



Research Highlight

Modelling Crustal Deformation for Saturn's Moon Enceladus using PyLith

Enceladus is a small (~500 km diameter), dynamic, and potentially habitable moon of Saturn (Vance et al., 2023). Enceladus's plumes, which vent water crystals sourced from a global subsurface ocean, erupt from four prominent, evenly spaced surface fractures – informally called Tiger Stripes – within the satellite's South Polar Terrain (SPT) (above). The SPT exhibits anomalously high heat flux and regional crustal thinning (Park et al., 2024); suggesting that interrelated thermo-mechanical phenomena underlie SPT activity (Spencer et al., 2006). Moreover, observed jet activity varies over Enceladus's tidal cycle with two peaks in activity: one after the satellite reaches apoapsis (i.e., the furthest point in orbit relative to Saturn) and a smaller peak after periapsis (i.e., the closest point) (Hedman et al., 2013). These observations suggest that diurnal tides periodically deform Tiger Stripes to enable plume activity. However, the exact mechanism that regulates jet activity along the Tiger Stripes (e.g., tidally induced strike-slip or opening motion) is not well understood.

To explore a potential relationship between the dynamics of the Tiger Stripes and jet activity at Enceladus, we develop three-dimensional finite element models ... [\[full article\]](#)

contributed by

Alex Berne, *California Institute of Technology*

From HQ

Dear Community,

I am TOPS certified! NASA's Transform to Open Science (TOPS) initiative is designed to transform agencies, organizations, and communities to an inclusive culture of open science. Their open science curriculum and certification was a fun way to test my knowledge and pick up a few pointers. Amusingly enough of the modules I completed, I scored the lowest (relatively speaking!) on the Open Code badge. You can test your knowledge and collect all badges in about a half-hour or go at a more leisurely pace.



Our community both uses and produces open source software (OSS). Our use of OSS maybe invisible, think Apache HTTP Server, or perhaps highly visible through explicit use e.g., VirtualBox, application libraries. A recent study, [The Value of Open Source Software](#), shows that the Professional, Scientific, and Technical Services trade receives around \$43 billion benefits from their usage of OSS. Across all industries this value is \$8.8 trillion. If OSS did not exist, it would cost \$4.15 billion to recreate. While the scope of the study does not include research software, this does give me pause to think how our communities contribute to both the "supply" and "demand" side of the equation for both research and industry.

The month of May kicks off our summer workshop season. I hope to see many of you soon and discuss your science. Have a great summer of research.

Lorraine Hwang, *Co-Director*

News

Congratulations

Congratulations to:

- **Anne Glerum** who has been awarded the EGU 2024 Geodynamics Division Outstanding Early Career Scientist Award for her contributions in geodynamics, including providing new insight in the East African rift system, methodological advancement of geodynamic modeling techniques, and outstanding community service. [\[more info\]](#)
- **CITCOM** celebrating 30 years of research. Read more about the evolution of CITCOM, Ellipsis, and Underworld family. [\[blog\]](#)

Tech bytes

- **bibtex fan?** There is now support for managing software entries. bibtex-software introduces four specific bibliographic entries for describing respectively software, software versions, software modules and code fragments, designed by a dedicated task force at [Inria](#). [\[download\]](#)
- **EU Open Research Repository.** Coming to Zenodo in Autumn 2024, provides a space for research outputs including data sets, software, posters, and presentations that are out of scope for the Open Research Europe publishing platform. [\[blog\]](#) [\[more info\]](#)

Speaker Series

Join us in congratulating our [2024-2025 CIG Distinguished Speakers](#):

- **Changing ice in a warming climate: a data-driven approach**, *Ching-Yao Lai, Stanford University*
- **Geodynamics of early crust formation: Constraints on Earth's long-term tectonic and thermal evolution**, *Brad Foley, Pennsylvania State University*

Apply to Host a Speaker

The CIG Speaker Series seeks to promote computational modeling in geodynamics and related Earth science disciplines. The series aims to bring computational geodynamics speakers to institutions that may not otherwise have access to speakers with expertise in computational science or computational geophysics. By doing so, we aim to connect speakers and CIG with audiences from a variety of STEM domains, and to broaden participation in CIG and to work toward building a more diverse community within computational geodynamics. Institutions interested in hosting a Speaker in 2024-2025 should **apply by May 31, 2024**.

See the [website](#) for more information.

Governance

Best Practices Hackathon

CIG held an online hackathon on March 29 to update its software development best practices. The participants carefully reviewed the current version of the best practices to identify gaps, outdated wording, and areas that needed general improvement. The resulting updates further align CIG best practices with those of the Journal of Open Source Software, improve recognition for contributors, add guidelines for release notes, and include better wording and organization across the minimum, standard, and target best practices. Future updates could include more detailed explanation and motivation as well as migrate the documents to a format with easier navigation and readability. [Contact us](#) if you are interested in contributing to a new working group to help CIG to continue improving our software and best practices. *Contributed by Brad Aagaard, USGS.*

Working Groups

CIG seeks to engage its community and encourage new ideas by seeking members interested in participating as a member of a current working group or starting a new Focused Working Group (FWG). New FWGs should address a specific topic and have a clearly defined scope e.g., workshop, white paper, benchmark, etc. A FWG should define concrete outcome(s) achievable within a short time frame, < 2 years. Anyone can propose one! We look forward to your ideas in continuing the CIG community's dynamic leadership in the Earth sciences. [\[apply\]](#)

Events

2024 Ada Lovelace

The 2024 Ada Lovelace Workshop on Modelling of Mantle and Lithosphere Dynamics will take place from Sunday, 1st September 2024 afternoon to Friday, 6th September 2024 morning. Limited travel support is available for U.S. based early career participants. For more information, please see the EGU [meeting](#) website and our website for [support](#).

CIG Webinars

CIG Monthly Webinars have a **new time** Thursdays **@noon / 12P PT**. The 2024 webinar series will focus on current efforts to understand the relationship between different systems in geosciences. By presenting examples of coupled geodynamics models and the difficulties encountered in coupling them, speakers of this series invite us into exploration and discussions of the science opportunities and challenges in code coupling and multidisciplinary research. See the [webinar](#) page and the [calendar](#) for more information.

Webinars

- May 9** Interactions Between Tectonic and Surface Processes: Insights from 2-D and 3-D Geodynamic Modeling.
Thomas Theunissen, University of Bergen
- May 16** From Mantle Convection to Seismic Observations -- Simulating 3-D Wave Propagation in Geodynamic Earth Models
Bernhard Schuberth, Ludwig-Maximilians-Universität München

Workshops

May 28-June 7	ASPECT Hackathon	Bellvue, Colorado
June 10-14	Crustal Deformation Modeling Workshop	Golden, Colorado
June 16-22	Rayleigh Hackathon	Granby, Colorado