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Session Application of remote sensing for floods monitoring and hydraulic risk assessment

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Congress Hall - Chairman: Maria Teresa Melis

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ERDS: a satellite-based approach in the extreme rainfall detection field

Many studies have shown a growing trend, in terms of number, frequency and severity of extreme events. As never before, having tools capable to monitor the amount of rain that reaches the Earth's surface has become a focal point for the identification of areas potentially affected by floods. In order to guarantee an almost global spatial coverage, a precipitation evaluation provided by satellite products proved to be the most appropriate source of information. NASA GPM (Global Precipitation Measurement) mission provides since March 2014 different IMERG (Integrated Multi-satellite Retrievals for GPM) products with a spatial coverage of 60°N - 60°S and a spatial resolution of 0,1° x 0,1°. The first part of our study is aimed to compare at the global scale satellite IMERG early and late data and rain gauge precipitation data, in order to evaluate their relative accuracy. The outcomes demonstrate that satellite data guarantees good result when rainfall aggregation interval is equal or greater than 12 hours. More specifically a 24-hours aggregation interval ensures a probability of detection (defined as the number of hits events divided by the total number of observed events) greater than 80% and a bias of -0,1 mm/h. With an aggregation interval of 72 hours a probability of detection greater than 90% is reached. The outcomes of this analysis supported the development of the updated version of the ITHACA Extreme Rainfall Detection System (ERDS - erds.ithacaweb.org). This system is now able to provide hourly near-real time alerts about extreme rainfall events. ERDS is a strategic tool, capable to provide, during the preparedness and response phases of the emergency cycle, immediate and intuitive information about potential flood events. The information is accessible through a WebGIS application, developed in a complete Open Source environment. Results are published on ERDS website by means of standard WMS services. Specifically, this system automatically downloads the most recent GPM IMERG early run half-hourly data and cumulates it according to specific periods (12hr, 24hr, 48hr, 72hr, 96hr). ERDS generates precipitation alerts where and when the precipitation amount is higher than a specific set of thresholds. This set of thresholds has been calculated for every aggregation interval on the basis of the average annual precipitation values evaluated on a 0,1° x 0,1° grid cell basis.

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