to post-glacial times. These magmas may be related to a widespread upwelling of the asthenospheric mantle beneath Europe. They could not be erupted from the upwelling asthenosphere until after the subducting slab had become detached and had sunk into the asthenosphere. Such "slab window" alkali basalts have been observed in other regions of the world when a subducting slab has been detached.

Pre-Alpine and Alpine metamorphic history of the Sopron Hills (Burgenland, Austria)

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The Sopron Hills, in the borderland between Austria and Hungary, represent one of the easternmost occurrences of the Central Alps towards the Carpatians and in spite of the poor outcrop situation they play an important part in understanding the geology of this area. Andalusite (And) - bearing lithologies of presumed pre-Alpine age have been recognised in the Hungarian part of the Sopron Hills for several years. This work deals with the continuation of these rocks into the Austrian part of this crystalline massif. Petrological, geochronological and structural investigations of the partly well preserved pre-Alpine And-bearing rocks give major insights in the *pre-Alpine* metamorphic history, the *Alpine* overprint and the post-mid-cretaceous tectonic exhumation by normal faulting.

Lithologies with a relatively well preserved pre-Alpine mineralogy, which outcrop predominantly in the uppermost levels of the Sopron Hills, comprise the *Óbrennberg-Kaltes Bründl Series (ÓKB)* consisting of schists and feldspar-rich schists with varying amounts of kyanite, sillimanite, and locally preserved andalusite. The rest of the massif with strong Alpine metamorphic overprint comprise gneisses and monotonous diaphthoritic mica schists with varying quartz contents and numerous rectangular to rhomboic pseudomorphs after staurolite (Stau), which is called *Sopron Series (SS)*.

Rb/Sr-mineral-ages in both series show partial Alpine resetting, although this was much more effective in the SS than in the ÓKB, where the oldest mineral-ages of the Sopron Hills are preserved.

The mica schists of both series are geochemically relatively similar. According to major- and traces discrimination diagrams, shales with an island-arc-signature are the most probable protolith for these rocks. Major- and trace-element discrimination diagrams for the amphibolites point to a protolith with ocean-floor-affinity, while the gneisses classify as peraluminous syn-collision granites.

The conditions of the pre-Alpine high-T metamorphism in the *ÓKB* are estimated at 650° C and 3-5 kbar. There is strong evidence for an Alpine metamorphism in the SS, with peak-conditions at 550 ± 30° C and 9.5 ± 1.5 kbar.

The SS in this area is believed to belong to the Lower Austroalpine "Grobgneis Unit", whereas the *ÓKB* show striking similarities to the Strallegger Gneisses and to the „Dist-Paramorphosenschiefer" (Koralpe), which are part of the Middle Austroalpine Units.

Although the present tectonic arrangement is supposed to be partly a result of the large scale nappe-transport during the Alpine orogeny the dominant ductile deformation within the mylonites and leucophyllites (shear bands, strain fringes, scc'-fabric, crystal preferred orientation and shape preferred orientation of dynamically recrystallised quartz) indicates a top-to-SE extension. These micro- and mesoscopic kinematic indicators as well as the geometric arrangement of the ductile to brittle deformation style and the Alpine metamorphic overprint suggests extensional exhumation along a SE-dipping normal fault.

Tertiary tectonic evolution of the Pannonian basin system and neighbouring orogens: a new synthesis of paleostress data

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The combination of a paleostress data base, borehole, gravity and seismic data, paleogeographic and stratigraphic information suggest that 7 major Tertiary tectonic episodes can be recognized in the Pannonian basin and surrounding orogens. The first two episodes affected two, separated major blocks, the East Alpine-Western Carpathian-North Pannonian (Alcapa) and the South Pannonian-Eastern Carpathian (Tisza-Dacia) blocks.

