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Paper Title:	Compact SAR and Micro Satellite solutions for Earth Observation
Abstract:	<p>Thales Alenia Space Italia is a driving actor in the design and development of Small and Micro-Satellites solutions and technologies for Earth Observation, since the requirements for near and short term mission applications (Observation and Reconnaissance, SIGINT, Early Warning, Meteorology,..) will leverage on system and spacecraft operational responsiveness, flexibility in configuration, lower cost constellations and formations, to improve both the revisit/response time of observation systems and the remote sensing techniques (distributed sensors, arrays, cooperative sensors).</p> <p>A first driving trend is coming from the emerging need for lightweight and high performance SAR satellites, for civil and dual-use applications. In this context, Thales Alenia Space started the Compact SAR project to develop an X-band SAR small satellite, characterized by low cost and reduced mass while providing, at the same time, high image quality in terms of resolution, swath size, and radiometric performance.</p> <p>COMPACT-SAR is a satellite embarking an X-band SAR based on a new technology for the Antenna Subsystem. It consists of an innovative deployable reflector antenna fed by an active phased array feed, capable of limited electronic beam steering, in both azimuth and elevation planes, to improve the operational performance offered by a typical mechanical steered SAR system on small platforms. Thanks to this design, the instrument can be operated in both STRIPMAP and SPOTLIGHT modes. Due to the very high gain provided by the large reflector, the system can also provide a real maritime surveillance mode based on a TAS patented Low PRF radar operation mode.</p> <p>Compact SAR will provide high flexibility and configurability to answer different users' needs: it is designed to operate in LEO with a reference orbit altitude in the range of 500 – 700 km, in both Dawn-dusk Sun-synchronous orbits (global scale access observation) and inclined non Sun-Synchronous orbits (regional access or specific areas of interest). SAR instrument design is the result of a multi-year experience in developing spaceborne SAR, which have been proven with in flight high quality images since 2007 : very high resolution, wide areas and wide access region, simultaneous dual polarization, advanced internal calibration.</p> <p>Furthermore several promising applications can be accomplished by use of Micro Satellite for Observation Missions aimed to Space and Ground surveillance. A short highlight of most promising mission concepts will be provided, such as passive SAR for bi/multi-static imaging and tandem missions, Space Debris detection and monitoring in LEO, Maritime Surveillance, Atmosphere sensing.</p>