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

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TANDEM-L: DESIGN CHALLENGES FOR A LEO SATELLITE WITH A LARGE DEPLOYABLE REFLECTOR

Abstract

This paper will present an overview of the OHB satellite design for the planned bistatic L-band radar mission Tandem-L. In particular, the challenges in the satellite design will be addressed and solutions presented.
In 2012, the German space agency DLR and the Japanese space agency JAXA agreed on their close cooperation in the definition of the Tandem-L mission. Tandem-L is anticipated to be a highly innovative L-band SAR mission for the global observation of dynamic processes on the Earth's surface. Its mission objectives include:

- global measurement of 3-D forest structure and biomass for a better understanding of ecosystem dynamics and the carbon cycle
- systematic recording of deformations of the Earth's surface with millimeter accuracy for earthquake research and risk analysis
- quantification of glacier movements and melting processes in the polar regions for improved predictions of sea level rise
- high resolution measurement of variations in soil moisture close to the surface for advanced water cycle research
- systematic observation of coastal zones and sea ice for environmental monitoring and ship routing
- monitoring of agricultural fields for crop and rice yield forecasts
- emergency observations for disaster mitigation, recovery and prevention

The Tandem-L space segment will consist of two radar satellites in low Earth orbit, which will be operated in two alternating mission phases that involve flying either in close formation or in constellation. Both satellites will implement an L-band (23.6 cm wavelength) synthetic aperture radar (SAR) instrument enabling bistatic radar measurements leading to polarimetric, single-pass interferometric and tomographic data products. For the implementation of the SAR instrument, a large deployable reflector will be

embarked, which will be complemented by high fidelity radar electronics and feed array, consequently enabling innovative techniques such as scan-on-receive (SCORE) and staggered SAR.
In 2014, two parallel phase A studies were initiated to investigate the feasibility of the satellite design. This paper will present the results of this study, focusing on the design challenges on both platform and satellite level, which will mostly deal with meeting the stringent performance requirements under the influence of a large deployable reflector.