



Paleotectonic reconstruction of the central Tethys domain since the Late Permian: the DARIUS Maps

Eric Barrier (1), Bruno Vrielynck (1), Marie-Françoise Brunet (1), Alastair Robertson (2), Marc Sosson (3), Andrea Zanchi (4), Jean-françois Brouillet (1), and Frédéric Kaveh (1)

(1) Institut des Sciences de la Terre Paris (iSTeP), UPMC University-UMR 7193 CNRS, 4 place Jussieu, 75252, Paris, France, (2) School of GeoSciences, University of Edinburgh, Edinburgh, UK, (3) UMR-CNRS Geoazur, Université de Nice-Sophia Antipolis, Valbonne, France, (4) Universita di Milano Bicocca, Dipartimento di Scienze Geologiche e Geotecnologie, Milano, Italy

The DARIUS Programme is a 4-years consortium sponsored by Major Oil Companies and Research Organizations. DARIUS drive together a group of academic scientific teams whose expertise includes several domains of tectonics (structural analysis, paleotectonic reconstructions, basin analysis, subsidence modeling), stratigraphy (paleontology, sequence stratigraphy, organic matter analysis), modeling, kinematics, and geophysics. The main objective is characterizing the tecto-stratigraphic evolution of a vast domain around Central Tethys extending from Black-Sea Anatolia in the west to western Central Asia in the east. One of the final products of the DARIUS Programme is a set of 20 paleotectonic maps of the DARIUS domain ranging in age from the Late Permian to Pliocene. In these maps we propose paleotectonic reconstructions of the south-central Eurasian and north African-Arabian plates starting after the Late Paleozoic Hercynian orogeny. These palinspastic maps are based on an up-to-date kinematics reconstruction of the African, Indian and Arabian plates with respect to Eurasia. For each map we depict the major tectonic-geodynamic features (i.e. the rifts, different types of basins, major orogens and fold belts, main transcurrent faults, subduction zones, accretionary prisms...) as well as the main paleofacies. Our reconstructions are based on an accurate timing of the tectonic events that have succeeded in the central Tethyan margins since the Late Paleozoic. These events include both the main orogenies resulting from collisions of major plates and blocks and the series of openings and inversions of basins that developed in the northern and southern Tethyan margins between the main collisions.

Following the Variscan orogeny that ended in the Early Permian, the Mid to Late Triassic Eo- and Mid-Cimmerian orogenies are related to the collision of Gondwanian blocs with the Pangea margin after closure of the Paleo-Tethys oceanic domain. Then, for the rest of the Mesozoic and Early Cenozoic mainly developed: (1) a northward subduction of the Neo-Tethys oceanic lithosphere beneath the southern Eurasian margin, and (2) a passive margin bordering the African-Arabian plate to the North. In this latter plate, riftings and basins developed until Late Cretaceous when the Neo-tethys ophiolites were obducted onto the Arabian passive margin. On the contrary, the North Tethys active margin recorded a complex tectonic evolution characterized by: (1) the opening of back-arc and marginal basins during the Triassic to Early-Mid Cretaceous times (e.g. Black Sea, Great Caucasus, South Caspian, Central Iran, Amu-Darya and Tadjik basins), and (2) regional compressions associated with the inversions and/or closure of these basins. The main inversions are Mid-Jurassic, Early Cretaceous, and uppermost Cretaceous-Paleogene in age. The first collision between major plates began in the Early Eocene when the northern Indian and southern Eurasian margins collided. The second one is the Arabia-Eurasia collision, which initiated in the Late Eocene. Both developed until Present, originating the Himalaya and Tien-Shan ranges and the Alpine chains respectively. After the complete closure of the remnant Tethyan oceanic domain, at the beginning of Neogene, the continent-continent collisions were developing all along the southern Eurasian active margin.