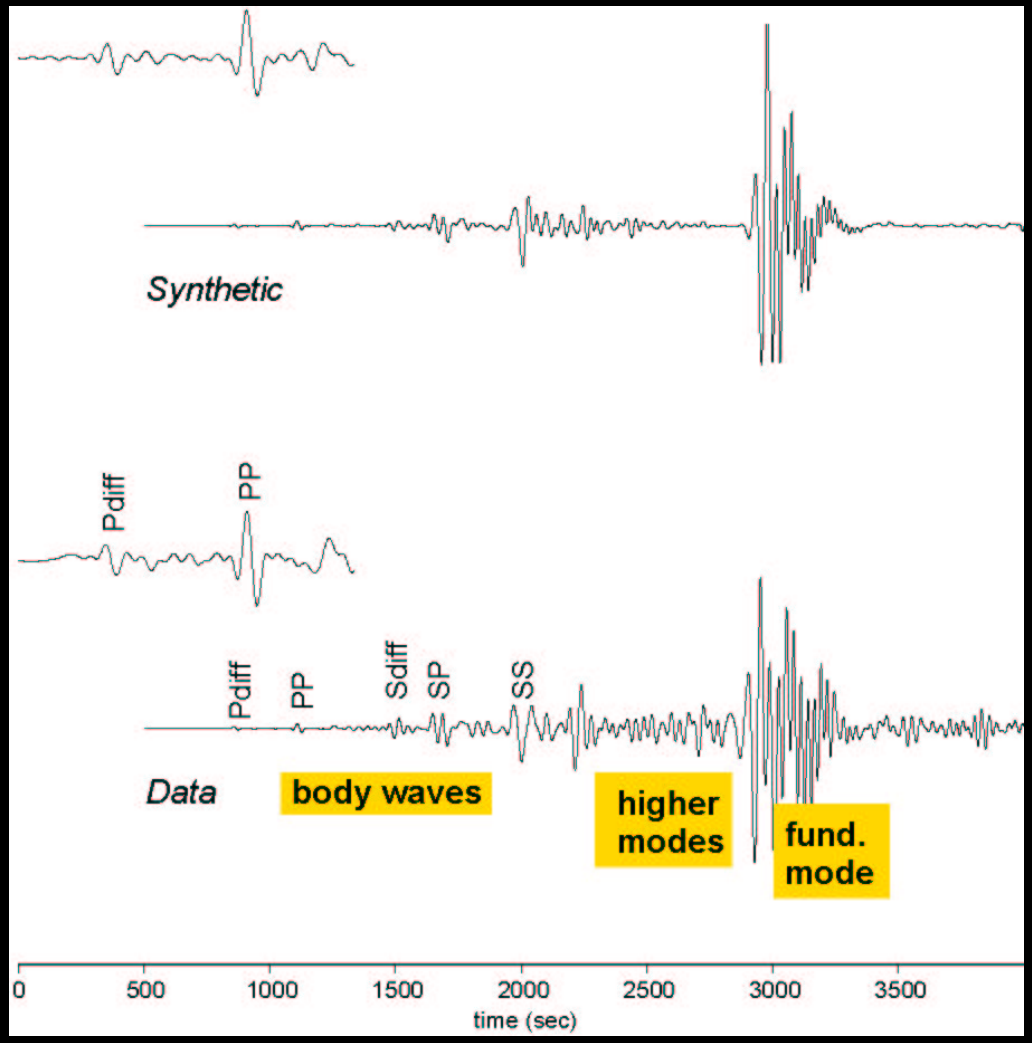
Oxford Seismology

Faculty:	John Woodhouse, Shamita Das
Postdocs:	Arwen Deuss, Eric Beucler
PhD students:	Ana Ferreira, Kit Chambers, David Robinson, Anna Stork, Ben Fox

Scientific Areas

* global tomography
* improving normal mode and surface wave techniques
* mantle discontinuities, connect with mineral physics
* earthquake phenomenology
* earthquake dynamics

