

Possible existence of a garnetite layer at the bottom of the mantle transition region

Tetsuo Irifune[1]

[1] Dept. Earth Sci., Ehime Univ.

<http://www.ehime-u.ac.jp/~cutie/index.html>

The cause of the 660 km seismic discontinuity has been discussed on the basis of recent mineral physics and high pressure experimental data. The subducted basaltic crust may be trapped near the depth of 600 km, where the spinel-post spinel phase transition occurs in a pyrolitic mantle composition as demonstrated by our recent in situ X-ray diffraction measurements. Thus trapped former oceanic crust (now garnetite) may be thicken over the geological time scale, and the bottom of this layer may eventually reach near 660 km. It follows that the 660 km discontinuity is caused by the chemical boundary between garnetite layer and the pyrolitic lower mantle of the perovskite facies.

The cause of the 660 km seismic discontinuity has been discussed on the basis of recent mineral physics and high pressure experimental data. The subducted basaltic crust may be trapped near the depth of 600 km, where the spinel-post spinel phase transition occurs in a pyrolitic mantle composition as demonstrated by our recent in situ X-ray diffraction measurements. Thus trapped former oceanic crust (now garnetite) may be thicken over the geological time scale, and the bottom of this layer may eventually reach near 660 km. It follows that the 660 km discontinuity is caused by the chemical boundary between garnetite layer and the pyrolitic lower mantle of the perovskite facies.