kilometers (>40 km) based on preliminary cross-sectional balancing efforts. These findings have an important corollary for the relative, pre-extensional position of the Northern Calcareous Alps (NCA) and the Transdanubian Central Range (TCR). Taking also into account the displacement on Miocene strike-slip faults in the NCA, e.g. the Salzach-Ennstal-Mariazell-Puchberg fault with a sinistral displacement of about 60 km, the restoration of Neoalpine deformation brings the NCA and the TCR unexpectedly close to each other. In fact, some WNW-trending right-lateral strike-slip faults in the TCR (e.g. Telegdi-Roth line) are interpreted to be analogous to those described from the NCA (e.g. Wolfgangsee-, Windischgarsten- and Hochwart fault). These Cretaceous tear faults were reactivated during the Late Miocene as it can be documented by reflection seismic data in the subsurface of the Danube Basin and the NCA.

The structural correlation between the NCA and TCR based on the characteristic wrench fault pattern provides further evidence for the much debated interpretation of the TCR in terms of a Cretaceous nappe-system in an Upper Austroalpine (or "Ultrastyrian") structural position. Furthermore, the recognition of regional-scale right-lateral strike-slip faulting in these major Alpine units has a significant impact on the kinematic/dynamic reconstructions of the Alpine-Carpathian-Pannonian area during Cretaceous and Tertiary times.

Tectonomagmatic constraints on the dynamics of the final stages of subduction in the Eastern Carpathians

Paul Mason[1], Hilary Downes[2], Ioan Seghedi[3] and Alexandru Szakacs[3]

[1] NERC ICP-MS Facility, Imperial College, Ascot, U.K.
[2] Department of Geology, Birkbeck College, London, U.K.
[3] Geological Institute of Romania, Bucharest

Changes in volcanic activity can be related to variations in critical tectonic processes responsible for melt generation. A rigorous investigation of magmatism in the Carpathian arc may therefore more closely constrain the style and timing of subduction in the Carpatho-Pannonian region.

The East Carpathian volcanic arc constitutes the youngest and most voluminous segment of subduction-related magmatic rocks in Eastern Central Europe. A general age progression of the climax of magmatic activity is seen along the East Carpathians from older volcanic structures in the north-west to the youngest in the south-east, a feature which is particularly striking over the final 200km of volcanic structures in Romania. Magmatism continued into the Plio-Pleistocene, significantly later than the perceived end of subduction along the Inner Carpathian arc which took place during the Miocene.

Trace element ratios in magmatic rocks from the East Carpathians are typical for subduction-related magmas and suggest an input of fluids from a dehydrating subducting crustal slab. A simple model of upwelling of hot mantle due to slab delamination and subsequent mixing with lower and upper crust cannot explain the chemistry of the East Carpathian magmas. It is necessary to have subduction to produce the volcanism. However, the relationship between the timing of subduction and the climax of magmatism remains unclear.

The migration of magmatic activity from north to south may be explained by a corresponding migration of the magma generating zone along the arc. Oblique subduction of a narrow oceanic basin or slab roll-back could create the necessary tectonic conditions for migration. Continental crust may have initially entered the subduction system in the north whilst oceanic subduction continued in the south. Subducted lithosphere would thus initially delaminate and break-off in the north of the East Carpathian arc and progress southwards with time. As more buoyant continental crust entered the trench, a slower subduction rate would lead to slab breakoff at shallower depths. If the slab broke off at shallow levels (<50km) in the extreme south of the arc, it may account for some of the unusual geological features (e.g. the eruption of alkaline magmas).