Seismological Data

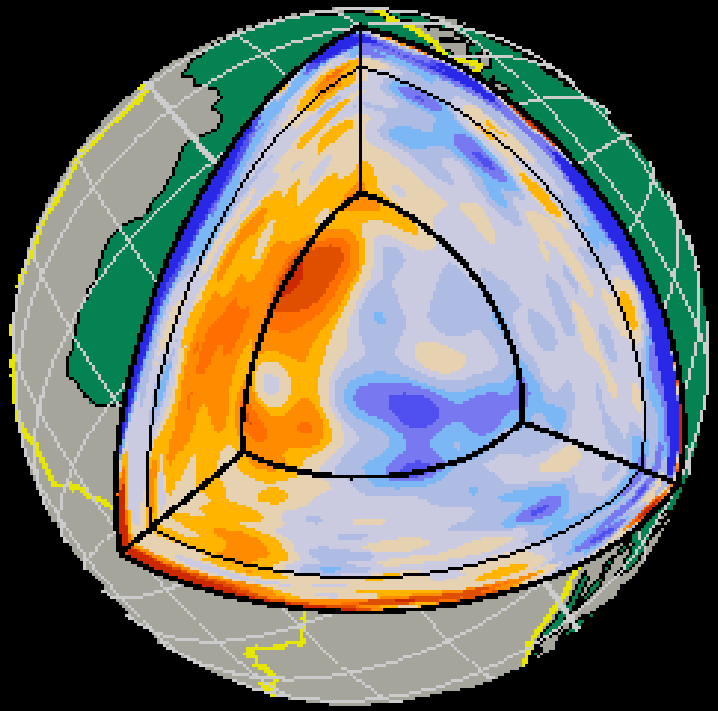


Synthetics computed using normal mode summation up to 6 seconds for PREM

Event 21 May 1998 (Indonesia) at TSUM (Tsumeb, Namibia)

Depth = 28km,
Mw= 6.6, Mb=6.3,
Δ =101.5

Global tomography



Shear wave velocity model S20RTS:

* body waves
* surface waves
* normal mode splitting functions

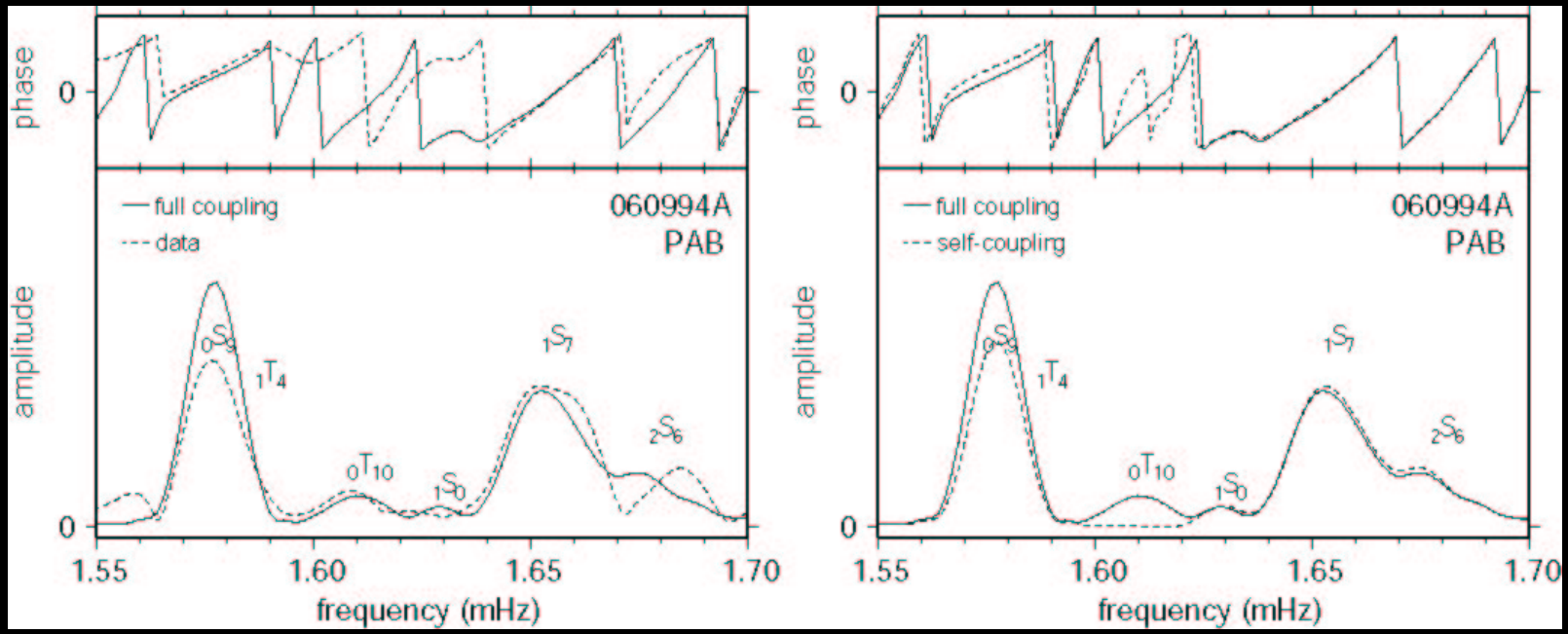
Collaboration Oxford-Caltech

Ritsema, van Heijst & Woodhouse (1999)

