Characterization of active tectonics in the Adriatic offshore and the External Dinarides of Croatia

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Newly obtained and combined structural and seismic data allow us to characterize active tectonics in the Adriatic offshore and the External Dinarides, seismically the most active parts of Croatia. Based on kinematics of Miocene-recent active faults, distribution of earthquake foci and fault plane solutions the studied region is divided into three seismogenic zones/areas. The first *Klana–Senj* seismogenic zone is characterized by a linear NW-SE trending arrangement of epicentres that extends for approximately 60 km along the coastline of Kvarner from Ilirska Bistrica (Slovenia) up to Senj at the NW flank of Mt. Velebit. Foci of instrumentally recorded earthquakes (1930-2008) with $M_L > 4$ are mostly located at depths between 20 to 5 km, i.e. some 20 km above the Moho. At the surface this zone is marked by ca. 10 km wide zone of outcropping Eocene-Miocene flysch sediments squeezed between the weakly deformed, aseismic block of stable Adria (Istria peninsula) and an imbricated pile of Paleo-Mesozoic rocks to the southwest and northeast, respectively. Calculated fault plane solutions in this zone point to predominately strike-slip and reverse faulting mechanisms with NE-SW compression and NW-SE extension. Here, steeply dipping NW-SE striking dextral faults are considered as the major seismogenic structures, reactivated from earlier reverse into the recent dextral motion. The second and the most active zone is *Dalmatia*, which extends for approx. 350 km along the NW-trending fold-thrust belt of the External Dinarides from Ravni Kotari near Zadar to Dubrovnik and the bay of Kotor in Montenegro. It is about 100 km wide and includes also the island belt of the central-Adriatic archipelago (*e.g.* Kornati, Brač, Hvar and Korčula). Foci of instrumentally recorded earthquakes (1930-2008) with $M_L > 3$ only locally reach below 20 km in depth. Here, fault plane solutions display prevalence of thrust tectonics sporadically interrupted by strike-slip faulting both characterized by NE-SW directed compression. When projected onto a set of profiles across this zone, foci are locally concentrated in a good alignment with the major NE-dipping and SW-verging thrust planes mapped at the surface or depicted from reflection seismic lines. At the SE end of this zone between Dubrovnik and Montenegro reflection seismics reveal a set of NE-dipping reverse faults of a long-lasting activity that could be traced from the depth of about 5 km up to the sea bottom. These are characterized by ca. 3 km offset of the top-Mesozoic/Paleogene carbonate platform horizon, cutting across the Messinian unconformity and clearly displacing Pliocene-Quaternary reflectors. The third is *the Adriatic offshore seismogenic area* assumed as almost aseismic until the installation of seismological equipment on the external islands and along the surrounding shores. This area extends for about 200 km from Zadar–Ancona to Dubrovnik-Gargano lines. Conspicuously, the most recent earthquake series are those around the islands of Palagruža (main shock $M_L = 5.4$), Jabuka (main shock $M_L = 5.9$) and around other uplifted structures, many of them seen on reflection seismic lines as still active salt diapirs. Fault plane solutions point here to prevalence of NW-SE striking reverse faulting with NE-SW directed compression, locally accompanied by normal faulting mechanisms.