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Space-Based Synthetic Aperture Radar (SAR) Imaging for Climate Research and Environmental Monitoring

Tuesday 31 May 2022 14:00 (45 minutes)

Space-based Synthetic Aperture Radar (SAR) has been widely used for Earth remote sensing for more than 40 years. SAR is unique in its imaging capability: It provides high-resolution imaging independent from daylight, cloud cover and weather conditions for a multitude of applications ranging from geoscience and climate change research, environmental and Earth system monitoring, 2D and 3D mapping, change detection, 4D mapping (space and time), security-related applications up to planetary exploration. Therefore, it is predestined to monitor dynamic processes on the Earth's surface in a reliable, continuous and global way. SAR systems have a side-looking imaging geometry and are based on a pulsed radar installed on a moving platform. By means of a coherent processing of the received echo signal, a long synthetic aperture can be formed, which corresponds to a synthetic antenna length of a few hundred meters and even several kilometers in the airborne and spaceborne case, respectively. Since the length of the synthetic aperture increases with the platform height, the spatial resolution becomes independent on the distance to the target, making SAR a unique technique for space-based SAR Earth observation.
This talk first describes the principles of SAR imaging along with various application examples. Next, advanced techniques for SAR imaging like interferometry, polarimetry, tomography and holography are presented. In combination with the latest digital beamforming imaging techniques, a highly innovative spaceborne SAR mission, called Tandem-L, has been proposed for global observation of dynamic processes on the Earth's surface with hitherto unprecedented quality and resolution. The talk concludes with an outlook on the future of space-based SAR imaging.

I want to give an oral presentation.

I want to present a poster.

Presenter: Prof. MOREIRA, Alberto (German Aerospace Center (DLR), Karlsruhe Institute of Technology (KIT))

Session Classification: Keynote I