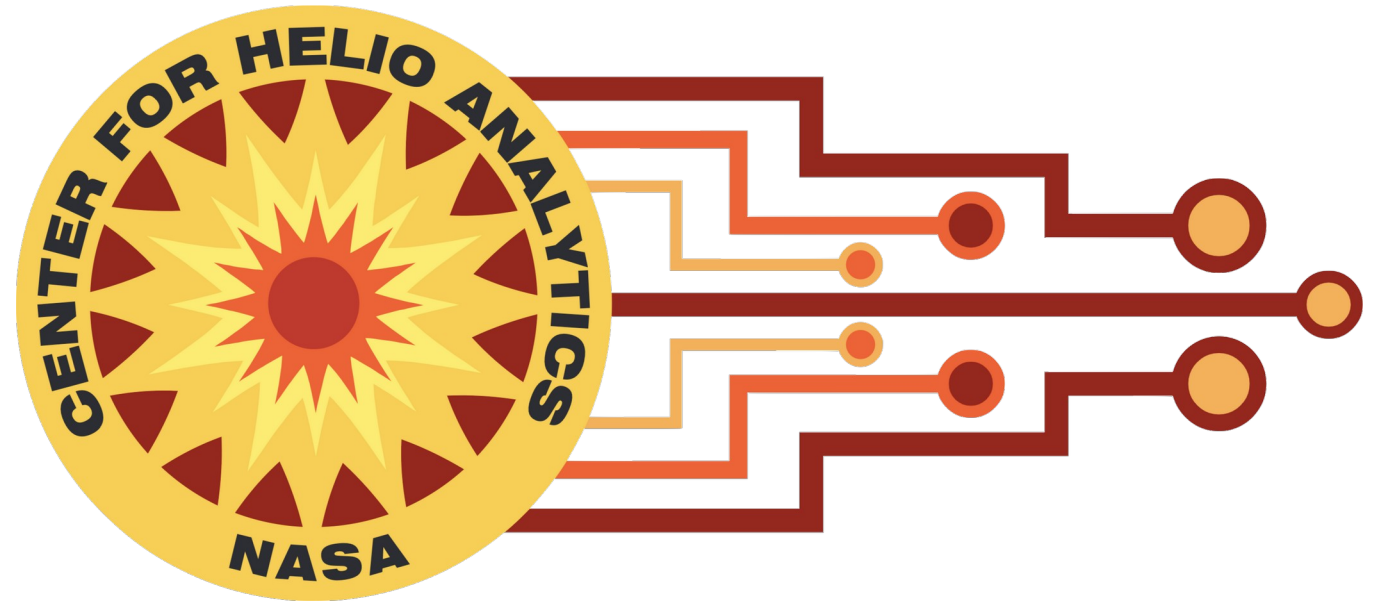




# NASA's Center for HelioAnalytics CS

Michael S.F. Kirk  
and the  
Center for HelioAnalytics



# What is HelioAnalytics

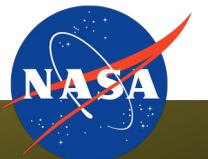
- HelioAnalytics is the cross-disciplinary convergence of communities of physicists, statisticians, and computer scientists.
- It is intended to foster research into advanced methodologies for heliophysical research, and to promulgate such methods into the broader community.
- HelioAnalytics focuses on problems that we can attack with modern methods that we cannot address otherwise.



# The need for HelioAnalytics

*Why do we need a data science effort devoted specifically to Heliophysics?*

- The range of problems, domains and types of data inside heliophysics presents many challenges. The heterogeneity makes a coordinated data science effort critical.
- A focused data science effort leads to a more nuanced and comprehensive understanding of the myriad of physical processes governing Heliophysics.
- Innovation in analytics requires sustained cross-cutting cross-disciplinary relationships
- Now is the right time to integrate contemporary data science know-how, methodologies, and workflows



# CfHA is Doing HelioAnalyt itics

The Center for HelioAnalytics will build sustainable connections in the Heliophysics community for the purpose of supporting efforts harnessing and creating innovations in data science, machine learning, and AI to drive scientific discovery.



# Center for HelioAnalytics (CfHA)

Established in 2019

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**Objectives:** Establish a community of practice among Heliophysics data scientists

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Support efforts to harness data science to drive Heliophysics scientific discovery

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Build sustainable connections to expand the potential of key Heliophysics research and missions

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Support, promote, and implement responsible and ethical AI at all practicable levels

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Capacity Building

Advanced DS R&D  
(ACME R&D)

Communications

Knowledge Capture  
and Sharing

Mission Forge

ML Ops

Responsible ML

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk



Capacity Building

Advanced DS R&D  
(ACME R&D)

Communications

Knowledge Capture  
and Sharing

Mission Forge

ML Ops

Responsible ML

Create and provide new resources to the Heliophysics community for improved information structuring (i.e., knowledge)  
Lead: Ryan McGranaghan

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk



Capacity Building

Advanced DS R&D  
(ACME R&D)

Communications

Knowledge Capture  
and Sharing

ACME is the “catch-all” team for projects that involve bespoke development of advanced data science methods for Heliophysics  
Lead: Chris Bard

ML Ops

Responsible ML

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk





Capacity Building

Advanced DS R&D  
(ACME R&D)

Communications

K

Focuses on the workforce of tomorrow through educational and skillbuilding programs  
Lead: James Harrington

Mission Forge

ML Ops

Responsible ML

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Capacity Building

Advanced DS R&D  
(ACME R&D)

Communications

Knowledge Capture  
and Sharing

Educates and develops resources encouraging  
the use of Responsible Machine Learning  
Lead: Ayris Narock

ML Ops

Responsible ML

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk



Capacity Building

Advanced DS R&D  
(ACME R&D)

Transitions machine learning model prototypes to  
production on NASA High End Computing  
resources  
Lead: John Dorelli

Knowledge Capture  
and Sharing

Mission Forge

ML Ops

Responsible ML

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk



Capacity Building

Develop a testbed for designing and experimenting with AI/ML enhancements to mission operations  
Lead: Alex Barrie

Communications

Knowledge Capture and Sharing

Mission Forge

ML Ops

Responsible ML

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk



Disseminate information to the community

Advanced DS R&D  
(ACME R&D)

Communications

Knowledge Capture  
and Sharing

Mission Forge

ML Ops

Responsible ML

PI: Barbara Thompson

Image art: Mary-Pat Hrybyk

# Community Engagement

- Tutorials
  - Python, HPC usage, and dataset creation
- Helio Hackathons
  - You too can lead a projects for this – See Poster by Linnea Wolniewicz
- Building Helio data science capacity
  - Building tools for Helio Open Science, e.g. AWS Jupyter environment
- Create an inclusive Heliophysics community in data science
  - Developing knowledge capture, best practices for communities of practice, HelioNauts



# Work with CfHA Today to Further Your Science

- Participate in upcoming Helio Hackathons
  - [helioanalytics.io](https://helioanalytics.io) in development
- Develop well-defined projects ready for future Hackathons
- Contact existing sub-teams to find the community members/groups that can support your aspirations
- Join HelioNauts.org (<https://helionauts.org/invites/eTL2oi8vbQ>)
- Lead or Co-author white papers for the upcoming Heliophysics Decadal Survey



*Facilitating strong and  
robust community around  
data science and  
advanced methods*



# NASA's Center for HelioAnalytics

