

Welcome!

Model-Based Reasoning Workshop

The 5th Hands-On Event
Hosted by the Intelligent Systems and Geosciences Community

August 15 - 18, 2022



Award #'s 1632211, 1849458, 2118285

INFORMATION ABOUT EARTH IS...



COMPLEX

DYNAMIC

BIG

BROAD

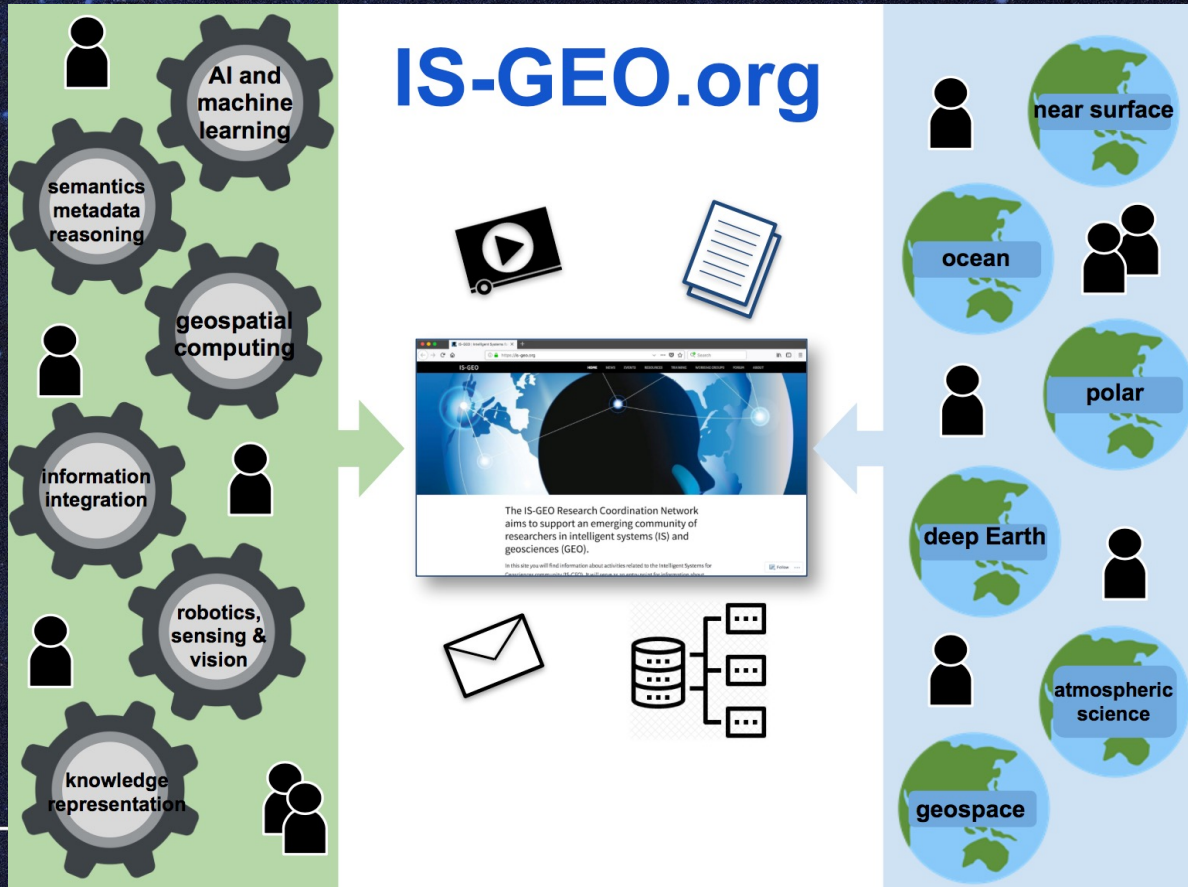
ILL-

UNCERTAIN

STRUCTURED

CHALLENGES BECOME OPPORTUNITIES

IS-GEO Research Coordination Network



IS-GEO
aims to support an
emerging community
of researchers in
Intelligent Systems (IS)
and
Geosciences (GEO).



