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Crustal Thickness Along the Central American Volcanic Arc

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Crustal thickness of volcanic arcs in subduction zones has been used to infer the time-integrated rate of mantle melting and the consequent rate of continental growth. Subduction of the Cocos Plate under the Caribbean Plate results in active volcanism in Central America. Tomography Under Costa Rica And Nicaragua (TUCAN) is an eighteen month broadband seismic experiment that began in the summer of 2004 with the goal of seismically imaging the upper mantle and subducting slab. Forty-eight IRIS/PASSCAL instruments were installed in two densely spaced cross-arc lines and two arc-parallel lines. Initial analysis has focused on three permanent and one pilot station in the region. Receiver functions calculated from teleseismic events recorded on these stations have strong signals from the Moho as well as a signal from a dipping slab, exhibiting a strong tangential component. The P-to-S conversions from the Moho seen in receiver functions in Costa Rica have approximately a two second delay relative to those in Nicaragua, indicating crustal thickening from Nicaragua into Costa Rica. A station in Costa Rica has an estimated crustal thickness of thirty to thirty-one kilometers whereas a station in Nicaragua has a thickness between forty and forty five kilometers depending on the velocity models used. This is consistent with previous crustal thickness estimates from Bouguer gravity and regional elevation, assuming Airy isostasy, meaning that elevation is controlled by crustal thickness. The difference in crustal thickness between Nicaragua and Costa Rica could be the result of different rates of crustal growth, or more likely, tectonic changes to crustal thickness (as a result of extension or compression)

in one or both places.

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8150 Plate boundary--general (3040)
7200 SEISMOLOGY
7205 Continental crust (1242)
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