2021 Workshop: Model software engineering

Long title Model software engineering Conveners Michael Hirsch Matthew Zettergren Description

This session discusses results and tutorials connecting open-source and black-box models together for science closure, data analysis and instrument design. Sessions will demonstrate:

- compiled languages working together with scripted languages
- platform-agnostic build systems
- transitioning models from PI team to general science public users
- success stories from recently funded projects (e.g. NASA ROSES HDEE, E.7)

Agenda

- brief introduction
- Kamodo (R. Ringuette, NASA GSFC)
- portable library development (J. Haiducek, NRL)
- Fortran to Python porting: EmmPy (G. Stephens, JHU-APL)
- <u>flipchem: An ion density calculator via Python wrapped C and Fortran</u> (pdf) (A. Reimer, SRI)
- modern Fortran: stdlib, IDE, packaging (Ondřej Čertík, LANL)
- Tutorial: Version control (Git) and CI (GitHub Actions) for multi-institutional teams
- Group discussion

Justification

ST #5: Fuse the Knowledge Base across Disciplines

Bridge the gap between software engineering and physics to help make models more accessible. Show how to integrate restricted license software in an opensource package. Metrics include increased number of modelers sharing core functionality of their model, and enhancing model connections to CEDAR and the Python Heliophysics community.

ST #6: Manage, Mine, Manipulate Geoscience Data and Models

When users don't have to rely on the PI team to get started with a model, this accelerates science discovery. Encourage example gallery codes and videos for the models. Metrics include mining papers for citations / keywords used such as links to software repos used, which can themselves be mined for use of continuous integration tools, build system type and specific software libraries.

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