Improving normal mode techniques

* most modes studied in self-coupling approximation

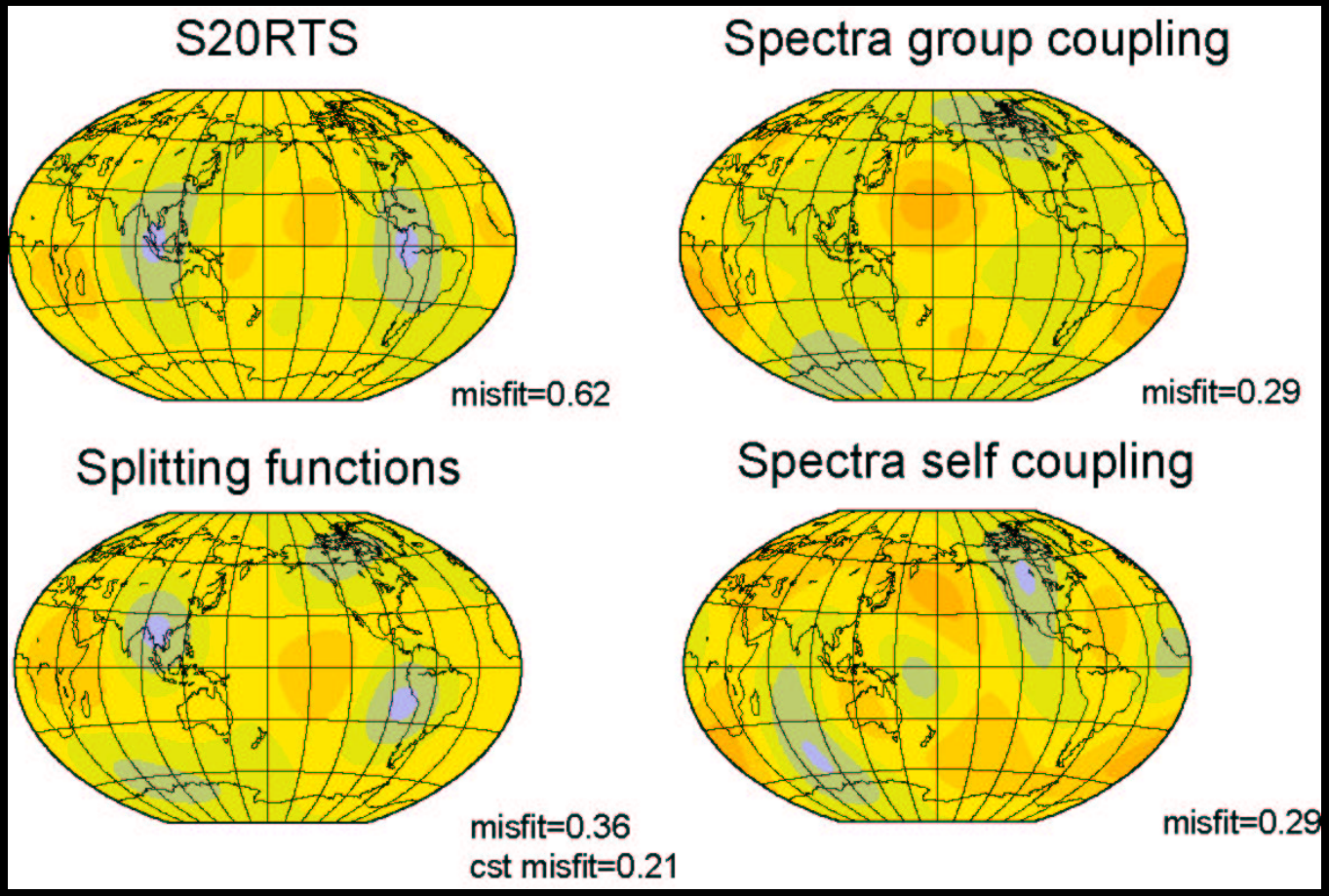
* BUT: coupling between modes is very important and should not be ignored!



Deuss & Woodhouse (2001)

