



Are subduction zones actually mantle wedges upduction? – A new interpretation of the Mediterranean arcs

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Abstract: Recent reviews of results of different group working to large scale seismic tomography show that the prolongation of the rigid/colder lithospheric slab up to the core mantle boundary, if any, is not clearly recognizable (Fukao et al., 2001; Romanowitz, 2003). Often the tomographic images of these high-velocity bodies smoothly become horizontal – at the deep of the 640 km discontinuity – and often they continue to bend slightly coming back toward the upper mantle.

Because the strict similarity of some Italian and Mediterranean tectonic situations to the East Asia tectonics – arcs, trenches, Wadati-Benioff zones, volcanic and seismic activities, and the above mentioned horizontal bending of the alleged lithospheric slab –, many clues are examined in search of new interpretations of the Mediterranean geological and observational evidence, with the aim to find solutions that are exportable to the problems of the circumpacific arc-trench zones.

The inspection of facts coming from surface geology, magmatism, geochemistry, different method tomographies, etc., is at variance with the alleged Africa-Eurasia convergence. The clues for rifting prevail on those for compression, and many tectonic situations previously interpreted as due to plates' collision, are associated or mixed to rifting evidence. The high velocity bodies characterizing the Wadati-Benioff zone connects gently with large extents of anomalous high velocity mantle trapped in the transition zone. Consequently the proposal is put forward that limitate amount of up-rising – or upduction – of mantle material wedges – driven by isostasy – between two separating lithospheric plates could be a new work hypothesis (Scalera, 2004a,b).

Because on an expanding Earth the Mediterranean region has had ever a little lat-

itudinal extension, it is possible in this view, to identify as Mediterranean phases of opening also the Paleo Tethys and Neo Tethys currently alleged 'closures', which have added to the Proterozoic nuclei the Variscan and Alpine terranes respectively. These phases and their orogens has to be considered as extensional phases – in which continentalisations of narrow basins have happened – and the added terranes of African provenance (e.g. the Adriatic fragment) should be regarded as fragments left behind by the going away continental Africa. In this sense, considering the ongoing process of opening as having Proterozoic origin, it is possible to speak of the Mediterranean as a slowly nascent ocean, but also – paradoxically – as a very old ocean.

More generally, this way of reasoning could be extended to Middle East paleotectonics and to Asia (Scalera, 2001), checking that the greater proximity of Eurasia and Gondwana on a smaller globe obtainable in the expanding Earth framework can resolve many of the outstanding problems of paleogeography.

Future aim of this research line is to better describe the different phases of opening of the several Mediterranean basins, taking into account the older age of eastern Levantine seafloor, the intermediate age of western Mediterranean and the young age of the Tyrrhenian sea, all in a framework in which Africa is slowly escaping away from Europe.

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