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Future Earth Observation Systems (2)

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NEW SMALL SAR-ENABLED SATELLITE CONCEPT TO SUPPORT EARLY WARNING FOR FAST-DEVELOPING EVENTS

Abstract

Technology development in recent years has allowed to reduce dimensions and complexity of space-based assets, thus reducing as well the development and launch costs. The combination of these factors permits a new approach to not only risk and investment profiles, but also to product design, therefore opening the way for private investors, and providing the base ingredients for a new era of space exploration that is currently dubbed by many as New Space.

Leveraging on the promising expertise developed over the last 20 years in Portugal, the INFANTE arises from this opportunity created by the New Space emergence. The project is led by TEKEVER and puts together renowned Portuguese companies and internationally recognized R&D centres with a diverse range of expertise, combining them towards a unique end goal: the development and the in-orbit demonstration of a small satellite, as a precursor Earth Observation mission.

In this paper we will present INFANTE and the vision behind it as a potential gap filler, paving the way to new capabilities complementary to the ones provided by existing observation systems such as non-geostationary high-performance standalone satellites that have global coverage and revisit frequencies of days (such as the Sentinel satellite family used by the Copernicus programme), and by in situ sensor networks comprised by on-demand platforms (such as unmanned air vehicles) and static platforms that have local reach and continuous surveillance during a certain period.

In order to reach this goal, the INFANTE mission will make use of both radar and optical sensors, and will explore their different imaging capabilities in order to obtain more comprehensive data. Furthermore, it will combine these with SDR-based sensors such as GNSS, AIS and ADS-B receivers, fusing the different layers of data into a cohesive piece of information for improved situational awareness. By pairing this information with others obtained from other sources, new EO services supported by INFANTE can be derived.

This paper will focus on INFANTE from a concept of operation design standpoint, and it will present the overall approach and key characteristics of the mission along with major system architecture and functional issues, and some of the most interesting challenges we had to resolve thus far, mostly associated with the challenging development schedule and this being the first made-in Portugal satellite.