The ILAMB Benchmarking System - v2.1

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ILAMB Links

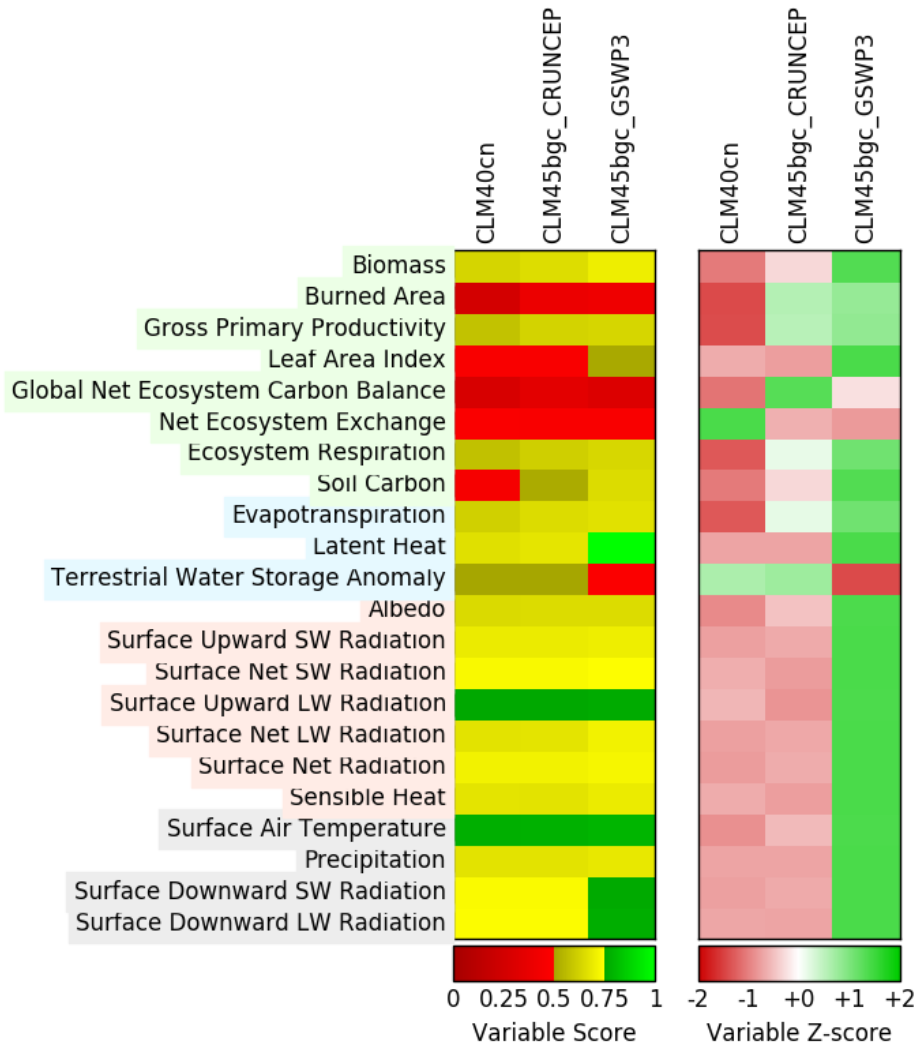
- Open source git repository

  `https://bitbucket.org/ncollier/ilamb`

- Sample output

  `http://climate.ornl.gov/~ncf/ILAMB-next/index.html`

High level summary of model performance



- Measure model performance against **60** datasets across a wide swath of measurable quantities from land models **24** variables
- Left: absolute performance in terms of an *overall* score
- Right: relative performance with respect to other models

ILAMB in Python Package Index

- Now you can install ILAMB with:

  ```
  pip install ILAMB --user
  ```

  this will install almost all the dependencies automatically, except for `basemap`.
- The installation tutorial has been updated and now includes scripts for running on institutional machines.
- The runscript `demo/driver.py` was moved to an installed script `ilamb-run`.
- There is now an option:

