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# Changes in dip of subducted slabs at great depth: Petrological and geochronological evidence from oceanic eclogite-facies rocks in the Chinese Tianshan

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Previous high-resolution seismic imaging has shown abrupt changes in the dip of subducted oceanic plates [e.g., Rondenay et al., 2008]. In any subduction zone, such 'kinking' apparently coincides with the disappearance of the low-velocity layers associated with subducted oceanic crust. In the present study [for details see Klemd et al., 2011], we provide petrographical, petrological, and geochemical evidence for kinking derived from oceanic blueschist- and eclogite-facies rocks from the Chinese Tianshan. The investigated samples show a wide range of peak metamorphic conditions (330-580 °C at 1.5-2.3 GPa). Such a wide range in peak metamorphic conditions in high- and ultrahigh-pressure rocks, which are interlayered on a meter-scale, have also been reported from other Tianshan localities [Lü et al., 2009; Wei et al., 2009]. This suggests that the rocks equilibrated at varying depths within the subduction zone before being juxtaposed during exhumation in the subduction channel. Four Lu-Hf mineral isochrons defined by high-pressure rocks yielded consistent garnet-growth ages of 313±12, 315.8±2.9, 313.9±4.8, and 315.2±1.6 Ma, confirming that the eclogite-facies metamorphism of the Tianshan high-pressure rocks occurred during a single subduction cycle in the Late Carboniferous. Interestingly, all previously reported estimates of peak metamorphic conditions from UHP metasediments and eclogites define a lower geothermal gradient than that indicated by the HP blueschists and eclogites from the present study. These data are consistent with a sudden increase in slab-subduction angle occurring between the equilibration depths of the HP and UHP rocks, i.e. > ca. 90 km. Such kinking may act in concert with the negative buoyancy of mafic UHP rocks in subduction zones to hinder the exhumation of such rocks, perhaps explaining their paucity on Earth's surface.

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