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Comparison between weather radar and rain gauges data of precipitations that triggered debris flows in the Dolomites (North Eastern Italian Alps)

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High intensity and short duration (usually 15-30 minutes) rainfalls are able to generate sudden and abundant runoff in rocky cliffs that can entrain large quantities of sediments and originate debris flow phenomena. A rain gauge network has been set up in two different areas of Dolomites (North Eastern Italian Alps) far each other about 15 km: Fiames (Cortina d'Ampezzo) and Rovina di Cancia (Borca di Cadore). The first network is composed of 9 rain gauges in an area of 1 km2, while the second is composed of 6 rain gauges in an area of 2 km2. In both the areas, the rain gauges are positioned both upstream and downstream the initiation areas of the occurring debris flows. Another single rain gauge is positioned close to the initiation area of Rudavoi debris flow (Auronzo di Cadore) and is far about 5 km from the Fiames rain gauges network. All the rain gauges sample precipitation depth at 5 minutes intervals. In the years 2009-2015 records of rainfalls that triggered 22 debris flows were taken. In most cases, the recorded rainfalls show an higher variability both along distance (200-500 m) and along altitude (200-600 m). Precipitation data recorded by the rain gauges are then compared with those estimated by means of a C-Band weather radar about 70 km away from there, to verify the possible interchangeability of the two measurement systems. Rainfall depths estimated by radar are provided with the temporal interval of the rain gauges (5 minutes) but with a different spatial scale (500 x 500 m raster resolution). To avoid the observation scale gap between the different techniques, in addition to standard comparisons between point gauge and radar rainfall measures, mean areal precipitations were derived from rain gauge network and compared with radar data. Results seem to demonstrate that radar tends to underestimate precipitation evaluated from rain gauges network, both on different measurement scales and on mean spatial data. On average, underestimation regards both rainfall rates and cumulative depths and is more marked for the events with the lowest intensity. Furthermore, disagreement between rainfall data could lead to greater differences when looking at peak flow discharges simulated by means of an hydrological model developed "ad hoc" and tested against runoff measurements in a rocky channel in the Fiames area. Relevance of gap between simulated runoff seems depends to both antecedent moisture condition and geomorphological features of basins object of simulations.