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FOREARC DEFORMATION ALONG THE PERUVIAN MARGIN AND THE EFFECTS OF CHANGES IN SUBDUCTION STYLE: QUANTIFYING THE RATES OF QUATERNARY DEFORMATION USING IN SITU PRODUCED COSMOGENIC ^{10}BE AND ^{26}AL

Sarah Hall*, Daniel L. Farber*†, Laurence Audin**, Anne-Sophie Meriaux†, & Victor Torres††

*University of California Santa Cruz, Dept. of Earth Sciences, Santa Cruz, CA 95064, USA
**IRD-Université P. Sabatier, Dept. Géologie, 38 rue des 36 ponts, 31400 Toulouse, France
†Lawrence Livermore National Laboratory, Livermore, California 94550, USA
††Instituto Geológico Minero y Metalúrgico, 1470 Avenida Canadá, San Borja, Lima 41, Perú

The Andes are one of the world's two highest mountain ranges and together with the western cordillera of North America they form an almost a continuous mountain chain from the tip of Patagonia to the Alaskan peninsula. Common to all the cordillera of western North and South America is the influence of long-lived subduction. Indeed, the style of this subduction process has profoundly modified the margin of both continents. For example, following relatively normal subduction in the Jurassic and the Cretaceous, the Laramide orogeny of North America is thought to have been produced from effects of extremely flat subduction. However, the tectonic effects due to changes in subduction angle in older orogens are extremely difficult to quantify. We are fortunate however, in that Peru is a natural laboratory for studying the tectonic effects of changes in subduction angle. Presently, the largest region of flat subduction in the world underlies northern Peru, while southern Peru is characterized by more normal subduction angles. The transition region between these two end members lies approximately at the latitude of the Pisco deflection. The goal of this study is to quantify the along strike variations in uplift rates and correlate these with the style of subduction (i.e. flat, steep, or subduction of an aseismic ridge). The well-preserved sequences of marine terraces and old pediment surfaces found along the Peruvian margin are a geomorphic expression of uplift associated with the subduction of the Nazca plate beneath the South American plate and provide a unique set of markers that can be used to quantify the rates of Quaternary coastal uplift along these different tectonic sections. Our general approach is to 1) map these surfaces and the active deformation within them and 2) to use *in situ* produced cosmogenic ^{10}Be and ^{26}Al in quartz and ^{36}Cl in calcite to date these features and thus derive the local uplift rates. Our initial fieldwork and sampling has focused on the area along the Peruvian margin from 14.5°S – 18.0°S. Previous studies, have attempted to correlate the terrace surfaces with known Quaternary marine high-stands thus providing an estimate of terrace age and uplift for this area. Twenty-seven marine terraces along the bay of Chala (15.8 °S) were estimated to have ages ranging from the early Pleistocene to the present based on U-series, amino acid, and morphostratigraphic data (Goy et al., 1992). Uplift rates derived from these estimates are 460mm/ky during the last 500 ka and are based on the interpretation that Isotope stage 5e corresponds to the 68m terrace in this region (Goy et al., 1992). In the south near Ilo, (17.6°S) thirteen marine terraces have been interpreted from morphostratigraphic data to have ages ranging from the late-middle Pleistocene to the present with uplift rates of 160 mm/ky over the last 120ka (with Isotope stage 5e corresponding to the 25m terrace; Ortlieb et al., 1996).

The terraces at Ite (just south of Ilo) have been loosely correlated with those at Ilo suggesting slightly lower uplift rates at Ite relative to Ilo (Tosdal et al., 1984). These previous studies suggest that that much the topography of the modern Andes is quite young (< ~15 My) and that the along strike variations are significant but these conclusions are based on a rather loose chronology which argues strongly for further chronologic, tectonic and stratigraphic work. Building on these previous studies, we have added additional sites to those previously studied. We will present new chronologic data illustrating the age and uplift rate

variation along strike, and their implications for the latitudinal changes in tectonic forcing due to changes the in the style of subduction along the Peruvian margin.

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