Northeastern Section (39th Annual) and Southeastern Section (53rd Annual) Joint Meeting (March 25–27, 2004)

Paper No. 33-8

Presentation Time: 10:40 AM-11:00 AM

ONSET OF TECTONIC EXHUMATION OF THE CORDILLERA BLANCA, NORTHERN PERU BASED ON FISSION-TRACK AND U+TH/HE DATING OF ZIRCON

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The high, glaciated Cordillera Blanca rests along the spine of the northern Peruvian Andes, and consists of a Miocene Cordillera Blanca Batholith that intruded the Jurassic Chicama Formation at 8.2 Ma. The Cordillera Blanca Batholith sits in the footwall, and the hangingwall rocks consists of folded Mesozoic strata unconformably overlain by Tertiary volcanic rocks and the Pliocene Callejon de Huaylas synorogenic basin. The poorly dated hangingwall basin records initial unroofing of the Cordillera Blanca, which may coincide with significant uplift of the Andes in Northern Peru. Footwall exhumation has occurred during flat-slab subduction of the Nazca plate and extension is accommodated by the 210-km-long Cordillera Blanca Normal Fault. Exhumation resulting from slip along the fault and erosion due to glaciation has resulted in peaks in excess of about 5000 meters and nearly 7000 m at Nevados Huascaran, the highest peak in Peru. Twenty-three new zircon and apatite fission-track cooling ages, and U+Th/He ages fall between c. 5.0 Ma to 2.0 Ma indicating substantial exhumation was initiated at this time. Zircon fission-track (ZFT) ages were determined from samples along three transects (valleys) perpendicular to the fault in the Llanganuco and Ulta valleys (central), and Cojup valley (south). Six zircon fission-track (FT) cooling ages were determined for Huascaran and range from ~3.2 Ma to 4.8 Ma. The fastest cooling ages and exhumation rates coincide with the highest topography in the center of the range. Assuming a 40° dip of the fault, a closure temperature depth of 7 km, the rocks in the central part of the range were exhumed at rate of about 2.5 to 3.0 km/Myr for the interval between 5 Ma and 3 Ma. Four ZFT ages from the nearby Ulta Valley are between 2.8 Ma and 4.8 Ma, indicating an exhumation rate of about 1.4 km/Myr. Rates to the south are about half the rate in the central part of the Range.

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