

Reconstructing the Tethys

Nurbike G. Sağdıç,* Nalan Lom, Semih Can Ülgen, and A. M. C. Şengör

İTÜ Avrasya Yerbilimleri Enstitüsü, Ayazağa 34469, İstanbul, Turkey

*Corresponding author: e-mail, sagdic@itu.edu.tr

The most troublesome part of the Tethyan reconstructions is still the circum-Mediterranean area. The problem arises from the extremely poor quality of the available paleomagnetic data for Permian time, the small size of the oceans not permitting the full-fledged growth of magmatic arcs, and the great similarity of facies in considerable parts of the region. The deformations are multiple and of extreme magnitude and varied nature. Usually, it is difficult to know where to begin.

The approach we have adopted in this paper was first to undo the Alpidic deformations between western Turkey and the Atlantic region. Surprisingly, this is the most neglected aspect of the reconstructions hitherto attempted. We did this by beginning with the undeformed cratonic parts and progressively moved into the orogen attached to the craton. When three main cratons were completed, namely the full cratons of Africa and Russia and the quasi-craton of central and western Europe, we knew how much latitude we would have for the oceans in between. Before tackling the oceans, however, we checked whether the Hercynian facies (sedimentary and tectonic) made sense when followed from western, central, and southeastern Europe into the Alpidic units.

When the late Permian reconstruction thus materialized, we began putting together the sedimentary and magmatic facies of the early Mesozoic, interpreted via tectonosedimentary and tectonomagmatic viewpoints. The result was that the Scythian keirogenic system appeared to play a major role in the tectonics of the future Mediterranean Alpides north of Greece, former Yugoslavia, and Italy, all the way into the Pyrenees. After the Hercynian collisions, the western part of the Palaeo-Tethys was rimmed by a continuous subduction zone, which had an extensional arc in the southern Gondwanian margin, whereas a highly oblique subduction system with shortening and extensional segments created a variety of terrestrial Triassic basins along the northern Laurasian margin. Africa's loosening from North America and western Europe clearly started in the Permian, but none of the resulting extensional loci later nucleated the Liassic ocean opening between Gondwana and Europe and North America. It seems as if the Scythian keirogen interfered with the mid-plate tectonics of the Central Atlantic magmatic province to create the widespread extensional regime in the central Atlantic regions that extended along the Tethys.

The closest analogue we can find with the Tethyan region from the extensional regions of eastern North America to the Caucasus area is the present-day western Pacific, from the Tartray Strait to the southern Philippines, but the analogy is obscured by the rise in global sea level, creating the vast shelves of the circum-Mediterranean Tethysides.