Steering Landsat-oriented, open-source risk-mapping tools towards Copernicus: tuning parameters on Sentinel-2 data

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ABSTRACT

Aim: The paper introduces a set of algorithms, also available as a QGIS plugin, originally designed to process Landsat and very high resolution imagery with the aim to extract vulnerability indicators. In particular, the focus is on the adaptation of the original methods to the recently available Sentinel-2 data.

Problem: In the context of risk monitoring, a series of vulnerability proxies can be defined, such as the extension of a built-up area or buildings regularity. For many years, Landsat satellites represented a common input in the urban remote sensing community; the advent of Sentinel-2 marks a new starting point, posing new challenges but also enlarging the user community. The SENSUM Earth Observation tools, also adopted within the RASOR project framework, are a set of vulnerability-oriented workflows, designed with the aim to extract risk-related features. Two of them are based on Landsat input in order to extract built-up areas – an important risk exposure element - over different time slices and to compare the extractions, looking for the evolution in time of a specific area of interest.

Solution: The mentioned algorithms have been updated with the aim to handle the slightly different Sentinel-2 inputs and to reduce the total processing time. In particular, the main idea was to make the procedure as automatic as possible, with a user input limited to the definition of the input folder. The proposed solution is also capable to handle SRTM DEM data in order to increase the final accuracy. Following the "open" trend in research, all the code is released under a GPLv3 license, leaving room for users to test and modify the code according to their needs.

Conclusion: With the lack of a unified software suite for exposure/vulnerability indicators extraction, the proposed solution can provide inputs for the RASOR platform and other already available models like the Global Earthquake Model. The "open" policy and the adoption of the products within the RASOR consortium guarantees support and improvements to the proposed set of tools.

Keywords:
Vulnerability monitoring, exposure monitoring, remote sensing, optical imagery, Copernicus, Sentinel-2, open-source software tools