basins. These basins are underlain by anomalously thin crust (20-22 km) and lithosphere (55-60 km) in a spatially coincident manner.

Two regional structure transect were constructed across the Hungarian and Romanian part of the Pannonian Basin and the Apuseni Mts. These perpendicularly oriented sections were also constrained by deep reflection seismic profiles (Pannonian Geotraverse 1 and 4) in order to gain insight into the lithospheric-scale structure of the region. These transects suggest large-magnitude extension during the Neogene, mostly due to the superimposed extensional styles.

Alpine tectonics in the East Alpine-Pannonian transition zone (Austria-Hungary)

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Structural interpretation of reflection seismic profiles combined with well data reveals distinct modes of upper crustal extension in the NW Pannonian Basin. As the first manifestation of extensional collapse at the beginning of the Middle Miocene (~17.5 Ma, Ottnangian/Karpatian boundary) the Rechnitz metamorphic core complex has been formed in the Raba River extensional corridor.This metamorphic core complex style, ENE-WSW trending extensional phase can be characterized by a minimum of 80 km horizontal extension. Shortly after, and partly overlapping with this period, the style of syn-rift extension changed to a wide-rift style one (16.5-13.8 Ma, Early and Middle Badenian) producing a minimum of 40 km extension in a NW-SE direction across the East Alpine/Pannonian transition zone.

The predominance of low-angle normal faults in the Neogene structure of the Danube Basin excludes its pull-apart basin origin proposed by many. The numerous Miocene detachment faults interacted with earlier Cretaceous decollement levels, although in a more complicated manner than previously thought.

Widespread Upper Badenian and Sarmatian strike-slip faulting has little to do with the formation of the Danube Basin but it belongs to the post-rift phase and records a basin-wide inversional stage. The still continuing, but gradually diminishing continental extension during the Late Miocene and Pliocene (12.5-5.5 Ma, Sarmatian-Lower Pannonian) could not advance to the localization of extension into a narrow rift zone in the NW Pannonian Basin, except perhaps the center of the Danube Basin (zone of Pasztori and Kolarovo).

Regarding the whole lithosphere of the NW Pannonian Basin gravity modeling indicates that the present-day thickness minima for the crust and the upper mantle do not coincide. The some 160 km lateral offset between them indicates the detachment of the the upper crust from the mantle lid along a rheologically weak lower crust during Miocene times.

Geodynamic evolution of the area adjoining the Pannonian Basin and Dinarides

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Almost all recent geodinamic interpretations of the evolution of the Pannonian Basin (PB) are related to the Carpathians. However, the Dinarides, especially its northernmost parts played very important role in their evolution.

The central part of the northernmost Dinarides is genetically related to an ancient magmatic arc, as indicated by following units: (1) Upper Cretaceous-Paleogene trench sediments, in lower parts interlayered by basalts, rhyolites and pyroclastics which overlie (2) Jurassic-Cretaceous ophiolites associated in places with blueschists, (3) Alpine medium-pressure metamorphics originating from the trench sediments and associated volcanics, and (4) Alpine synkinematic granitoids.

The western part of the northernmost Dinarides, west of the Zagreb-Zemplen fault zone is mostly covered by the Sava nappe, composed of Upper Palaeozoic metaclastic and carbonate rocks, Schytian clastics, and Middle and Upper Triassic limestones and dolomites. The tectonic windows composed of Jurassic-Cretaceous basinal sediments of Dinaridic affinity are exposed below the Sava overthrust. Further to the east in the area of Zagreb, the Sava nappe is thrust onto the ophiolites.

In the northern part of the Dinarides subduction processes terminated with the Eocene compressional event and the uplift of the Dinarides.

West of the Zagreb-Zemplen line numerous intramontane shallow-marine, fluviatil and lacustrine basins during the Oligocene were generated. Penecontemporaneous andesites can be compositionally correlated with the easternmost Periadriatic tonalites, but the andesites are also found along the Drava and Sava strike-slip faults.

The rift stage, induced by the upper mantle rise and attenuation of the "alpine" lithosphere with shallow necking, is marked by submarine Karpatian trachyandesites, Badenian basalts, andesites, dacites and rhyolites, and Pannonian alkali basalts. Extension gave rise to the escape tectonics, i.e., the displacement of the North Dinaridic units to the PB. The main trails for the large scale tectonic transport were the Periadriatic-Sava and Zagreb-Zemplen fault systems and their subparallel satellites.

