland	State:	ОН
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:	07/31/2022
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
Contact Email:	david.l.urban@nasa.gov		
Flight Program:	ISS		
Flight Assignment:	NOTE: End date changed to 7/31/2022 per PI (Ed., NOTE: Changed end date to 3/31/2021 per PI (Ed.,	10/5/20) 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:	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. 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. 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. 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 method such as NASA STD 6001B.	
Rationale for HRP Directed Research		
Research Impact/Earth Benefits:	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.	
Task Progress:	The 2020 annual International Flammability Limits At Reduced-g Experiment (FLARE) workshop, originally planned to be held in Tsukuba, Japan, was held virtually this year 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 annual group picture was a montage of screen images of participants on the WebEx. At the FLARE workshop, it was announced that the setup of the hardware on ISS will occur in NovDec. 2020, with experiment operations starting as early as Dec. 2020. JAXA astronaut Soichi Noguchi, who is launching on Space-X Crew-1, will be doing the setup and initial checkout tests later this year. Additional microgravity drop tower tests at low pressure were performed prior to the mandatory telework situation to add to the results from last year's low-gravity aircraft parabolic trajectory tests and atmospheric microgravity drop tower experiments. The goal of these tests is to determine blowoff extinction limits for thin sheets of bleached grade#90 cheesecloth as a function of oxygen concentration flow velocity, and now pressure. To avoid confusion with ignition limits, the flames were ignited under a flammable condition, and the conditions were changed (flow, oxygen) to determine if the flame would blow off. These blowoff boundaries will help in the selection of the flight experiment conditions.	
Bibliography Type:	Description: (Last Updated: 04/17/2024)	
Abstracts for Journals and Proceedings	Olson SL. "Radiative Exchange during Concurrent Flame Spread Over Three Parallel Thin Fuel Sheets in Microgravity." 7th FLARE Workshop, virtual webex, September 2020. JAXA 7th FLARE Workshop, virtual Webex, September 2020. , Sep-2020	