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Paleostress Analysis Using Calcite Twins in Carbonates – A key study on the Cretaceous Sava-Klepa Massif, Former Yugoslav Republic of Macedonia

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The Geological composition of the Balkan region has been predominantly shaped by the existence of two ophiolite belts originated after the closure of the Tethyan ocean(s) which are the Dinaride-Hellenide ophiolite belt in the south-west and the Vardar belt in the north-east. These two ophiolite belts are either relics of two separate major branches of the Neotethys ocean with intervening continental terranes (Karamata, 2006), or may represent a single thrust from the Triassic–Jurassic Vardar oceanic sequence onto the Adria passive (Schmid et al., 2008). A bulk of Balkan ophiolites are of Jurassic age, and available data on the metamorphic sole indicate that the major episode of convergence and the ocean closure happened not later than in the Upper Jurassic. Recently, the Sava-zone ophiolite of late Cretaceous age was differentiated in the northern Bosnia-Kozara ophiolite and more southerly in the Klepa Massif of Macedonia. Geochemistry of the lavas occurring within the Sava-zone ophiolites show an alkaline character similar to intracontinental rift zones, with no similarities to arc or MORB attributes. This may imply a re-opening of the Tethys during the Early Cretaceous until the Late Cretaceous and thus challenges the widely accepted model of a terminated Upper Jurassic ocean closure (Schmid et al., 2008).

This study focuses on the basement sequences surrounding Klepa Massif in Macedonia. Our aim is to test the hypothesis that the Klepa Massif could represent a new ocean that rifted after the collision of Europe and Adria. Detailed structural mapping and paleostress reconstructions from calcite twins within Jurassic as well as Cretaceous carbonates were performed to constrain the evolution of the Cretaceous Sava-Klepa Massif. We use the Turbo Pascal program package of calcite paleostress analysis (Sperner & Ratschbacher, 1994) based on the P-B-T method, together with the numerical dynamic analysis method. Orientation of twin planes and c-axis orientations are measured with an automated fabric analyser microscope (Peternell et al., 2009). Very first results indicate that the rifting was controlled by a pull-apart tectonic setting.

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