Interactive Workspaces

- Synthesis studies
- Wholistic approaches
- High-level research questions



Theory-Driven Learning

- Large but minuscule datasets
- Extreme events
- Multiple scales



Information Ecosystems

- Many locations & data types
- Georeferenced & curated data
- Discover interlinked events



Model-Driven Sensing

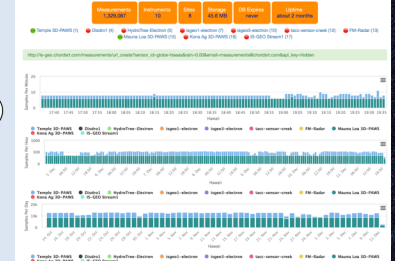
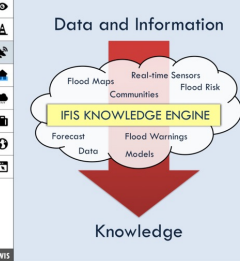
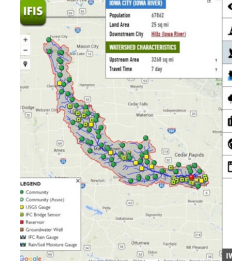
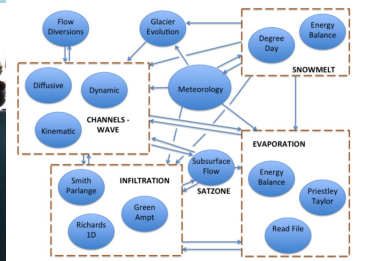
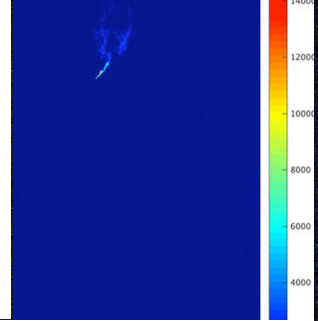
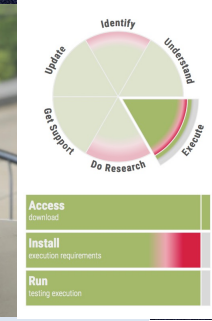
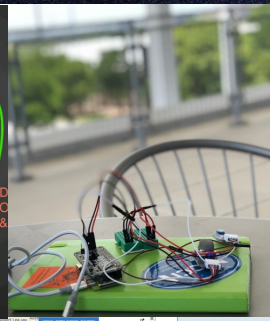
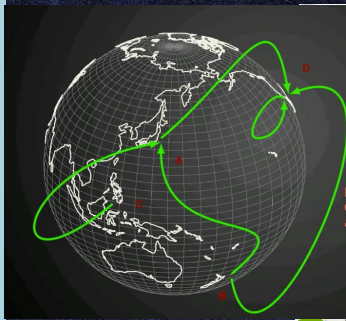
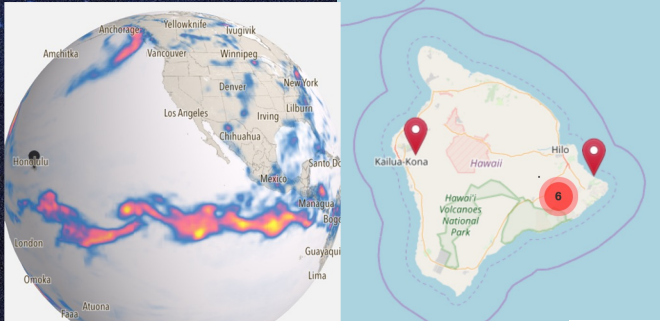
- Selective data collection
- Inaccessible locations
- Optimize experimental design

IS-GEO RCN Building Resources

Training Institutes

SME Lectures

Digital Tools



Opportunities & Resources...

Established

Working Groups – [EDU](#), [Model Integration](#), [Adaptive Sensing](#)
SME Lecture Series – [Subject Matter Experts](#) share monthly
Training Institutes/Workshops
[Hands-on 2015 – 2022](#), planned through 2027

Informal

Curricular material sharing
Professional training for private partners

Compute

Access to HPC resources to pilot test applications
and learn via the [DataX portal](#) at TACC





CUAHSI



Partners and Support

Support to Sustain IS-GEO activities has evolved in many ways including In-Kind and Funded Support

Some of the Partners | Collaborators that have made and are making a difference for IS-GEO include:

Sparkfun, Redfish SimTable, Wicked Device, Particle.io, Planet Texas 2050, U of Iowa, Petrobras, Microsoft

