

MIOCENE SHIFTS OF THE DRAINAGE DIVIDE IN THE ALPS: EVIDENCE FROM SEDIMENT BUDGET, PROVENANCE AND GEOCHRONOLOGICAL DATA

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The sediment budget of circum-Alpine basins has been quantified in order to compare sediment masses derived from the northern (western) versus the southern (eastern) flank of the Alps. The evolution of the major catchment areas since Oligocene time is shown in a series of sketch maps.

A fast shift of the drainage divide towards the N at ~17 Ma and back to the S at ~11 Ma is deduced in the Swiss and Western Alps. The shifts affected a catchment area of ~ 6,000 and ~13,000 km² in size, respectively. Although the tectonic setting and exhumation history of the Swiss Alps in Miocene time suggests that the area of the Lepontine dome was affected by this shift, thermochronologic data prove that at least the northwestern part of this core complex constantly discharged freshly cooled crustal material to the N. Since no indications of a relevant asymmetry in climate, especially contrasting precipitation, exist in Miocene time for the two opposite flanks of the orogen, a tectonic explanation for the shifts of the drainage divide is favoured. Important catchment reorganizations in the Alpine foreland, occurring also at 17 Ma and 11 Ma, were forced by Alpine thrusting and uplift in

Lower Austria (Amstetten swell, as part of the Bohemian massif) and of the Swiss Jura, respectively.

In the Eastern Alps, no such dramatic shift of the drainage divide is observed. Marker pebbles in Molasse foreland fans indicate that until about 11 Ma a part of the Adamello pluton and thus the South Alpine realm was part of the paleo-Inn catchment. Probably, the Periadriatic lineament provided a west-east dewatering line, whereas the Brenner line provided a dewatering line to the N. Marker pebbles from south of the Tauern window were probably transported westward to the Brenner line and then to the N. Since 11 Ma, the drainage divide probably stepwise retreated towards the NE. According to longitudinal river profiles, the Rienz river N of the Dolomites was the last to be captured by the Etsch/Adige river system.

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