graphic orientation is observed for the whole spiral. Local geological data and microstructural elements tend toward a simultaneous growth and rotation for the core region of the snowball garnet, whereas subsequent garnet growth occurs under a non rotational regime. The similarity in geometry between the central sector domains and the geometry acquired by the snowball garnets under the rotational regime strongly suggests that as long as the growth is accompanied by rotation, the primary core orientation is preserved, but once the rotation stops the crystallographic orientation may change.
EBSD data also indicate that the central domain displays a crystallographic orientation characterized by a [001] pole oriented sub-parallel to the symmetry axis of the snowball garnet. Moreover, in most crystallographic sectors, one of the two other [100] poles is (sub)parallel to the orientation of the internal foliation. This feature suggests that the crystallographic orientation across the garnet spiral is not random and that a relation between symmetry axis, internal foliation and crystallographic orientation does exist. Several arguments indicate that EBSD data can represent an indicator of the modification of the growth regime during the formation of the snowball garnet. In this view, EBSD data can potentially be used to distinguish between the rotational and non-rotational models.

## Determination and interpretation of vertical pressure gradients throughout the Plattengneiss shear zone, Koralpe, Eastern Alps

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The Plattengneiss is one of the largest shear zones in the Eastern Alps. It is flat lying, about 500 m thick and crops out over almost 1000 km$^2$. It is characterised by a strong mylonitic foliation, a strictly north - south striking lineation, an absence of obvious shear sense indicators and it does not separate different tectonic units in the hanging- and the foot wall. Thus, main kinematic features during the development in the Eo-Alpine orogenic event are still unknown. In this project barometric gradients across the shear zone were measured in order to determine the vertical kinematics via petrological methods.
Samples from the hanging- and the foot wall of the Plattengneiss shear zone were collected. Based on published geometrical models of the shear zone the vertical distance of each sample from the shear zone margin was calculated. Formation pressure was then determined for each sample using THERMOCALC 3.30, paying careful attention to compare identical parageneses in all samples. Moreover, pressure differences were determined for selected hanging wall and foot wall pairs. For this, a new facility of THERMOCALC was employed. Pressure differences can be determined with much more precision than absolute pressures, as many of the errors cancel out.
Pressure differences throughout the whole outcrop area of the Plattengneiss show systematic trends. Typically, pressure differences between hanging wall - foot wall pairs are too high compared to the vertical distance between the two samples. For example, two samples with 2 km vertical separation record a pressure difference of approximately 2 to 4 kbars.
Being aware of that, all samples were listed in an order corresponding to the vertical distance from the shear zone contacts. Two possibilities of vertical pressure gradients are fit to the data. Both feature a more rapid increase of pressure with depth than can be explained by a lithostatic gradient. Both suggest that about 10 km of material in a vertical extension are missing. We suggest that this may be interpreted in terms of a strong component of flattening or as a loss of material during deformation. Moreover, it can be observed that the formation pressures in the Plattengneiss are higher than pressures in both the hanging- and the foot wall. Interpretations of this observation in terms of (a) tectonic overpressure, (b) the shear zone recording a different stage of the metamorphic evolution and (c) the Plattengneiss representing a low viscosity channel are discussed.

## The Styrian Tectonic Phase - A series of events at the Early/Middle Miocene boundary (Styrian Basin, Central Paratethys)

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The *Styrian Phase* of Stille (1924) characterises multiple tectonic events at the Early/Middle Miocene, i.e., Karpatian/Badenian boundary. This phase is based on the observed Neogene tectonic history in the Styrian Basin, Austria. In a geologic setting, the Styrian Basin belongs to the western part of the Intra-Carpathian Pannonian Basin system. Basin formation started during the Early Miocene, probably during Ottnangian. On top of deeply eroded Austroalpine nappes, swamp and flood deposits are transgressed by the Paratethys Sea in Karpatian time.
Angular discordances and sedimentation gaps characterize the Early/Middle Miocene, the Karpatian/Badenian boundary. On top of the Karpatian, deep water sediments of the „Steirischer Schlier" follow a series of marine ingressions of the Badenian Sea in the realm of Central Paratethys. During Badenian, tectonic activity is accompanied by extensive volcanism.
Changes in sedimentation, discordances, sedimentation gaps, as well as tectonic and volcanic activity demonstrate the *Styrian Phase* as a multiphase event around the Early/Middle Miocene boundary. New stratigraphic results in combination with paleomagnetic and micropaleontological investigations allow a timing of these events. A major event is present between the sedimentation of the Karpatian *Steirischer Schlier* and the lowermost Badenian silts, with tilting of the *Steirischer Schlier*, and a sedimentation gap between 16.5 and 16.1-16.2 my. The next gap occurred around the nannoplankton zone NN4/NN5 boundary (14.74 my) between chron C5Br and C5Bn.1n, ranging from about 15.4 to <14.8 my. A third discontinuity at the base of corallinacean limestones is too short to be dated in the Wagna section. The sedimentation gap is extended in the Retznei sections from the top of Karpatian *Steirischer Schlier* to the base of carbonate sedimentation (larger gap between NN4 and NN5). Only in a few places sandy-silty sediments of the Early Badenian are intercalated below the carbonates. Volcanic ash layers and tuffites are deposited within the marls of zone NN5, in the overlapping range of *Praeorbulina* and *Orbulina*, which belong to chron C5ADn (14.19-14.58 my).
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Stille, H. (1924): Grundfragen vergleichender Tektonik. - 1-443, Berlin (Borntraeger).