# 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/
  - <u>https://ilamb.ornl.gov/CMIP5/</u>
  - <u>http://gws-access.ceda.ac.uk/public/jules/ILAMB/ILAMB\_JULES-ES\_JULES\_C/</u> (JULES example neglects land-sea fraction weighting)

### Gridded Metrics



- Bias
- RMSE
- Max Month



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

#### **Global Scores**



#### **Relationships Between Variables**



#### Relationships Between Variables



# Results Table

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## **Results Summary**

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ILAMB Benchmark Results × +									
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## How do I run ILAMB?

- Run on your own computer
  - Download from <a href="https://bitbucket.org/ncollier/ilamb">https://bitbucket.org/ncollier/ilamb</a>
  - Installation instructions <a href="https://ilamb.ornl.gov/doc/install.html">https://ilamb.ornl.gov/doc/install.html</a>
    - 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 (<u>https://ilamb.ornl.gov/doc/add\_model.html</u>)
- 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: <u>https://ilamb.ornl.gov/doc/add\_data.html</u>
  - Correctly format your dataset (<u>https://ilamb.ornl.gov/doc/format\_data.html</u>)
  - 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: <u>https://ilamb.ornl.gov/doc/confront.html</u>

## 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.)