

**Catherine A. Hier Majumder**  
**MESSENGER Fellow**  
**Department of Terrestrial Magnetism**  
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**Education**

- Ph.D., Geophysics, University of Minnesota at Minneapolis, 2003  
Thesis: Numerical Methods in Geophysics, Prof. David A. Yuen, Advisor
- Bachelor of Science, Geology, University of Illinois at Urbana-Champaign, 1997, *Summa cum Laude* with Distinction in the Curriculum, Honors  
Senior Thesis: The Des Plaines Disturbance: A Buried Meteorite Impact Site

**Research Positions and Fellowships**

- 2005 – present, MESSENGER Fellow, Department of Terrestrial Magnetism, Carnegie Institution of Washington
- 2004 – 2005, Post-doctoral Researcher, Computational Physics Group, Earth Science Division, Lawrence Livermore National Laboratory
- 2003 – 2004, Graduate Research Assistant; Atmospheric, Climate, and Environmental Dynamics Group; Earth and Environmental Science Division; Los Alamos National Laboratory
- 2002 – 2003, Doctoral Dissertation Fellow, Graduate School, University of Minnesota at Minneapolis
- 2000 – 2003, Associated Western Universities, Graduate Student Fellow in residence at Fluid and Computational Engineering Group, Pacific Northwest National Laboratory
- 1998 – 2001, Graduate Student Fellow, National Science Foundation
- 1997 – 1998, Graduate School Fellow, University of Minnesota at Minneapolis
- 1997 – 1998, Department of Geology and Geophysics Fellow, University of Minnesota at Minneapolis
- 1996, James Scholars Award for undergraduate research projects, University of Illinois at Urbana-Champaign

### **Teaching Experience**

- 2006, Summer Intern Advisor, Carnegie Institution of Washington
- 2003, Instructor, Geo 4212, Solid Earth Geophysics II, Department of Geology and Geophysics, University of Minnesota at Minneapolis
- 1999 – 2003, Teaching Assistant for introductory geology, Department of Geology and Geophysics, University of Minnesota at Minneapolis
- 1996 – 1997, Teaching Assistant for introductory and historical geology, Department of Geology, University of Illinois at Urbana-Champaign
- 1995 – 1997, Class Assistant for differential equations and symbolic computation, Department of Mathematics, University of Illinois at Urbana-Champaign

### **Service to Scientific Community**

- 2006, NASA Astrobiology Institute Early Career Liaison, Carnegie Institution of Washington
- 2006, Reviewer, *Icarus*
- 2005, AGU Representative, Congressional Visit Days
- 2004, Reviewer, NATO Cooperative Science and Technology Sub-Programme Collaborative Linkage Grants
- 2002, Engineering, Physical, and Math Sciences Policy and Review Committee, University of Minnesota at Minneapolis
- 2002, Department of Geology and Geophysics Representative, Council of Graduate Students, University of Minnesota at Minneapolis
- 2000 – 2001, Seminar Committee, Department of Geology and Geophysics, University of Minnesota at Minneapolis
- 1998 – 2000, Program advisor and presenter for Geological Society of Minnesota's school outreach presentations
- 1998 – 1999, Helped write texts for geological markers located at various sites in Minnesota
- 1998, Volunteer for Minerals Education Workshop sponsored by the Minnesota Department of Natural Resources for Minnesota elementary and secondary school teachers.

### **Publications in Preparation**

Hier-Majumder, C. A.; Hustoft, J. W.; Solomon, S. C. Iron core formation by percolation and compaction.

Hier-Majumder, C. A.; Fei, Y. Partitioning of siderophile elements during multistage core formation.

Seager, S.; Hier-Majumder, C. A., Extrasolar planet bulk compositions from their cold mass-radius relations.

### **Peer-reviewed Publications**

Hier-Majumder, C. A.; Travis, B. J.; Bélanger, E.; Richard, G. ; Yuen, D. A.; Vincent, A. P. (2004). Use of the adjoint method for sensitivity studies in geophysics, *Geophysical Journal International*, in press.

- Hier Majumder, C. A.; Bélanger, E. ; DeRosier, S. ; Yuen, D. A. ; and Vincent, A. P. (2005). Data assimilation for plume models. *Nonlinear Processes in Geophysics*. Vol. 12: 257-267 .
- Hier Majumder, C. A.; Yuen, D. A.; Vincent, A. P. (2004). Four dynamical regimes for a starting plume model. *Physics of Fluids*. Vol: 16: 1516-1531.
- Vecsey, L.; Hier Majumder, C. A.; Yuen, D. A. (2003). Multi-resolution tectonic features over the Earth inferred from the wavelet transformed geoid. *Visual Geosciences*. Vol. 8: 10.1007/s10069-003-0008-8.
- Onishi, Y.; Trent, D. S.; Yokuda, S. T.; Hier Majumder, C. A.; Martinen, E. W.; Rieck, C. A. (2003). Optimal pump elevation and configuration for mixing erosion-resisting radioactive tank waste. Proceeding of FEDSM'03. 4<sup>th</sup> ASME\_JSME Joint Fluids Engineering Conference. Honolulu, HI.
- Hier Majumder, C. A.; Yuen, D. A.; Sevre, E. O.; Boggs, J. M.; and Bergeron, S. Y. (2002). Finite Prandtl number 2-D convection at high Rayleigh numbers. *Electronic Geosciences*. Vol. 7: 10.1007/s10069-002-0004-4.

### Technical Reports

- Onishi, Y.; Yokuda, S. T.; Majumder, C. H. (2002). Optimal elevation and configuration of Hanford's double-shell tank waste mixer pumps. United States Department of Energy Technical Report PNNL-13913. Pacific Northwest National Laboratory, Richland, WA 99352.

### Teaching Materials

- Mann, C. J.; Hier, C.; Russell, J. (1997). *Historical Geology Laboratory Manual*. Campus Publishing Services, University of Illinois at Urbana-Champaign.

### Invited Talks

- Interiors of Planetary Bodies: Formation of Iron Cores in Terrestrial Planets and Methods for Characterizing Interiors of Extrasolar Planets, University of Maryland, College Park, November 11, 2005.
- Core Formation in Planets and Mercury's Core, Department of Geology and Geophysics, Yale University, September 19, 2005.
- Finite Prandtl Convection; Department of Geological Sciences, Brown University; July 12, 2005.
- Convection in fluids with large, but finite Prandtl numbers; Berkeley Seismological Laboratory, University of California; March, 29, 2005.
- Advances in visualization and numerical simulation: Examples from finite Prandtl convection, wavelets analysis, and dark streaks on Mars; Lunar and Planetary Institute; February 4, 2004.
- Advances in numerical modeling and visualization: Examples from finite Prandtl number convection and nuclear waste tank mixing; Earth Sciences Division, Lawrence Livermore National Laboratory; December 5, 2003.