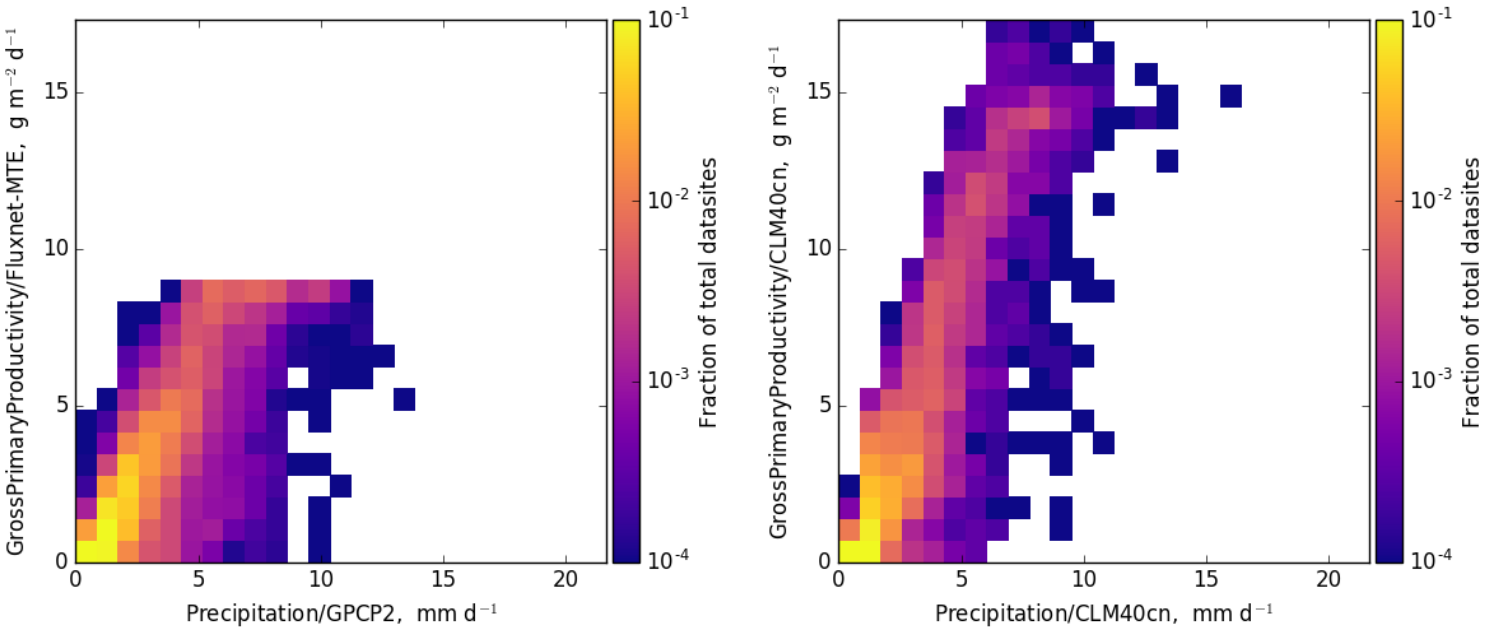
  ```
  --model_year y0,yf
  ```

  which will shift all model results by `yf-y0` years.

Relationship Scores: 1-(Hellinger Distance)

For $P = (p_1, ..., p_k)$ and $Q = (q_1, ..., q_k)$, then

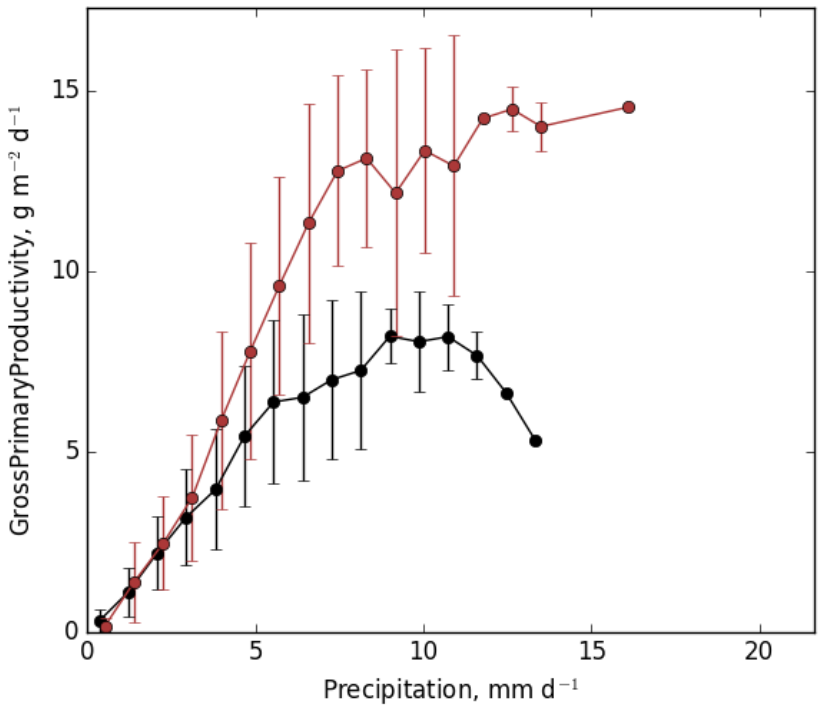
$$H(P, Q) = \frac{1}{\sqrt{2}} \sqrt{\sum_{i=1}^{k} (\sqrt{p_i} - \sqrt{q_i})^2}$$



