nodes available within a rock volume containing Irpinia earthquake hypocenter in order to obtain a 3D micro-parameters image. The relocated micro-seismicity, approximately confined within the same volume of the 1980s Irpinia earthquake faults, is absent in the volume bounded by the first and the second fault segments activated during the event. We hypothesize that this geometrical barrier could have played a key role during the 1980 Irpinia event, and possibly has controlled the delayed times of activation of the two rupture segments. The velocity images down to 20 km depth reproduce the main lithological units and discontinuities within this portion of the Apennines chain, showing evidence of a wide and confined high VP/VS and low VP×VS volume, co-located with the present-time background seismicity. The QP model reaches the highest values in the volume containing the Irpinia 1980 event hypocenter between 8-12 km depths. The QS model also shows strong lateral variations along a SW-NE direction with a major variation occurring in correspondence with the 1980 earthquake rupture. In the volume in which QP reaches its highest values, at about 10 km depth, we constrain the porosity and consolidation in the ranges 4–5% and 5–9, respectively, with the possible fluid mixes being both brine-CO2 and CH4-CO2. The consolidation parameter range indicates high pore pressures at these depths. These results indicate that the investigated volume is a geologically complex and intensely fractured system. At location where the 1980 earthquake faults dislocated and where most of the current micro-seismicity occurs there is evidence of gas saturation and high pore-pressure,. This suggest that the most probable seismicity triggering mechanism at the fault zone is related to the fluid-induced pore pressure changes.

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SEISMOTECTONIC MAP OF THE NORTHERN SICILY CONTINENTAL MARGIN (NSCM) AND IMPLICATIONS FOR GEOHAZARD ASSESSMENT

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The Sicily dominates the central Mediterranean Sea. The Northern Sicily Continental Margin (NSCM) is a segment of the Appeninic-Tyrrhenian System whose upbuilding refers to both the post-collisional convergence between Africa and a very complex “European” crust (Bonardi et al., 2001) or AlKaPeKa (sensu Boullin, 1986) and the opening of the Tyrrhenian back-arc basin. Seismo-stratigraphic and structural analysis of a large number of available (from ViDePi project) and unpublished (from Department of Earth and Marine Science of the University of Palermo) multichannel seismic reflection profiles acquired across the NSCM, allow us to produce an accurate seismotectonic map, in order to obtain a useful tool for the assessment of the seismic hazard of the sea-land region. This first seismotectonic map has been realised from the overlapping of different geological layers that represent the main identified seafloor and sub-seafloor features, such as tectonic elements (normal and revers faults), earthquakes, heat flow, gravimetric (Bouguer) and magnetometric anomalies, Moho depth, mass-wasting, fluid escape structures (e.g. pockmarks,

mounds, gas flares, and gas chimneys), sedimentary successions, and lateral and vertical motions. The NSCM is suitable to test this approach because it is located in a transitional area between the Sicilian-Maghrebian chain to the south and the Tyrrhenian back-arc basin to the north. Along this transect the Moho depth ranges from about 10 km, in the Marsili bathyal plain, to about 40 km, towards the northern Sicily coast. The Bouguer anomalies change from 180 mGal in the Tyrrhenian region to negative anomalies in central Sicily (-100 mGal), while positive magnetic anomalies characterize the volcanic edifices, both submerged and buried. While, the heat flow shows very high values across the southern Tyrrhenian Sea (200 mW/m-2) that decrease (30-40 mW/m-2) towards the stable sector of the foreland area (Iblean plateau in SE Sicily). Along the NSCM, we distinguished, at a regional scale, different shallow and deep seismogenetic volumes. The eastern part of the Sicilian continental margin is characterised by a deeper seismicity related to the Ionian subduction, which is prevailingly linked both to extensional fault systems (Pollina, Messina strait) and to right-lateral NW-SE transcurrent systems (Vulcano-Lipari and Tindari-Giardini). While the western region shows shallow earthquakes (up to 25 km) of low to moderate magnitude (max Mw 5.9 on September 2002) occurring along an E-W trending belt and resulting from the brittle deformation of the Maghrebian chain. The focal mechanisms related to the main seismic shocks are in agreement with a dominant NW-SE compressive offset direction, with a right strike-slip component, and an antithetic NE-SW fault trend.
Evidences of mass-wasting processes have been identified across the continental shelf and the continental slope and their spatial distribution, geometry, and seismic character suggest that the fluid seepage, oceanographic processes and the slope oversteepening could be important preconditioning factors, while the tectonic activity showing fault displacements during earthquakes is the main trigger. During the last 125 ky tectonic activity is evidenced by an uplift/subsidence patterns, decreasing from E to W. The continental regions are raised while offshore areas are subsiding, suggesting the occurrence of vertical differential movements. The GPS measurements document the active deformation with differential movements of individual blocks northward-directed, in agreement with the shallow seismicity, as well as with the convergence between Sicily and Sardinia, with values of about 2-6 mm/y. The first step of this work produced the detailed seismotectonic map between the Castellammare and Palermo gulfs, including both the terrestrial and marine areas. Across the NSCM, we defined two main seismogenetic volumes that are produced by a NW-SE oriented compressional stress field defining an intraplate shallow seismogenetic zone. Though these results are only preliminary, we are developing a scientific product that can provide useful information in terms of seismic hazard in a complex region that includes both continental and marine sectors. Therefore, the identified geological features may be potentially geohazard elements for the neighbouring population and for the near goods, as well as submarine infrastructures (i.e. cables) and our seismotectonic map represent an important tool for monitoring the potentially seismogenic structures and assessing geohazards in marine and coastal environments.

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TOWARDS A JOINT INTERPRETATION OF VP, VP/VS AND RESISTIVITY MODELS OF THE HIGH AGRI VALLEY (SOUTHERN ITALY)

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The interpretation of earth subsurface models provided by the inversion of geophysical data is a very subjective issue of any geological study. Therefore, in order to have more constraints for the interpretation of geophysical models, very often a comparison between properties inferred by the inversion of different kind of data is carried out. We present a geophysical study of the High Agri Valley (southern Italy), which is a region characterized by a very high seismogenic potential. In addition to its natural seismicity, there were documented a) fluid-induced microseismic swarms due to the injection through the CM2 single-well of the wastewater produced from the exploitation of the Val d'Agri oil field, the biggest on-shore oil field in west Europe; b) continued reservoir induced seismicity due to effects of the presence of the artificial Pertusillo