



Tectonic geomorphology of the Safeen Anticline (Northern Iraq)

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The Zagros Fold- and Thrust Belt extends over 1800 km from Kurdistan in N-Iraq to the Strait of Hormuz in Iran and is one of the world most promising regions for the future hydrocarbon exploration. The Zagros Mountains are the result of the collision of the Eurasian and the Arabian Plates starting in the Late Cretaceous. Recent GPS measurements in have shown that the shortening between these two plates is about 2.5 cm/a most of which is distributed within the Zagros collision orogen. Whereas the tectonic structure and the geomorphological response to active deformation is thoroughly studied in the SE part of the Zagros in Iran, there are almost no modern field based studies of the NW part of the Zagros in Iraq.

Here we present the first structural field studies, the mechanical stratigraphy and geomorphological investigations of the Safeen anticline in the NE of the city of Erbil in the Kurdistan region, which is a province of Northern Iraq. The sub-cylindrical part of the anticline strikes for about 65 km NW-SE and has a dominant wavelength of about 6 km. Perpendicular to the strike of the anticline Cretaceous to Tertiary sediments are exposed consisting mainly of bedded to massif limestones and sandstones (competent lithologies), intercalated with marl and claystones (incompetent lithologies). Whereas deformation in the competent lithologies is accommodated by diffusive mass transfer processes and mainly fracturing, the incompetent lithologies record distributed plastic deformation.

Along the investigated section, the limbs of the anticline dip with 55° towards NE (backlimb) and 60° towards SW (forelimb). Interestingly the drainage pattern of the forelimb differs significantly to the erosional signature along the backlimb. Both limbs are dominated by transverse river segments. The backlimb records straight almost perpendicular to the fold axis with a spacing of the segments of about 200 m. The forelimb, however, is dominated by a more irregular pattern with a wider spacing of the main segments of about 600m. We use an ASTER digital elevation model in combination with the geological map in order to quantify the differences in geomorphological signal along the different limbs of the Safeen anticline.