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Active tectonics in the Messina Straits and surroundings: preliminary results from the TAORMINA-2006 seismic cruise

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The research activity carried out during the TAORMINA-2006 cruise aimed at investigating the seismotectonics of the Messina Straits and surrounding regions within the frame of a project funded by the National Civil Protection Agency. Special attention has been payed to verify the occurrence of the Taormina Fault, which might represent a potentially large seismic gap, but that has not been documented, so far.

The study area is tectonically active, as indicated by GPS velocities and uplifted marine terraces, and is the site of the large 1908 Messina earthquake. However, in spite of its hazard potential, geophysical surveys purposedly devised to investigate the neotectonic features are lacking. In order to bridge this gap we carried out a multichannel seismic survey aimed at defining the structural pattern of the Messina Straits and surroundings.

A seismic survey, totalling about 700 km of profiles, has been carried out with two different systems, a 48-channel 600 m long streamer and a 24-channel 120 m long streamer, according to the operation conditions.

Multibeam and Chirp Sonar data have been acquired during the seismic survey, and independently in selected areas.

Some preliminary results have relevance on the seismotectonics of the study area:

i) the Taormina Fault is supposed to trend NNE-SSW along the coast of Sicily, between Taormina and Messina. Besides uplifted marine terraces, however, its occurrence remains hypothetical. Our data failed to image a fault running parallel to the

coast; on the other hand, the slope between Taormina and Briga is characterised by a package of sediments originally deposited sub-horizontally and now tilted east-ward. Altogether, it appears that the whole sector straddling the coastline has been tilted.

ii) the direction, length and dip of the fault responsible for the Messina 1908 earthquake have been inferred from inverse modelling of the seismograms and geodetic levelling. These fault parameters, however, vary substantially among diffent Authors, and the structural setting within which the Messina 1908 fault is active is still not clear, also when compared to onshore geology. Faults imaged by our survey occur on the Calabrian side of the Straits and seem connected to the faults reported onshore near Reggio Calabria, but they have no obvious relationship with the 1908 Messina earthquake.

iii) a huge submarine slide, longer than 10 km and thicker than 400 m, has been imaged offshore Mt. Etna, in a region where a chaotic seismic response was previously identified. The slide is located offshore the Chiancone outcrops, at the NE side of Mt. Etna, although stratified marine sediments are involved in the lower part of the slide.