Improving normal mode techniques

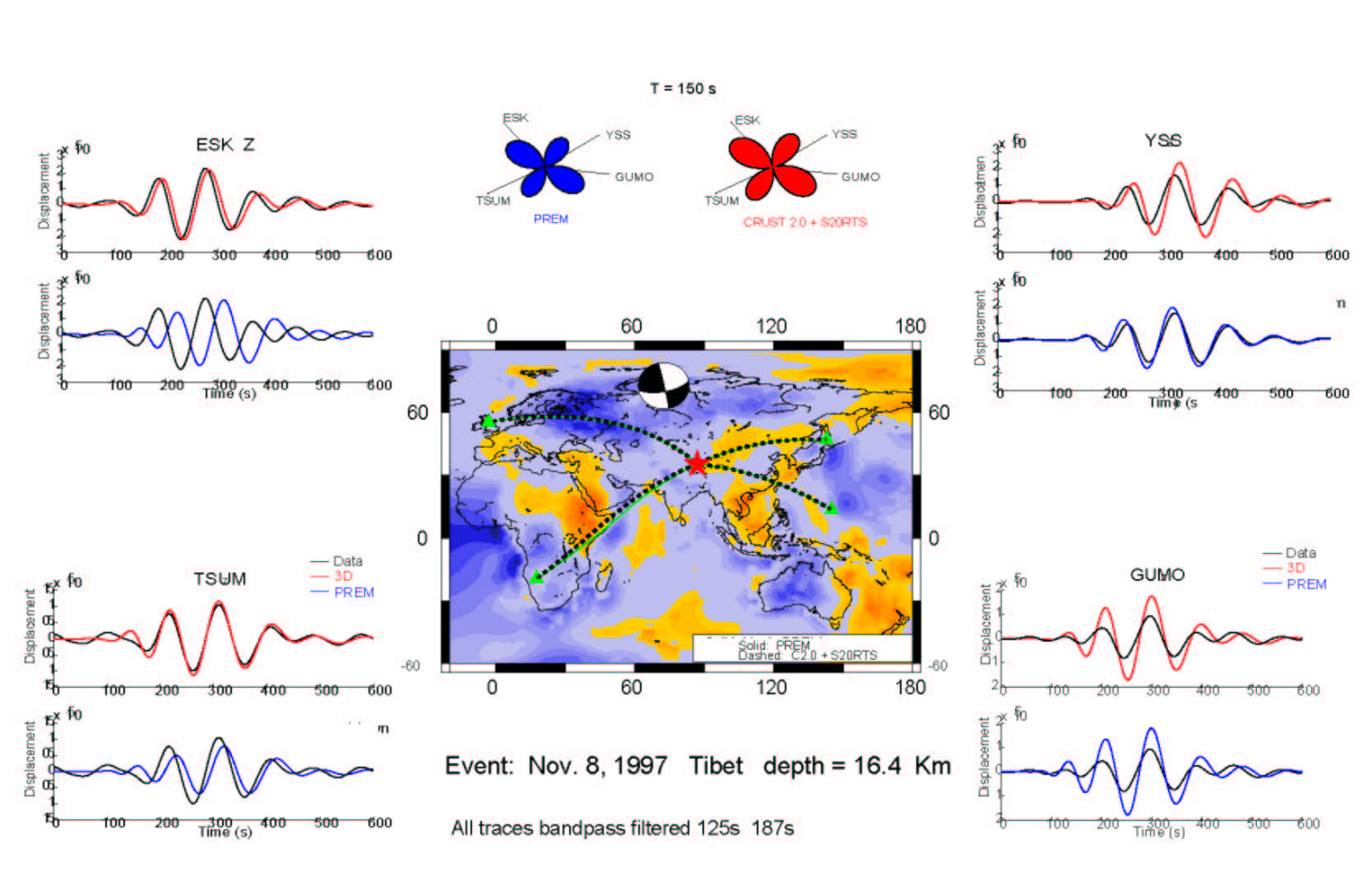
Splitting function approximation leads to significant differences compared with direct spectra inversion



Shear wave velocity, at 1225 km depth Deuss & Woodhouse (2003)

