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EARTH OBSERVATION MULTI-SENSOR HIGH-PERFORMANCES SMALLSAT CONSTELLATION

Abstract

In the current new space economy, the demand of remote sensed Earth Observation data is constantly increasing; moreover, the needs of the end users require the data providers to generate continuously more precise and frequent information to be exploited. Therefore, we are witnessing a fast-evolving race between the images providers in order to fulfil the users requirements. The current constellation market is mainly based on individual entities each providing a single (or a very limited set of) type of information as SAR, visible or infrared images; the added value information that could be retrieved by a combination of those data shall therefore be obtained combining data from very dis-homogenous sources thus not optimizing the information necessary to fulfil the specific user's application. Starting from these considerations, in this paper, a constellation design based on an opposite approach is proposed; the configuration starts from the end user applications and the corresponding requirements regardless of the payload type necessary to obtain them. In this work the performances of a medium-size constellations of small satellites (300 kg class) embarking different type of EO remote sensors are presented and discussed; in particular, the combination of SAR, TIR, VNIR and PAN/RGB products is analysed against the possible applications focusing on the innovation introduced from the small satellites exploitation. The presented solution design exploits the flexibility of the platform solution and the system in order to provide the end users with a twofold objective: a) the constellation configuration allows the mapping of a selected area of interest (in this work the Italian territory was considered), with all the sensors of the constellations, with a refresh time of the entire AoI of about one week in order to provide continuous monitoring of the customer full assets status; b) the platform capabilities and the constellation tasking features allow the system to accept on-demand requests and to provide information on a reduced area with a reaction time of about one hour with every type of sensor in the constellation in order to deliver the required data, for example, during emergency situations. The constellation performances obtained will enable a multi-application service able of providing the end users with the capabilities of continuously monitoring their assets with high spatial resolution (sub-metric resolution), on-demand hourly revisit time and many spectral bands observed.