

ILAMB for JULES Evaluation

JULES Training Workshop

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What is ILAMB?

- International Land Model Benchmarking (ILAMB) project software package
- ILAMB is python code that evaluates gridded land surface model data
- Including carbon cycle, hydrology and surface energy fluxes

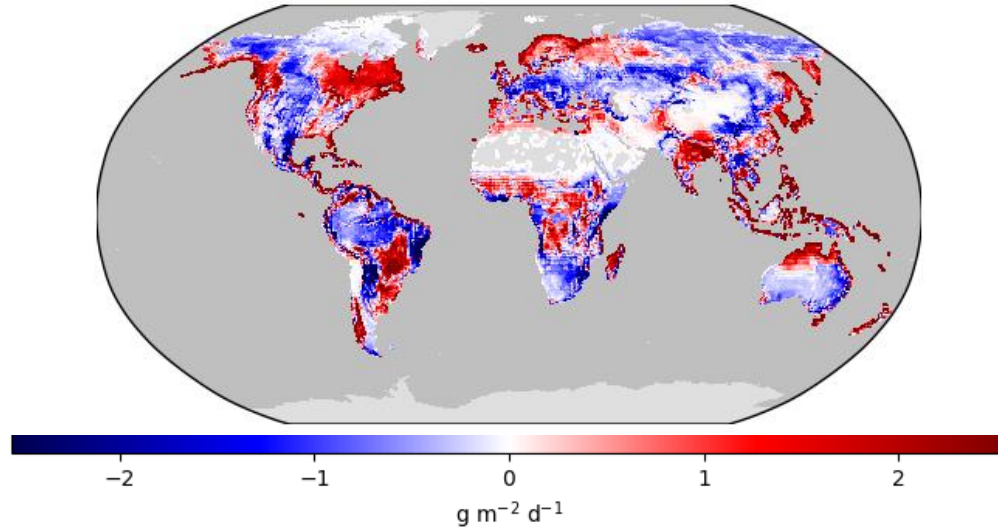
What do ILAMB results look like?

- Webpage
- .png figures
- netCDFs of processed data

- Example output:
 - <https://www.ilamb.org/CLM/>
 - <https://ilamb.ornl.gov/CMIP5/>
 - http://gws-access.ceda.ac.uk/public/jules/ILAMB/ILAMB_JULES-ES_JULES_C/
(JULES example neglects land-sea fraction weighting)

