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Deformation of the Subalpine Molasse seemingly progressed from the internal to the external part. It was coeval with deformation in the hinterland and sedimentation in the Plateau Molasse. An area balance suggests that in eastern Switzerland shortening within the Subalpine Molasse is compensated in the pre-Triassic basement by bulging of the Aar massif. In western Switzerland, where the basement uplift is more important, additional shortening might be related to the folding of the Jura.

3-D constraints for tectonic models of Molasse Basin and Jura arc deformation in Central and Western Switzerland

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Balancing sections across frontal parts of the Central Swiss Alps between the crest line of the external crystalline Aarmassif and the most external Jura yields invariably some 25 km or more of net cover shortening. This amount of shortening seems to be constant across the major cross-strike discontinuity represented by the disappearance of the Jura fold belt in the east. The decreasing net shortening of the Jura seems to be compensated by an increased shortening within the more internal subalpine Molasse belt. The two most external latest alpine deformation zones: Jura and Subalpine Molasse are proposed to be formed in an en échelon array in front of a large indenter, the main body of the Central Alps. According to this model (Fig. 2; Burkhard 1990, Fig. 7) the seemingly undeformed Plateau Molasse of Central Switzerland, particularly in an area between Zürich and Bern, had to undergo a dextral shearing deformation (corresponding to Laubscher's (1961)) 7°-clockwise rotation of the Jura indenter. Given the summary knowledge about structures and internal deformation within the Plateau Molasse this model seems at least a viable alternative to the currently proposed models of Jura arc formation. Many of the still largely accepted ideas about Jura and Molasse tectonics clearly violate simple 3-D mass balance considerations. As an example, it is extremely difficult to accomodate the Jura arc by a "radiating" push (balanced cross sections are drawn WNW-SSE in the western and N-S in the eastern part of the Jura!) without extensively deforming the Hinterland (Molasse) by considerable SW-NE strike parallel extension. Jura and Molasse tectonics are intimately linked with each other and an increased knowledge in either area will have consequences for a better understanding of the entire Alpinefront (Fig. 2).

REFERENCES

BURKHARD, M. 1990: Aspects of the large-scale Miocene deformation in the most external part of the Swiss Alps (Subalpine Molasse to Jura folg belt). Eclogae geol. Helv. 83, 559–583.

HEIM, ALB. 1921: Geologie der Schweiz. Tauchniz, Leipzig.

LAUBSCHER, H. 1961: Die Fernschubhypothese der Jurafaltung. Eclogae geol. Helv. 54, 221–280.

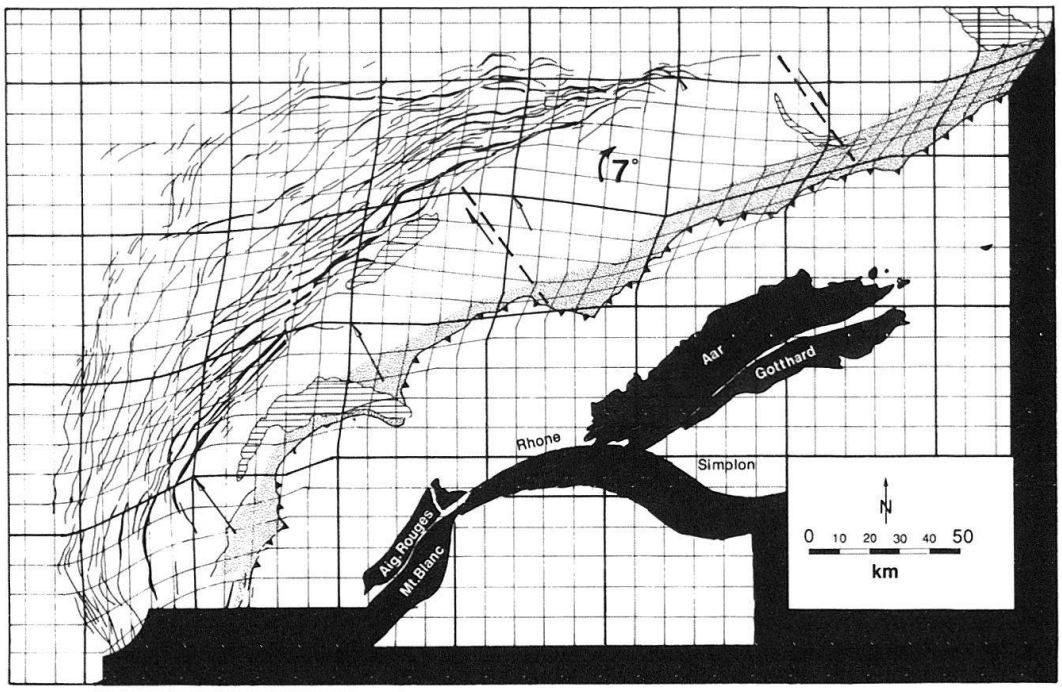

Fig. 2. New model for the large-scale Miocene deformation of the northwestern mountain front of the Swiss Alps. Deformation is visualized through the present day, deformed state of an initially rectangular Miocene coordiante grid with 10 km spacing. Fold trends (anticlines) in the Jura fold and thrust belt are copied from Heim 1921, plate XX. (From Burkhard 1990).

Seismic facies changes and Flower Structures – indicators for significant lateral block movements within the Swiss Molasse Basin

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Seismic sequences within the Middle and Lower Mesozoic interval below the Molasse Basin of northeast central Switzerland tend to thin out in a southerly or easterly direction. Within individual wedge-shaped sequences, defined by unconformities and regionally consistent reflectors, the seismic facies changes laterally in a more or less consistent way.

On long regional seismic dip lines it is often possible to laterally distinguish a typically northern from a typically southern seismic facies within a particular seismostratigraphic unit. However, locally the seismic interpreter is puzzled by difficulties of correlating seismic sequences and events across faults, particularly when both thickness and facies of some units seem to change abruptly. Such changes across faults were originally regarded as a serious nuisance to seismic interpretation in an area with a relatively wide and irregular grid of lines of different vintage and differing processing, lines that moreover often cut faults at random, or worse, at acute angles.