Geophysical Research Abstracts
Vol. 18, EGU2016-18451-1, 2016
EGU General Assembly 2016

3D modelling of the active normal fault network in the Apulian Ridge (Eastern Mediterranean Sea): Integration of seismic and bathymetric data with implicit surface methods

Andrea Bistacchi (1), Caludio Pellegrini (2), Alessandra Savini (1), and Fabio Marchese (1)

(1) Department of Earth and Environmental Sciences, Università degli Studi di Milano-Bicocca, Milano, Italy, (2) Institute of Marine Science (ISMAR), National Research Council (CNR), Bologna, Italy

The Apulian ridge (North-eastern Ionian Sea, Mediterranean), interposed between the facing Apennines and Hellenides subduction zones (to the west and east respectively), is characterized by thick cretaceous carbonatic sequences and discontinuous tertiary deposits crosscut by a penetrative network of NNW-SSE normal faults. These are exposed onshore in Puglia, and are well represented offshore in a dataset composed of 2D seismics and wells collected by oil companies from the ‘60s to the ‘80s, more recent seismics collected during research projects in the ‘90s, recent very high resolution seismics (VHRS - Sparker and Chirp-sonar data), multibeam echosounder bathymetry, and sedimentological and geo-chronological analyses of sediment samples collected on the seabed.
Faults are evident in 2D seismics at all scales, and their along-strike geometry and continuity can be characterized with multibeam bathymetric data, which show continuous fault scarps on the seabed (only partly reworked by currents and covered by landslides). Fault scarps also reveal the finite displacement accumulated in the Holocene-Pleistocene.
We reconstructed a 3D model of the fault network and suitable geological boundaries (mainly unconformities due to the discontinuous distribution of quaternary and tertiary sediments) with implicit surface methods implemented in SKUA/GOCAD. This approach can be considered very effective and allowed reconstructing in details complex structures, like the frequent relay zones that are particularly well imaged by seafloor geomorphology. Mutual cross-cutting relationships have been recognized between fault scarps and submarine mass-wasting deposits (Holocene-Pleistocene), indicating that, at least in places, these features are coeval, hence the fault network should be considered active. At the regional scale, the 3D model allowed measuring the horizontal WSW-ENE stretching, which can be associated to the bending moment applied to the Apulian Plate by the combined effect of the Apennines and Hellenides subduction.