THE ZUGSPITZE CROSS SECTION AND THE STRUCTURE OF THE WESTERN NORTHERN CALCAREOUS ALPS

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fold-and-thrust belt, deformation partitioning

In a cross section of the southern part of the Northern Calcareous Alps between in the Inn and Loisach valleys across the Zugspitze, the Triassic reef complexes of the Wetterstein mountains in the north and the Mieming chain in the south are thrust onto Albian sediments. In spite of the comparable structure, the Wetterstein mountains have been correlated with the Lechtal thrust sheet. It was suggested that this unit was transported to its present-day position by a south directed backthrust. The main reason for this is that the Wetterstein mountains are in stratigraphic contact to their north-eastern foreland, and cannot be separated from the Lechtal thrust sheet. The Mieming chain, however, has been regarded to belong to the north-transported Inntal thrust sheet.

The main problem in the long-lasting controversy are the thrust models used. Previous authors tried to define thrust sheets that are completely separated by a thrust from their substratum, and were emplaced during a single shortening event. Thrusts can, however, loose offset and die out laterally. In the case of the Zugspitze, the thrust boundary of Triassic onto Albian rocks was exhumed by a younger out-of-sequence thrust that dies out toward the east, where shortening is taken up in a series of folds. Therefore, the Albian thrust in the Wetterstein mountains is continuous with the Albian thrust in the Mieming mountains, and the Lechtal and Inntal thrust sheets are not entirely separated.

Cretaceous thrusting has been associated with folds with NE- to ENE trending axes, contrasting Cenozoic shortening with WNW-trending axes. All folds in the Mieming range, the Wetterstein and Karwendel mountains have W- to WNW-axes, inspite of their position on top of a Cretaceous (Albian) thrust. A distinct change of fold axis direction is observed across the WNW-striking Höll fault. We suggest transpressive thrusting and deformation partitioning, causing the coexistence of NE-trending axes to the south and WNW-trending axes to the north of the Höll fault. Unfortunately, this eliminates the possibility to correlate shortening direction and fold axis orientation with deformation phases based on orientations.