Geophysical Research Abstracts,
Vol. 11, EGU2009-2637, 2009
EGU General Assembly 2009

The Alpine Tethys Rift System in Western Europe: From Variscan Inheritance to Alpine Inversion

G. Manatschal
CNRS-UdS, IPG-EOST, Strasbourg, France (manatschal@illite.u-strasbg.fr

The Permian to Cenozoic evolution of the Tethys system in Western Europe remains a subject of numerous debates. Its tectonic evolution is controlled by the collapse of the Variscan orogen, the closure of the Paleo-Tethys and the relative movement of Africa relative to Europe that changed from left-lateral to north directed in Santonian/Campanian time. Slab-pull forces derived from the subduction of slabs along the north-western margin of the Palaeo-Tethys may account for distributed extensional strain within the Alpine domain during Triassic time and the subsequent localization and extension within domains that underwent extreme crustal thinning and mantle exhumation before being reactivated and subducted during Alpine convergence. This process can account for the diachronous evolution of rift domains ranging from Late Triassic (Meliata-Vardar), to Middle Jurassic (Alpine Tethys) to Early Cretaceous (Iberia-Atlantic) and the younging of the subsequent syn-collisional facies (flysch/molasse) from Upper Jurassic (Meliata) to Eocene/Oligocene (Pyrenees/Alps) to present (eastern Mediterranean) across the Alpine system. Thus, the Alpine system in Western Europe results from a complex paleogeographic evolution and represents an orogenic collage in which coeval lateral domains evolved at different times. The strain localization is likely to be controlled by structural, thermal and compositional inheritances in the continental lithosphere that resulted from repeated tectonic events. Based on the example of the Alpine Tethys rift system, I will discuss the importance of lithospheric inheritance and how it may control the evolution of a rift system and subsequent mantle exhumation and in turn the onset of subduction and the architecture of the resulting collisional orogen. I will show that: 1) rift systems localized at the edges of stronger lithospheric domains, were guided by inherited structures and formed as v-shaped basins floored either by exhumed crust or subcontinental mantle; 2) during onset of convergence the “oceanic” domains behaved rigid and the plate kinematic response was instantaneous and distributed across conjugate margins; and 3) the Alpine domain is strongly segmented and largely controlled by inherited structures.