

### **3D-modelling of the Hochstegen Formation of the western Tauern Window at the Brenner Pass**

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The Hochstegen Formation in the western Tauern Window represents the autochthonous sedimentary cover of the external, pre-alpidic European margin. This Jurassic formation transgresses on a lithological highly variable basement of Permo-Triassic trough sediments and partly mylonitic Permo-Carboniferous gneiss cores of the Venediger duplex. The Hochstegen Formation is predominantly composed of the Hochstegen marble and a basal quartzite (Basisquartzit) and underwent up to amphibolite facies metamorphism during the Alpine orogeny. In this study we investigated the nappe stack in general and the Hochstegen Formation in detail including its contact to the overlying Kaserer Series. The study is based on detailed lithological and structural mapping including several deep drill cores of the exploration campaign for the Brenner Base Tunnel. The results were used to elaborate a 3D model using Petex MOVE. The study aims to improve the knowledge about subsurface structures of the partly karstified Hochstegen marble, which are of high relevance for the Brenner Base Tunnel, especially for hydrogeological questions. We present a new tectonic model, that includes large scale isoclinal folding and internal thrusting of the Hochstegen Formation related to the nappe stacking within the Tauern Window. Between Flatschspitz in the south and Vals valley in the north, the Hochstegen Formation is on the one hand the autochthonous cover of the Central Geiss with transgressive contact to it, and on the other hand is part of the overlying Wolfendorn nappe. We interpret the contact between the Kaserer Series and the top of the Hochstegen Formation to be a ductile tectonic contact, and not a sedimentary one. Therefore, we suggest a Permo-Triassic age for the Kaserer Series and a new tectonic nappe boundary at its base. This leads to a thinning of the Wolfendorn Nappe, which is reduced to a single slice of Hochstegen Formation. During Miocene exhumation of the Tauern Window these older tectonic boundaries were reworked and overprinted by normal faulting along the Brenner Fault and by a set of NE-SW striking brittle sinistral strike slip faults.