Erosional and depositional events during the Miocene in the West Carpathian Foredeep, Flysch Belt and Vienna Basin as evidenced by vitrinite reflectance and fission tracks

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The final phases of the collision of the Africa-related plates with Europe resulted in a series of uplift and subsidence events associated with massive transport of the eroded material to the active sedimentary basins in the Alpine and Carpathian realm. New measurements of thermal maturity of organic matter in shales and siltstones, such as vitrinite reflectance, T_{max} of the Rock-Eval pyrolysis, and biomarker ratios, provide along with illite-smectite expandability consistent data on the maximum thermal stress during the burial catagenesis. Apatite and zircon fission tracks made on selected samples complement the information on the time of cooling/uplift of the strata.

In the Early Miocene, the eastern margin of the Bohemian Massif subsided due to the loading by the approaching Alps and West Carpathians. The Carpathian Foredeep (CFd), the marginal foreland basin, and the Vienna Basin (VB) were a sink for the material transported from the elevated forebulge situated on the adjacent Bohemian Massif northwest off the Carpathians. In the Middle Miocene, the West Carpathians arrived on the Bohemian Massif and the Vienna Basin moved closer to the Foredeep on the thrust sheets of the Carpathian Flysch Belt (CFB). The left-lateral movements of the Outer West Carpathians resulted in opening of a wrench type Vienna Basin as a dominant sink on one hand and uplift of the adjacent Flysch Belt in the NE.

This area became an important source of material both for the Foredeep and Vienna Basin. The Foredeep switched from sink to source in the Upper Miocene while the VB continued to subside.

Several systematic trends are observed in the thermal maturity pattern. 1) Both the Carpathian Foredeep and Vienna Basin occur in a very low heat flow area. The trend of the vitrinite reflectance increase with depth is very low when compared with the Danube and East Slovakian basins of the Pannonian system. 2) The external units of the CFB are more mature than the CFd suggesting partial uplift and erosion prior to emplacement in their final position. 3) The Flysch Belt below the Vienna Basin is more mature than the Miocene but is less mature than CFB northeast off the VB. This indicates that Paleogene overthrust units (CFB) were considerably eroded in the fold-and-thrust belt, which served as the source during the post-Lower Miocene time. 4) The Magura nappe (M) is always more mature than the external Zdanice and Subsilesian units. 5) The borehole data show often an inverse catagenetic profiles. This is interpreted as evidence that M was exposed to deeper burial and higher temperatures prior to emplacement on top of the external units.