



Thermo-mechanical models of obduction applied to the Oman ophiolite

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During obduction regional-scale fragments of oceanic lithosphere (ophiolites) are emplaced somewhat enigmatically on top of lighter continental lithosphere. We herein use two-dimensional thermo-mechanical models to investigate the feasibility and controlling parameters of obduction. The models are designed using available geological data from the Oman (Semail) ophiolite. Initial and boundary conditions are constrained by plate kinematic and geochronological data and modeling results are validated against petrological and structural observations. The reference model consists of three distinct stages: (1) initiation of oceanic subduction initiation away from Arabian margin, (2) emplacement of the Oman Ophiolite atop the Arabian margin, (2) dome-like exhumation of the subducted Arabian margin beneath the overlying ophiolite. A parametric study suggests that 350-400 km of shortening allows to best fit both the peak P-T conditions of the subducted margin (1.5-2.5 GPa / 450-600°C) and the dimensions of the ophiolite (~170 km width), in agreement with previous estimations. Our results further confirm that the locus of obduction initiation is close to the eastern edge of the Arabian margin (~100 km) and indicate that obduction is facilitated by a strong continental basement rheology.