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Professional Preparation

1984: Ph.D., Physics, University of California, San Diego
1981: M.S., Physics, University of California, San Diego
1976: A.B., Physics, University of California, Berkeley

Appointments

2003 - : Senior Research Scientist, NorthWest Research Associates
1997 - 2002: Associate Research Professor, New Jersey Institute of Technology
1996 - 1997: Senior Research Scientist, Windrush Research Corporation
1995 - 1996: Research Scientist, Bartol Research Institute, University of Delaware
1993 - 1994: Research Associate, The Pennsylvania State University
1992 - 1993: Lecturer in Physics, California Institute of Technology
1990 - 1993: Senior Research Fellow, California Institute of Technology

Publications Related to Proposed Research

Hanasoge, S. M., Woodard, M., Antia, H. M., Gizon, L. and Sreenivasan, K. R.: 2017, "Sensitivity of Helioseismic Measurements of Normal-mode Coupling to Flows and Sound-speed Perturbations", *Mon. Not. R. astr. Soc.* **470**, 1404.
Woodard, M. F.: 2016, "Evidence for Large-Scale Subsurface Convection in the Sun", *Mon. Not. R. astr. Soc.* **460**, 3292.
Woodard, M.: 2014, "Detectability of Large-Scale Solar Subsurface Flows", *Solar Phys.* **289**, 1085.
Woodard, M., Schou, J., Birch, A.C., Larson, T.P.: 2013, "Global-Oscillation Eigenfunction Measurements of Solar Meridional Flow", *Solar Phys.* **287**, 129.
Woodard, M. F.: 2009, "Seismic Detection of Solar Mesogranular-Scale Flow", *Ap. J.* **706**, L62.
Woodard, M. F.: 2007, "Probing Supergranular Flow in the Solar Interior", *Ap. J.* **668**, 1189.
Woodard, M. F.: 2002, "Solar Subsurface Flow Inferred Directly from Frequency-Wavenumber Correlations in the Seismic Velocity Field", *Ap. J.* **565**, 634.
Woodard, M. F., Korzennik, S. G., Rabello-Soares, M. C., Kumar, P., Tarbell, T. D., and Acton, S.: 2001, "Energy Distribution of Solar Oscillation Modes Inferred from Space-Based Measurements", *Ap. J.* **548**, L103.
Woodard, M. F.: 2000, "Theoretical Signature of Solar Meridional Flow in Global Seismic Data", *Solar Phys.* **197**, 11.

- Woodard, M. F.: 1998, "Effect of Subsurface Inhomogeneities on the Statistics of Solar Oscillation Power Spectra", *Solar Phys.* **180**, 19.
- Woodard, M. F.: 1989, "Distortion of High-Degree Solar p-Mode Eigenfunctions by Latitudinal Differential Rotation", *Ap. J.* **347**, 1176.

Other Publications

- Woodard, M. F., and Libbrecht, K. G.: 2003, "Spatial and Temporal Variations in the Solar Brightness", *Solar Phys.* **212**, 51.
- Woodard, M. F. and Libbrecht, K. G.: 1993, "Observations of Time Variation in the Sun's Rotation", *Science* **260**, 1778.
- Woodard, M. F. and Chae, J.: 1999, "Evidence for Non-Potential Magnetic Fields in the Quiet Sun", *Solar Phys.* **184**, 239.
- Taylor, S. F., Varsik, J. R., Woodard, M. F., and Libbrecht, K. G.: 1998, "Spatial Dependence of Solar-Cycle Changes in the Sun's Luminosity", *Solar Phys.* **178**, 1.
- Woodard, M. F. and Libbrecht, K. G.: 1993, "Solar Activity and Oscillation Frequency Splittings", *Ap. J. Letters* **402**, L77.
- Woodard, M. F., Kuhn, J. R., Murray, N., and Libbrecht, K. G.: 1991, "Short-Term Changes in Solar Oscillation Frequencies and Solar Activity", *Ap. J. Letters* **373**, L81.
- Woodard, M. F. and Marti, K.: 1985, "Clusters and Cycles in the Cosmic Ray Age Distributions of Meteorites", *International Cosmic Ray conference proceedings, La Jolla* **5**, 402.

Relevant Scientific, Technical, and Management Performance

Woodard was PI on a number of NASA and NSF projects related to the proposed work. The goal of these projects was to develop helioseismic models of solar mass flows and apply them to *SOHO*/MDI and GONG solar oscillation data sets to study subsurface flows on scales ranging from supergranulation to meridional circulation. Woodard is currently PI on a NASA project closely related to the proposed work. The goal of the project is to investigate turbulent convection on the largest angular scales using *SOHO*/MDI solar oscillation data.