Absolute timing of thrust faulting - a thermochronological approach

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The absolute timing of movement across thrust faults has important implications for both the tectonic and kinematic evolution of thrust belts. Absolute timing constraints provide a link between regional tectonics and structural development at a local scale, while kinematic models for fold and thrust belts often assume a particular chronology for the formation of structures. Apatite fission track thermochronology has the potential to provide absolute timing constraints at shallow erosional levels in fold and thrust belts if it accepted that distinct breaks in cooling history across discrete structures are related to the denudation of actively thrusting plates. In practice, fold and thrust belts are often deeply eroded, such that low-temperature thermochronometers often only provide evidence for regional cooling. An approach involving the integration of vitrinite reflectance data and apatite fission track thermochronology is proposed to assess this potential limitation. General principles will be illustrated using case studies from southwest Alberta (Rocky Mountain Main Ranges and Foothills) and western Sichuan Province, China (Longmen Mountains Thrust-Nappe Belt).