

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Life Support and EVA Systems (6)

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ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS FOR HUMAN EXPLORATION  
MISSIONS TO NEAR EARTH OBJECTS AND BEYOND**Abstract**

Before flying to Mars, which is the ultimate destination for human exploration, upcoming manned spaceflights will most likely head to near-Earth asteroids or comets. As such missions last for many months and resupply of consumables is hardly possible, it is crucial to have a reliable closed loop Environmental Control and Life Support System (ECLSS). To plan future missions to near-Earth objects, estimates on system parameters like mass, volume and power consumption are necessary. To get an overview of these parameters, the software tool “Environment for Life Support Systems Simulation and Analysis” (Elissa) was developed at the Institute of Space Systems at the University of Stuttgart. However the subsystems implemented in Elissa are designed for a specific crew size, which makes it difficult to change this parameter. One major objective is to investigate how those subsystems scale with crew size, regarding their mass, volume and power consumption. The results are modeled and implemented into Elissa by using the software tool LabView®. This advanced version of Elissa is now used to simulate various modular designed ECLSS for exploration missions lasting up to one year. The influence of varying mission duration on the system’s configuration and parameters is being investigated. The results of these investigations are used to design an ECLSS for a specific mission to a near-Earth asteroid. Beside estimations on system parameters like mass, volume and power consumption, it is now possible to better adjust subsystems of an ECLSS to specific mission parameters like crew size and mission duration. Elissa is now more adequate to be used for an ECLSS assessment in future mission analyses.