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Interpreting late stage warping of a crustal scale shear zone:

The Plattengneiss shear zone of the Eastern Alps

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The Plattengneis is a flat lying shear zone that crops out over 600 square kilometres in the Koralpe Complex of the Eastern Alps. The region is well known for its high metamorphic grade and also hosts the eclogite type locality. The Plattengneiss shear zone dips in and out of the topography and it appears to be warped into large open folds on a kilometre length scale, but it remains unclear what their geometry is and if these folds belong to a single mylonitic horizon. However, although the mylonitic deformation of the Plattengneiss shear zone has been studied in some detail (Krohe, 1987; Kurz et al., 2002), both the large scale geometry of the shear zone and its post-Eo-Alpine deformation history remains not very well understood.

The overall geometry is of interest because shear heating of the Plattengneiss has been suggested as a possible contributor to the heat budget during Eo-Alpine metamorphism (Stüwe, 1998). In order to evaluate such hypothesis it is necessary to constrain details of its volume and distribution in this region of little outcrop. The late stage deformation history is of interest because it occurred in an important part of the evolution of the region: It occurred during the subsidence of the near by Gosau basin and simultaneous exhumation of the Gleinalm dome (Neubauer et al., 1995).

In order to constrain the spatial geometry of the shear zone, we have modelled the shear zone in 3 dimensions. For the modelling, we used 800 field data points from where the position relative to the Plattengneiss is known (above, within or below) and the interpretative software 3D weg as amodelling tool to constrain the geometry of the shear zone contacts. It is shown that the shear zone is made up of a single, 500m thick mylonitic layer that is folded into 4 open synforms and 5 antiforms with a mean distance of about 5 km. In the south, these folds strike WNW-ESE and turn towards an N-S direction in the north. This geometry indicates that the folding event was highly non-coaxial. We suggest that this geometry may be interpreted in terms of a southward propagation of folding and exhumation of the region during the late Cretaceous.

The robustness of our model is tested by reducing the data density used for the three dimensional modelling. It is shown that even models with 80% data reduction provide reasonably good predictions of the distribution of Plattengneiss outcrops.

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