Geophysical Research Abstracts
Vol. 20, EGU2018-17446, 2018
EGU General Assembly 2018

Assessing Relative Landscape Maturity of Anticlines along the NW Segment of the Zagros Mountain Front Flexure, Kurdistan Region of Iraq

Mjahid Zebari, Payman Navabpour, Christoph Grützner, and Kamil Ustaszewski
Institut für Geowissenschaften, Friedrich-Schiller-Universität Jena, Jena, Germany (mjahid.zebari@uni-jena.de)

The Zagros Mountain Front Flexure (MFF) separates the Simply Folded Belt from the Zagros Foredeep. It has been allocated to an inherited basement fault that has been reactivated c. 5 Ma ago due to the Eurasia-Arabia convergence. The MFF marks a dominant topographic step and is characterized by numerous active anticlines atop of fault strands emerging from the basement fault. Little is known about the relative ages and growth rates of these structures, and if deformation is localized or distributed on a number of faults. In order to identify the most active structures and to estimate the slip rates of the underlying faults, we assessed the relative maturity of the landscape along three anticlines (from SE to NW, the Harir, Perat and Akre anticlines), which are located on the hanging wall of the NW segment of the MFF in the Kurdistan Region of Iraq. While Akre shows deeply incised valleys and advanced erosion, Harir and Perat have a relatively smooth surface and are supposedly younger than the Akre. Landscape maturity was evaluated using geomorphic indices such as hypsometric integral, surface roughness, surface index, and stream-length gradient index. Then a landscape evolution model for the Harir anticline was built with Landlab toolkit (Hobley et al., 2017)* in order to measure the relative time difference between the maturity stages of the three anticlines. The present-day topography of the Harir served as a starting model. The stream power equation was used to introduce erosion from a fluvial system, and the hillslope diffusion equation was applied to account for sediment transport. For different time steps of model evolution, we calculated the hypsometric curves and other indices of the landscape generated from the Harir model. A comparison of the values to those of the present-day Akre topography reveals that it will take the Harir anticline 140±20 kyr to reach the maturity level of today's Akre anticline. Since the factors that control geomorphology (lithology, structural setting and climate) are similar for all three anticlines, and under the assumption of constant growth and erosion rates, we infer that uplift in Akre started 140±20 kyr before Harir started to grow, with the Perat anticline lying closer to the Harir . Our method of estimating the relative age difference can be applied to many other anticlines in the MFF region that eventually develops into a model of temporal evolution of this fold belt. This will shed light on how folds develop over time in a setting where deformation in shallowly detached stratigraphic successions is controlled by a major basement fault.

* Hobley, D.E., Adams, J.M., Nudurupati, S.S., Hutton, E.W., Gasparini, N.M., Istanbulluoglu, E., and Tucker, G.E.: 2017, Creative computing with Landlab: An open-source toolkit for building, coupling, and exploring two-dimensional numerical models of Earth-surface dynamics, Earth Surf. Dynam., 5, 21–46, doi:10.5194/esurf-5-21-2017.