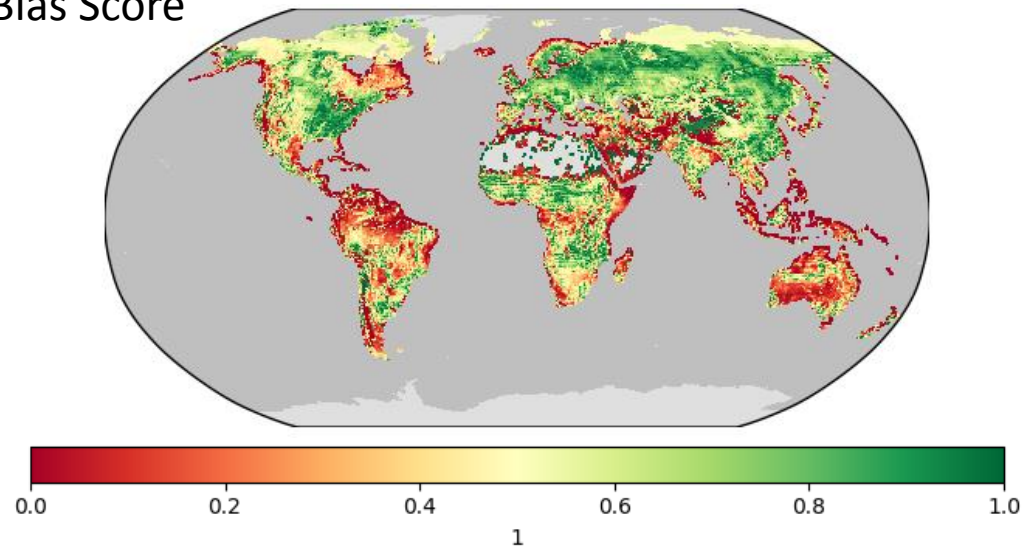
Gridded Metrics

GPP Bias

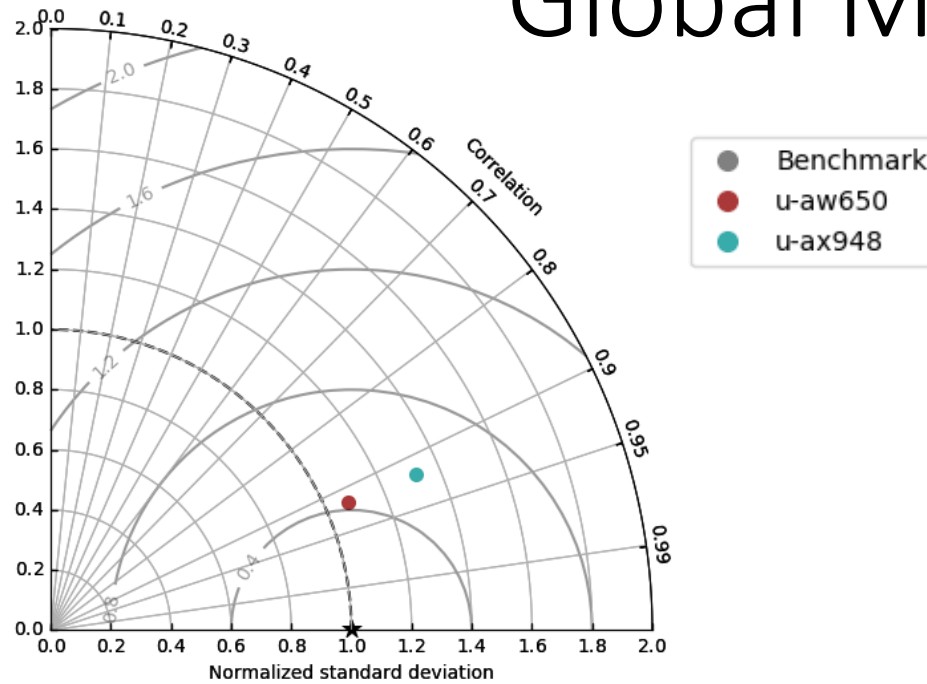


- Bias
- RMSE
- Max Month

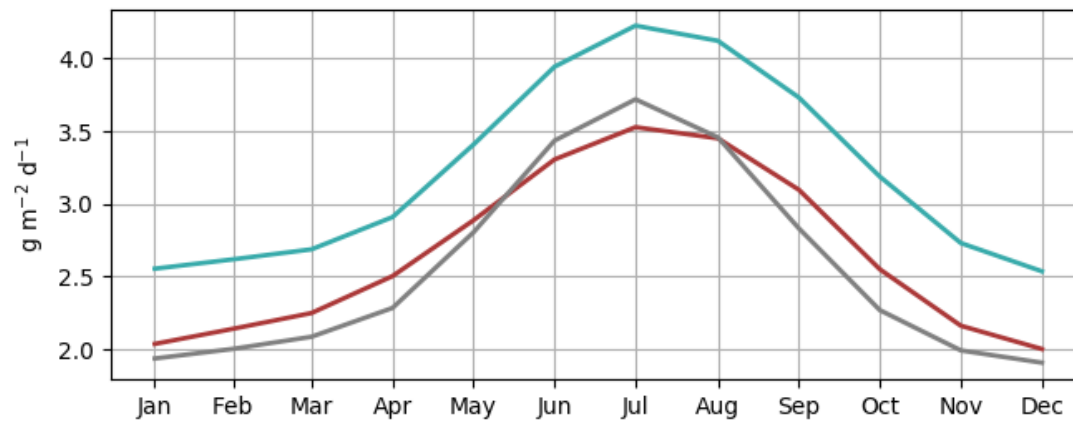
GPP Bias Score



Global Metrics



- Spatial correlation
- Spatial standard deviation
- Global mean seasonal cycle
- Mean Bias
- Mean RMSE



Global Scores

Mean State - Mozilla Firefox

file:///net/spice/scratch/eroberts/ILAMB/RESULTS/u-au081_JES_JC/EcosystemandCarbonCycle/GrossPrimaryProductivity/GBAF/GBAF.html

170% Search

Most Visited e-mail MetNet Yammer JULES NCO Timewatch yourSelf http://www-hc/~had... Warning experime...

GrossPrimaryProductivity / GBAF / 1982-2008 / ...

