

References

- Alsina, D., R. L. Woodward, and R. K. Snieder (1996) Shear-wave velocity structure in North America from large-scale waveform inversion of surface waves, *J. Geophys. Res.*, **101**, 10,969-15,986.
- Anderson, D. L. (1961) Elastic wave propagation in layered anisotropic media, *J. Geophys. Res.*, **66**, 2953-2963.
- Anderson, D. L. (1990) The deep structure of continents, *J. Geophys. Res.*, **84**, 7555-7560.
- Babuška V, J. P. Montagner, J. Plomerova and N. Girardin (1998) Age-dependent large-scale fabric of the mantle lithosphere as derived from surface wave velocity anisotropy. *Pure Appl. Geophys.*: 121, 257-280.
- Bally, .W., C. R. Scotese and M. I. Ross (1989) North America: Plate-tectonic setting and tectonic elements, in *The Geology of North America*, vol. A, edited by A. W. Bally and A. R. Palmer, pp. 1-15, Geol. Soc. Am., Boulder, Co.
- Barruol, G. , P. G. Silver and A. Vauchez (1997) Seismic anisotropy in the eastern United States: Deep structure of a complex continental plate, *J. Geophys. Res.*, **102**, 8329-8348.
- Bokelmann, G. H. R. (2002a) Convection-driven motion of the North-American craton: evidence from P-wave anisotropy, *Geophys. J. Int.*, **248**, 278-287.
- Bokelmann, G. H. R. (2002b) Which forces drive North America?, *Geology*, **30**, 1027-1030.
- Bokelmann, G. H. R. and P. G. Silver (2002) Shear stress at the base of shield lithosphere, *Geophys. Res. Lett.*, **29**, 6 -1, 10.1029/2002GL015925.
- Bormann, P. G. Grünthal, R. Kind and H. Montag (1996) Upper-mantle anisotropy beneath central Europe from SKS wave splitting: effects of absolute plate motion and lithosphere-asthenosphere boundary topography?, *J. Geodynamics*, **23**, 11-32.
- Bostock, M. G. (1996) Ps conversions from the upper mantle transition zone beneath the Canadian landmass, *J. Geophys. Res.*, **101**, 8393-8402.
- **Bréger, L. and B. Romanowicz (1998) Thermal and chemical 3D heterogeneity in D", *Science*, **282**, 718-720.
- **Bréger, L., B. Romanowicz and L. Vinnik (1998) Tests of tomographic models in D" using differential travel times, *Geophys. Res. Lett.*, **25**, 5-8.
- **Bréger, L., H. Tkalcic and B. Romanowicz (2000a) The effect of D" on PKP(AB-DF) travel time residuals and possible implications for inner core structure, *Earth Planet. Sci. Lett.*, **175**, 133-143.
- **Bréger, L., B. Romanowicz and S. Rousset (2000b) New constraints on the structure of the inner core from P'P', *Geophys. Res. Lett.*, **27**, 2781-2784, 2000.
- **Bréger, L., B. Romanowicz and C. Ng (2001) The Pacific plume as seen by S, ScS, and SKS, *Geophys. Res. Lett.*, **28**, 1107-1110.
- **Bunge, P. M., Richards, C. Lithgow-Bertelloni, B. Romanowicz and S. Grand (1998), Time scales and heterogeneous structure in geodynamic Earth models, *Science*, **280**, 91-95.
- **Capdeville, Y., B. Romanowicz and A. To (2002) Coupling spectral elements and modes in a spherical earth: an extension to the "sandwich" case, *Geophys. J. Int.*, in press.
- **Clévéde E., C. Mégnin, B. Romanowicz, and P. Lognonné, (2000) Modeling of waveforms in a 3-D Earth: asymptotic and non-asymptotic approaches", *Phys. Earth. Planet. Int.*, **119**,37-56.
