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A NEW ERA IN X-BAND SAR – IMPROVED QUALITY FOR INCREASING USER
REQUIREMENTS: TERRASAR-X NEXT GENERATION**Abstract**

The geo-information community currently witnesses an evolution of the remote sensing applications and user requirements, in order to face the socio-economic challenges of the 21st century. Increasing information requirements challenge space systems' capabilities and implicitly require synergies between optical and multi-frequency radar imagery. Operational monitoring of the terrestrial and maritime environment, in a multi-mission and integrated data streaming approach, supported by intelligent planning tools become of great importance. In addition, manifold applications that provide valuable socio-economic benefits require higher resolution and coverage capability than the market offers today. The proposed bandwidth extension to be allocated to the Earth Exploration Satellite Service (EESS) by the International Telecommunications Union at the World Radiocommunication Conference in 2015 (WRC-15) technically enables this cornerstone for spaceborne X-Band SAR.

Launched in 2007, the TerraSAR-X mission provides X-Band data and services on an operational basis. Recent improvements and evolutions of the program comprise the introduction of new SAR imaging modes and the upcoming constellation with the Spanish PAZ satellite. The TerraSAR-X Next Generation mission, being implemented as a commercial and civil program, constitutes the next step in the German X-Band SAR roadmap and is designed to guarantee the TerraSAR-X data and service continuity for commercial and public end-users well beyond the year 2025. Designed for an operational system lifetime of at least 9 years, the TerraSAR-X Next Generation mission will bring improved system capabilities compared to the current mission. It aims at addressing user needs by adding a very high resolution capability, with ground resolution up to 0.25 m, and large area maritime surveillance with specific maritime modes.

The paper aims at presenting the rationales driving the need for an integrated multi-mission data stream for C- and X-Band data and an increase of the resolution in X-Band radar. The paper will, in addition, present the objectives and the characteristics of the TerraSAR-X Next Generation program and especially describe the last achievements undertaken for this mission, unique from a technological and commercial point of view. Furthermore, the analysis will provide an insight in the valuable contribution of the involvement of the private sector in the current economic context.