Welcome

Governance

– EC Activities

– Elections

Activities

Discussion

– Survey
LEADERSHIP 2019

EXECUTIVE COMMITTEE ACTIVITIES

Leadership Transition
CIG IV Planning
CIG Community Meeting
Writing Committee
CIG STAFF

DIRECTOR
Lorraine Hwang

RESEARCH SCIENTIST
Hiroaki Matsui
John Naliboff
Rene Gassmoeller

SYSTEM ADMINISTRATION
Bill Broadley
Timothy Thatcher*

Ask about the video ...
~Tahoe, CA

*new
Thanks to:
Frederik Simons

Nominating Committee
Carolina Lithgow-Bertelloni
Frederik Simons
Jolante van Wijk

Executive Committee:
Bruce Buffet (UC Berkeley)*
Katie Cooper (WSU)
Claire Currie (U. Alberta)*
Louis Moresi (Melbourne U.)
Carl Tape (UA Fairbanks)

5 elected members
2 ex-officio
GOVERNANCE

Science Steering Committee:
Ebru Bozdag (CSM)
Juliane Dannberg (U. Florida)*
David Ham (Imperial C.)
Jessica Irving (Princeton)
Scott King (VaTech)*
Gabriele Morra (UL Lafayette)
Krista Soderlund (UT Austin)
Cian Wilson (Carnegie DTM)

8 elected members
2 ex-officio

Thanks to:
Brad Aagaard
John Rudge

2019 CDM Workshop
GOVERNANCE

New Institutional Member
University of Florida
PyLith Development

Parallel, 2-D and 3-D finite-element code for modeling crustal deformation associated with earthquake faulting and elastic and/or viscoelastic rheologies - Aagaard, Knepley, Williams

Version 2.2.2 (July 2, 2019) Fixes a few small bugs

Version 3.0.0 beta (June 2019)
• New multiphysics formulation and PETSc time-stepping algorithms
• New examples

Version 3.0.0 (Jan/Feb 2020)
• Numerous delays due to other commitments and new bugs (e.g., changes to PETSc DMiPlex finite-element data structures)
• Still adding more tests (and finding more bugs)
Workshop
2019
June 10-14
Crustal Deformation Modeling Workshop
Colorado

2.0 days PyLith tutorials
+ 2.5 days science talks & discussions

58 participants
PyLith Hackathon
June 7–14, 2020,
Colorado School of Mines

- Looking for about 12 interested hackers
- Expectation: 3–4 projects with 3–4 people working together. LIST OF POTENTIAL PROJECTS Pending
- Application process will open in late January

PyLith v3.x Development Plan, April 2019
- Significant progress on poroelasticity implementation
  Robert Walker, Josimar Alves da Silva
- Update spontaneous rupture formulation and explicit time stepping
- More under-the-hood changes (e.g., Python 2 → Python 3)

Still waiting for champion(s) to lead other community code development efforts
Geodetic inversions
Long Term Tectonics

White Paper

Transitional Domains of the Lithosphere: the Future of Lithospheric Geodynamics

observational and computational

Canadian Geophysical U.
The Lithosphere Workshop

LTT Crustal Deformation Modeling

volunteers needed!
2019 Rayleigh Hackathon

- Online documentation that auto-updates
- Jupyter notebook examples:
  - modifying the code's equation sets
  - volumetric rendering using YT and Vapor.
- Custom-reference states and custom nondimensionalizations
- Generic inputs

22-26 July
15 participants
Major Development Milestones

- Coseismic and postearthquake deformation
- Gravity anomalies
- Magnetic anomalies
- GPU implementation: Phase I

Significant Future Plans

- Frequency Domain solver and Normal Modes
- Glacial Isostatic Adjustments
- True Polar Wander and Wobbles
- GPU implementation: Phase II
Release 2.1.0 (April 2019)
Geodynamic World Builder
Volume of Fluid method
New compressible formulations
\[ \rightarrow \text{DI33C-0049} \]

Future:
Visco-elastic-plastic deformation with phase changes, compressibility
24 participants

• Temperature stabilization: new SUPG, improved EV
• Robust shear band angles for visco-plastic → $T51C-16$
• Visco-elasto-plastic models
• Mesh deformation framework
• Various cookbooks and benchmarks

21 May – 1 June

2019
ASPECT
Hackathon
Spike was 66 million years to early to become a dinosaur of computing.
Albuquerque, NM

HPC

XSEDE
- allocation available for community use

Frontera Early Access (ranked #5)
- ASPECT: implemented multigrid solver. Excellent scaling.
- Future: I/O at scale, realistic problems, high-resolution grain-size models
Webinar Series

November 14
Richard Styron, GEM Foundation & Earth Analysis, LLC.