Mean State Relationships All Models Data Information

Globe

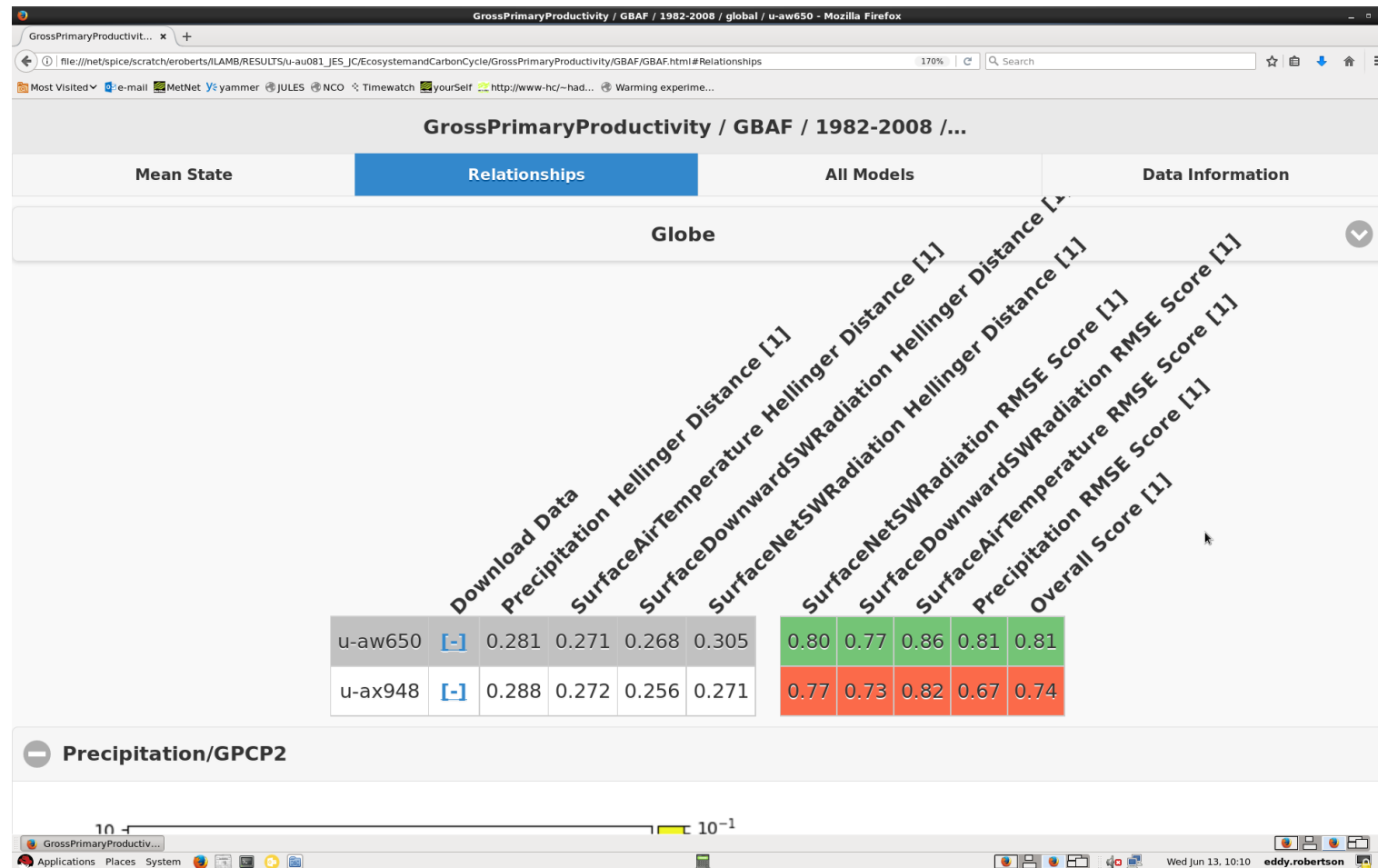
Download Data
 Period Mean (original grids) [Pg yr-1]
 Model Period Mean (intersection) [Pg yr-1]
 Model Period Mean (complement) [Pg yr-1]
 Benchmark Period Mean (intersection) [Pg yr-1]
 Benchmark Period Mean (complement) [Pg yr-1]
 Bias [g m-2 d-1]
 RMSE [g m-2 d-1]
 Phase Shift [months]
 Bias Score [1]
 RMSE Score [1]
 Seasonal Cycle Score [1]
 Spatial Distribution Score [1]
 Overall Score [1]

