

## **Description of Additional Supplementary Files**

File Name: Supplementary Data 1

Description: From left to right columns are longitude (deg), latitude (deg), depth (km), dvs (%), fast axis orientation (deg) and anisotropic magnitude (%).

File Name: Supplementary Movie 1

Description: 3-D iso-surface representation of fast wavespeed bodies with magnitude greater than 1.5%. The north direction points inward. The depths range from the Earth's surface down to 1,000 km. Two white rectangular outlines denote the 410- and 660-km discontinuities.

File Name: Supplementary Movie 2

Description: Shows vertical cross sections moving across model US32 along constant longitudes.

File Name: Supplementary Movie 3

Description: Shows vertical cross sections moving across model US32 along constant latitudes.