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SMALL SATELLITE L BAND SAR SYSTEM AS A CONSTELLATION BUILDING BLOCK

Abstract

A recent proliferation of small satellite SAR systems has attracted both public and private funding. To facilitate funding, these systems aim at the security / Defence market, and thus X Band sensors have come to the fore, the images superficially similar to familiar optical images, with all the 24/7, all weather advantages of SAR.

The remote sensing community, however, seeks a longer wavelength SAR, to assist with global monitoring of surface deformation, soil moisture, vegetation biomass. The better penetration through vegetation also assists with detection of flooding under the canopy, as well as detecting urban development. The current Decadal Review of the US NSF has very specific goals for a suitable SAR system for surface deformation monitoring.

Obtaining funding for such a system is difficult since the applications are not priorities for the Defence community. A funding model based on investment recouped via various levels of data sales is applicable. Given the impact of this type of sensor on Environmental, Disaster Management and Food Security issues, there is a possibility of attracting some Governmental funding. The EU, for example, buys third party data that it makes available to the EU science community. Thus, if a sensor or constellation is funded by investors, the uptake of an annual quantity of data by a large agency mitigates risk for the investors.

The front line user of SAR data is unlikely to have the skills and experience to extract important information from the image data, which leads to another potential investor into a SAR sensor, a data informatics organisation. Such organisations have to work with clients to use domain specific information to develop the AI algorithms to provide relevant, actionable, information to the users.

Constellations provide the only way to ensure ubiquitous coverage that is timely. This, in turn, requires low cost bus / sensor combinations, to enable affordable data acquisition. Combined with satellite control from Geosynchronous, and data downlink directly to the Cloud via third party ground infrastructure, the previously expensive Ground Segment becomes a software problem.

In the paper, we demonstrate that Dragonfly Aerospace has 20 years of spaceflight experience, resulting in a modular bus suitable for optical and radar sensors. We describe a low cost, reflector based, L Band sensor, with its imaging modes. No high performance spacecraft manoeuvres are planned, that add mass to the bus and antenna / support.