

**The Borinka unit (Malé Karpaty Mts, Western Carpathians):
sedimentary and tectonic model of a clastics-dominated, rift-related Jurassic halfgraben**

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The southern and central parts of the Malé Karpaty Mts (MK) consist of several superimposed basement/cover allochthonous units affiliated to the Tatric superunit. The Borinka unit is the lowermost structural element of this Tatric nappe stack. It is cropping out on the NW slopes of the MK, in a tectonic

window from below the large, basement-involved Bratislava nappe. It forms the biggest „blue spot” to be seen on general geological maps of the Slovakian Western Carpathians (WC), which suggests a significant amount of Jurassic sediments present there (altogether more than 1 km thick), in contrast to the other parts of the WC.

The sedimentary infill of the Jurassic Borinka basin exhibits a strong asymmetric pattern of proximal and distal deposits that are composed mostly of terrigenous clastics. During the mid-Early Jurassic (Sinemurian – Pliensbachian), massive limestones (Ballenstein Lmst) with signs of redeposition, olistostromatic bodies of extraclastic carbonate breccias and giant olistolites of Triassic carbonates, as well as bioclastic limestones and quartzitic sandstones (Prepadlé Fm, at least 300 m) deposited in the SE marginal position. Simultaneously, the central and NW parts of the basin were filled with mixed carbonate-siliciclastic turbidites and spotted marlstones (Korenec Fm, up to 800 m). The terrigenous input ceased in the axial part of the halfgraben by the late Lias, when hemipelagic anoxic black shales with famous deformed ammonite imprints were laid down (Toarcian – Bathonian? Marianka Fm, more than 300 m). The overlying Slepê Fm (Middle – Upper Jurassic?, more than 200 m) consists of calciturbidites containing shallow-water biodetritus. Contemporaneously with the Marianka and Slepê Fms, huge masses of coarse-grained scarp breccias (Somár Fm, some 500 m) accumulated in the proximal SE part of the basin, just above the Prepadlé Fm. The clastic material of the Somár mixtitic breccias is dominated by basement rocks (Paleozoic phyllites, amphibolites and granites) with numerous megaolistolites of Triassic quartzites and carbonates. Lateral relation of distal and proximal facies shows an interfingering, zig-zag pattern in a cross-section. The proximal to marginal disorganized sediments were deposited as debris avalanches and mass-flows derived from fault-controlled linear sources located to the SE, while the Korenec turbidites were most probably fed by a river that drained a wide dry land. On contrary, calciturbidites occurring in the Marianka and Slepê Fms are almost free of siliciclastic material and were likely derived from the obviously gentler NW counterslope of the basin. Based on these features, the Borinka basin is reconstructed as an elongated tilted halfgraben some 10–15 km wide with a steep, normal-fault escarpment on its SE side. This Early to Middle Jurassic fault separated the basin from a continental ridge, which was temporarily exposed to subaerial erosion.

The Borinka unit has no equivalents in the whole WC. However, its close analogies can be found in cover successions of the Lower Austroalpine nappes of the Eastern Alps, e.g. in the Radstätter Tauern Mts or Graubünden area. There, similar Jurassic scarp breccias are interpreted as derived from marginal normal faults that flanked the opening South Penninic (Ligurian-Piemont-Tauern-Vahic) ocean from the S. Such a position fits well also the WC situation, despite no undisputable oceanic elements participate at the present surface structure of the WC. The long (some 30 Ma), though episodic activity of the SE marginal fault of the Borinka halfgraben allows its interpretation as a master break-away fault that separated the lower (SE) and upper (NW) plates of an asymmetric rift zone, which was active until the final break-up of the South Penninic oceanic tract that occurred further to the NW in the late Middle Jurassic.