



The significance of main water divide study for tectonic geomorphology of an intraplate mountain range, the Sudetes, Central Europe

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The Sudetes are a large tract (c. 300 x 80 km) of upland and medium-altitude (up to 1602 m a.s.l.) mountain terrain in central Europe north of the Alps, interpreted as subject to differential uplift and subsidence in the late Cenozoic in the predominantly extensional regime. However, tectonic topography is superimposed on geomorphic features arising the long-term denudation of this lithologically and structurally complex mountain range. Therefore, separating tectonic and non-tectonic factors as well as deciphering the interactions between active tectonic controls and surface response remain a challenge. In this study we explore the significance of the main and some secondary water divides for elucidating the spatial pattern of vertical displacements, using elevation data derived from high-resolution 1 m DEM resampled to 10x10 m resolution. The main water divide is 516 km long and winds along the Sudetes, shifting position from the north to the south of the range and causing considerable asymmetry of regional drainage pattern. Shifts to the south-west from the theoretical range symmetry line are more common, suggesting more uplift in the south-west. Likewise, the divide varies in terms of altitude, with high (>1000 m a.s.l.) terrains alternating with less elevated uplands and wide intramontane basins. In several sub-regions the divide runs perpendicular rather than parallel to the elongation of the range, possibly indicating the presence of tectonic structures transversal to the extension of the range. The main divide separates drainage basins of contrasting morphometric properties, with drainage to the north-east being more integrated, whereas south-facing basins are more elevated and steeper. The study of water divide against regional topography supports the concept of spatially varying uplift of the Sudetes and helps to propose sub-division of the range into second-order morphotectonic units.