- Debayle, E. and B. L. N. Kennett (2000) Anisotropy in the Australasian upper mantle from Love and Rayleigh waveform inversion, *Earth Planet. Sci. Lett.*, **184**, 339-351.
- **Durek, J. and B. Romanowicz (1999) Inner core anisotropy inferred by direct inversion of

- normal mode spectra, *Geophys. J. Int.*, **139**, 599-622.
- Dziewonski, A. M. and D. L. Anderson (1981) Preliminary reference earth model, *Phys. Earth Planet. Int.*, **25**, 297-356.
- Ekström, G. and A. Dziewonski (1998) The unique anisotropy of the Pacific upper mantle, *Nature*, **394**, 168-172.
- Ekström, G., J. Tromp and E. W. F. Larson (1997) Measurements and global models of surface wave propagation, *J. Geophys. Res.*, **102**, 8137-8157.
- Estey, L. H. and B. J. Douglas (1986) Upper mantle anisotropy: a preliminary model, *J. Geophys. Res.*, **91**, 11,393-11,406.
- Forsyth, D. W. (1975) The early structural evolution and anisotropy of the oceanic upper mantle, *Geophys. J. R. astron. Soc.*, **43**, 103-162.
- Forsyth, D. W. and A. Li (2003) Array-analysis of Two-dimensional variations in surface wave phase velocity and azimuthal anisotropy in the presence of multipathing, ??????
- Fouch, M. J., K. M. Fischer, E. M. Parmentier, M. E. Wysession, and T. J. Clarke (2000) Shear-wave splitting, continental keels, and patterns of mantle flow, *J. Geophys. Res.*, **105**, 6255-6275.
- Gaherty, J. B. and T. H. Jordan (1995) Lehmann discontinuity as the base of an anisotropic layer beneath continents, *Science*, **268**, 1468-1471.
- Grand, S. P. (1994) Mantle shear structure beneath the Americas and surrounding oceans, *J. Geophys. Res.*, **99**, 11,591-11,621.
- Grand, S. P. (2002) Mantle shear wave tomography and the fate of subducted slabs, *Phil. Trans. R. Soc. of London*, **360**, 2475-2491.
- Gu, Y., A. M. Dziewonski and G. Ekström (2001) Preferential detection of the Lehmann discontinuity beneath continents, *Geophys. Res. Lett.*, **28**, 4655-4658.
- **Gung, Y. C. and B. Romanowicz (2003) Q tomography of the upper mantle using three component long period waveforms, *Geophys. J. Int.*, submitted.
- **Gung, Y., M. Panning and B. Romanowicz (2003) Global anisotropy and the thickness of continents, *Nature*, **422**, 707-711.
- **Igel, H., N. Takeuchi, R. Geller, C. Megnin, H.P. Bunge, E. Clevede, J. Dalkolmo and B. Romanowicz (2000) The COSY Project: verification of global seismic modeling algorithms, *Phys. Earth Planet. Inter.*, **119**, 3-24.
- Hess, H. Seismic anisotropy of the uppermost mantle under the oceans, *Nature*, **203**, 629-631.
- Hirth, G., R. Evans, and A. D. Chave (2000) Comparison of continental and oceanic mantle electrical conductivity: is the Archean lithosphere dry? *Geopchem. Geophys. Geosyst.*, **1**, 2000GC000048.
- Jaupart, C., Mareschal, J. C. and Guillou-Frottier, L.(1998) Heat flow and thickness of the lithosphere in the Canadian Shield, *J. Geophys. Res.*, **103**, 15,269-15,286.
- Jordan. T. H. (1975) The continental lithosphere, *Rev. Geoph. Space Phys.*, **13**, 1-12.
- Jordan. T. H. (1978) A procedure for estimating lateral variations from low-frequency eigenspectra data, *Geophys. J. R. astr. Soc.*, **52**, 441-455.
- Jung, H. and S.I. Karato (2001) Water-induced fabric transitions in Olivine, *Science*, **293**, 1460-1463.
