Professor John Woodhouse

Professor of Geophysics

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Research Profile

My research interests span both theoretical seismology and the analysis of seismic data. Global seismology is concerned, on the one hand, with elucidating properties of earthquake and explosion *sources* and on the other with the determination of the internal *structure* of the Earth. A major strand of my work is concerned with determining the variation in seismic wave speeds in three dimensions. Thereby one obtains information about the three dimensional distributions of temperature and composition throughout the Earth. This is the field of *global seismic tomography,* in which I have pioneered a number of the principal techniques that are used, employing them to determine, for the first time, the principal features of the Earth's large scale internal structure. This information is used to understand convection in the Earth's mantle.

Brief bio: I did my PhD at Cambridge, following which I was a Research Fellow at Kings College Cambridge. I also did postdoctoral work at the University of California, San Diego. In the period 1978-1990 I was Assistant, Associate and Full Professor at Harvard. I was appointed Professor of Geophysics at Oxford in 1990. Honours include the Macelwane Award (1984) and the Lehmann Medal (2001) of the American Geophysical Union, Fellowship of the Royal Society (FRS, 2000), the Gutenberg Medal of the European Geosciences Union (2008), the Gold Medal for Geophysics of the Royal Astronomical Society (2010).

Teaching Profile

I teach first-year mathematics, third year seismology and geodynamics and fourth year seismology.

Selected Publications

- Fox, BD, Selby, ND, Heyburn, R, Woodhouse, JH, (2012) 'Shallow seismic source parameter determination using intermediate-period surface wave amplitude spectra', *Geophysical Journal International*. pp. 601-615 doi: 10.1111/j.1365-246X.2012.05612.x
- Al-Attar, D, Woodhouse, JH, Deuss, A, (2012) 'Calculation of normal mode spectra in laterally heterogeneous earth models using an iterative direct solution method', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 1038-1046 doi: 10.1111/j.1365-246X.2012.05406.x
- Ritsema, J, Deuss, A, van Heijst, HJ, Woodhouse, JH, (2011) 'S40RTS: a degree-40 shear-velocity model for the mantle from new Rayleigh wave dispersion, teleseismic traveltime and normal-mode splitting function measurements', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 1223-1236 doi: 10.1111/j.1365-246X.2010.04884.x
- Valentine, AP, Woodhouse, JH, (2010) 'Reducing errors in seismic tomography: combined inversion for sources and structure', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 847-857 doi: 10.1111/j.1365-246X.2009.04452.x
- Deuss, A, Irving, JCE, Woodhouse, JH, (2010) 'Regional Variation of Inner Core

Anisotropy from Seismic Normal Mode Observations', *SCIENCE*. pp. 1018-1020 doi: 10.1126/science.1188596

- Al-Attar, D, Woodhouse, JH, (2008) 'Calculation of seismic displacement fields in self-gravitating earth models-applications of minors vectors and symplectic structure', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 1176-1208 doi: 10.1111/j.1365-246X.2008.03961.x

- Ferreira, AMG, Woodhouse, JH, (2007) 'Source, path and receiver effects on seismic surface waves', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 109-132 doi: 10.1111/j.1365-246X.2006.03092.x

- Chambers, K, Woodhouse, JH, (2006) 'Investigating the lowermost mantle using migrations of long-period S-ScS data', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 667-678 doi: 10.1111/j.1365-246X.2006.03002.x

- Boschi, L, Woodhouse, JH, (2006) 'Surface wave ray tracing and azimuthal anisotropy: a generalized spherical harmonic approach', *GEOPHYSICAL JOURNAL INTERNATIONAL*. pp. 569-578 doi: 10.1111/j.1365-246X.2006.02870.x

- Deuss, A, Redfern, SAT, Chambers, K, Woodhouse, JH, (2006) 'The nature of the 660-kilometer discontinuity in Earth's mantle from global seismic observations of PP precursors', *SCIENCE*. pp. 198-201 doi: 10.1126/science.1120020

- Deuss, A, Woodhouse, J, (2001) 'Seismic observations of splitting of the mid-transition zone discontinuity in Earth's mantle.', *Science*. pp. 354-357 doi: 10.1126/science.1063524

- Robinson, DP, Henry, C, Das, S, Woodhouse, JH, (2001) 'Simultaneous rupture along two conjugate planes of the Wharton Basin earthquake.', *Science*. pp. 1145-1148 doi: 10.1126/science.1059395

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