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Shallow constraints on late orogenic vertical movements at the transition from foredeep to orogenic wedge in the SE-Carpathians

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Foredeep basins evolve adjacent to mountain chains as an effect of interacting lithospheric and surface processes causing subsidence and uplift. The part of the basin that is a particularly sensitive recorder of these vertical motions is at the transition to the orogen. This is where, in the classical foredeep model, the sediment pile is thickest and sediments are exhumed by incorporation in the active belt (1). In other cases, foredeep sediments are deposited on top of, and deformed simultaneously with, the active wedge (2), or they are underthrusted by the wedge and as such obtaining a basinward dip over the so-called triangle zone (3). Each of these types features a different uplift and subsidence history.

The former two types of transitions are represented adjacent to the Romanian East and South Carpathians respectively, while the foredeep of the Carpathian Bend Zone, the Focsani Depression, is characterized by steeply basinward dipping sediments that largely postdate major tectonic shortening in the orogen. As opposed to the East Carpathians that overlie the strong East European Craton, the Focsani Depression is overlying the weak lithosphere of the Moesian Platform. The region is moreover characterized by intense intermediate depth seismicity, attributed in a number of conceptual models to a tearing, delaminating or breaking slab.

New depth converted shallow seismic data provide the detailed geometry of the tilted foredeep strata, and together with restoration of the extended sections this enables constraining the kinematics of the vertical motions in this part of the basin. Subsidence has been ongoing since the end of deformation in Sarmatian (10 Ma), with the largest

thickness of the lacustrine sediments west from the current (erosional) basin margin. Tilting started in the Quaternary, and is accompanied by the deposition of coarse fluvial gravels. The depocenter has shifted towards the east. We propose to explain this rapid change in tectonics and associated sedimentation by large scale folding, associated with a high angle basement thrust.