



## On a multitemporal analysis of Copernicus Sentinel data for a robust and near-real time mapping of floods

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Among the data made available by the European Copernicus Sentinel missions, those acquired by sensors aboard Sentinels 1 and 2 satellites have already proven to be suitable for detecting and monitoring floods, with different capabilities depending on the characteristics of the instrument used. C-band SAR aboard Sentinel 1A and 1B can provide all-day and all-weather information with a spatial resolution of 10 m a sub-weekly temporal resolution (when both satellites are working together), whereas the MultiSpectral Instrument on Sentinels 2A and 2B can provide data only in daytime conditions and in the absence of clouds with a slightly lower spatial resolution (i.e., 20 m) and almost a similar temporal resolution. Nevertheless, their integration may allow for a more accurate and comprehensive investigation of the studied event if adequate data analysis methodologies are used. This study presents a multitemporal approach to map flooded areas using long-term historical series of Sentinel 1 and Sentinel 2 data. Such an approach, based on a preliminary characterization of the expected value of the investigated signal at the pixel level, can allow for robust identification of any signal transients related to the occurrence of statistically significant change within the pixel, such as a different and/or increased water presence due to floods. The Google Earth Engine (GEE) cloud computing system, where all historical data are present and accessible, was used to implement the proposed methodology. In addition to Sentinel 1 and 2 data, all other datasets/tools useful for developing the proposed methodology are already available in GEE, facilitating its implementation and application to the analysis of different flood episodes. The results achieved for a few events that occurred worldwide using each single approach and their integration were compared with flood maps made available by the Copernicus Emergency Monitoring Service system to assess their accuracy. The performance achieved is discussed in this study.