Protocol for the Analysis of Land Surface models (PALS) and modelevaluation.org

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PALS

Protocol for the Analysis of Land Surface models

Welcome to PALS

The Protocol for the Analysis of Land Surface models is a web application for evaluating and benchmarking land surface models. It provides standards for model input/output formatting, driving data for modelling experiments, as well as a wide range of automated diagnostic performance measures once model output is uploaded. More about PALS features.

PALS is supported by a range of funding and research coordination bodies, including the Terrestrial Ecosystem Research Network (TERN), the ARC Centre of Excellence for Climate System Science, the GEWEX Global Land Atmosphere System Study panel, the Australian Energy and Water Exchange initiative. More about PALS collaborators.

PALS is collaboratively developed and maintained by many researchers. While we endeavour to maintain PALS at the highest standards, authors and contributors take no responsibility whatsoever for damages of any kind resulting from the use of the PALS site.

PALS terms and conditions

All of the software behind PALS is open source. Contact palshelp@gmail.com for more information.



Participating in an Experiment - simple description





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Using Experiments – MIP or development environment Creating a Model profile

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Experiment Analysis Script / integrating new analysis packages



- All **Data Sets** associated with the Experiment
- All **Model Outputs** that have been uploaded to the Experiment (within current Workspace)
- Model Output that is being uploaded and is triggering the analysis
 - User's nominated Benchmarks associated with this Model Output

Analysis browser page uses these properties, as well as Experiment, Workspace to classify display panels PALS | Protocol for the Analysi × A D & A A Not Secure https://130.56.252.168/analyses/a Current Workspace: GLASS Ben Analysis Results in All Available Workspaces CABLE1.4h Summan Ole times Qle diurnalcvc Qle scatte HTML <u>E Hitt</u> output Qle pdf Oh tavic **ILAMB** Python Qh pdf NEE timese NEE tayl NEE annualcy package Default analysis returns: Master Paths to images Analysis Model Outputs used Benchmarks used Script Image types Analysis names Analysis error messages Metric names and values • Benchmark err messages puthon Evaluation products used

 The Analysis Script for a given Experiment might only use a fraction of this information to produce its analysis suite (e.g. only the triggering Model Output and a single evaluation product might be compared).

Implementation vision

- Analysis is not restricted to a particular package / language (e.g. R, Python, NCL) – plan to include ILAMB, LVT
- Distributed architecture will allows analysis to be co-located with big data:
 - 'Worker' nodes (e.g. R / Python analysis servers) to be installed locally across multiple locations, co-located with large data sets
 - 'Upload' of files to the system simply stores path: (a) if local worker node is present, files are not copied (b) local worker not present, files are uploaded
 - Analysis routing is strategized, depending on proximity and load of workers
- API access could allow remote continuous integration testing of *science* in model, not just code, e.g. Jenkins
- System can be used with any model type not land surface specific

Features

 When admin users create/edit Data Sets, evaluation files can be marked as nondownloadable, but still accessible to analyses

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Features

Potential to data mine ancillary information as part of analyses



Information sent to the Analysis Script when a Model Output is uploaded to a given Experiment (including paths, meta-data):

- All Data Sets associated with the Experiment
- All Model Outputs that . have been uploaded to the Experiment (within current Workspace)
- Model Output that is being ٠ uploaded and is triggering the analysis
 - User's nominated Benchmarks associated with this Model Output

Features

- MIPs are transparent analysis scripts are viewable, experiments can be replicated
- MIPS are ongoing:
 - new model additions will automatically be analysed (can be in the original MIP workspace, or in a private development workspace)
 - New analyses can be added retrospectively
- Imagine having GSWP phases, PILPS experiments, PLUMBER, GLACE (et al) data still available and analysable – quickly.

Questions

- What additional measures are needed to improve reproducibility?
- What kinds of new features might improve usability?
- What do you see as the limitations of this type of system?