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ANALYSIS OF PERFORMANCE ENHANCEMENT OPTIONS FOR NEW SPACE ECONOMY
INNOVATIVE DOWNSTREAM SERVICES**Abstract**

The Earth Observation (EO) economy is growing quickly. Its value has been estimated to be between EUR 2.6 and 2.8 billion in 2020. In fact, in the last five years in Europe more than 500 new start-ups were created aiming to extract relevant data from EO images. This trend increased the demand for precise and reliable EO data to enable innovative monitoring services. These downstream applications span from infrastructures monitoring to risks mitigation covering a high variety of different domains like oil gas, renewable energy, forestry, maritime, transportation and land security. Most of them, with their monitoring applications, are tackling the UN SDGs increasing the sustainability of the related industries and economies. In particular, the monitoring applications of energy plants and infrastructures, analysed in this study, have strict requirements on the revisit time of the EO satellites. A near-real time monitoring is achievable only with a maximum revisit interval lower than 12 hours. However, this requirement is not fulfilled by the commercial imagery satellites available in Europe nowadays. The problem is that the use of a single constellation alone, for instance Sentinel, is not able to satisfy the requirements for near-real time monitoring. In fact, the maximum revisit time for the Sentinel-2 constellation is nearly 48 hours for monitored locations placed in Italy. Therefore, the aim of this study is to analyse the performance enhancement enabled by the synergetic use of different EO satellites. The results demonstrate that the combined use of the available satellites lowers dramatically the maximum revisit interval and the maximum downlink interval, which measures the time span between two subsequent downloads of information. The research has considered, as a case study, the monitoring of 8 different strategic locations in Italy, 4 cities (Milan, Rome, Matera, Alghero) and 4 cardinal points at the extreme latitudes and longitudes. The combined use of all the European SAR earth observation satellites, a group of 15, brings the maximum downlink interval to a value between 9 and 5 hours for all the monitored targets. The mean revisit interval for this group is between 2 to 4 hours. Similar results are obtained with the group of European optical EO satellites. This research could foster the development of innovative downstream applications that, exploiting the combined use of different EO satellites, will be able to offer more precise and accurate monitoring services using the available upstream infrastructures.