- Karato, S. I. (1992) On the Lehmann Discontinuity, *Geophys. Res. Lett.*, **9**, 2255-2258.
- Karato, S. I. and P. Wu (1993) Rheology of the upper mantle: a synthesis, *Science*, **260**, 771-778.
- Komatitsch, D. and J. P. Vilotte (1998) The spectral element method: an effective tool to simulate

- the seismic response of 2D and 3D geological structures, *Bull. Seism. Soc. Am.*, **88**, 368-392.
- Komatitsch, D. and J. Tromp (1999) Introduction to the spectral element method for three-dimensional seismic wave propagation, *Geophys. J. Int.*, **139**, 806-822.
- Larson, E.W.F., J. Tromp and G. Ekström (1998) Effects of slight anisotropy on surface waves, *Geophys. J. Int.*, **132**, 654-666.
- Laske, G. and G. Masters (1998) Surface wave polarization data and global anisotropic structure, *Geophys. J. Int.* **132**, 508-520.
- Leven, J. H., Jackson, I. and Ringwood, A. E. (1981) Upper mantle seismic anisotropy and lithospheric decoupling, *Nature*, **289**, 234-239.
- Levin, V. and J. Park (2000) Shear zones in the Proterozoic lithosphere of the Arabian Shield and the nature of the Hales discontinuity, *Tectonoph.*, **323**, 131-148.
- Levin, V., W. Menke and J. Park (1999) Shear-wave splitting in the Appalachians and the Urals: A case for multilayered anisotropy, *J. Geophys. Res.*, **104**, 17,975-17,993.
- Li, X. D. and T. Tanimoto (1993) Waveforms of long period body waves in a slightly aspherical Earth model, *Geophys. J. R. astr. Soc.*, **52**, 441-455.
- **Li X. D. and B. Romanowicz (1995) Comparison of global waveform inversions with and without considering cross branch coupling. *Geophys. J. Int.*, **121**, 695-709.
- **Li, X.D. and B. Romanowicz (1996) Global mantle shear velocity model developed using nonlinear asymptotic coupling theory, *J. Geophys. Res.*, **101**, 22,245-22,273.
- Li, A., D. W. Forsyth and K. M. Fischer (2003a) Shear velocity structure and azimuthal anisotropy beneath eastern North America from Rayleigh wave inversion, *J. Geophys. Res.*, in press.
- Li, A., D. W. Forsyth and K. M. Fischer (2003b) Rayleigh wave constraints on shear-wave structure and azimuthal anisotropy beneath the Colorado Rocky Mountains, —it AgU Monograph: Lithospheric structure and evolution of the Rocky Mountain Region, submitted.
- Li, A., K. M. Fischer, M. E. Wysession and T. J. Clarke (1998) Mantle discontinuities and temperature under the North American continental keel, *Nature*, **395**, 160-163.
- Masters G., Johnson, S., Laske, G. and Bolton, B. (1996) A shear-velocity model of the mantle, *Philos. Trans. R. Soc. Lond. A*, **354**, 1,385-1,411.
- **Mégnin, C. and B. Romanowicz (1998) The effect of theoretical formalism and data selection scheme on mantle models derived from waveform tomography, *Geophys. J. Int.*, **138**, 366-380.
- **Mégnin, C. and B. Romanowicz (2000a) The 3D shear velocity structure of the mantle from the inversion of body, surface and higher mode waveforms, *Geophys. J. Inter.*, **143**, 709-728.
- **Mégnin, C. and B. Romanowicz (2000b) A comparison between tomographic and geodynamic models of the earth's mantle, History and Dynamics of Plate Motions, *Geophysical Monograph, AGU*, **121**, 257-276.
- **Mégnin, C., H.P. Bunge, B. Romanowicz and M. Richards (1997) Imaging 3-D spherical convection models: what can seismic tomography tell us about mantle dynamics?, *Geophys. Res. Lett.*, **24**, 1299-1302.
