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THERMAL MATURITY OF CARBONIFEROUS TO MESOZOIC SEDIMENTS AS A TOOL FOR PALEOGEOGRAPHIC RECONSTRUCTION IN THE ALPINE-DINARIDIC-PANNONIAN TRIPLE JUNCTION

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Vitrinite reflectance has become the most widely applied parameter for quantitatively estimation of the thermal maturity of sedimentary rocks. Principles and techniques of vitrinite reflectance were originally developed for use on coal, and have been modified for use on organic matter dispersed in sedimentary rocks. In this study, vitrinite reflectance was performed by measurement of mean random reflectance (%Rr) in Carboniferous to Albian strata of the Southalpine Southern Karawanken Range and the Austroalpine Drau Range. Our purpose is to present a map showing the spatial pattern of vitrinite reflectance in the "Alpine-Dinaridic-Pannonian Triple Junction" (HAAS et al., 2000), involving the data of this study and data from LACZÓ (1982 a, b), IHAROSNÉ LACZÓ & VETÖ (1983), CLAYTON and KONCZ (1994), GREBER et al. (1997) and BALAZS & KONCZ (1999). A comparative interpretation of these data demonstrates the presence of domains characterized by a distinct thermal history. Extension during Norian to Liassic rifting formed an overall N-S trending basin of the South-Alpine realm and its northern prolongation (SCHMIDT et al., 1991) which is divided into a number of asymmetric basins separated by submarine highs. This is documented by abrupt lateral thickness and facies changes in the stratigraphic succession. Thermal maturity of Late Triassic strata is primary dependent on the heat flow and subsidence history. Therefore, thermal basin models can be used to constrain the thickness of Jurassic to Eocene overburden which is now eroded in this area. Consequently, the estimated amount of thickness gives evidence about the paleogeographic position of distinct tectonostratigraphic units.

Vitrinite reflectance values between 1.6% and 1.9%R_r in Carnian strata characterize the Southern Karawanken Range. In contrast, the eastern part of the Gailtal Alps, the western and central part of the Northern Karawanken Range and the northern margin of the Julian Alps show significant lower values between 0.8% and 1.0%. Vitrinite reflectance in the eastern part of the Northern Karawanken Range increases up to 1.6%R_r. Coalification in the Carnian overstep sequences of the Austroalpine Gurktal Range Complex is characterized by a west to east decrease of Rr from 1.2% to 0.8% (RANTITSCH & RUSSEGGER, 2000). This pattern is overprinted by coalification anomalies in the central part of the Gailtal Alps and along a dextral Riedel shear of the Periadriatic Lineament (Hochstuhl fault). These anomalies are attributed to post-tectonic events of strong heating during Oligocene and Miocene times. Vitrinite reflectance values in Late Carboniferous to Albian sediments are used to calibrate a numerical heat flow model of the Drau Range and the Southern Karawanken Range. Thermal alteration within the peripheral segments of the Drau Range (Northern Karawanken Range, eastern segment of the Gailtal Alps and the Dobratsch block and parts of the Lienz Dolomiten Range) is explained by a low heat flow of approx. 60 mW/m^2 during basinal subsidence and a pile of 1400 m Late Cretaceous to Eocene sediments on top of the exposed stratigraphic succession. In contrast, vitrinite reflectance in the Southern Karawanken Range is explained by an eroded

overburden of ca. 3000 m Jurassic to Eocene sediments and a heat flow of approx. 60 mW/m^2.

Because the reconstructed thermal history of the Southern Karawanken Range is very similar to the thermal history of the northeastern part of the Generoso basin (western Lombardian basin, GREBER et al., 1997), these data give strong evidence for a deep basinal position of the Southern Karawanken Range during Jurassic to Cretaceous times. Furthermore, the model is consistent with the Jurassic to Eocene stratigraphic succession which is exposed within the Transdanubian Range, a Pannonian tectonic unit with facially and stratigraphic affinity to the Southalpine unit (KÁZMÉR, 1987). In the Pannonian realm, low vitrinite reflectance between 0.5% and 0.8%R_r in Middle to Late Triassic strata of the Transdanubian Range and Zala Basin points to a lower thickness of Jurassic to Eocene sediments and therefore, to a platform position of these units. These values are compatible with the thermal model of the Drau Range and indicate a similar paleogeographic position. In contrast, vitrinite reflectance between 1.0 and 1.4%R_r in Late Triassic sediments of the Mecsek Unit may be interpreted by a higher amount of Jurassic to Eocene sediments or by a higher heat flow at the time of maximum subsidence. The map showing the spatial pattern of vitrinite reflectance in the "Alpine-Dinaridic-Pannonian Triple Junction" suggests a paleogeographic relation between the Drau Range (Lienz Dolomiten Range, Gailtal Alps, Northern Karawanken Range), the Transdanubian Range and the Zala Basin during Jurassic to Eocene times. The proposed deep basinal position of the Lienz Dolomiten Range (SCHMIDT et al, 1991) and Zala Basin (KÁZMÉR, 1987) is not reflected by the data of this study. Accepting a close relationship between thermal maturity and sedimentary burial, vitrinite reflectance suggests a paleogeographic position of these units which includes only approx. 1400 m Late Cretaceous to Eocene sediments. In contrast, the Southern Karawanken Range is seen as an exotic block in its present tectonic framework with close affinity to a deep basin (Generoso Basin) of the Lombardian Basin.

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