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Exhumation of the northwestern Fairweather Range, southeast Alaska

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The study investigates spatial and temporal patterns in exhumation along the transpressive plate boundary Fairweather Fault, Alaska, USA. The Fairweather transform fault forms the eastern boundary between the obliquely colliding Yakutat Terrane and the North American plate. Deformation on the Fairweather Fault initiated around 30 Ma and has been suggested to be a transpressive dextral strike-slip fault zone that formed the Fairweather Range. This 300 km long and 50 km wide mountain range is characterized by > 4000 m high peaks and deep glacial valleys that drain into the North Pacific. Previously published low-temperature thermochronometer data suggest that deformation and exhumation is not restricted to one side of the fault. Maximum estimated exhumation rates of up to 2 mm/yr occur within 10 km of the fault and extend about 300 km along strike. We collected 15 sand samples from modern glacial drainages spanning 80 km along strike of the northwestern part of the Fairweather Range to quantify spatial variations in deformation and exhumation of this range. Zircon fission track age distributions are measured to quantify the long-term exhumation patterns along this fault. The aim of this study is to gain better special coverage for the cooling age signals in this glaciated and remote region. We concentrate on the northern part of the Fairweather Range because it comprises the partitioning of strain as the strike-slip motion of the Fairweather Fault changes to convergence and thrust tectonics when it merges into the St. Elias Range. Calculation of final grain-age distributions from these samples is in progress. We will present detrital zircon fission track ages along the northwestern ca. 80 km of the Fairweather Fault and including the transition into the St. Elias Range. Based on existing bedrock samples we anticipate the youngest age populations to be <5 Ma and in catchments that cover the Fairweather Fault itself. Older age populations are also anticipated >15 Ma in catchments that are located farther away from the fault. Additionally, we expect to see changes in the amount of exhumation and its distribution with respect to the fault zone along the strike. Deviations in the new detrital samples compared to existing bedrock samples could be due a) localized areas of enhanced or retarded exhumation due to temporal variations on Fairweather Fault slip, b) deformation and exhumation of rocks on previously unrecognized structures, and/or c) spatial variations in the intensity of glacial erosion along strike of the Fairweather Fault.