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Subduction evolution of the Dinarides and the Cretaceous orogeny in the Eastern Alps

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The geological evolution of the Dinarides, Pannonian basin and Eastern Alps has been reconsidered taking into account the constraints obtained from new paleotectonic reconstructions for the central Mediterranean (e.g., Argnani, 2009, 2012; Argnani et al., 2006). Work on passive continental margins shows that for extensive stretches the substrate of deep water sediments is neither oceanic nor strictly continental; therefore, the dichotomy between oceanic and continental substrate could be misleading in paleotectonic interpretation, particularly with respect to the possibility for the lithosphere to be subducted. The geological record of the Dinarides shows that one or more oceanic basins existed between Africa and Europe in late Triassic - late Jurassic. Oceanic subduction occurred during late Jurassic - early Cretaceous, leading to westward obduction of oceanic lithosphere above the Drina-Pelagonian microcontinent (Pamic et al., 2002). Following the late Jurassic - early Cretaceous obduction, subduction resumed close to the European margin, and continued until early Paleogene, when the Vardar oceanic basin closed, and an ophiolitic melange was emplaced on the Drina–Pelagonian region. Subsequently, the substrate of the narrow Pindos-Bosnian ocean-like basin was subducted to the east, originating the Posavina magmatic arc, until its closure caused the Adriatic-Dinaric carbonate platform units to be accreted to the Dinaride fold-and-thrust belt. Plate kinematics indicate that N-S convergence between Africa and Europe initiated only after the Cenomanian, that is well after ophiolite obduction occurred in the Dinarides-Hellenides. Oceanic subduction and continental collision in the Alpine s.s. domain developed from the late Cretaceuos onward (Gebauer, 1999). The only exception is represented by the Eastern Alps, where an early Late Cretaceous orogeny has been recorded (Thoeni, 1999). This tectonic event appears to be separated by the subsequent tectonic evolution, that is linked to the Alps s.s., both in terms of age of deformation, nature of involved terranes, and structural directions, making the Cretaceous orogeny of the Eastern Alps not fully understood (Schmid et al., 2008). The new paleoreconstructions suggest that the Pindos-Vardar ocean ended to the NW, against a transform fault that bounded to the south the Austroalpine domain. Within this frame, the problematic Cretaceous orogeny of the Eastern Alps can be explained as linked to the episodes of ophiolite obduction and subsequent shift of tectonic activity that have been recorded in the Dinarides.

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