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Deep Alpine and Perialpine Valleys

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A map of the bedrock topography of the inner alpine and perialpine area shows (a) that some sectors of the main valleys are very deep and (b) that equally deep valleys exist also outside the major actual valleys, completely filled–in with complex glaciogenic, lacustrine and fluvial sediments. The term overdeepened valley or valley sector has been used to describe the phenomenon. However, the genetic processes behind are not known to an acceptable level. Some very few specific sites within the Alps can be explained as basins of confluence of several glaciers. Otherwise it is difficult to argue that glacial erosive action is responsible for overdeepened valleys out to the limits of glaciation. One major handicap in the discussion on the genesis of the deep valleys is the lack of knowledge of their (detailed) morphology and shape. The few points where bedrock levels have been reached by drilling do not allow deciding if we are dealing with a system of gorges or with a succession of basins. Most available reconstructions are favoring the basin model – but is it correct? Behind the basin or gorge model is the question of the main erosive agent: rivers (for the gorge) and glaciers (for the basin). And if it should be a system of drowned gorges, the controversy about postmolassic differential uplift is added.

Apart from this dilemma three facts are known: (1) sediment infill may reach several hundreds of meters, therefore bedrock surface may be below sea level by several hundreds of meters as well (e.g. Lake Geneva, the inner–alpine Rhone Valley, the Aare Valley with Lake Brienz), (2) the age of the sedimentary fillings dates back over several glacial cycles at least some of the deep sectors have been eroded during Middle Pleistocene or before, (3) in the insubric area these deep valleys contain Pliocene marine sediments; they are, with this reasoning, related to pre–Pliocene erosion (Messinian?). This age relationship points to a likely north – south disharmony

with the deepest erosion reached earlier to the south than to the north of the Alps.

The phenomenon of deep valleys is discussed in an alpine context and related to a basin–and–riegel concept. It is also illustrated that the deep valleys are one of the remaining mysteries of alpine geomorphology.