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Subaerial and submarine characterization of the landslide responsible for the 1783 Scilla tsunami

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Between February 5th and March 28, 1783, Southern Calabria (Italy) was struck by an exceptionally violent seismic sequence, with five main shocks between M5.8 and M7.3. Namely first shock and aftershock (February 5th and 6th) devastated the central-southern part of the Calabria region. Number of casualties, already high because of the earthquake, further rose by seismic-induced phenomena, such as landslides well described in the historical sources. One of the main landslide occurred on the coast just south of the town of Scilla. Historical witnesses report that after some 30 minutes after the February 6th earthquake (occurred shortly after midnight) part of the seaward flank of Pacì Mountain collapsed. Immediately afterwards a tsunami wave was generated, that killed some 1500 people that were camping on the neighbour beach (Marina Grande) because of the previous day's earthquake. Waves were reported to be as high as 16 meters in that beach, shortly decreasing to 2m in Messina harbour (13 km far from the landslide). A study of that event, encompassing both offshore and onshore survey, recently started, with the aim of characterize one of the worst tsunami events even recorded in Italy in the recent past. The source area is made up of metamorphic rocks of ercinic age i.e. ortho- and para-gneiss underlying schists; these units are deeply affected by tectonics with at least two main fault systems trending parallel and oblique (30˚) to the coast, creating cataclastic belt with carbonate cement. No data exists on the offshore sector, even if a structural continuity should be envisaged based on regional geology considerations. From a morphological point of view, the sub aerial scar shows a complex morphology, with a blocky deposit partially covering its lower part. Also in the marine sector, a scar is present just offshore the sub aerial one; at the foot of the submarine scar, on the axis of a valley parallel to the coastline,

an hummocky morphology characterises a bulge including of very large blocks has been found. Preliminary reconstruction of the pre- and post- landslide morphology let us estimate up to 5Mm^3 for the sub aerial event while the submarine one accounts for about 3 Mm^3.

Hypotheses on the cinematic relationships between the submarine and sub aerial features are at present under study and some results will be presented