Generation of Rapid Civil Alerts by a Satellite On-Board SAR Processing Chain

Stefan Wiehle, Dominik Günzel, Björn Tings, Helko Breit, Srikanth Mandapati, Ulrich Balss*

German Aerospace Center (DLR), SAR Signal Processing

**Email: Stefan.Wiehle@dlr.de*

The concept and prototype implementation of a satellite on-board SAR processing chain designed for Maritime Situation Awareness is described. It aims to reduce the latency between data acquisition and product delivery to about 3-4 minutes. SAR processing is one component of a larger prototype system being developed in the frame of the H2020 EO-ALERT project. It further comprises an optical data chain, data compression/encryption, and delivery. The system employs multiple boards with Multi-Processor-System-On-Chip (MPSoC) combining FPGAs and ARM CPUs. Low latency data processing was a key development goal, hence, a tailored workflow and adapted L1 and L2 processing algorithms ensure that the requirements for latency and product quality are met. The SAR processor is designed to generate SAR imagery from TerraSAR-X stripmap data for subsequent ship detection and sea state determination. The achieved overall L1 and L2 processing times were 60 s for ship detection and 105 s for sea state determination on a 1125 km² SAR image. These results enable further work towards a new generation of Earth Observation satellites with similar processing capabilities on-board, providing users with products only a few minutes after acquisition.