A Middle Eocene to Early Oligocene N-S compression is connected to contractional basin formation in the foreland and hinterland of the Alpine-Carpathian orogenic wedge. Due to the north-westward shift of the Adriatic promontory, the Alcapa terrane was separted from the Southern

Alps. This process probably started during latest Oligocene, and accelerated during the Early Miocene. The main dextral slip was accommodated along the Periadriatic and Mid-Hungarian shear zones. This dextral separation was associated with the lateral extrusion of the Alcapa wedge. During and/or after this tectonic episode, within the Ottnangian the eastern (Pannonian-Carpathian) part of the Alcapa suffered 50° CCW, the southern Tisza-Dacia block 60°-80° CW rotations.

The Pannonian basin system was born by rifting of back-arc style during the late Early and Middle Miocene time. The tension was oriented initially eastward, toward the free interface of the Carpathian subduction front. From the middle Badenian onward the direction of tension were controlled both by the retreating subducted slab and by the gradual cessation of thrusting in the Western Carpathians. The norheastward drag (NE-SW tension) was gradually replaced by E-W to SE-NW tension. After the cessation of thrusting along the northeastern segment, the whole basin was slightly compressed and some parts were inversted. During the Late Miocene, E-W to NE-SW tension renewed. From the latest Miocene the compressional tectonism has propagated from the Southern Alps gradually into the Pannonian basin and resulted in Pliocene through Quaternary inversion and uplift.

Miocene tectonic evolution of the Periadiatic Zone and surrounding area in Slovenia: repeated dextral transpression

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Dextral separation of the Periadriatic zone was postulated by several authors using divers criteria, but detailed kinematics and timing of movements were not yet investigated along its whole length. Stratigraphic and sedimentological study, structural and paleomagnetic measurements, mapping, borehole data analysis permitted to unravel the Miocene-Quaternary tectonic evolution of its Slovenian segment.

The brittle deformation was characterised by NNW-SSE (NW-SE to N-S) compression and perpendicular tension. The prominent style of deformation within the two main shear zones, the Periadriatic line-Sostanj fault system and the subparallel Sava-Celje fault zone is penetrative dextral strike-slip faulting associated with folding and verticalisation of beds. Such dextral transpression took place in the Early Miocene (Ottnangian), than during the Karpatian, and reoccurred several times during the Late Miocene and Pliocene and lasted up to the Quaternary. Between the two shear zones, the western Smrekovec area is characterised by sinistral transpression, while the eastern Savinja block was affected by dextral transtension.

The highly strained rocks within the dextral shear zones show mainly clockwise, sometimes counterclockwise rotations, variable in amount. The non-coaxial nature of faulting was detected by the comparison of paleomagnetic and stress data; NE-SW compression occurred in sites where important CW rotation took place. The area of sinistral transpression could be rotated slightly in clockwise direction, following domino-type rotation induced by the boundary dextral shear zones.

Relationship between tectonic zones of the Albanides, based on results of geophysical studies

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The Albanides link the Dinarides and the Helenides, with which they form the southern branch of the Mediterranean Alpine Belt. Our analysis of the Albanides and their extension into the Adriatic Sea integrates surface geological observations, well data and results of seismological, refraction and reflection seismic, gravity, magnetic and geoelectric surveys.

Evolution of the Albanides began with the Triassic subsidence of their Hercynian substratum under a tensional regime, culminating in crustal separation and opening of the Subpelagonian and Hellenic-Dinarid oceanic basins. The Alpine orogenic history of the Albanides spans Late Jurassic to Quaternary times and can be subdivided into a Late Jurassic-Early Cretaceous tectonic, a Mid-Cretaceous to Eocene main-tectonic, an Oligocene-Miocene late tectonic and Plio-Pleistocene neo-tectonic cycle.

The Albanides consists of two major paleogeographical domains. The Internal Albanides formed part of the oceanic Subpelagonian Trough, whereas the External Albanides developed out of the western passive margin and continental shelf of the Adriatic plate. During the early-tectonic phase, the ophiolitic Mirdita nape was obducted onto the margin of the Adriatic plate. This was accompanied by the development of a flexural foreland basin.