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Flood detection products to support emergency management services in the Lombardy region

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Earth Observation (EO) environments have been increasing exponentially in the last decades. New generation of satellites are designed for monitoring climate related hazards, providing higher spatial and temporal resolution images. Hazards processes are triggered by anomalies in precipitation. The service will be able to provide information on the extent of the flood footprint. The test area is located south of the city of Milan, where the urban area of Pavia is located. There was an unexpected high runoff of the Ticino river that produced high water in the flood-plain surface, affecting the local population for three consecutive days and with a total damage estimate of 250,699 euro.

The identification of datasets counts on a broad availability of EO data processed, such as C-band Synthetic Aperture Radar (SAR) data from the Sentinel 1 satellite constellation together with X-band SAR data provided by the TerraSAR-X. Methods include in-SAR coherence, by cross-multiplying the two SAR images or techniques like threshold with a final pixel size of Sentinel 1 of 8.9 m and 1.8 m of TerraSAR-X. Imagery from the 25th of November (Sentinel 1) with a VV (vertical transmit, vertical receive) polarization and from the 27th of November (TerraSAR-X) with a HH (for horizontal transmit and horizontal receive) polarization were selected. Different bands have different characteristics, for instance in penetration and spatial resolution.

Obtained products include urban footprint and flood detection maps. Results could provide an important decision support tool for a wide range of actors, including public authorities to support the preparedness, mitigation and response phases of the emergency management cycle. In addition, adaptation measurements, intervention and urban planning, as well as flood mitigation activities are additional benefits. Future analysis will include impact estimates and vulnerability analysis on the urban footprint area.