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Author: Dr. Klaus Slenzka
OHB System AG-Bremen, Germany, klaus.slenzka@ohb.de

Mrs. Sandra Podhajsky
OHB System AG-Bremen, Germany, sandra.podhajsky@ohb.de

BIOSAT - A COMMERCIAL ORBITAL LIFE SCIENCE EXPERIMENT PLATFORM

Abstract

Earth orbit is a perfect environment to conduct research without the influence of gravity. BioSat is envisioned as a commercial orbital research platform for the fields of biology, medicine, pharmaceutics and life science. Experiments in biology, medicine, pharmaceutics and life science are usually conducted in comparably short timescales mostly in the order of hours, days or weeks and sometimes month. The concept of BioSat is based on nano- and microsatellite strategies to provide affordable access to earth orbit for short-term experiments that exceed the microgravity timescales of sounding rockets. The BioSat platform consists of dedicated experiment compartments that provide life support and a controlled environment. To accommodate a broad spectrum of experiments the compartments are designed to be modular. BioSat experiment compartments can also be modified for ground experiments in order to conduct parallel studies, e.g. in areas of biology, biotechnology, medicine and pharmaceutics as well as other life science topics. Conceivable options for BioSat design include a physical platform of one single satellite accommodating all experiments and a virtual platform consisting of a satellite network composed of free flying nanosatellites accommodating the individual experiments. The physical platform presents as well-proven approach in the tradition of recognized research satellites like e.g. Bion. All experiments share space and resources in a standardized payload suite. Each experiment is allocated to an individual secluded compartment. The experiments make use of a common standardized infrastructure. The virtual platform presents an unconventional approach inspired by swarm technology. The virtual platform consists of a nanosatellite network. The experiments are accommodated in individual nanosatellites connected by intersatellite datalinks to a node satellite for maximum ground communication time. Once an experiment as ended the nanosatellite is decommissioned and a new experiment nanosatellite is inserted into the network. As both approaches have advantages and disadvantages are trade-off study is conducted and the results are discussed and present as well as necessary development steps.