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*Title: Extreme up-and-down vertical motions of accreting arc crust in an active collisional suture, Coastal Range of eastern Taiwan

*Abstract:

Mountain building involves vertical crustal motions that drive the rock cycle, but the rates and timescales of large vertical displacements in unmetamorphosed rocks are poorly understood. We utilize high-resolution magneto-biostratigraphy and backstripping analysis of marine deposits in an active arc-continent suture zone of eastern Taiwan to document short cycles of vertical crustal oscillations. A basal unconformity formed on Miocene volcanic arc crust in a slowly uplifting flexural forebulge starting ~6 Ma, followed by rapid foredeep subsidence to 6.5–7.8 km depth at 2.3–3.2 mm/yr (~3.4 to 0.5 Ma) in response to an oceanward migrating thrust load. Since ~0.8–0.5 Ma, arc crust has undergone extremely rapid (~9.0–14.4 mm/yr) uplift and exhumation to form the modern Coastal Range due to combined strong transpressional strain and isostatic rebound within the active oblique-collisional suture zone. Considerably slower uplift rates derived from millennial marine terraces, and modern subsidence measured with geodetic records in the north, imply that some areas of inverted arc crust have recently entered a new subsidence stage related to reversal of subduction polarity. These transient vertical motions of shallow crust are under-detected by conventional thermochronologic methods, but likely are characteristic of continental growth by arc accretion over geologic timescales.