



XSEDE Resource Allocation System XRAS

[XRAS / Request](#)

CIG Science Gateway and Community Codes for the Geodynamics Community

 Submission for XRAC - March 2016 [View Opportunity](#)
Actions:



Number MCA08X011

Status Submitted

Type Renewal

Abstract – The Computational Infrastructure for Geodynamics (CIG), an NSF cyberinfrastructure facility, aims to enhance the capabilities of the geodynamics community through developing software that can be used to address a range of challenging problems in geophysics. CIG supports code development and benchmarking, user training, and new users by providing small allocations of computation time along with user support for CIG codes. CIG supports the aforementioned efforts in the following areas of activity: mantle dynamics, seismic wave propagation, geodynamo, and crustal and lithospheric dynamics on both million-year and earthquake time-scales. These efforts have resulted in successful allocation requests by our community and involvement of international researchers in benchmarking the next generation of geodynamo codes all of which were enabled by our community allocation.

Keywords – Adaptive mesh refinement, Finite element method, Short and long term tectonics, Geodynamo, Mantle Convection, Seismology, Geophysics

Fields of Science

Distributed and Parallel Processing, Vectorization

Tectonics

Seismology

 Geophysics primary

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Renewal Submitted

Opportunity Information

Resources

1. TACC Dell PowerEdge C8220 Cluster with Intel Xeon Phi coprocessors (Stampede)

Requested	2,491,520.00 SUs	Comments: (none)
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2. TACC Long-term tape Archival Storage (Ranch)

Requested	10,000.00 GB	Comments: (none)
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3. TACC HP/NVIDIA Interactive Visualization and Data Analytics System (Maverick)

Requested	20,000.00 SUs	Comments: (none)
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Documents

1. *List of Publications Resulting from XSEDE Support: **Publication list*** [CIG_Publicatio_list_20160115_2.pdf \(69.4 kB\)](#)
2. *Progress Report: **Progress report*** [CIG_Pregress_report_20160115.pdf \(1.1 MB\)](#)
3. *CoPI CV: **Cv for Lorraine Hwang*** [HwangBio.pdf \(115.9 kB\)](#)
4. *Code Perf & Scaling: **Code scaling*** [CIG_Code_Scaling_20160115.pdf \(1.1 MB\)](#)
5. *Main Document: **Proposal*** [CIG_xsede-Renewal_20160115.pdf \(149.7 kB\)](#)
6. *CoPI CV: **CV for John Naliboff*** [NaliboffBio.pdf \(98.7 kB\)](#)
7. *CoPI CV: **CV for Hiroaki Matsui*** [Matsui_20150115.pdf \(84.8 kB\)](#)
8. *PI CV: **CV for Louise Kellogg (PI)*** [KelloggBio-MRI2016.pdf \(110.7 kB\)](#)

Grants

1. **Geoinformatics: Facility Support: Computational Infrastructure for Geodynamics (0949446)**

Funding agency: National Science Foundation

Program Officer: [Robin Reichlin <rreichli@nsf.gov>](mailto:rreichli@nsf.gov)

PI: Louise H. Kellogg

Dates: 2010-07-01 - 2016-06-30

Award: \$7724260.0 (25.0% support)

Comments: Renewal of CIG award is pending in NSF for another 5 years.

Publications

1. C. Nore, J. Léorat, J. Guermond, A. Giesecke. **Mean-field model of the von Kármán sodium dynamo experiment using soft iron impellers.** Physical Review E. 1. . <http://dx.doi.org/10.1103/PhysRevE.91.013008>. 2015.
2. W. Herreman, C. Nore, L. Cappanera, J. Guermond. **Taylor instability in liquid metal columns and liquid metal batteries.** J. Fluid Mech.. . 79-114.

<http://dx.doi.org/10.1017/jfm.2015.159>. 2015.

