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Vortragstitel EnMAP Satellite Bus On-Board Operations Concept - Facilitating Daily Operational Tasks by Applying a One-Telecommand Philosophy

Autoren K. Aßmann, M. Kassebom, P. Froehner, H. Bothmer, A. Hoffmann, K. Lenfert

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Abstract

The Environmental Mapping and Analysis Program (EnMAP) is a joint German initiative under the scientific leadership of the GeoForschungsZentrum (GFZ) Potsdam. In the EnMAP project OHB-System is responsible for the satellite bus, where the company Kayser-Threde, is the industrial prime contractor for the EnMAP space segment, and is responsible for the Hyper Spectral Imaging Payload. The EnMAP project is carried out under contract to the German Space Agency DLR with funds of the German Federal Ministry of Economic Affairs and Technology under grant No. 50 EP 0801. The EnMAP satellite will be operational in 2014 with a mission duration of 5 years.

EnMAP provides high quality hyperspectral Earth observation data on a frequent basis. The EnMAP information is based on about 230 spectral bands in the wavelength range from 420 nm to 2450 nm at a ground sampling distance of 30 m x 30 m and with an imaging capacity of 5000 km per day.

The design of the EnMAP satellite bus is now close to its finalization at the end of Phase C approaching a system CDR in the end of this year. This paper shortly summarizes the basics of the current design. Subsequently the advanced on-board operational concept of the EnMAP satellite bus is presented in detail. Hereby an emphasis is laid on the applied one-telecommand-philosophy for the most common daily operational tasks: Image acquisitions, payload data download and payload data deletion.

The EnMAP satellite bus' operational concept includes an autonomous on-board handling of these operational tasks. For an image acquisition several subsystems have to be activated, controlled and coordinated simultaneously. Using one telecommand for each subsystem, or even for each operation within the different subsystems, would lead to a great amount of telecommands. The EnMAP satellite bus requires only one telecommand per commanded sequence, including image acquisitions, payload data download and deletion. This is named the one-telecommand-philosophy. In Addition the payload data is autonomously compressed onboard, and, depending on the downlink duration, a matching amount of data is transmitted to the ground station, having sent only one telecommand.

This advanced on-board operational concept results in a very low effort for on ground modeling of on-board resources and mission planning for nominal operations. Especially for missions requiring only one individual satellite this is an

advantage, and also for target and event observation scenarios, in which no permanent nadir pointing is performed. Due to this, the EnMAP satellite bus turns out to be a very suitable and cost effective platform for small earth observation satellites.