- Mochizuki, E. (1986) The free oscillations of an anisotropic and heterogeneous Earth, *Geophys. J. R. astr. Soc.*, **86**, 167-176.
- Montagner, J. and H. C. Nataf (1986) A simple method for inverting the azimuthal anisotropy of surface waves, *J. Geophys. Res.*, **91**, 511-520.
- Montagner, J. and H. C. Nataf (1988) Vectorial Tomography, I: Theory, *Geophys. J. R. Astron. Soc.*, **94**, 295-307.
- Montagner, J. P. and N. Jobert (1988) Vectorial Tomography, II: application to the Indian Ocean,

- Geophys. J. R. astr. Soc.*, **94**, 309-344.
- Montagner, J. P. and D. L. Anderson (1989) Petrological constraints on seismic anisotropy, *Phys. Earth Planet. Int.*, **54**, 82-105.
- Montagner J. P. and T. Tanimoto (1991) Global upper mantle tomography of seismic velocities and anisotropy. *J. Geophys. Res.*, **96**, 20,337-20,351.
- Montagner, J.-P., D. A. Griot-Pommera and J. Lavé (2000) How to relate body wave and surface wave anisotropy, *J. Geophys. Res.*, **105**, 19,015-19,027.
- Mooney, W.D. and L. W. Braile (1989) The seismic structure of the continental crust and upper mantle of North America, in *The Geology of North America*, vol. A., *Overview*, edited by A. W. Bally and A. R. Palmer, pp. 39-52, Geol. Soc. of Am., Boulder, Colo..
- Mooney W. D., G. Laske, G. Masters (1998) CRUST-5.1: A global crustal model at $5^{\circ} \times 5^{\circ}$. *J. Geophys. Res.*, **103**, 727-747.
- Panning, M. and B. Romanowicz (2003) Waveform modelling of mantle anisotropic structure, XXIII General Assembly of IUGG, Sapporo, July 2003, abstract.
- Park, J. (1987) Asymptotic coupled-mode expressions for multiplet amplitude anomalies and frequency shifts on an aspherical earth, *Geophys. J. R. astr. Soc.*, **90**, 129-169.
- Park, J. (1997) Free oscillations in an anisotropic earth: path-integral asymptotics, *Geophys. J. Int.*, **129**, 399-411.
- Park, J. and V. Levin (2002) Seismic anisotropy: Tracing plate dynamics in the mantle, *Science*, **296**, 485-489.
- Phinney, R. A. and R. Burridge (1973) Representation of the elastic-gravitational excitation of a spherical earth model by generalized spherical harmonics, *Geophys. J. R. Astr. Soc.*, **34**, 451-487.
- Plomerova, J., D. Kouba and V. Babuška (2002) Mapping the lithosphere-asthenosphere boundary through changes in surface-wave anisotropy, *Tectonophysics*, **358**, 175-185.
- Revenaugh, J. and T. H. Jordan (1991) Mantle layering from ScS reverberations. 3. The upper mantle, *J. Geophys. Res.*, **96**, 19,781-19,810.
- Ritsema, J. , H. van Heijst and J. H. Woodhouse (1999) Complex shear wave velocity structure imaged beneath Africa and Iceland, *Science*, **286**, 1925-1928.
- Rodgers, A. And J. Bhattacharyya (2001) Upper mantle shear and compressional velocity structure of the central US Craton: shear wave low-velocity zone and anisotropy, *Geophys. Res. Lett.*, **28**, 383-386.
- Rondenay, S., M. G. Bostock, T. M. Hearn, D. J. White and R. M. Ellis (2000) Lithospheric assembly and modification of the SE Canadian Shield: Abitibi-Grenville teleseismic experiment, *J. Geophys. Res.*, **105**, 13,735-13,754.
- Romanowicz, B. (1979) Seismic structure of the upper mantle beneath the United States by three-dimensional inversion of body wave arrivals, *Geophys. J. R. Astron. Soc.*, **57**, 79-506.