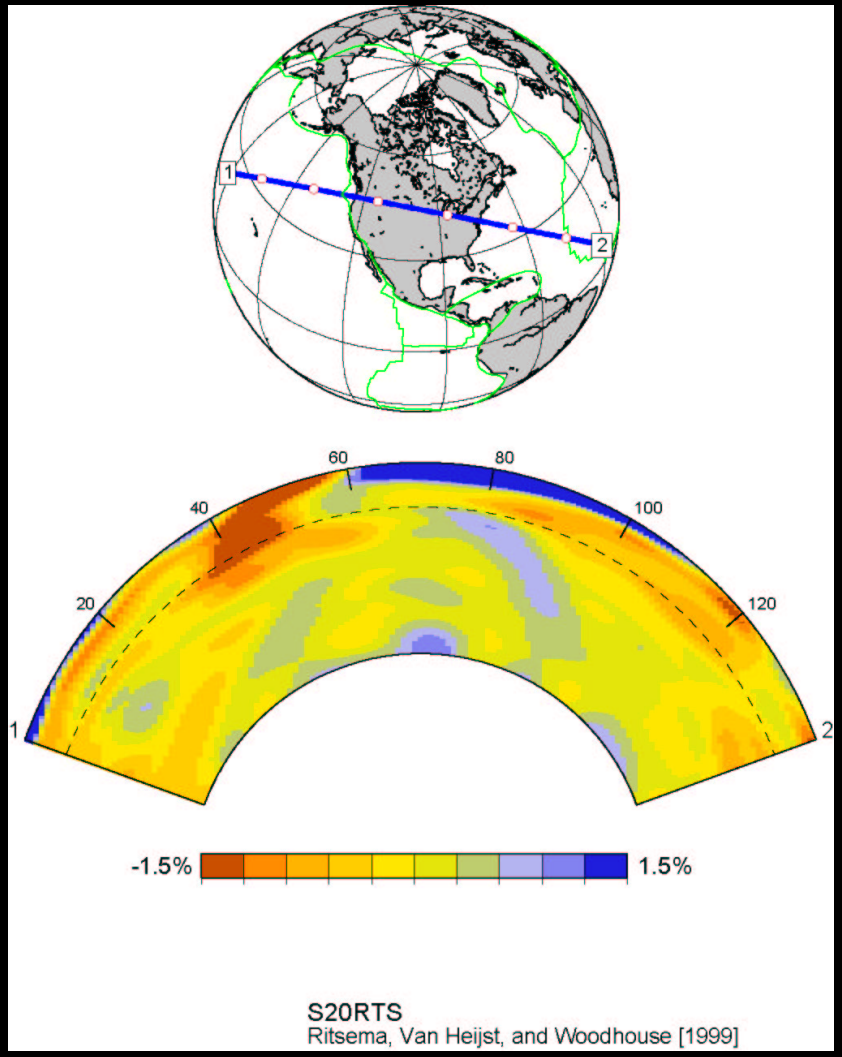
Improving surface wave techniques

Local structure at the source affects surface wave amplitudes more than previously thought

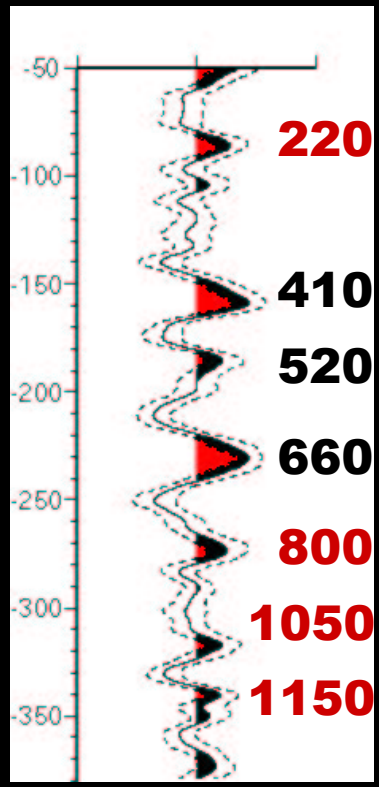


Ferreira & Woodhouse (AGU, 2003)