3. H. Matsui, E. Heien, J. Aubert, J. Aurnou, M. Avery, B. Brown, B. Buffett, F. Busse, U. Christensen, C. Davies, N. Featherstone, T. Gastine, G. Glatzmaier, D. Gubbins, J. Guermond, Y. Hayashi, R. Hollerbach, L. Hwang, A. Jackson, C. Jones, W. Jiang, L. Kellogg, W. Kuang, M. Landeau, P. Marti, P. Olson, A. Ribeiro, Y. Sasaki, N. Schaeffer, R. Simitev, A. Sheyko, L. Silva, S. Stanley, F. Takahashi, S. Takehiro, J. Wicht, A. Willis. **Performance benchmarks for a next generation numerical dynamo model**. *Geochemistry, Geophysics, Geosystems*. . . . 2015.
4. N. Featherstone. **The Spectral Amplitude of Stellar Convection and its Scaling in the High-Rayleigh-Number Regime**. *Astrophys. J.* . . . 2015.
5. C. Nore, D. Castanon Quiroz, J. Guermond, J. Léorat, F. Luddens. **Numerical dynamo action in cylindrical containers**. *Eur. Phys. J. Appl. Phys.*. 3. 31101. <http://dx.doi.org/10.1051/epjap/2015150049>. 2015.
6. B. Buffett, H. Matsui. **The fluid dynamics of inner-core growth**. *Physics of the Earth and Planetary Interiors*. . 22-29. <http://dx.doi.org/10.1016/j.pepi.2015.04.001>. 2015.
7. X. Liu, S. Zhong. **The long-wavelength geoid from three-dimensional spherical models of thermal and thermochemical mantle convection**. *J. Geophys. Res. Solid Earth*. 6. 4572-4596. <http://dx.doi.org/10.1002/2015JB012016>. 2015.
8. A. Ribeiro, G. Fabre, J. Guermond, J. Aurnou. **Canonical Models of Geophysical and Astrophysical Flows: Turbulent Convection Experiments in Liquid Metals**. *Metals*. 1. 289-335. <http://dx.doi.org/10.3390/met5010289>. 2015.
9. H. Matsui, E. King, B. Buffett. **Multiscale convection in a geodynamo simulation with uniform heat flux along the outer boundary**. *Geochemistry, Geophysics, Geosystems*. 8. 3212-3225. <http://dx.doi.org/10.1002/2014GC005432>. 2014.
10. P. Rudiger, C. Weber, H. Matsui, E. Heien, L. Kellogg, B. Hamann, H. Hagen. **Pre-filtering of turbulent vector fields in the geodynamo**. *VIS* 2015. Chicago, IL. . . . 2015.
11. N. Featherstone. **An Open-Source, Pseudo-Spectral Convection Code for $SO(10^{15})$ Cores**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2014.
12. H. Lokavarapu, H. Matsui. **Optimization of Parallel Legendre Transform using Graphics Processing Unit (GPU) for a Geodynamo Code**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2015.
13. H. Lokavarapu, E. Heien, H. Matsui. **Parallelization of the Legendre Transform for a Geodynamics Code**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2014.
14. D. Stamps, W. Bangerth, B. Hager, C. Kreemer, E. Saria. **Kinematics and Dynamics of Observed Along-Rift Surface Motions in the East African Rift System**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2015.
15. D. Stamps, W. Bangerth, B. Hager. **Influence of Edge-Driven 3D Convection on Mantle-Lithosphere Interactions in East Africa**. XIV International Workshop on Modeling of Mantle and Lithosphere Dynamics. Orleans, France. . . . 2015.
16. D. Stamps, W. Bangerth, B. Hager. **Topside Driven 3D Convection Model of the East African Rift System with Comparison to Observed Rift-Parallel Surface Motions**. *Comparative Tectonics and Geodynamics of Venus, Earth, and Rocky Exoplanets*. California. . . . 2015.
17. D. Stamps, W. Bangerth, B. Hager. **Regional 3D Numerical Modeling of the Lithosphere-Mantle System: Implications for Continental Rift-Parallel Surface Velocities**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2014.
18. A. Ribeiro. **Container-scale hydrodynamic and magnetohydrodynamic modes in liquid metal rotating convection experiments with and without an imposed magnetic field**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2015.
19. H. Matsui. **Performance and accuracy benchmarks for a next generation geodynamo simulation**. American geophysical Union Fall meeting. San Francisco, CA. . . . 2015.
20. H. Matsui. **Thermal structure of the inner core boundary in numerical dynamos**. *The Earth's Mantle and Core: Structure, Composition, Evolution*. Ehime, Japan. . . . 2015.
21. H. Matsui, E. Heien. **A performance geodynamo benchmark**. American Geophysical Union Fall Meeting. San Francisco, CA. . . . 2014.
22. Y. He, M. Billen, E. Puckett. **Local Discontinuous Galerkin (LDG) Method for Advection of Active Compositional Fields with Discontinuous Boundaries: Demonstration and Comparison with Other Methods in the Mantle Convection Code**. American Geophysical Union Fall Meeting. San Francisco. . . . 2015.
23. K. Haynie, M. Jadamec. **Building the Yakutat plateau into models of flat slab subduction in Alaska**. GeoPRISMS TEI SCD Meeting. Redondo Beach, CA. . . . 2015.

MY XSEDE

RESOURCES

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ECSS Overview

Allocations/Usage	Remote	Community	Announcements	Course Calendar	Help Desk	ECSS Projects
Accounts	Visualization	Codes	Allocation	Online Training	Security Incident	ECSS Symposium
Jobs	File Manager	Manage Data	Policies			ECSS Workflows
Profile	Software	User Guides	Request Steps			
Publications	Queue Prediction	News	Submit/Review			
Tickets	Science	Usage Policy	Request			
Change	Gateways	Knowledge Base	Successful			
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