	Benchmark	u-aw650	u-ax948
Benchmark	119.		
u-aw650	124.	123.	27.7
u-ax948	169.	148.	25.9
Model Period Mean (intersection)	0.623	0.108	1.44
Model Period Mean (complement)	0.623	0.108	1.44
Benchmark Period Mean (intersection)	0.623	0.108	1.44
Benchmark Period Mean (complement)	0.623	0.108	1.44
Bias [g m-2 d-1]	0.657	1.79	1.17
RMSE [g m-2 d-1]	0.50	0.39	0.81
Phase Shift [months]	0.95	0.61	
Bias Score [1]	0.44	0.36	0.81
RMSE Score [1]	0.89	0.57	
Seasonal Cycle Score [1]			
Spatial Distribution Score [1]			
Overall Score [1]			

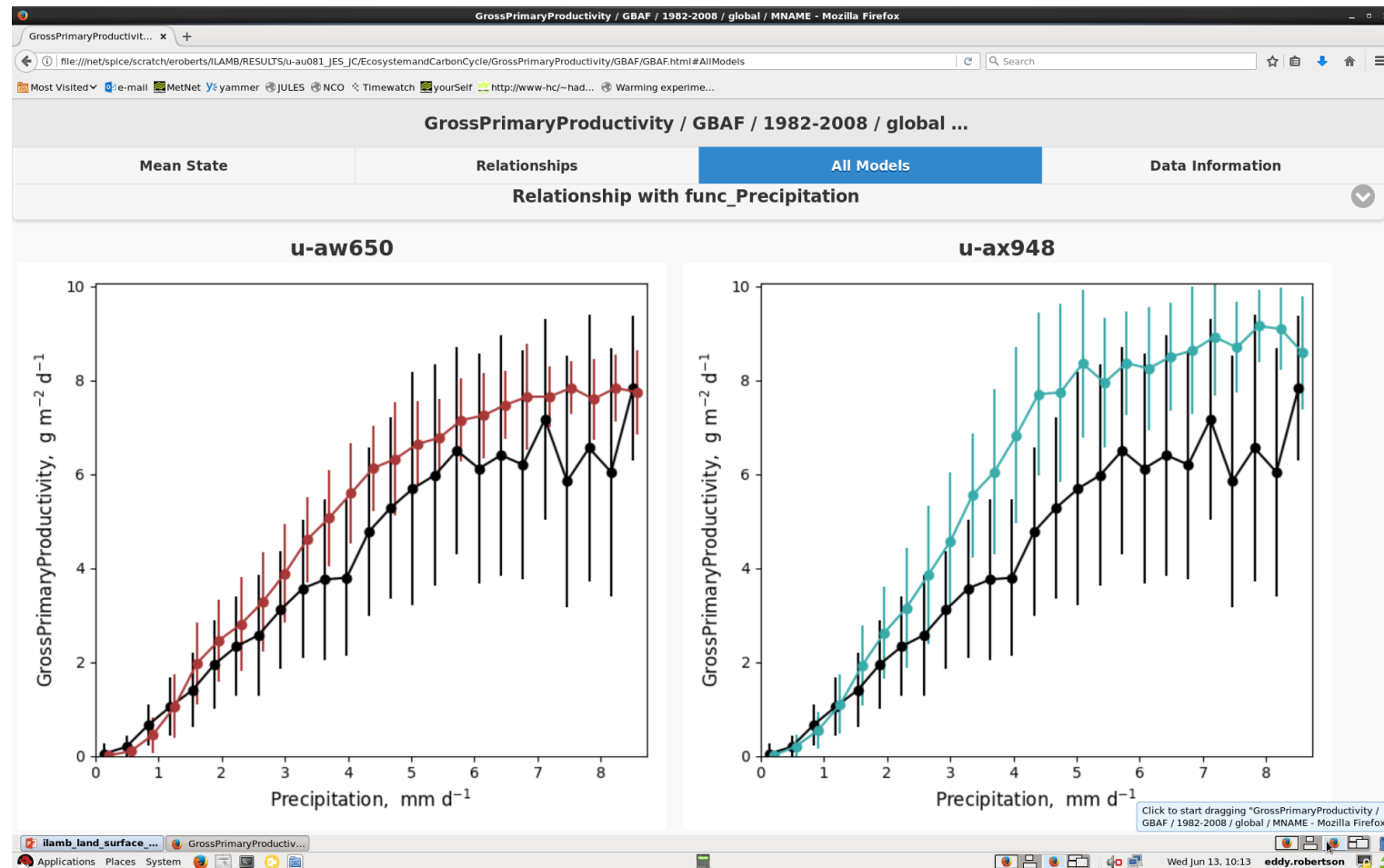
Temporally integrated period mean

Applications Places System Wed Jun 13, 10:08 eddy.robertson

Relationships Between Variables



Relationships Between Variables



Results Table

Mean State	Relationship	Results Table	
		u-aw650	u-ax948
Biomass		0.48	0.50
Burned Area		~	~
Gross Primary Productivity		0.63	0.60
Leaf Area Index		0.51	0.46
Global Net Ecosystem Carbon Balance		0.86	0.71
Net Ecosystem Exchange		0.60	0.58
Ecosystem Respiration		0.57	0.55
Soil Carbon		0.37	0.41
Ecosystem and Carbon Cycle Summary		0.51	0.49
Evapotranspiration		0.66	0.64
Latent Heat		0.64	0.63
Runoff		0.72	0.72
Sensible Heat		0.65	0.61
Hydrology Cycle Summary		0.67	0.65
Albedo		0.53	0.52
Surface Upward SW Radiation		0.64	0.62
CERES (35.7%)		0.66	0.65
GEWEX.SRB (35.7%)		0.66	0.64
WRMC.BSRN (28.6%)		0.57	0.55
Surface Net SW Radiation		0.74	0.74
Surface Upward LW Radiation		0.75	0.76
Surface Net LW Radiation		0.63	0.62

Results Summary



How do I run ILAMB?

- Run on your own computer
 - Download from <https://bitbucket.org/ncollier/ilamb>
 - Installation instructions <https://ilamb.ornl.gov/doc/install.html>
 - Note that other python packages are required (see installation instructions)
 - Use the `ilamb_fetch` command to download the observations
- Or use the copy already installed on JASMIN
- At the command line
 - `export ILAMB_ROOT={location of observational data}`
 - `ilamb-run --config sample.cfg --model_root {location of model data}`
- Or use a rose-suite

What data from JULES is needed?

- Monthly mean data from up to ~20 variables, mostly from 1980-2015
- See JULES suites : u-ba532 (inc. N-limitation) and u-ba531
 - contain “ilamb” output profiles which include the required variables
