

EARTH OBSERVATION SYMPOSIUM (B1)
Future Earth Observation Systems (2)

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SYSTEM DESIGN CHALLENGES USING P-BAND SAR OBSERVATIONS FROM LOW EARTH
ORBIT FOR THE BIOMASS MISSION

Abstract

This paper presents the current mission and system design for the ESA Biomass Earth Explorer 7 mission by the OHB consortium. Biomass is a P-band radar mission with a large deployable reflector in low Earth orbit. The paper focuses on the current Phase-B1 system concept for the Biomass mission addressing system design and operational scenarios and presents some of the challenging aspects of the mission related to using a large unfurlable mesh reflector in the low Earth orbit. Another aspect presented is the evolution of the system concept from the early stages to Phase-B1. Furthermore, the various ITU and radio frequency interference constraints at P-band will be discussed.

Biomass will be the first mission using P-band SAR in space as well as the first mission using a large deployable reflector with a projected aperture of more than 10m in low Earth orbit (LEO). The radar will be operated in full polarimetric mode and repeat-pass interferometry is required to obtain the desired data product.

The aim of the mission is the first accurate mapping of the Earth's tropical, temperate and boreal forest biomass, including height and disturbance patterns, as well as the assessment of the changes in the biomass over the mission lifetime. This information will improve the knowledge of the size and distribution of the terrestrial carbon stock and fluxes, and is important to improve the accuracy of carbon cycle models for climate simulations. While forests are the primary interest of the mission, the system can also serve a

number of secondary science goals. Among them is a depth survey of glacial and desert regions, enabled by the low frequency used for this radar.

For the selection of ESA's Earth Explorer 7 Core mission, Phase-0 and Phase-A Studies have been performed by two different industrial consortia to investigate the feasibility of the different candidate mission concepts. In the beginning of 2013, a User Consultation Meeting recommended Biomass over two other candidate missions for the Earth Explorer 7 mission. It was then selected by ESA later that year.

This paper shows how the OHB consortium plans to overcome the challenges posed by this unique mission scenario. Specific aspects of the system and mission evolution are presented.