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Shift of basin subsidence due to oblique subduction along the Northern Austroalpine margin during the Late Cretaceous-Tertiary of the Eastern Alps and the Western Carpathians

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Subsidence within the Late Cretaceous to Early Tertiary basins at the northern margin of the Austroalpine microplate (Austroalpine Units of the Eastern Alps, Tatric and higher units of the Western Carpathians) shows a regular time shift from the West to the East. Rapid subsidence into bathyal depths within the northwesternmost part of the Northern Calcareous Alps (NCA) began already in the late Turonian. Other basins of the Gosau Group of the NCA (WAGREICH & FAUPL 1994) and the western part of the Inner Western Carpathians (WAGREICH & MARSCHALKO 1995) indicate a shift of this subsidence pulse predated by short uplift and deformation from the Santonian in the west to the Maastrichtian in the southeast. This eastward youngig in the beginning of major subsidence is continued within the Centralcarpathian Paleogene, e.g. the Sulov Conglomerates (Paleocene) and turbiditic formations of the Eocene/Oligocene, partly also early Miocene in eastern Slovakia (see also KOVÁC et al., 1994).

This time shift of subsidence can be interpreted as a result of diachronous oblique subduction processes to the north of the active leading margin of the Austroalpine microplate (including the NCA and the Tatric units of the Western Carpathians). This margin was characterized by southward subduction of the Penninic Ocean from the Cretaceous onwards The short deformation and following rapid subsidence may be due either to tectonic erosion or subduction roll-back, or a combination of both processes. Tectonic erosion due to collision and subduction of an oceanic asperity is more probable in the Eastern Alps based on structural evidence and sedimentological reasoning such as the elimination of an accretionary ridge north of the NCA (WAGREICH 1993, 1995). Within the Western Carpathians a combination of tectonic erosion and later subduction roll-back is more likely, especially for the subsidence of the Centralalpine Paleogene basins, which postdate accretion of the Pieniny Klippen Belt to the north.

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Alpine thrust and subthrust structures below the Vienna Basin and along its adjacent borders.

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The segment of the Alpine Carpathian belt, which passes the Vienna basin from one border to the other below the Neogene basin fill, are mainly the Flysch Zone, the Calcareous Alps with their Palaeozoic base, the Greywacke Zone and the Central Alps.

The Alpine structural style has been studied by detailed surface mapping and by deep wells situated at the borders and within the basin. In the area of the Matzen-Schönkirchen oil fields further information has been obtained by 3D seismic surveys. Correlation between the Austrian and the Slovakian part of the Vienna Basin and the Carpathians on surface show in general a continuation of the main elements and their stratigraphic characteristics from the Alps into the Carpathians but some changes in the structural arrangement.

The Semmering-Leithagebirge system representing the Lower/Middle Austroalpine units seems to be replaced by a more heterogeneous structural and facial complex in the Male Carpaty mountains.

The overriding of the deeper Carpathian and Central Alpine units by the Calcareous Alps is evident in the Alps and Carpathians as well as the overthrust of these units over the Flysch or Klippen Zones. The Greywacke Zone disappears in the Vienna Basin toward NE.

The structures of the Calcareous Alps are strongly compressed especially along their frontal part. Steeping, overturning and backthrustings are the consequence. The narrowing of the Calcareous Alpine Zone toward NE could be a tension effect, but the steep structures point to a stacking of tectonic elements because of subsiding conditions during overthrusting. The main nappe systems are