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Knickpoints and faulted alluvial fans: evidence of orogen parallel active extension related to delamination in the Western Betics

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We present the first results of the MORPHOMED project, in order to deepen the chronology, uplifting rate, and tectonic forcing of different sectors of the Betic Cordillera since the Pliocene. Our initial morphotectonic analysis in the Western Betics, at the active termination of the Betic dextral STEP fault, highlights the location of active orogen-parallel normal faults cutting Pliocene marine sediments, uplifted above 600 masl, and Quaternary alluvial fans. The morphometric study we carried out includes normalized river steepness (ksn) and other geomorphic indices calculated in GIS using our own code designed in python. The fieldwork developed comprises the identification of uplifted Pliocene marine deposits, faulted alluvial fans and remnants of uplifted planation surfaces. The alluvial fans are related to travertine deposits older than 350 ka, which would be associated with hot springs. Geochronological studies involve previous and new U-Th dating on travertines and speleothems from caves in the high areas. The preliminary morphometric analyses reveal the occurrence of knickpoints that coincide with normal faults affecting marine Pliocene deposits and alluvial fans. These fans show vertical displacement of more than 20 m and their age remains unknown albeit the associated travertines are being dated. These results support previous works concerning of active tectonics in the Central and Western Betic Cordillera and they will serve to define new active faults, driving tectonic uplift of the Western Betics, which are the key to understand the landscape evolution forced probably by deep mantle rooted tectonics like slab tearing and edge delamination.