SPACE SYSTEMS SYMPOSIUM (D1)
Innovative and Visionary Space Systems Concepts (1)

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THE SPACE WEATHER OBSERVATION NETWORK (SWON) CONCEPT – INAUGURATION OF THE DLR ADVANCED STUDY GROUP

Abstract

The DLR Advanced Study Group (ASG) is a team of engineers and scientists that investigates visionary or unusual aerospace concepts regarding their feasibility and applicability to scientific problems, in an attempt to erase the "fiction" from the "science fiction" of scientifically valid ideas and make them rigorous science. To achieve this, the ASG uses established processes and new approaches for concept analysis, like so called Concurrent Evaluation sessions. One of the first ideas investigated as a testcase for this kind of evaluation is the Space Weather Observation Network (SWON). The peculiarity of space weather for Earth orbiting satellites, air traffic and power grids on Earth and especially the financial and operational risks posed by damage due to space weather, underline the necessity of space weather observation. In recognition of the importance of such observations, even more prominent due to the impending solar maximum, we propose a mission architecture for solar observation as an alternative to more conventional mission plans, like Solar Probe (NASA) or Solar Orbiter (ESA). Based upon the first Concurrent Evaluation session of the ASG in the Concurrent Engineering Facility of the German Aerospace Center, we suggest using several spacecraft in an observation network. Instead of placing such spacecraft in a solar orbit, we propose landing on several asteroids, which are in opposition to Earth during the course of the mission and thus allow observation of the Sun's far side. This is especially advantageous due to a significant improvement (about two weeks) in the warning time with regard to solar events. Landing on Inner Earth Object (IEO) asteroids for observation of the Sun has several benefits over traditional mission architectures. Exploiting shadowing effects of the asteroids reduces thermal stress on the spacecraft, while it is possible to approach the Sun closer than with an orbiter. The closeness to the Sun improves observation quality and solar power generation, which is intended to be achieved with a solar dynamic system. Furthermore landers can execute experiments and measurements with regard to asteroid science, further increasing the scientific output of such a mission. Placing the spacecraft in a network would also benefit the communication contact times of the network and Earth. Concluding we present a first draft of a spacecraft layout, mission objectives and requirements as well as an initial mission analysis calculation as the results of a one day inauguration session of the ASG.