IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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MUSA SUBORBITAL FLIGHT: A MICROGRAVITY EXPERIMENT ON BOARD OF THE SUBORBITAL EXPRESS 3 OF THE SWEDISH SPACE CORPORATION TO VALIDATE THE CRITICAL SYSTEMS FOR A DUAL CULTURE IN SPACE OF TRICHODERMA HARZIANUM AND THE PANAMA DISEASE FUNGUS

Abstract

This paper describes the design, implementation, prototypes, results, and next steps for project MUSA Suborbital Flight, a 1U suborbital payload flown onboard the Swedish Space Corporation Suborbital Express 3 from Esrange Space Center, Kiruna, Sweden. The suborbital flight of project MUSA seeks to assess and validate the criticality of engineering systems and biological procedures for a dual culture in space of Trichoderma Harzianum fungus and Trochoderma Harzianum f. sp. cubense tropical race 1 thePanama Disease fungus. This fungus produces banana wilt in plantations around the world, currently this disease has multiple countries in phytosanitary alert and no effective treatment has been found to date. This suborbital flight is being used as a stepping stone for the next phase of the project, where critical design choices were tested during the flight and design lessons will be applied iteratively to the next stage of the mission. The critical systems validated include electronic, software, mechanical, biological systems, and operational procedures. We present the results of all the engineering systems as well as biological results from the experiment. The work and validation from this flight will be used to prepare the project for its next launch to the ISS in 2024.