

THE FIRST YEAR OPERATION AND INITIAL SAMPLE ANALYSIS AND CURATION REHEARSALS OF THE TANPOPO ASTROBIOLOGY EXPERIMENTS

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Launched in April, 2015, the "TANPOPO" mission has beocme the first astrobiology space experiment of Japan. It aims to test various aspects of the "quasi-panspermia" hypothesis for exogenesis origin of life precursors and their interplanetary transport [1]. In May and November 2015, the first year samples were installed on two sets of the "ExHAM" pallet on the handrail of the ISS-Japan Experiment Module (JEM) Exposed Facility (EF) in the duration of 1-4 years. The TANPOPO experiment consists of following six sub-themes: 1) capture of microbes in space, 2) exposure of microbes in space, 3) exposure of organic compounds in space, 4) capture of organic compounds in micrometeoroids in space, 5) evaluation of ultra low-density aerogel developed for the Tanpopo mission, and 6) capture of space debris at the ISS orbit.

In 2015-2019, the TANPOPO employs blocks of the the least dense aerogels among past space missions as 0.01 g/cc [2] on the Capture Panels (CP) that will be exposed and retrieved to capture impacting solid microparticles such as organic-bearing micrometeoroids and possible terrestrial particles in the low Earth orbit. By analyzing captured micrometeoroids in the CPs, one can learn what kinds of extra-terrestrial organic compounds inside micrometeoroids to be transported from parent bodies and how they may be altered in outer space. Also by evaluating retrieved samples of exposed terrestrial microbes and astronomical organic analogs on the exposure panels, one can investigate their survivals and alterations in the duration of interplanetary transport.

If microparticles of terrestrial origin are ever impacted into the CPs, one can prove that terrestrial microbes (e.g., aerosols embedding microbial colonies) may be present, even temporarily and in "freeze dry" form in the low earth orbit altitudes.

The TANPOPO-Initial Sample Analysis and Curation (ISAC) has been in its rehearsal since January 2016 and will be conducted by its Preliminary Examination Team (PET) as soon as the first samples will be returned to the Earth after summer of 2016.

The ISAC plan for CPs covers the receipt of retrieved samples, their initial inspection and documentation, processing and distribution of the samples for detailed analyses of each sub-theme, cataloging for data archiving and sample storage. For initial inspection and documentation, they will map and measure aerogel penetration tracks and captured particles (e.g., incoming angle, track depth and track volume) by the original keystone machine at ISAS clean room. Then they will process keystones containing microparticles to be inspected further and their penetration tracks for allocation to respective sub-theme researchers, in accordance with their requests for the subsequent detailed analyses within the first 100 days after the Earth sample return [3].

References: [1] Yamagishi A. et al. 2009. *Trans. JSASS Space Tech. Jpn.* 7: Tk 49-Tk 55. [2] Tabata M. et al. 2011. *Biol. Sci. Space.* 25: 7-12. [3] Yokobori S. et al. 2009. *Life Evol. Biosph.* 39: 377-378.

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