Mantle discontinuities

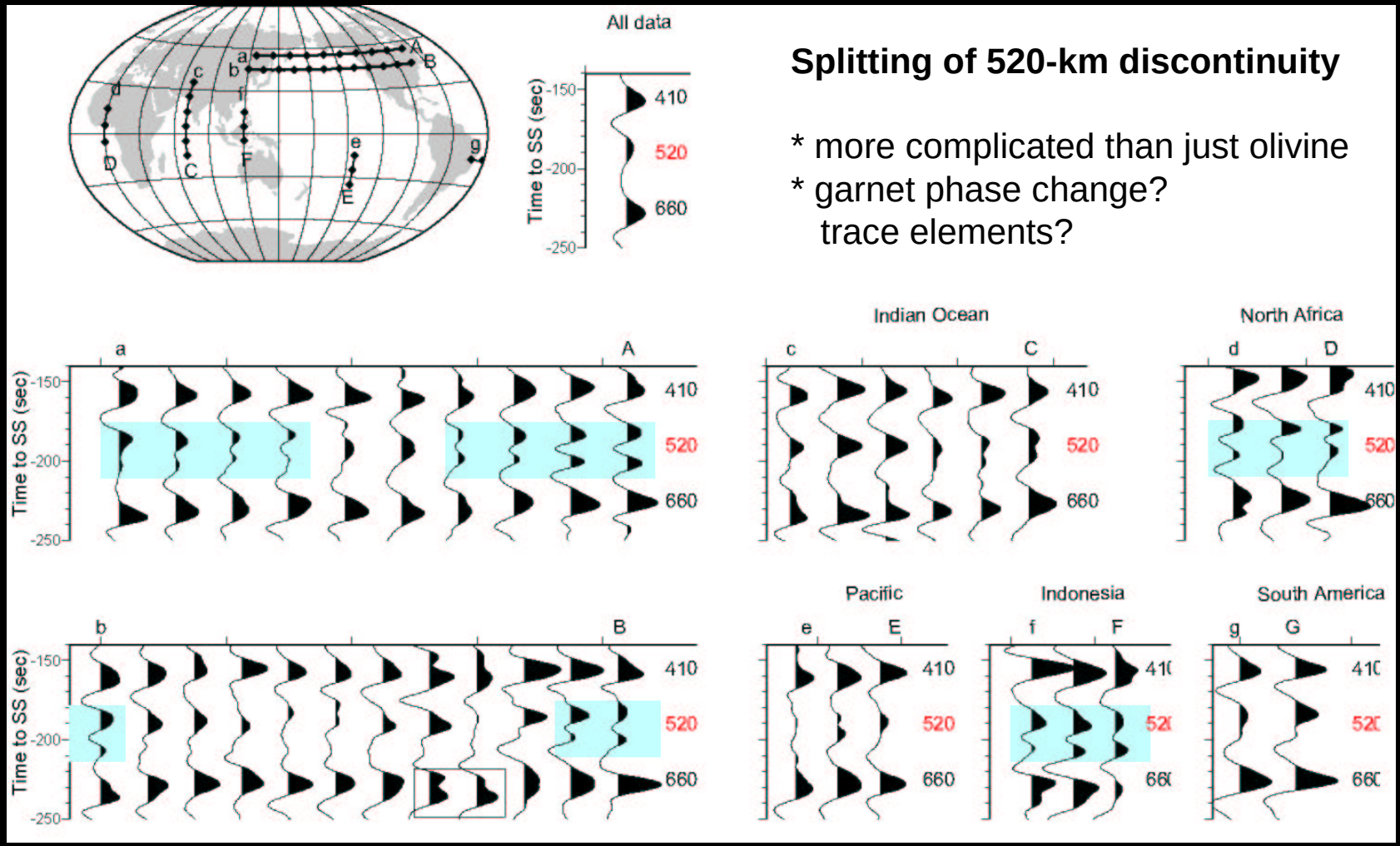


Stack for North America, using SS-precursors



(Deuss & Woodhouse, GRL, 2002)

