

Coupes géologiques des Alpes occidentales suisses

Escher A., Masson H. & Steck A.

Two geological profiles across the Western Swiss Alps have been constructed. Profile A-B cuts mainly across the upper tectonic units: the Prealpine, Helvetic, middle and upper Penninic, and Dent Blanche nappes. Profile C-D gives a view of the lower units: the external basement massifs, the lower Penninic nappes and the root zones of the higher nappes. Because of the axial plunge constantly directed towards the W or SW in the internal Penninic Alps, the two sections are here complementary. On the contrary, in the external part of the profiles the opposite axial plunges and the longitudinal discontinuities of some tectonic units make that they do not complete each other so well.

The profiles have been constructed by lateral projection of observed facts on the planes of the cross sections. Because of often non-cylindrical folds and varying trends and plunges the projection paths are generally curved. The marked Alpine topography has mostly made it possible to construct accurately enough these projection paths. No attempt has been made to extend the profiles beyond a depth where construction remains reasonable and coherent by this method. The only way this could be attempted would be by the "balanced cross section" technique. However, we think that conventional, two dimensional balanced profiles are only valid in thin skinned belts and not in the deeper zones where deformation was very ductile with varying strain directions. Here the balancing of the sections would need to be three dimensional and would imply a much better knowledge of the strain ellipsoids and of alpine paleogeography.

It is important to note that most of the internal and lower Alpine nappes are fold nappes with normal and inverse limbs. True thrust nappes mainly occur in the external and upper part of the belt. The Helvetic nappes offer interesting examples of an intermediate situation, with inverse limbs present at some levels or for some stages of the emplacement of the nappes, and not at others.

The colours have been chosen in a way to show the main tectonic units and their relations. We have tried to give the same colour to the units probably derived from the same paleogeographic domain. For instance the Gurnigel-Sarine, Brèche, Mont Fort and Mont Rose nappes possess the same colour because they all are likely to have originated from the external border of the Piemonte basin.

Finally several new propositions are given concerning the tectonic subdivisions and the origin of the different nappes.