 - More definitive ilamb output profiles will be included in JASMIN JULES suites
- Land-sea fraction (sftlf [%]) and gridbox area (areacella [m²]):
 - Area means including coastal gridboxes should be weighted by land-sea fraction
 - At coarse resolution (e.g. n96) neglecting land-sea fraction can cause large errors in global totals
 - JULES does not output these variables – currently they must be manually added to the formatted model output directory

How to format JULES data.

- Rose-suites for running ILAMB include code to format JULES data
- Changes required:
 - Latitude-longitude grid
 - Cf-compliant units (not including “C” for carbon)
 - Calculates relative humidity and gridbox mean leaf area index
 - Put processed data in required directory structure (https://ilamb.ornl.gov/doc/add_model.html)
- Changes the “jules_for_ilamb” app also makes:
 - Improves time coordinate
 - Calculates other variables, e.g. net biome productivity

How to analyse a subset of model data

- In ILAMB rose-suite gui (i.e. rose edit)
 - Suite conf/ilamb variables: set chosen variables to TRUE
 - Run ilamb/env: space separated list of models
- At command line:
 - `ilamb-run ... --confrontations GrossPrimaryProductivity Runoff`
 - `ilamb-run ... --models CLM JULES-ES JULES-C`
- Modify the ILAMB configuration file
 - Lists the variables ILAMB should analyse
 - How each should be analysed
 - How to weight scores from each model-observation “confrontation”

Adding datasets and metrics to ILAMB

- Instructions here: https://ilamb.ornl.gov/doc/add_data.html
 - Correctly format your dataset (https://ilamb.ornl.gov/doc/format_data.html)
 - Add new dataset to model directory
 - Add new dataset information to configuration file
 - If required add new model variables
- For new metrics, perhaps start here:
<https://ilamb.ornl.gov/doc/confront.html>

Suites on JASMIN

Expected to be ready soon:

- Global historical JULES suite (GL7 configuration – no carbon cycle, etc.)
 - Including driving data, ancillaries and some basic instructions
- ILAMB suite
 - Including code to format JULES output for ILAMB and some instructions

Expected later:

- Global historical JULES suite (JULES-ES configuration – carbon and nitrogen cycles, etc.)