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Debris flows following heavy rainfalls occurred in Messina (Italy) on October 2009

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On October, 1 2009 a heavy rainfall hit a limited area on the N-E part of Sicily (Italy) near the town of Messina. A rainfall of about 220 mm occurred in 7 hours with a peaks of more than 10 mm in 5 minutes. A rainfall event of similar intensity occurred in the same area just a week earlier, on September 23-24, 2009. The October 1, 2009 event was so intense that many landslides such as slidings, debris flows and mud flows occurred in a series of villages near Messina, causing 37 victims and widespread damages to buildings, roads and railways and other lifelines.
In particular, Giampilieri village, that is very close to a sloping hill was hit by three main landslides that evolved in debris flows along Loco Grande, Sopra Urno and Puntale streams, that cross the inhabited area. The debris flows propagated throughout the narrow and sloping roads, invading many buildings downstream and causing many victims.
At Scaletta Zanclea the major damage was caused by the debris flow propagating along the Racinazzi stream, where some victims were brought up to the sea and never found.
Even at Itala some landslides occurred due to the heavy rainfall particularly in the medieval Borgo village and the Mannello village.
A high risk has been evaluated for the studied areas. It could be mitigated both reducing exposition and vulnerability. About exposition, medieval villages cannot be abandoned for economical, social and cultural reasons. So the decision was to mitigate vulnerability providing remedial works to allow people living safely in their villages.
This paper will describe the kind of remedial works designed to control landslides and debris flows in the studied areas. Where villages are located very close to the steep unstable slopes it was decided to stabilize the thin layer (1-2 meters) of the debris material applying anchored iron mesh. In other cases iron rings debris barriers were built to stop the flow.