The strong sin-rift unconformity is placed at the end of the Sarmatian, and break up unconformity at the end of the Pannonian. It is followed by a compressional event, regionally recognised all over the PB. Due to thermal subsidence in Pliocene the South PB was covered with more than 2.000 m of lacustrine fresh-water deposits. There is also some evidence of another, very recent compression phase, especially in the Sava and Mura domains.

Trace elements and isotope geochemistry of ultramafic xenoliths: constraints on the lithospheric mantle beneath the Graz Basin (Eastern Austria)

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The Plio-Pleistocene alkali basalt activity in the Carpatho-Pannonian Region (CPR) is characterised by the occurrence of a wide variety of ultramafic xenoliths, i.e. spinel lherzolites, clinopyroxenites, harzburgites, wehrlites, amphibole pyroxenites, etc. (Downes & Vaselli, 1995). They occur throughout the whole region from the Graz Basin (eastern Austria-northern Slovenia) to the Persani Mts. (Transylvania), from Nógrád-Gömör (southern Slovakia-Northern Hungary) to Balaton Highlands and Little Hungarian Plain (central-western Hungary).

Detailed isotopic and REE (Rare Earth Elements) and HFSE (High Field Strenght Elements) investigations have previously been performed in the above mentioned localities (Downes et al., 1992; Vaselli et al., 1995a), except for Nógrád-Gömör and Graz Basin. In this work, we present new isotopic and trace element data for 6 xenolith-bearing localities (Tobaj, Güssing, Grád, Kloch, Stradnerkogel, Neuhaus) in the Graz Basin where only the ultramafic xenoliths from Kapfenstein were previously studied (Vaselli et al., 1996). Güssing and Neuhaus can be regarded as new outcrops of mantle xenoliths since no mention of them has been found in literature.

The ultramafic xenoliths are mainly spinel peridotites although websterites, werhlites and pyroxenites have been found. Amphibole is always interstitial although discrete grains have found in Tobaj xenoliths. Textural features of the ultramafic xenoliths investigated indicate low to slight deformation, almost all the xenoliths being protogranular to porphyroclastic. The only exceptions are one xenolith from Neuhaus and one from Kloch which are equigranular and secondary, respectively.

Generally speaking, bulk-geochemistry and mineral chemistry of the single mineral phases indicate that most of the Graz Basin xenoliths seem to have suffered only a depletion by extraction of mafic melts at different degrees of partial melting because they have major and trace element contents which lie close to that of the Primitive Mantle as defined by McDonough (1990) or have lower contents but with the same trend (Vaselli et al., 1995b).

The REE and HFSE patterns for clinopyroxenes and amphiboles from the Graz Basin xenoliths are generally depleted in the more incompatible elements, most of the Ce_N/Yb_N ratios being from 0.23 to 0.65 and 0.23 to 0.57, respectively. Besides, Ti/Ti* and Zr/Zr* in clinopyroxenes and Zr/Zr* in amphiboles Ba, Nb, Sr and Ti contents indicate that mantle amphibole preferentially hosts these elements and their abundances are generally lower compared to amphibole megacrysts from CPR alkali basalts (Zanetti et al., 1995). Szabó et al. (1995) and Vaselli et al. (1995a) found similar values for interstitial amphiboles of ultramafic xenoliths from the Little Hungarian Plain and Persani Mts., respectively.

Sr and Nd isotopic composition for the clinopyroxenes are between 0.70210 and 0.70294 and 0.512960 and 0.51349 which indicate a depleted mantle and these ratios are strikingly similar to those observed in the ultramafic xenoliths from eastern margin of the CPR, i.e. Persani Mts. (Vaselli et al., 1995).

In conclusion, the REE and HFSE contents and the Sr and Nd isotopes for the ultramafic xenoliths from Graz Basin indicate that the lithospheric mantle beneath this region suffered enrichment/depletion processes very similar to those already observed for the xenolith suite from the Persani Mts. the two localities being situated at the peripheral parts of the mantle diapir which has been recognised by geophysical studies (e.g. Horváth, 1993; Lillie et al., 1994). Thus, the host