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The Thermal-Mechanical Evolution of the Middle Hsuehshan Range in Taiwan Based on Zircon Thermochronology and Numerical Modeling

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The Hsuehshan Range is the second largest mountain belt in Taiwan. Despite extensive previous research, past thermo-mechanical studies of orogenesis in Taiwan have failed to adequately explain the origin of the Hseuhshan Range. In this study we present new zircon fission track and (U-Th)/He ages from the mid Hsuehshan Range (mid-HR). The data is used to provide thermochronological constraints on thermal-mechanical models. These models incorporate a cooling-rate-dependent closure temperature, rather than assuming that this is constant. With imposed constant uplift rate the thermochronological data are best explained if exhumation of the mid-HR started around 5.6 Ma with a rate of 2.0 km/Myr. We further simulate the formation of mid-HR with thermal-mechanical models. The model results suggest that the low strength of lithologies that comprise the Hsuehshan Range has led to homogeneous deformation of the mountain range and that the eastern part of mid-HR was an active deformation zone during the initial stages of orogenesis.