



Large scale landslide monitoring based on Sentinel-2 derived NDVI maps and NCC algorithm

Marco Mulas and Alessandro Corsini

University of Modena e Reggio Emilia, Chemical and Geological Sciences, Modena, Italy (marco.mulas@unimore.it)

The advent of the Sentinel fleet, paired with the ESA's choice to distribute Sentinel data products freely to the Scientific community opened new interesting perspectives in the earth observation framework. Also, it boosts the possibility to make new and more effective usage of "classical" remote sensing derived indexes such as the Normalized Difference Vegetation Index (NDVI) that, in case of significant landslide evolution resulting in changes of land coverage, can well depict the progression of movements at slope scale.

The present study illustrates the workflow followed in order to monitor displacements occurring in large active landslides using Sentinel-2 acquisitions. The high revisit time of the Sentinel-2 mission (10 days until March 2017, 5 days with the complete fleet in orbit) helps to mitigate the requisite of clear sky above the Area Of Interest (AOI) and potentially allows the generation of detailed time-series. The extrapolation of displacement time-series from Sentinel-2 products is based on the Normalized Cross correlation (NCC) performed on NDVI maps of the selected landslide. Where available, the so-derived displacements time-series have been validated using continuous GNSS data. Considering the obtained results, advantages and limitations of Sentinel-2 derived displacement time-series are discussed in the context of landslide monitoring during major reactivation events that, usually, reach displacement rates out of the order of magnitude that can be monitored with other satellite based approaches.