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Large scale mapping of human settlements from earth observation data with JEO-batch of the JRC Earth Observation Data and Processing Platform

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The spatial distribution of built-up areas and their expansion represent one of the most important forms of land use/ land cover changes confronting climate, environmental and socio-economic systems at a global scale. Characterizing the status and dynamics of built-up areas over large areas is technically feasible thanks to the availability of a panoply of earth observation data with different spatial, spectral and temporal characteristics. In the last 10 years, at the Joint Research Centre of the European Commission, the Global Human Settlement Layer project has been exploiting different sources of satellite imagery to monitor changes in the European and Global built-up landscapes to better inform policies and decision making (Corbane et al. 2017) (Florczyk et al. 2016).
To meet the demands of large-scale mapping of human settlements from space, not only mass storage infrastructures are needed but also novel data analytics combined with high-performance computing platforms have to be designed. The JRC EO Data and Processing Platform (JEODPP) developed in the framework of JRC Big Data Analytics (BDA) project provides petabyte scale storage coupled to high throughput computing capacities enabling and facilitating the extraction of built-up areas from large volumes of satellite data both at the European and Global scales (Soille et al. 2018). In this work, we present the JEO-batch feature of the JEODPP; a low-level batch processing orchestrated by a dedicated workload manager and its utility for the execution of two main automated workflows for extracting built-up areas over large zones. The first workflow is implemented on a pan-European coverage of Very High Resolution satellite data from the Copernicus contributing missions acquired in 2015; the second workflow exploits a global Sentinel-2 pixel-based composite from the Copernicus constellation of satellites acquired mainly in 2018.
Although the two workflows build on the same classifier, the number of images/tiles to be processed and their projections, the characteristics of remote sensing sensors, in particular their spatial resolutions and the derived outputs required different configurations of the workload automations. Taking advantage of the Docker universe of the JEO-batch that relies on the HTCondor architecture, the workflows, originally coded in Matlab, were compiled and successfully run on the JEODPP. The following table summarizes the main characteristics of the massive batch processing that allowed extracting built-up areas at the European and global scales:

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