- Romanowicz, B. (1987) Multiplet-multiplet coupling due to lateral heterogeneity: asymptotic effects on the amplitude and frequency of the Earth's normal modes, *Geophys. J. R. astr. Soc.*, **90**, 75-100.
- **Romanowicz, B. (1998) Attenuation tomography of the Earth's Mantle: a review of current status, *Pure Appl. Geophys.*, **153**, 257-272.
- **Romanowicz, B. (2001) Can we resolve 3D density heterogeneity in the lower mantle? *Geophys. Res. Lett.*, **28**, 1107-1110.
- **Romanowicz, B. (2002) The 3D structure of the lower mantle, *C.R.Acad.Sci.*, **335**, 23-36.

- **Romanowicz, B. (2002) Global mantle tomography: recent achievements and future challenges, *Acta Geophys. Polonica*, **50**, 3-21, 2002.
- **Romanowicz, B. (2003) Global mantle tomography: progress status in the last 10 years, *Annu. Rev. Geoph. Space Phys*, 31 (1), 303.
- Romanowicz, B. and G. Roullet (1986) First order asymptotic effects for the eigenfrequencies of the earth and application to the retrieval of large-scale lateral variations of structure, *Geophys. J. R. astr. Soc.*, **87**, 209-239.
- Romanowicz, B. and R. Snieder (1988) A new formalism for the effect of lateral heterogeneity on normal modes and surface waves, II- general anisotropic perturbation, *Geophys. J. R. astron. Soc.*, **93**, 91-100.
- **Romanowicz, B. and L. Bréger (2000) Anomalous splitting of free oscillations: a reevaluation of possible interpretations, *J. Geophys. Res.*, **105**, 21,559-21,578,.
- **Romanowicz, B. and J. Durek (2000) Seismological constraints on attenuation in the earth: a review, *Geophysical Monograph*, **117**, AGU, 161-180.
- **Romanowicz, B. and Y.C. Gung, Superplumes from the core-mantle boundary to the lithosphere: implications for heat-flux, *Science*, **296**, 513-516, 2002.
- **Romanowicz, B., X.D. Li and J. Durek (1996) Anisotropy in the inner core: could it be due to low order convection?, *Science*, **274**, 963-966.
- **Romanowicz, B., H. Tkalcic and L. Bréger (2002) On the origin of complexity in PKP travel time data from broadband records, in Earth's Core: Dynamics, Structure, Rotation, V. Dehant and K. Creager Eds, *AGU Geodynamics Series*, **31**, 31-44.
- Rudnick, R., McDonough, W. and O'Connell, R. (1998) Thermal structure, thickness and composition of continental lithosphere, *Chem. Geol.*, **145**, 395-411.
- Savage, M. K. (1999) Seismic anisotropy and mantle deformation: what have we learned from shear wave splitting?. *Rev. of Geophys*, **37**, 69-106.
- Savage, M. K., A. F. Sheehan and A. Lerner-Lam (1996) Shear wave splitting across the Rocky Mountain Front, *Geophys. Res. Lett.*, **23**, 2267-2270.
- Savage, M. K. and A. F. Sheehan (2000) Seismic Anisotropy and mantle flow from the Great Basin to the Great Plains, western United States, *J. Geophys. Res*, **105**, 13,715-13,734.
- Shearer, P. (1990) Seismic imaging of upper mantle structure with new evidence for a 520km discontinuity, *Nature*, **344**, 121-126.
- Silver, P. G. (1996) Seismic anisotropy beneath the continents: probing the depth of geology, *Annu. Rev. Earth Planet. Sci.*, **24**, 385-432.
- Silver, P. G. and W. W. Chan (1988) Implications for continental structure and evolution from seismic anisotropy, *Nature*, **335**, 34-39.
