Topic 5
Landslides, coastal erosion and tsunamis in the Mediterranean

High temporal and spatial resolution X-band radar based system to monitor rainfall events and detect landslide risk in the Mediterranean area.

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In Mediterranean regions landslides and debris flows can be triggered by rainfall, with different frequency and under the effects of different types of storms. Moreover, increasing high intensity precipitations in the Mediterranean regions are often causes for landslides which can be seriously damaging for both ecosystems and urban settlements. Traditional rain gauge networks do not provide neither an useful spatial resolution nor a high frequency characterization of the events.

In order to improve the monitoring of extreme rainfall events and consequently to detect areas in which landslides may occur an experimental network of meteorological micro-radar has been installed in the Italian regions of Sicily, Piedmont and Aosta Valley. The system is composed of several high temporal and high spatial resolution radars. Each radar acquires a rain map every minute with a spatial resolution around 60 meters and with a 30 km range. A first processing step is made by the software installed on each radar, in order to remove most of the ground clutter with a robust median threshold (time dependent) filter. Preprocessed data are then transferred in compressed form to the central server via a flexible communication system and here cleaned out from residual high frequency clutter.

A web site provides the real time rain maps to the operators, the maps are projected over a common cartographic system. In parallel, the rain data is fed to a Landslides Risk Estimation Software (LRE1.0):

1. it computes the precipitation accumulation map over the entire observed area at different time intervals: every hour, 6 hours, 12 hours and every day;
2. it arranges a weekly report with the accumulation maps;
3. it monitors specific locations defined by geologists taking into account hydro-geological studies and knowledge of past events (they can define several "sensitive zones" such as active landslides or unstable slopes with triggering thresholds for each of them).
4. Every day the software computes the mean accumulated rain in the area and a risk level (according to the given thresholds). In order to draw the attention of the computer operator the risk level is represented using four classes of risk from the green (no risk) to the red (high risk).

The system is a valuable aid in monitoring landslides triggering events, and it is flexible and open to the needs of the local authorities in charge of the risk management.