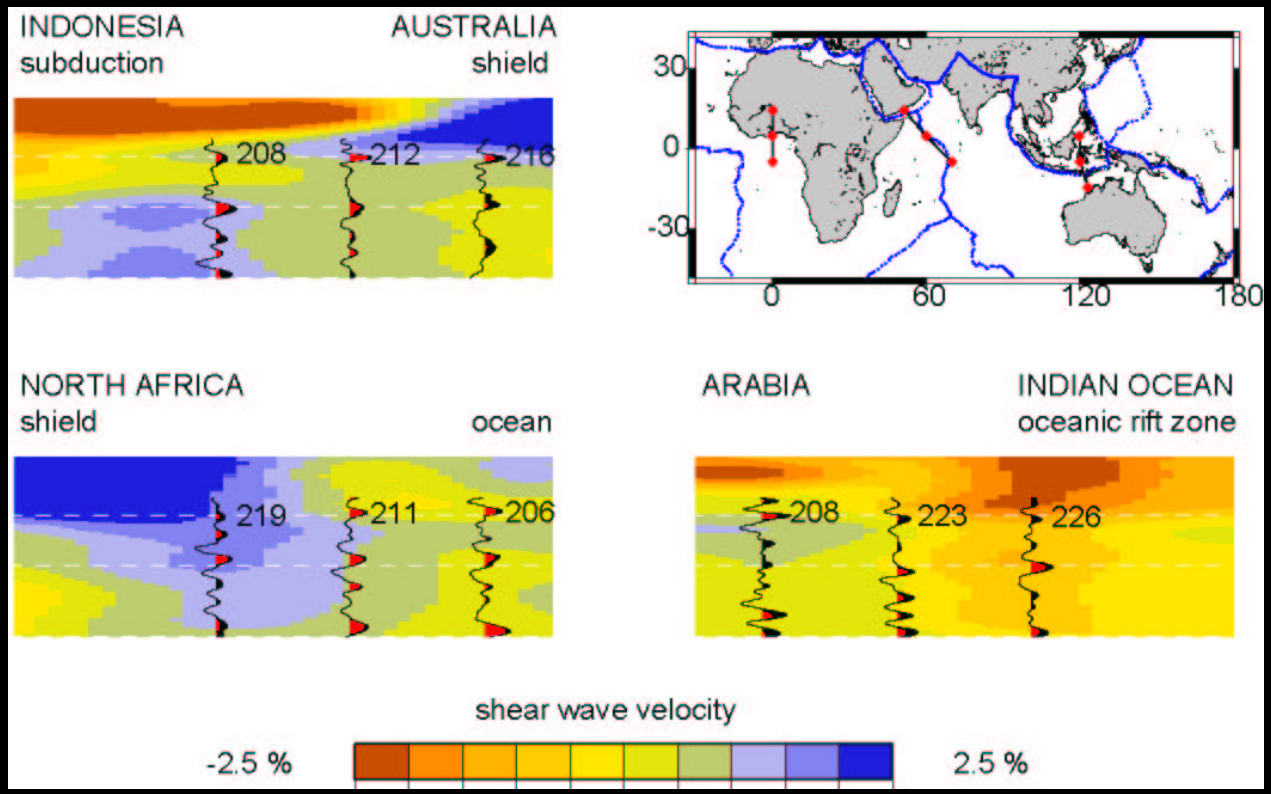
520-km discontinuity Observations



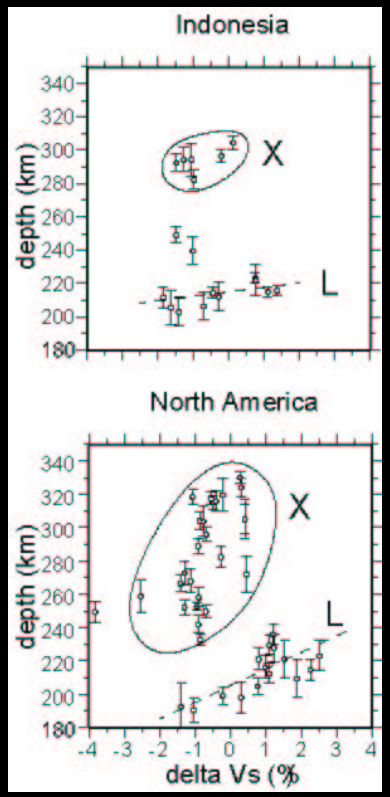
(Deuss & Woodhouse, Science, 2001)

Mantle discontinuities - Mineral physics

Seismological observations

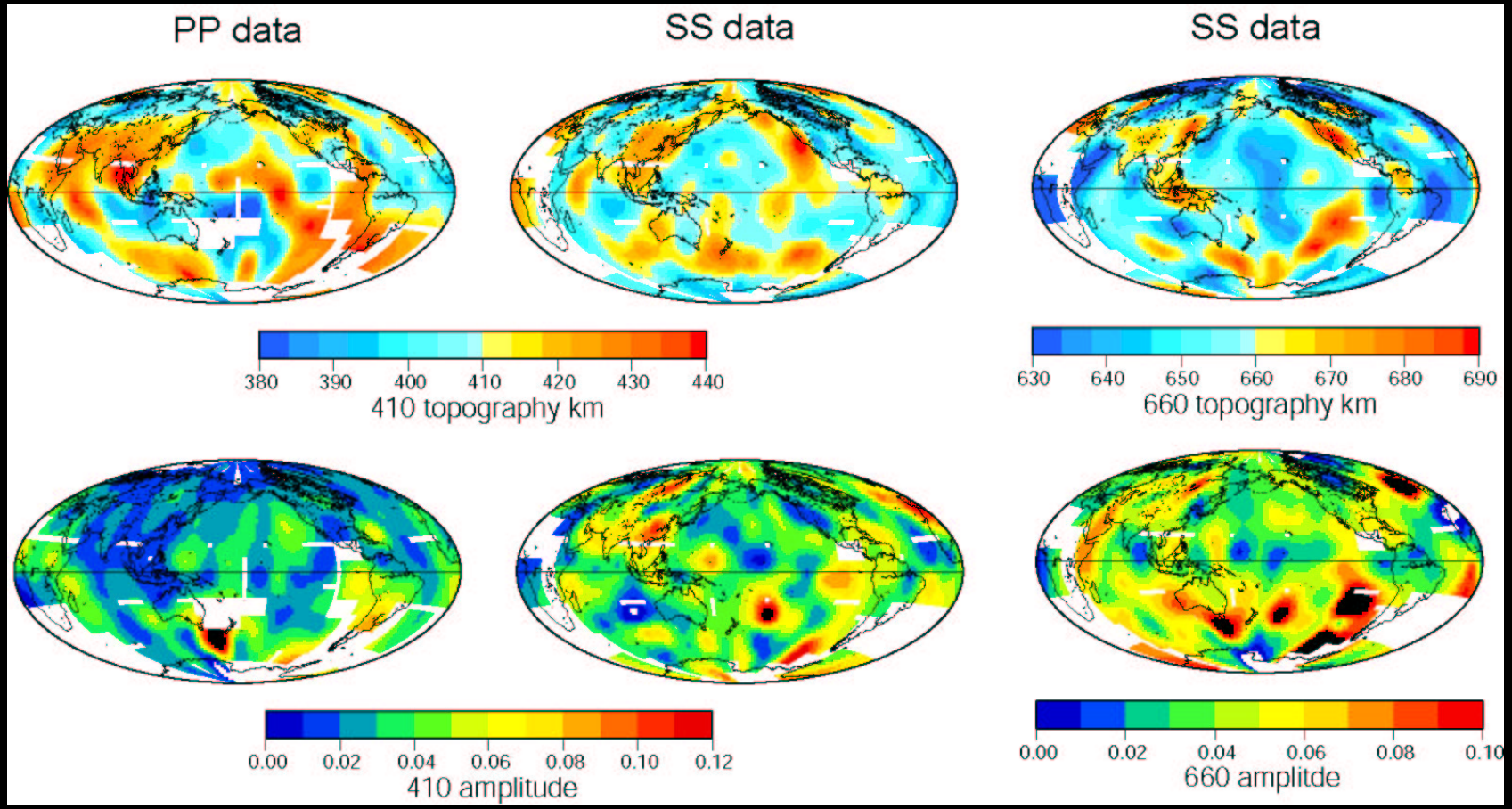


Clapeyron Slopes



Deuss & Woodhouse, submitted to EPSL, (2004)

