



## **Improved Medium Resolution Urban Mapping for Natural Catastrophe Studies at Regional Level**

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According to UN predictions, currently nearly half of the world's population (48.7%) lives in urban areas with an expected increase of two percent every 5 years in the coming decade. This increase is expected to take place to a greater extent in developing countries compromising the precarious equilibrium of these regions. Urbanization phenomena are believed to trigger many other land cover modifications and are therefore key factors in man-made transformation affecting our planet which often provoke natural catastrophes.

This preliminary study focuses on the creation of an improved, consistent database describing urban areas at regional-continental scale. The study investigates the potential of Medium Resolution Imaging Spectrometer (ENVISAT-MERIS) data at 300m full resolution mode for the mapping and monitoring of urban land cover. The suitability of the MERIS instrument for the given application was tested and verified regarding the geometry as well as the spatial, spectral and radiometric properties of the data. Eventually, the ultimate objective was the creation of an independent consistent global urban layer at 300m resolution. The resulting classification product shall provide indications on the urbanization level and give a clear insight in the heterogeneity of the urban class by defining the urban subclasses.

MERIS Full-Resolution geolocated and calibrated TOA Radiance data (MER\_FR\_1P) represented the main input for this study. To optimize the processing, two datasets, namely the urban layer of the MODIS land cover product (MOD12Q1) and the Night Light dataset, were used in order to select urban areas within the MERIS scenes. The study areas were particularly chosen in Africa,

Southern and Northern America and Europe but an effort was made to work with a globally representative city sample. The classification algorithm was developed based on the combination of different indices created by linearly combining MERIS bands. The single indices aim at maximizing the spectral variability range between heterogeneous components present within the urban environment. Indices are applied in a hierarchical way and require specific thresholds for discriminating urban subclasses. The findings derived from this preliminary study prove MERIS FR data potential for in-depth classification of urban areas. The improved class-detail, the frequent availability and the global coverage make this product very suitable as an input for natural catastrophe impact studies interesting the urban environment. Possible applications are inputs in models aiming at assessing the vulnerability of an urban settlement as well as detailed before-after maps for damage estimation and planning of intervention at regional scale.

**Keywords:** ENVISAT-MERIS instrument, urban mapping, land cover, classification, natural hazards, medium resolution, regional scale studies