Tertiary tectonic evolution of Southern Carpathians external area - reconstruction using kinematic and depth data

Liviu Matenco[1] and Giovanni Bertotti[2]

[1] Faculty of Geology and Geophysics, Bucharest University, Romania
[2] Dept. of Sedimentary Geology, Vrije Universiteit, Amsterdam, The Netherlands

The evolution of Southern Carpathians external area is analysed by means of paleostress determination, outcrop to regional scale structures, as well as depth interpreted data. The main latest Cretaceous - Tertiary deformations can be summarised as following:

After the middle and late Cretaceous orogenic phases, the Southern Carpathians - Moesian platform system was affected by strike-slip deformation with NE-SW oriented compression and NW-SE tension. During Paleogene - Early

Burdigalian pure tensional deformation is recorded, which opened a WSW - ENE oriented extensional basin. In late Burdigalian, NE-SW oriented contraction caused the oblique inversion of the older extensional structures. During the Sarmatian times the strike-slip regime was dominant. First NW-SE (middle Sarmatian), followed by N-S (late Sarmatian) trending compression direction produced mainly NW-SE dextral strike-slip faulting and thrusting in the frontal areas. The structural analysis suggest that the Sarmatian deformations which took place in the foreland areas along a roughly E-W oriented corridor represent the effect of the regional dextral movement between the Southern Carpathians in the north and the Moesian Platform in the south. Late Pliocene deformations recorded by small scale local folding and thrusting represent the final deformation stage recorded in the studied area.

Lateral variations in the mechanical properties of the Romanian Outer Carpathians: Inferences of flexure- and gravity modelling

Liviu Matenco[1], Reini Zoetemeijer[2], Sierd Cloetingh[2] and Corneliu Dinu[1]

[1] Faculty of Geology and Geophysics, Bucharest University, Romania
[2] Department of Earth Sciences, Vrije Universiteit, Amsterdam, The Netherlands

We present the results of two- dimensional flexure and gravity modelling of the subsidence of the Romanian Carpathian foreland based on twenty profiles through the Southern and Eastern Carpathians. The small distance between the profiles allows us to investigate the lateral variations in tectonic behavior along the profiles and along strike.

In general the topographic elevation of the Romanian Outer Carpathian mountain belt is modest and the minimum in the Bouguer gravity anomaly, characteristic for flexural control of subsidence in foreland basins, is located relatively far to the foreland in respect to the Outer Carpathian mountain belt. This implies that the contribution of topographic loading to the evolution of the Romanian Carpathian foreland system is small and, therefore, a subduction (underplating) dominated tectonic regime controlled the nappes emplacement and basin shortening in the external flysch and molasse basins during the Late Tertiary.

The modelling results infer important variations in effective elastic thicknesses (T_e) and plate boundary conditions. Especially in the western part of the Southern Outer Carpathians values for Te are low and increase to the east. High flexural bending stresses and changes in rheological properties of the Moesian Platform are proposed to explain this behavior. Furthermore, field observations indicate that variations in deflection along strike may also be related to basement unregularities, stress field rotations and strike- slip movement along lateral ramps during the Tertiary.

Continental collisioin and the ending phases of subduction in the Eastern and Southern Carpathians: incorporation of geophysical data from Romania

Victor Mocanu[1] and Robert J. Lillie[2]

[1] Department of Geophysics, University of Bucharest, Romania
[2] Department of Geosciences, Oregon State University, U.S.A.

The Eastern and Southern Carpathians in Romania have been interpreted as the final phases of closure of an oceanic embayment through subduction. The subduction is ending as overriding terranes collide with thicker crust along the continental margin of Europe. This project incorporates newly available geophysical data from Romania, as the gravity data, along with drillhole, seismic reflection and earthquake observation.

Previous work analysed similar geophysical data to study crustal and lithospheric structure associated with earlier collision in the Eastern Alps and Western Carpathians. High topography in the Eastern Alps, along with crust and a broad region of low Bouguer gravity anomalies, suggested approximately 200 km of continued convergence after oceanic closure. The Western Carpathians, in contrast, show low topography, thin crust and a narrow region of low Bouguer gravity anomalies, suggesting only about 50 km of convergence after oceanic closure; the continental margin of Europe is thought to be beneath the mountains.

The Eastern and Southern Carpathians present a unique opportunity to study structure at the time when the ocean basin has just barely closed.

When mountains just begin to develop as sediments are thrust over the continental margin. The current study may thus be important in appreciating the stage of continental collision development in new and ancient mountain belts world-wide.