The Jurassic Ligurian Tethys: An introduction.

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The Ligurian Tethys oceanic basin separated the Europe and Adria plates during Late Jurassic – Cretaceous times. Opening of the Ligurian Tethys basin was kinematically related to pre-Jurassic rifting and Late Jurassic spreading in the Central Atlantic and was a consequence of the passive extension of the Europe-Adria continental lithosphere (Fig. 1). Segments of the oceanic lithosphere of the Jurassic basin form large ophiolite bodies in the orogenic system of the Western-Central Alps, the Northern Apennines and the Alpine Corsica.

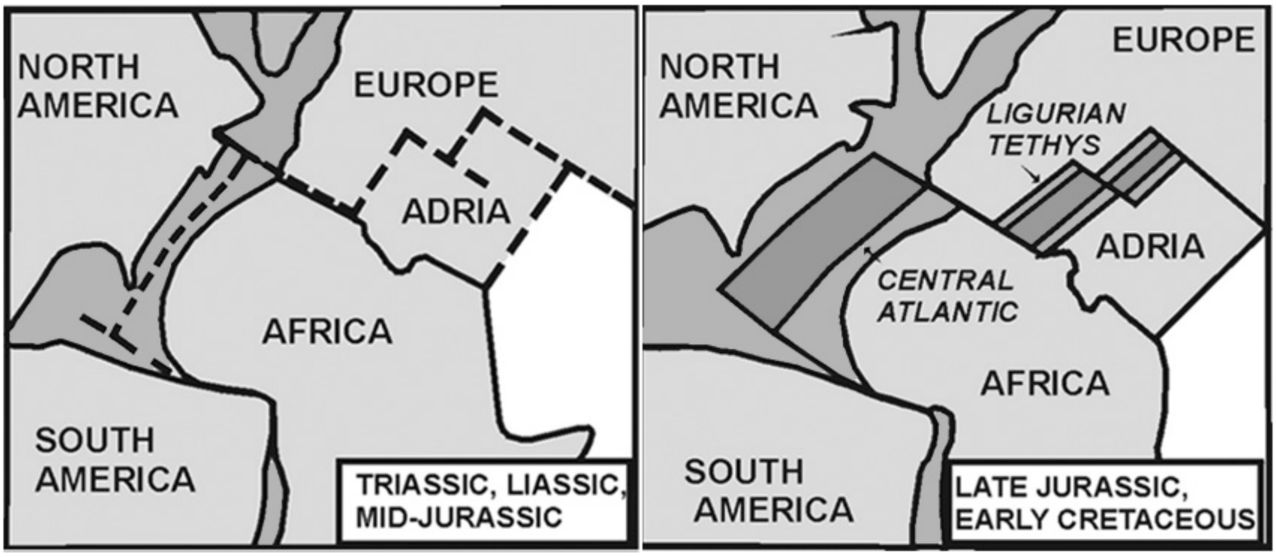

Fig. 1 – Mesozoic evolution of Central Atlantic and Ligurian Tethys basins, from continental rifting to ocean formation (redrawn and modified after Lemoine et al. 1987).

Palinspastic reconstructions suggest that the Ligurian Tethys did not reach the size of modern oceans (Winterer & Bosellini 1981): oceanic accretion in the Ligurian Tethys started in the Middle Jurassic and continued for approximately 25 Ma. Age data indicate a narrow time span between the end of divergence and the onset of convergence and subduction. In the Alpine realm, plate convergence leading to subduction of the oceanic lithosphere probably started in the Late Cretaceous. The subduction zone had a SW trending, with the Europe plate underthrusting the Adria plate, and it was most probably intra-continental in the northermost Alpine sector, and progressively intra-oceanic towards the Ligurian sector (Dal Piaz 1993, and references therein).

The Ligurian Tethys was completely closed in the Early Tertiary, when segments of its oceanic lithosphere were emplaced as West-vergent thrust units in the Alps and East-vergent thrust units in the Apennine. Depending on their stratigraphic, structural and metamorphic characteristics, the different ophiolitic sequences of Western Alps (WA)– Northern Apennines (NA) have been ascribed to different palaeogeographic settings in the Jurassic-Cretaceous Ligurian Tethys (Fig. 2).

Depending on the oblique trend of the subduction zone, ophiolite massifs pertaining both to the Europe (i.e, the Voltri Massif) and the Adria (i.e., the Lanzo Massif) plates underwent subduction and bear clear records of eclogite facies (LT-HP) recrystallization. The ophiolite-bearing Liguride Units of the Northern Apennine were part of the Adria plate and were located East of the subduction zone. They escaped subduction and underwent low-grade orogenic metamorphism.

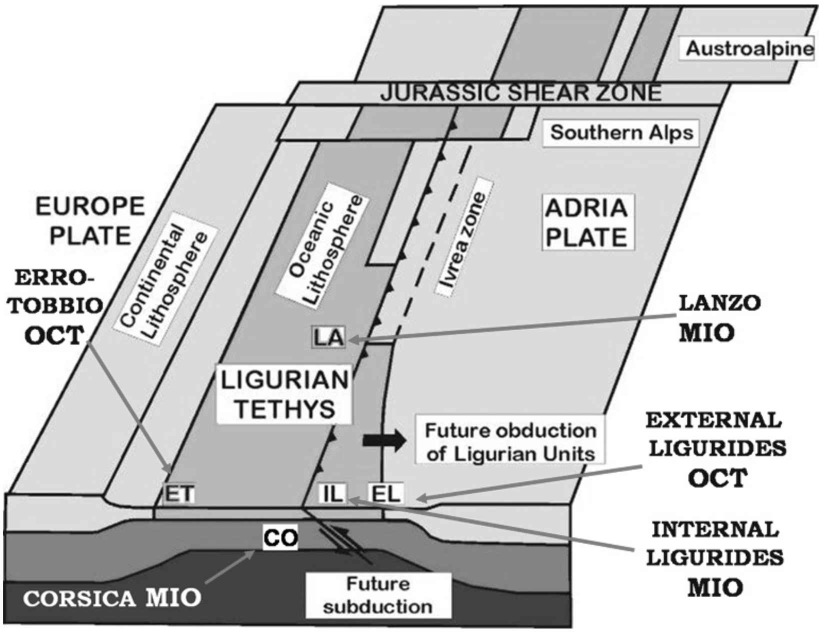

Fig. 2 – Generalized palaeogeographic restoration of the Ligurian Tethys, with location of the main ophiolite sequences at Ocean-Continent Transition (OCT) and More Internal Oceanic (MIO) settings (redrawn and modified after Dal Piaz, 1995).

The most relevant lithostratigraphic features of the Alpine-Apennine ophiolites is that serpentinized mantle peridotites underlie both basaltic lava flows and oceanic sediments, whereas sheeted dyke complexes and gabbroic Layer 3 are completely lacking. Km-size gabbroic bodies are present as intrusions into mantle rocks. Thus, a general consensus exists on the interpretation that the Ligurian Tethys basin was floored by a peridotite basement and the oceanic lithosphere was composed by mantle peridotites, with widespread gabbroic intrusions, and a discontinuous basaltic cover (Decandia & Elter, 1969; Bezzi & Piccardo, 1971; Lemoine *et al.* 1987; Abbate *et al.* 1994; Marroni et al., 1998, 2002), and was, accordingly, significantly different from the ideal ophiolite sequence as reconstructed by the Penrose Conference in 1972 (Anonymous, 1972) .

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