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The simulation of the 1783 Scilla tsunami, Calabria, Italy

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In 1783 Calabria was hit by a violent and long seismic crisis that lasted about three years. In the first two months this region was struck by a sequence of five strong earthquakes, with MCS intensity greater than IX, that occurred on different faults within a zone 100 km long in South and central Calabria. The crisis was started by a strong tsunamigenic earthquake on the 5th of February 1783 which was followed by a number of aftershocks. One of these occurred probably in the Messina Straits around midnight between the 5th and the 6th and was followed by a strong tsunami, that was one of the most lethal in the Italian history. It killed more than 1500 people that were passing the night on the beach of Scilla and that had abandoned their houses to escape the persistingly dangerous and scaring shocks. The tsunami was caused by the detachment of a mass of rocks from the Mount Campallà south-west of Scilla, facing the Messina Strait. Recent studies have shown that the tsunami is very well documented by coeval minute chronicles from which one can desume information on the slid rock mass and on the tsunami effects in Scilla, close to the source, and more general on the Calabria and Sicily coasts. High-resolution bathymetric surveys, performed recently offshore Scilla, support the occurrence of a rockfall, since evidence was found of a series of bodies spread on the sea floor that can be considered the deposited fragments of the rocky slide, further reworked by bottom currents. All this constitute a good and reliable set of data that allows one to reconstruct the event with modern means.

This work is focussed on the numerical simulation of the tsunami produced by this rockfall. The tsunami generated waves exceeded 8 m at the Scilla beach, called Marina Grande, which was the most affected place, but the tsunami was also destruc-

tive at Punta Faro on the opposite coast of the Strait. The motion of the rocky mass is computed through the code UBO-BLOCK. The tsunami propagation is calculated by means of both a finite-element code (UBO-TSUFE) and a finite-difference code (UBO-TSUFD) solving the depth-averaged water wave equations. Comparison between the results of the simulation and observations is quite satisfactory. This case shows the relevance of double tsunami-generation mechanisms (tectonic and mass failure) in coastal areas and poses the serious problem of how to handle combined tsunamigenic processes in the evaluation of tsunami potential and risk.