- Simons, F., R. van der Hilst, J. P. Montagner and A. Zielhuis (2001) Multimode Rayleigh wave inversion for shear wave speed heterogeneity and azimuthal anisotropy of the Australian upper mantle, *Geophys. J. Int.*, **203**, 1-17.
- Smith, M. L. and F. A. Dahlen (1973) The Azimuthal dependence of Love and Rayleigh wave propagation in a slightly anisotropic medium, *J. Geophys. Res.*, **78**, 3321-3333.
- Snieder, R. K., and G. Nolet (1987) Linearized scattering of surface waves on a spherical earth, *J. Geophys.*, **61**, 55-63.
- **Souriau, A. and B. Romanowicz (1996) Anisotropy in inner core attenuation: a new type of data to constrain the nature of the solid core, *Geophys. Res. Lett.*, **23**, 1-4.
- **Souriau, A. and B. Romanowicz (1997) Anisotropy in the inner core: relation between P-velocity

- and attenuation, *Phys. Earth Planet. Inter.*, **101**, 33-47.
- Tanimoto, T. (1986) Free oscillations of a slightly anisotropic earth, *Geophys. J. R. astr. Soc.*, **87**, 493-518.
- Tanimoto, T. and D. L. Anderson (1984) Mapping convection in the mantle, *Geophys. Res. Lett.*, **4**, 287-290.
- ** Tkalcic, H., B. Romanowicz and N. Houy (2002) Constraints on D" structure using PKP(AB-DF), PKP(BC-DF) and PcP-P travel time data from broadband records, *Geophys. J. Int.*, **148**, 599-6162.
- **Tkalcic, H. and B. Romanowicz (2002) Short scale heterogeneity in the lowermost mantle: insights from PcP-P and ScS-S data, *Earth Planet. Science Lett.*, **201(1)**, 57-68.
- van der Lee, S. and G. Nolet (1997) Upper mantle S-velocity structure of North America, *J. Geophys. Res.*, **102**, 22,815-22,838.
- van der Lee, S. (2002) High resolution estimates of lithospheric thickness from Missouri to Massachusetts, USA, *Earth Planet. Sci. Lett.*, **203**, 15-23.
- Vinnik, L., G. L. Losarev and L. I. Makeyeva (1984) Anisotropy in the lithosphere from the observations of SKS and SKKS, *Dokl. Acad. Nauk SSSR*, **278**, 1335-1339.
- Vinnik, L., V. Farra and B. Romanowicz (1989) Observational evidence for diffracted SV in the shadow of the earth's core, *Geophys. Res. Lett.*, **16**, 519-522.
- Vinnik, L. P., L. I. Makeyeva, A. Milev and A. Y. Usenko (1992) Global patterns of azimuthal anisotropy and deformation in the continental mantle, *Geophys. J. Int.*, **111**, 433-447.
- **Vinnik, L., L. Bréger and B. Romanowicz (1998) On the inversion of Sd particle motion for anisotropy in D", *Geophys. Res. Lett.*, **25**, 679-682.
- Woodhouse, J. H. and T. P. Girnius (1982) Surface waves and free oscillations in a regionalized earth model, *Geophys. J. R. Astron. Soc.*, **68**, 653-673.
- Woodhouse, J.H. and A.M. Dziewonski (1984) Mapping the upper mantle: three-dimensional modeling of Earth structure by inversion of seismic waveforms, *J. Geophys. Res.*, **89**, 5953-86.
- Woodhouse, J. H. and Y. Wong (1986) Amplitude, phase and path anomalies of mantle waves, *Geophys. J. R. Astron. Soc.*, **87**, 753-773.
- Yu, Y. and J. Park (1994) Hunting for azimuthal anisotropy beneath the Pacific Ocean, *J. Geophys. Res.*, **99**, 15,399-15,421.
- Zhang, S. and S. I. Karato (1995) Lattice preferred orientation of olivine aggregates deformed in simple shear, *Nature*, **375**, 774-777.