

2008 Fall Meeting
Search Results

Cite abstracts as **Author(s) (2008), Title, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract xxxxx-xx**

Your query was:
t13c-1961

HR: 1340h

AN: **T13C-1961 INVITED**

TI: **Seismic Hygrometry of the Mantle**

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AB: Somewhere on the order of 10^{12} kg of water is subducted yearly. Most is returned to the surface hydrosphere through arc volcanism and broadscale flow, but some amount, perhaps as much as a quarter, makes it into the deep upper mantle and beyond. The fate of that water, apart from its distribution in MORB source regions, is largely unknown. Our ignorance isn't for lack of interest: the geophysical effects of small amounts of water on mantle silicates are often subtle. In particular, the predicted seismic velocity decrements of lightly hydrated mantle rocks are easily masked by or mistaken for temperature and major element variability. Discrimination between water and everything else requires highly accurate estimates of seismic velocities and attenuation and still is non-unique. There are, however, other calling cards of water that seismologists can look to. These "hygrometers" exploit the effects of hydrogen on phase transitions and melting and include: width and elevation of the 410-km discontinuity, the reflection coefficient ratio of the 520-km to 410-km discontinuity, the presence of partial melt atop the 410-km discontinuity and, potentially, the strength and width of the seismic lid-LVZ transition. Together, these hygrometers provide a series of spot estimates of water in the upper mantle and transition zone and can be applied anywhere mantle phase transitions can be accurately mapped. We will demonstrate the use of these measures and others in discerning the degree of hydration of a broad swath of western and central Pacific upper mantle, revealing both wet and dry regions. We are quickly approaching the point at which seismology will be able to meaningfully estimate the ppm concentration of water in large portions of the mantle.

DE: 1037 Magma genesis and partial melting (3619)

DE: 1038 Mantle processes (3621)

DE: 7208 Mantle (1212, 1213, 8124)

DE: 8124 Earth's interior: composition and state (1212, 7207, 7208, 8105)

DE: 8135 Hydrothermal systems (0450, 1034, 3017, 3616, 4832, 8424)

SC: Tectonophysics [T]

MN: 2008 Fall Meeting

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