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Geophysical modelling of vertical motion processes constrained by geodetic and geological observations (UPLIFT)

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The Earth's lithosphere undergoes vertical motion on a range of spatial and temporal scales. In recent years it has become increasing clear that mantle related forcing and in particular mantle plumes are a significant contributor to uplift events in many regions of the world, making vertical motions a powerful probe into sublithospheric processes. Significant improvements of observational methods (e.g. satellite missions) and publicly-accessible databases (e.g. digital geological maps) make it now feasible to map vertical motions from geodetic to geologic time scales. This in turn provides invaluable constraints to inform key, yet uncertain, parameters (e.g. rheology) of geodynamic models. Here we report results of an ongoing Research Training Group (RTG) 2698, with 10 individual dissertation projects and a Post-doc project, funded by the German Research Foundation. The RTG follows an interdisciplinary approach of Geodynamics, Geodesy and Geology aiming to answer questions related to how the interaction of exo- and endogenic forcing shapes a diverse array of earth processes. From a combined interpretation of interdisciplinary observations with different spatial and temporal sensitivity, together with physical models, work in the RTG tries to disentangle different uplift mechanisms, including the plume, plate and isostatic mode, based on their specific spatial and temporal patterns. We will give an overview of key results and highlight the synergies that derive from bringing multiple constraints to bear on vertical motion processes of the lithosphere.