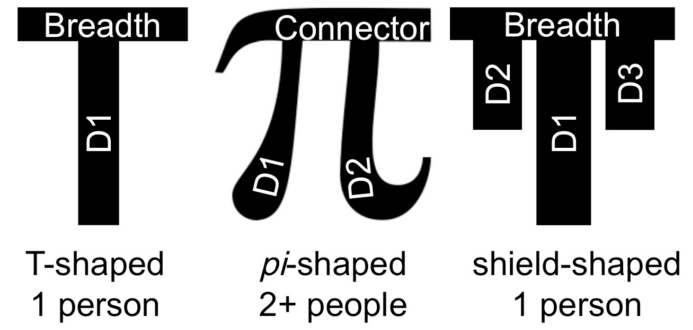
And many NSF projects/programs! Particularly EAR & CISE

- Ike Wai, Uhawaii, EPSCOR
- Ontosoft, CHORDS, and other EarthCube projects
- CUAHSI, Hydrology program
- iHARP, Harnessing the Data Revolution



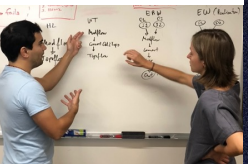
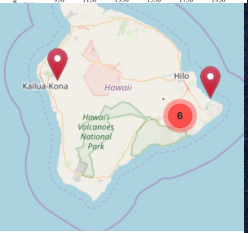
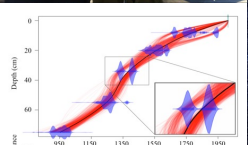
What you can do...

- You've already started! Team up with other IS-GEO researchers
- Share digital objects of research (code, workflows, data, course materials)
- Nominate an SME Lecturer
- Tell others about IS-GEO, iHARP, CUAHSI, and our partners



(picture from Hawaii Workshop, 2018; figure from Pennington et al., 2019)

Evolution of IS-GEO Workshops...



*IS-GEO Established, NSF Workshop [Washington, DC | 2015](#)

US-Mexico Exchange Course [San Miquel de Allende, MX | 2016](#)

* Intelligent Decision Support Systems [Austin, TX | 2017](#)

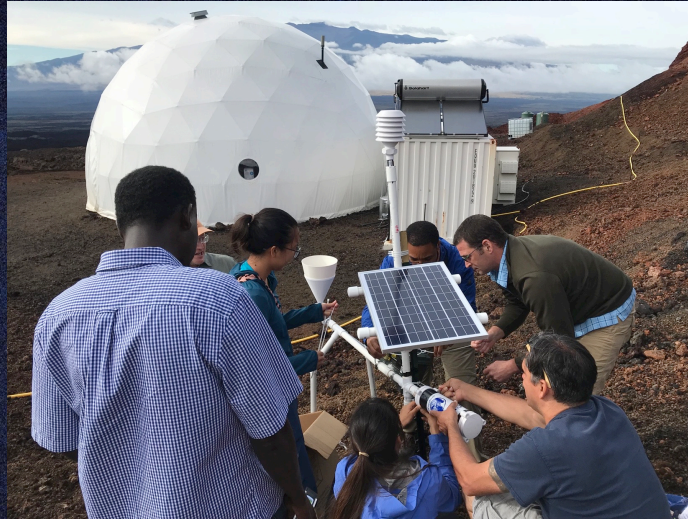
* Adaptive Sensing and Cyberinfrastructure [Kona, HA | 2018](#)

* End-to-end Applications [Boulder, CO | 2019](#)

Hack UIOWA [Virtual and Iowa City | 2020, 2021](#) – [Upcoming 2022](#)

* Model-based Reasoning [Virtual | 2022](#)

Time to start Learning Together!



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References

Gil, Y., David, C., Demir, I., Essawy, B.T., Fulweiler, R.W., Goodall, J.L., Karlstrom, L., Lee, H., Milles, H.J., Oh, J., Pierce, S.A., Popes, A., Tzensg, M.W., Villamizar, S.R., Yu, X, 2016, Toward the Geoscience Paper of the Future: Best practices for documenting and sharing research from data, Earth and Space Science, AGU Publications, 3,388–415, doi:10.1002/2015EA000136.

Gil, Y., Pierce, SA, et al., 2019, Intelligent Systems for Geosciences: An Essential Research Agenda, Communications of the ACM, January 2019, Vol. 62 No. 1, Pages 76-84. DOI: 10.1145/3192335.5.

Pennington, D., Ebert-Uphoff, I., Freed, N., Martin, J., Pierce, SA, 2019, Bridging sustainability science, earth science, and data science through interdisciplinary education, Sustainability Science, <https://doi.org/10.1007/s11625-019-00735-3>, pp. 1-15.

