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On the combined use of high temporal resolution, optical satellite data for flood monitoring and mapping: a possible contribution from the RST approach

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Among natural disasters, floods are ones of those more common and devastating, often causing high environmental, economical and social costs. When a flooding event occurs, timely information about precise location, extent, dynamic evolution, etc., is highly required in order to effectively support civil protection activities aimed at managing the emergency. Satellite remote sensing may represent a supplementary information source, providing mapping and continuous monitoring of flooding extent as well as a quick damage assessment. Such purposes need frequently updated satellite images as well as suitable image processing techniques, able to identify flooded areas with reliability and timeliness.
Recently, an innovative satellite data analysis approach (named RST, Robust Satellite Technique) has been applied to NOAA-AVHRR (Advanced Very High Resolution Radiometer) satellite data in order to dynamically map flooded areas. Thanks to a multi-temporal analysis of co-located satellite records and an automatic change detection scheme, such an approach allows to overcome major drawbacks related to the previously proposed methods (mostly not automatic and based on empirically chosen thresholds, often affected by false identifications).
In this paper, RST approach has been for the first time applied to both AVHRR and EOS/MODIS (Moderate Resolution Imaging Spectroradiometer) data, in order to assess its potential - in flooded area mapping and monitoring – on different satellite packages characterized by different spectral and spatial resolutions. As a study case, the flooding event which hit the Europe in August 2002 has been selected. Preliminary results shown in this study seem to confirm the potential of such an approach in providing reliable and timely information, useful for near real time flood hazard assessment and monitoring, using both MODIS and AVHRR data. Moreover, the combined use of information coming from both satellite packages (easily achievable thanks to the intrinsic RST exportability on different sensors) significantly improves (from 6 to less than 3 hours) surface sampling rate, reducing the negative impact of cloud coverage, currently one of the main limit of this kind of satellite technology.