February 13
Christy Till, Arizona State U.

March 12
Nicole Gasparini, Tulane U.
Jane Willenbring, Scripps Inst. of Oceanography

April 9
Ved Lekic, U. Maryland

May 7
Brandon Schmandt, U. New Mexico

2019-2020 Observations and Data that Drive Geodynamics

Finding creative ways to track car keys.
2019 ASPECT Hack

more in 2020!
FROM GRAINS TO TECTONIC PLATE BOUNDARIES

Sylvain Barbot, USC
U. Louisiana, Lafayette  ◆ Louisiana State U.

CLUES ABOUT THE BREAK-UP OF THE AFRICAN CONTINENT

Sarah Stamps, Virginia Tech

WHAT CREATES THE UNIQUE TOPOGRAPHY OF EAST AFRICA?

Jolante Van Wijk, NMT
Florida State U.  ◆ U. Montana  ◆ Montana Tech
Future Activities

January 21-23
ASPECT User Workshop Virtual
May 3-6
CGU Banff LTT
June 7-14
PyLith Hackathon Colorado
July 25-31
LTT Deformation Modeling Workshop Colorado
Aug 4-15
ASPECT Hackathon Wyoming
Summer
Rayleigh Hackathon tbd
October 6-8
SPECFEM Developers Workshop
October 23-25
CIG Community Workshop Davis, CA

Cultivating analog skills. 2019 ASPECT Hack
My primary affiliation is with a:

- University: 48
- Government: 6
  - Sr. Research Scientist: 2
  - Faculty: 41

Career level:

- Sr. Research Scientist: 10
- Faculty: 41

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Survey - Demographics
Survey - Demographics

My domain area(s) of expertise is:
choose all that apply

- Computational Science: 23
- Core Dynamics: 7
- Long Term Tectonics: 22
- Mantle Dynamics: 22
- Seismology: 21
- Planetary Science: 12
- ST Crustal Deformation: 16
- Mineral Physics: 2
- Other: 4
Survey – Software

GPU implementation
inclusive communities
onboarding
fluid flow
multiphysics
data assimilation
workflow
AI
portability
usability
reproducibility

Rank the importance of each of the following themes for CIG IV:
Rank the importance of each of the following themes for CIG IV:

Survey – Science

EQ cycle modeling
computational seismology
model-based data fusion
education
energy and mineral security
hpc facility
next generation training
Rank the importance of each of the following themes for CIG IV:
Indicate how strongly you agree or disagree with the following statements:

- CIG should expand to additional domains in solid-Earth and planetary geophysics.
- CIG should seek dedicated computational resources for geodynamics.
- CIG should hold community-wide (“all hands”) meeting every 2 years.
- CIG should hold workshops on software engineering.
- CIG should hold workshops on coding.
- CIG should support activities that assist in building software communities.
- CIG should change the host institution/PI each funding period.
Survey - Comments

Frontier capabilities needed and opportunities:

- Machine learning in geodynamics
- Multi-scale physics and coupled problems across all scales e.g. LTT, MHD
- Supporting model and data collaboration and colocation

*Partnering with science entities*

Diversity and inclusivity:

- Demographics
- Participation in leading edge computing
- Small and large research groups
- International participation
- Funding
  - NASA for planetary geodynamics
  - NERC-NSF *United Kingdom*

Education:

- Pooling teaching resources
- Summer undergraduate researchers

Social responsibility:

- Decreasing our carbon footprint
2 Postdoctoral Researchers – RSE software development and engineering
  • The positions are expected to contribute to the development and support of numerical modeling codes in geodynamics and towards conducting independent research.

Applications:
  • < 5 page project proposal
  • Letter of Collaboration

Deadline January 26, 2020
https://recruit.ucdavis.edu/JPF03269

For more information contact Lorraine Hwang:
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Wishing you a New Year filled with Peace and Happiness