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# The topographic analysis of Western Alps: a contribution to the reconstruction of Late Miocene to Present landscape evolution

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The Western Alps, a double vergent mountain chain, are thought to be a post-orogenic collapsing belt as neotectonic, seismotectonic and geodetic data suggest. Moreover, AFT data show high cooling rates during latest Miocene-Pliocene final synchronous exhumation of the External Crystalline Massifs, but also provide evidence for diachronous Neogene evolution along and across the internal arc. Since mountain chain topography results from the interaction of geomorphology and tectonics, we analyzed the Western Alps topographic pattern focussing on local relief, swath profiles, drainage pattern, and stream longitudinal profiles to quantitatively characterize the influence of both surface and tectonic processes. Our main data source is a ca. 1 km pixel size DEM (GTOPO30), whereas bedrock erodibility and denudation rates are taken from literature. Our results indicate that both lithology and tectonic structure are the main factors ruling the topography and drainage pattern of the study area. Nevertheless the high values of concavity and steepness indices of the stream long profiles suggest a strong influence of glacial erosion as well as uplift rates. The regional water divide tends to migrate W-wards since the faster uplift occurring in the external arc prevents the regressive erosion of French rivers. The axial sector of Western Alps is characterized by a low local relief that is interpreted as a record of a previous gentle topography now almost completely eroded and testified by the position of peaks at about the same elevation. This smoothed landscape may be related to different processes and genetic environments occurred before the post-Miocene uplift of the chain. Finally, an integrated geological, morphological and morphometric study of the lower Sesia R. valley (Piemonte, Italy) allowed to reconstruct the 0.8 Ma stream long profile, and to calculate an incision rate of 0.2 mm/yr for the Middle Pleistocene-Present interval. This value is comparable to sedimentation and erosion rates estimated in the surrounding areas.