trachytes and Walkersdorf latites, have negative Ba-anomaly in respect to Rb and Th; the second, Weitendorf high-K basaltic andesites, Paldau latites and Mitterlabill high-K dacites show a small negative Ba-anomaly. Otherwise they share similar incompatible trace element patterns, including a significative negative Eu-anomaly in chondrite-normalized REE diagrams. The rocks of these two groups, all from the Styrian Basin, are geochemically clearly distinguishable from the Klagenfurt Basin volcanism, represented only by basaltic andesites and a high-K andesite from Kollnitz. These latter have a marked positive Th-anomaly and a steep chondrite normalized REE pattern with a strong LREE enrichment and no significative Eu-anomaly. The geochemical and petrological data so far obtained for the Miocene volcanism are compatible with a genesis by partial melting of a lithospheric mantle enriched by "subduction-related" components derived from the European lithosphere during the Paleogene N-S convergence which characterized the Eastern Alps/westernmost Carpathian transect. Such a delayed melting of a recently enriched lithospheric mantle is considered to be related to Miocene extensional collapse of the Eastern Alpine chain leading to the formation of the Pannonian Basin.

The studied Plio-Pleistocene volcanics are strongly silica-undersaturated and have a typical Na-alkaline affinity. They are mostly represented by lavas, except two vesiculated lava-like xenoliths within the pyroclastic rocks of Kalvarienberg and Riegersburg.

Their compositional variation roughly range from nephelinites (Wilhelmsdorf and Steinberg), to basanites (Steinberg, Klöch, Kindsbergkogel, Riegersburg).

The overall incompatible element pattern of the Plio-Pleistocene lavas is within the range of OIB; in respect to the OIB-average of Sun and McDonough (1989), they show an increasingly strong enrichment toward the most incompatible elements from P to Rb, which is in accordance with their strong silica-undersaturated character. In the Ba/Nb vs. K/Nb diagram these rocks plot in a narrow area, between the fields of Tristan da Cunha and St.Helena Islands. All these data are compatible with a derivation from low degrees of partial melting of an asthenospheric source.

Paleozoic evolution of the Tethyan domain

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Terranes now amalgamated in the Variscan orogen of southern Europe, formed a single ribbon like continent formerly attached to the northern side of Gondwana. This super-terrane detached from Gondwana in Silurian to form the northern margin of the Paleotethys. The western end of the super-terrane collided in late Devonian with the Laurentia-Baltica margin. The northern Paleotethyan elements are then incorporated into the Laurussian active margin as separate terranes: Mid and Central European and Intra-Alpine terranes.

Subsequently the Paleotethys started subducting northward under the accreted terranes. Terrane accretion and subduction of the Paleotethys have been responsible for the Variscan orogeny in Europe accompanied by crustal thickening up to a Cordillera stage in late Early Carboniferous. Then Gondwana and Laurussia are entering in a final continent-continent collision. The final closure of the oceanic domains is placed in Late Carboniferous. Crustal thickenning and arc magmatism during that period are rapidly followed by a general collapse of the Carboniferous active margin accelerating the closure of the remaining space between both super continents during the Late Carboniferous-Early Permian.

The northern orogenic areas have been affected by rifting since Carboniferous, starting with a major break-up along the Caledonian suture zone. In Late Carboniferous and Permian it is the Variscan accretionary complex which is affected by rifting. East of a paleo-Apulian promontory, this rifting graded into back-arc spreading (Hallstatt-Meliata marginal basin). The final closure of Paleotethys in these areas took place later between a migrating arc detached from Eurasia and a super-terrane derived from Gondwana, the Cimmerian continents.

On the Gondwana margin rifting took place first in Early Carboniferous certainly as a result of the partial collision with Laurussia at that time. But it is only when the Paleotethys engaged in an advanced stage of subduction that the Cimmerian blocks were removed from the Gondwana margin (inner Dinaro-Hellenides) to give birth to the Neotethys extending into the East-Mediterranean area.

