Transparent Moho: Arc Crust Evolution via. Crust-Mantle Transformation at IBM

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The Moho discontinuity, which is a sharp seismological boundary defined based on reflection and refraction of P- and S-waves, separates rocks having Vp of 6-7 km/s from those having velocities of about 8 km/s. The term 'crust' is then used to refer to the region of the solid Earth above the Moho. Petrological modeling for IBM (Izu-Bonin-Mariana) crust evolution suggests that the volume of mafic restite and cumulates that are 'crustal residues' after middle and upper arc crust creation is three to nine times greater than that of the seismically defined lower crust. One possible explanation to overcome this apparent dilemma is that the mafic crustal components are transformed to the subarc mantle through the Moho. The subarc Moho is the boundary between the remaining initial basaltic arc crust and the restites, and has been created as the melting front during the anatexis of the basaltic lower crust. The transformed crustal residues are more enriched in Fe and Al than mantle peridotites, providing a reasonable explanation for the rather low velocity observed in the uppermost subarc mantle. The crust-mantle transformation through the transparent Moho could play the major role in creating of the mature arc crust having differentiated compositions similar to the andesitic average continental crust.