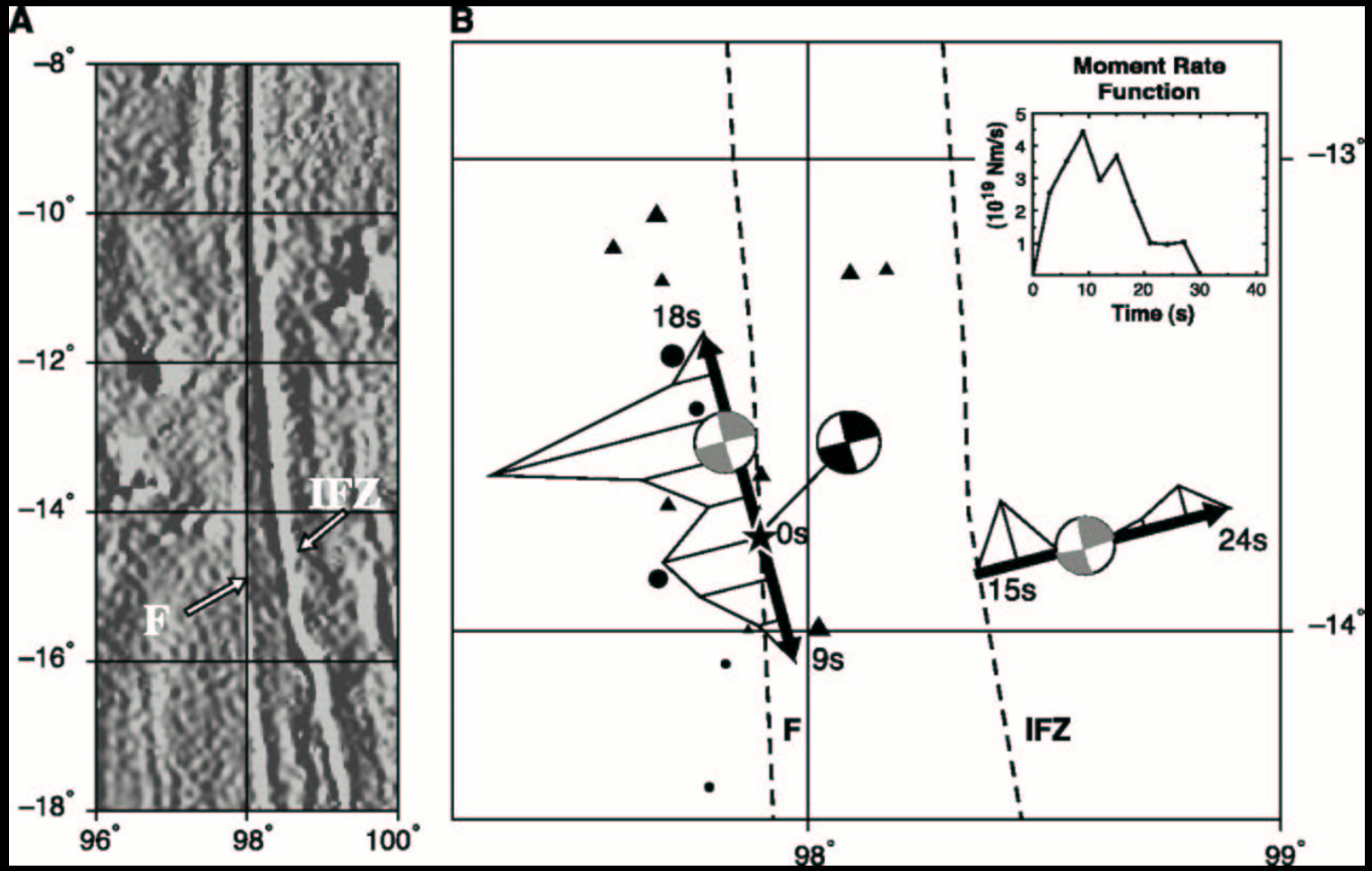
Mantle discontinuities: PP and SS



Chambers, Deuss & Woodhouse, in preparation (2004)

Earthquake dynamics

Simultaneous rupture along two conjugate planes of the Wharton Basin earthquake



(Robinson, Henry, Das & Woodhouse, Science, 2001)

Contributions to SPICE

* Seismic tomography
* Normal-mode methods
* Synthetic waveform modelling
* Source imaging
* Large-scale inverse problems