The Cimmerian super-terrane comprises also a peri-Apulian plate domain: Tunisia, Sicily and southern Apulia and the Apulian elements from the Dinarides, Hellenides and Taurides. Due to a lack of space north of these elements they very quickly entered into collision with the collapsing European active margin during Late Carboniferous to Early Permian. Continuing translation of Gondwana westward provided some new space and a new rift appeared north of Tunisia-Sicily (the Sicanian-Lagonegro rift system connected to the Ionian sea-East Mediterranean basin). The western part of the Meliata back-arc rift (Southern Alps-Ivrea) aborted at that time, whilst its eastern part (Hallstatt-Meliata-Dobrogea) oceanised (e.g. Early Triassic MORB pillow lava of N-Dobrogea). During the Late Permian-Early Triassic collision of the detached inner Dinaro-Hellenides Variscan sliver with the Cimmerian elements.

Characteristics of the lithosphere reflected upon electromagnetic parameters along the magneto-telluric profiles in Romania

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Information carried out along the eight MT profiles crossing the Eastern Carpathians and Pannonian Basin - Romanian area are used to reveal the most important aspects related to the lithospheric structure insisting on the suture zone associated to the Carpathian Orogen and Tethyan one. Taking into account the magnetotelluric (MT) results referring to the lithospheric thickness variations, contact alignments and structural relations between the main tectonic units and placement of the enhanced conductivity zones (over 0.1S/m) an explanation of the link between the lithosphere dynamics and crustal deformation is to be attempted. By means of the geoelectrical cross-section elaborated for every profiles, a general spatial image was pursued to be achieved. The MT profiles bring into the light some characteristic aspects emphasizing the structural particularities of these two major tectonic units. A first problem is related to the thickness of the sedimentary cover (1000 - 3000 m in Pannonian Basin) and (13000 - 18000 m in the Eastern Carpathians's Foredeep). The transition zone from the crust to mantle, marked by a decrease of the resistivity (less than 10 ohm.m) and associated esspecialy to Orogenic areas stands for the interesting point to be clarified, as regarding its affiliation on the hand, by means of the electrical properties and of the assesed depth, and the causes which generated it, on the other hand. Obviously, owing to its involvement in revealing certain lithospheric aspects, the top of the asthenosphere (contact between tectonic plates of various thickness) was pointed out where it was possible.

East Carpathian-Pannonian connection according to geophysical data

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The geologic boundary between the East Carpathians and Pannonian Basin is eophysical data to be a part of the transcontinental Oder-Caucasian lineament separating the thick from thin lithosphere or hot from cold asthenosphere in Europe. Over this fault crustal thickness varies from 27-30 km in Pannonia to 56 km in East Carpathians. This boundary is very clearly seen in the geothermal field. The main thermal energy source is situated within Pannonia west of the Transcarpathian deep fault. The former caused lithosphere thinning and high-temperature asthenosphere formation under Pannonia at 60-65 km depth. Under the East Carpathians temperature decreases strikingly and the lithosphere thickens. The velocity, density and magnetic properties change. Here under the East Carpathians, the thin crust of the Pannonian basin is alternated by the thick lithospheric armour of the more than 65 km thick Cis-Carpathian through.

A rheological analysis of geophysical data enables us to express the following idea of the structure of this region. Under Pannonian basin the crust is thinned by high temperature to 28 km and thickens towards the Fold Carpathians. The sediments reach in the Transcarpathian through 5 km and rest on a young folded basement lying on plastic granites, which is demonstrated by high temperature (200° C) corresponding with granitoid creep. The plastic granitoids are underlained by 10-12 km thick brittle basites layer whose top is clearly traced by seismic data. The brittle-to-plastic basalts transition is not always a contrasting acoustic boundary and nearly coincides with the 520° C geotherm. The M-discontinuity separates in Pannonia basic from ultrabasic rocks which are in plastic state. The lithosphere thins to 60 km and has been destructed by high (to 1200° C) temperature.

In the East Carpathians bounded by deep faults crust thickens due to its doubling in granitoid and brittle basite layers. The M-discontinuity deepens even more in the Cis-Carpathian foredeep. This is due to sedimentary cover thickening and the appearance of a "crust-mantle mix" layer with 7.5-7.6 km/s longitudinal wave velocity. The large "crust-mantle mix" thickness is due to plunging of a layer of brittle basites ("basaltic plate") driven by