

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Life and Microgravity Sciences on board ISS and beyond (Part I) (6)

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FLUID SCIENCE MISSIONS ONBOARD COLUMBUS

Abstract

Fluid Science Lab-ON is the expression for the successful continuation of fluidic experiments onboard Columbus, covering the instruments Soft Matter Dynamics (SMD) with Experiments CompGran (DLR) and FOAM-C (ESA) and the instrument Reference mUlti Boiling Investigation (ESA). SMD-CompGran will be installed and executed by Alexander Gerst in the frame of ESA ISS Mission "Horizons". CompGran contributes to basic research of physical behavior of granulates and micro granulates. The understanding of granular behavior will contribute many industrial applications, such as filter technologies.

FSL-ON was proposed by industry in June 2016, as a first step towards complete industrialization of Columbus, comprising of 2 major scopes: First to support GEOFLOW 2/C Mission, using first time Multi-Purpose Computer and Communication (MPCC) as IP-gateway for scientific data downlink. This was achieved between Nov 2016 and Feb 2017. Second scope is to support SMD and RUBI Missions, scheduled for 2018 and 2019.

Both Mission are supported by new approaches:

- Technical: FSL is de-complexed to ensure successful SMD and RUBI Missions. A new Video Management Unit (VMU Mk II) offers more flexibility within Mission execution Phases by providing commercial Interfaces to the Containers plus enlarged storage Volumes. All new Hardware items have been developed using Concurrent Engineering principles, enabling intensive Test campaigns at the Belgian User Support and Operations Center (B.USOC) in Brussels. The Tests have been organized in a way to have most representative conditions, using SMD Flight Model, VMU Mk II Flight Model, all outfitting elements Flight Models and FSL Flight Model spare parts. FSL-ON Missions also comprise corrective means and spare parts to counteract potential System anomalies.
- Organizational: The integrated FSL-ON industrial Team is composed by SMD- and RUBI engineering, VMU Mk II engineering, FSL engineering and Columbus System engineering teams. The industrial Teams are significantly supported by B.USOC Team in Brussels, the capital of FSL-ON operations. Cooperation between the Teams is on an intensive and frequent basis; each instrument foresees 5 Development-, 1 Verification- and 3 Mission Tests, including Engineering Sequence Tests. Early testing, fast-response feedback and high-fidelity integrated Tests are the key factors to the successful Development and Integration of SMD, RUBI and VMU Mk II into FSL-ON System.

Within FSL-ON, industry will act as integral shareholder to Science Mission. FSL-ON stands for an all-new setup between industrial teams and agency, paving the way to commercialization of scientific Payloads development, Integration and operation.