Mediterranean and West Pacific backarc basins, a comparison

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The classical division between Chilean-type and Mariana-type subduction zones has been a paradigm for many years, the age of the subducting plate being the main factor controlling the dip of the Wadati-Beniof zone and the tectonic regime of the upper plate, compressional or extensional; but recent advances suggest otherwise. From this early model only the relation between slab dip and the tectonic regime (steeply dipping slab/extension *vs* shallow dipping slab/compression) has been preserved in more recent models because a number of important factors had been so far neglected.

Among those factors the interaction between slabs and the convecting asthenospheric mantle, that can have complex 3D configurations, is the most important because it exerts significant forces on the sinking piece of lithosphere and influences its dip and retreat or advancing velocity. The interactions between the upper and lower plates with the convecting mantle have consequences on the deformation regime of the upper plate.

Northwest Pacific (mainly the Japan Sea and the South China Sea) and Mediterranean Neogene backarc basins are strongly influenced by this coupling as well as by far-field stresses transmitted across the continents from distant collision zones and the interactions between these influences are complex.

A series of pending questions remain to be answered for the South China Sea and Japan Sea: (1) what is the influence of hot mantle plumes, (2) How are the upper plate crust and mantle coupled, (3), what is the influence of slab tears and detachment on the opening mechanisms, (4) How does intracontinental tectonics interferes with slab retreat and asthenospheric flow to shape the backarc basins, (5) what is the role played by pre-existing heterogeneities in the crust, the role of tectonic inheritance, (6) which is the role of gravitational forces stored in the pre-extension orogenic crust ?

Recent advances in the Mediterranean region have brought partial answers to these questions and the evolution of the Aegean Sea, the Liguro-Provençal Basin, the Tyrrhenian Sea and the Alboran Sea are reviewed to extract the most influential parameters. It is shown that mantle dynamics related to slab tearing, slab retreat and plumes exert first order controls on the kinematics of backarc extension. Pre-extension tectonic events induce the formation of strong heterogeneities in the crust that strongly control the localisation of deformation. In the case of the Mediterranean the formation of large-scale strike-slips faults is also a consequence of the flow pattern in the mantle and not only of the Arabia-Eurasia collision. The same question can be posed in the East Asian case.