



The Mid-Miocene Marine Cliff Line – A Natural Erosion Contour Line and Paleogeodetic Marker of Surface Uplift, Swabian Alb, Germany

Markus Hoffmann and Anke M. Friedrich

Department of Earth and Environmental Sciences - Geology, University of Munich, Germany (ma.hoffmann@lmu.de)

Paleoshorelines and marine cliffs are recorders of surface uplift and relative sea-level variations. These ancient coastlines are often segmented and their history is hampered by an overprint of regional earth surface processes. One outstanding example of such a coastline is the c. 17 Ma marine cliff line, which records some combination of coastline migration, uplift, and southeast-directed tilting of the Swabian Alb, probably related to flexural-bending of the Alpine foreland basin, and rift-flank uplift of the southern Black Forest. This study aims to quantitatively examine the temporal and spatial evolution of individual cliff segments relative to the foreland basin since c. 17 Ma. The marine cliff, used as a marker and natural erosion contour line in our study, can be followed for > 200 km along the southern margin of the Swabian Alb. Cliff remnants are exposed at six well-described locations, which range in elevation from < 350 m in the northeast to c. 800 m about 200 km along strike to the west, implying regional-scale southeast-directed tilting. In addition, previous publications postulated local variations in cliff height of 50 to 90 m. However, our evaluation of previously published observations reveals a significant range in stratigraphic age, hampering the along-strike correlation of the paleo-cliff. We compiled published data and mapped cliff-related features on digital elevation models and satellite images. We also collected new data from outcrop surveys, including differential GPS measurements of the cliff exposures. Our preliminary results show that the paleocliff was affected by younger regional-scale tectonic and fluvial erosion processes, which limits the direct usability of the paleocliff as a paleogeodetic marker. Further fieldwork, geodetic surveying, and better stratigraphic control is underway to resolve the significance of vertical relief on the cliff line, and to quantify the tectonic and erosional processes involved.