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Rainfall extremes and their impacts: from the local to the National Scale. The INTENSE project.

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This study describes the activities developed within the project “rainfall exTremEs and their impacts: from the local to the National Scale (INTENSE)”, funded by the Italian Ministry of University and Research (MUR) and by the EU. INTENSE will provide a novel assessment of hazards related to extreme rainfall and landslides, to aid risk management at the local and national scales.

The long historical rainfall records available from rain gauges allow us to derive extreme precipitation probabilities in gauged locations, but they hardly represent ungauged areas and cannot adequately sample the spatial variability of extreme rainfall in areas with strong climatological gradients, such as orographic and coastal regions. To overcome these limitations, we collect national-scale observations from rain gauges, weather radars and satellites and we use state-of-the-art statistical approaches, stochastic weather generators, and physically based landslide models.

In particular, a novel statistical approach for the analysis of extreme values from remotely sensed rainfall is used to produce national scale maps of extreme rainfall at multiple scales. The INTENSE approach allows us to link local rainfall climatology (i.e. frequency of rainstorms; intensity of ordinary and extreme rainstorms; rainstorms temporal structure) to the probability of initiation of shallow mass movements, a long standing challenge in rainfall-related hazards assessment. This is done feeding physically based landslide initiation models with long simulations of climate variables able to adequately represent the statistics and properties of both ordinary and extreme rainstorms.

We present here the preliminary results of the project with a particular focus on (i) rainfall frequency analysis, (ii) downscaling of extreme precipitation, and (iii) of the critical soil moisture maps needed to trigger shallow movements in a selected case study.

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