Strong spatial gradients in uplift, exhumation and erosion of the Andes (30-35°S).

This presentation will examine the surface uplift, exhumation and erosion history in a section of the Andes that straddles an abrupt change in the angle of the Nazca plate that subducts beneath South America. Changes in the dip of the subducted plate between shallow (flat) and steep are often invoked as the primary influence on upper crustal deformation, thus large scale patterns of shortening and coincident surface uplift should mimic the slab. Stable isotope d18O values from Miocene to Pliocene pedogenic (soil) carbonates preserved in seven different sedimentary basin sequences spanning different tectonic and topographic positions in the range are used to determine paleoelevations. Paleoelevation estimates indicate present day, low elevation foreland localities were at their present elevations during the Miocene, while three of the intermontane basins experienced up to 2 km of surface uplift between the end of deposition during the late Miocene and present. Detrital zircon double dating in three modern drainage basins reveals a clear ≤5 Ma exhumation signal south of the flat slab with modest Miocene exhumation apparent at 32°S. The exhumation pattern is consistent with paleoelevation results. At shorter timescales, the pattern of 10Be-derived erosion rates over the same range of latitudes demonstrates a symmetric pattern on both sides of the range, with the highest rates observed between 32°S and 34°S. Interestingly, the maximum inferred surface uplift is greatest where crust thicknesses is thinnest, and the inferred timing of the observed changes in elevation are not linked to any documented episodes of large-magnitude crustal shortening in the eastern half of the range. The spatial pattern of surface uplift, exhumation and erosion reveal a hotspot coincident with the slab transition. The apparent symmetry in erosion rates on either side of the range suggest a strong tectonically controlled steady-state behavior in the range at these latitudes.