



3 EXPOSE Missions - overview and lessons learned A. Aman (1,2), B. Bman (2) and C. Cman (1) OR A.

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Abstract

The International Space Station ISS provides a variety of external research platforms for experiments aiming at the utilization of space parameters like vacuum, temperature oscillation and in particular extraterrestrial short wavelength UV and ionizing radiation which cannot be simulated accurately in the laboratory. Three Missions, two past and one upcoming, will be presented.

A family of astrobiological experimental ESA facilities called “EXPOSE” were and will be accommodated on these outside exposure platforms: on one of the external balconies of the European Columbus Module (EXPOSE-E) and on the URM-D platform on the Russian Zvezda Module (EXPOSE-R and EXPOSE-R2). Exobiological and radiation experiments, exposing chemical, biological and dosimetric samples to the harsh space environment are - and will be - accommodated on these facilities to increase our knowledge on the origin, evolution and distribution of life, on Earth and possibly beyond. The biological experiments investigate resistance and adaptation of organisms like bacteria, Archaea, fungi, lichens, plant seeds and small animals like mosquito larvae to extreme environmental conditions and underlying mechanisms like DNA repair. The organic chemical experiments analyse chemical reactions triggered by the extraterrestrial environment, especially short wavelength UV radiation, to better understand prebiotic chemistry. The facility is optimized to allow exposure of biological specimen and material samples under a variety of conditions, using optical filter systems. Environmental parameters like temperature and radiation are regularly recorded and down linked by telemetry.

Two long term missions named according to their facility - EXPOSE-E and EXPOSE-R – are completed and a third mission is planned and currently prepared. Operations of all three missions including sample accommodation are performed by DLR. An overview of the two completed missions will be given including lessons learned as well as an outlook and short introduction to the next mission, EXPOSE-R2

