Paper ID: 85224
oral

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

Author: Dr. Luca Soli
Thales Alenia Space Italia, Italy

Dr. Vanessa Mastroddi
Thales Alenia Space Italia (TAS-I), Italy
Mrs. Alice Nervo
Thales Alenia Space Italia (TAS-I), Italy
Dr. Annamaria Nassisi
Thales Alenia Space Italia, Italy
Dr. Carlo Ciancarelli
Thales Alenia Space Italia, Italy

SAR SMALLSAT CONSTELLATION: SYSTEM TRADE OFF ACROSS MULTIPLE INCLINATIONS

Abstract

The Space sector is experiencing unprecedented transformation and developments in different countries around the world, as major technological advances push the industry into a new global innovation stage. Specifically, Earth Observation Small Satellite constellations are driving market demands towards Earth Observation information that is closer to the final user's needs, improving upon the traditional images and services model. The added-value services provided by the small satellites constellations are aimed at quickly acquire information in response to sudden crisis occurrence on various geographical scales (such as earthquakes, floods, morphological instability, devastation due to multiple factors, wildfires etc..) and for other commercial applications. Small-micro satellites constellations can provide higher revisit sensing rates than the large satellite system, thanks to the potential for a higher number of satellites easily deployed in constellation with the multi launch capability. Regarding SAR (Synthetic Aperture Radar) space systems, the new high revisit SAR Small Satellite Earth Observation constellations can effectively complement and integrate the existing large earth observation assets to improve revisit time and responsiveness. This synergic approach will allow for achievement of the right balance between the two classes of satellites to meet the final user's needs. This paper will focus on a trade-off analysis on the orbital design, a fundamental topic to address the best solution for the specific planned constellation purpose. An overview of SAR space system versus inclination (polar/medium inclination/equatorial), power system, duty cycle and other design parameters will be analysed evaluating pros and cons. Through dedicated constellation design algorithms and cost optimization functions, an accurate trade-off allow for the identification of the best solution based on the target area of interest. Finally, the complementarity with the existing space assets (e.g. Copernicus, Cosmo Sky Med. . .) considering the context also of new constellation initiatives (e.g. IRIDE) will be evaluated as an important aspect to meet the user's needs enabling new possible mitigation and adaptation actions to the climate changes and for sustainability.