Relationship Scores: RMSE Score

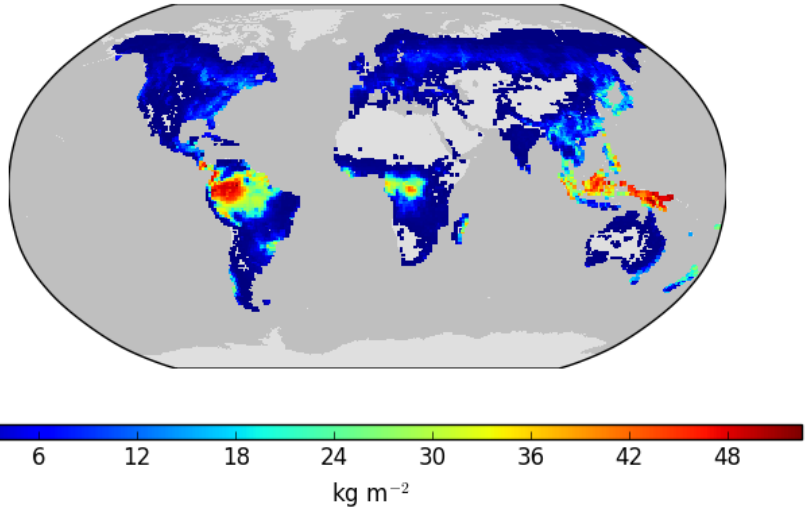
For $p(x)$ and $q(x)$, then

$$S = e^{-\sqrt{\frac{\int (p(x)-q(x))^2 \ dx}{\int p(x)^2 \ dx}}}$$

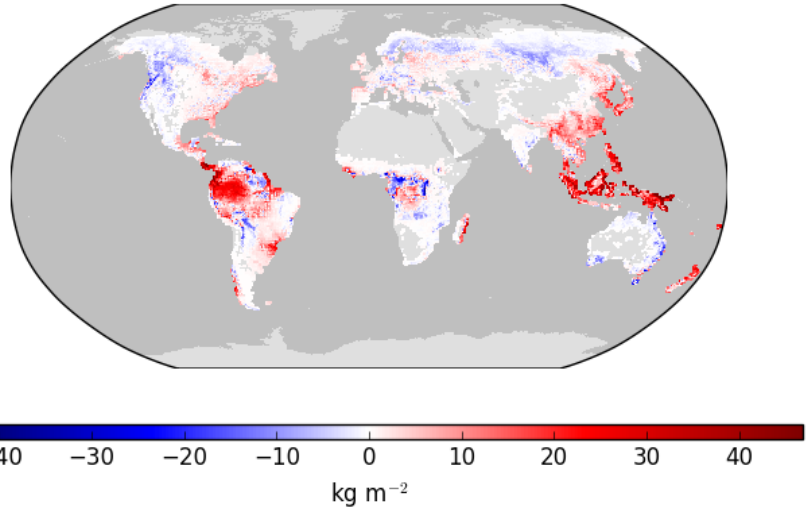


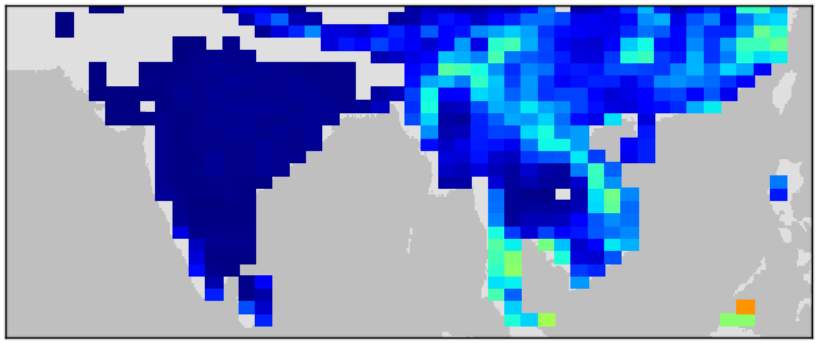
Plotting Changes - Biomass example

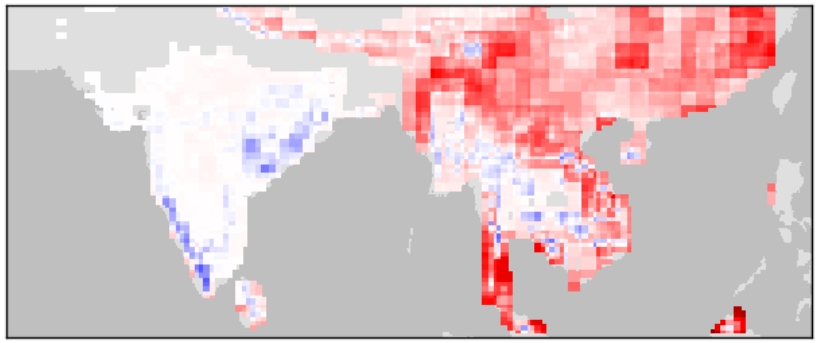
Mean



Bias





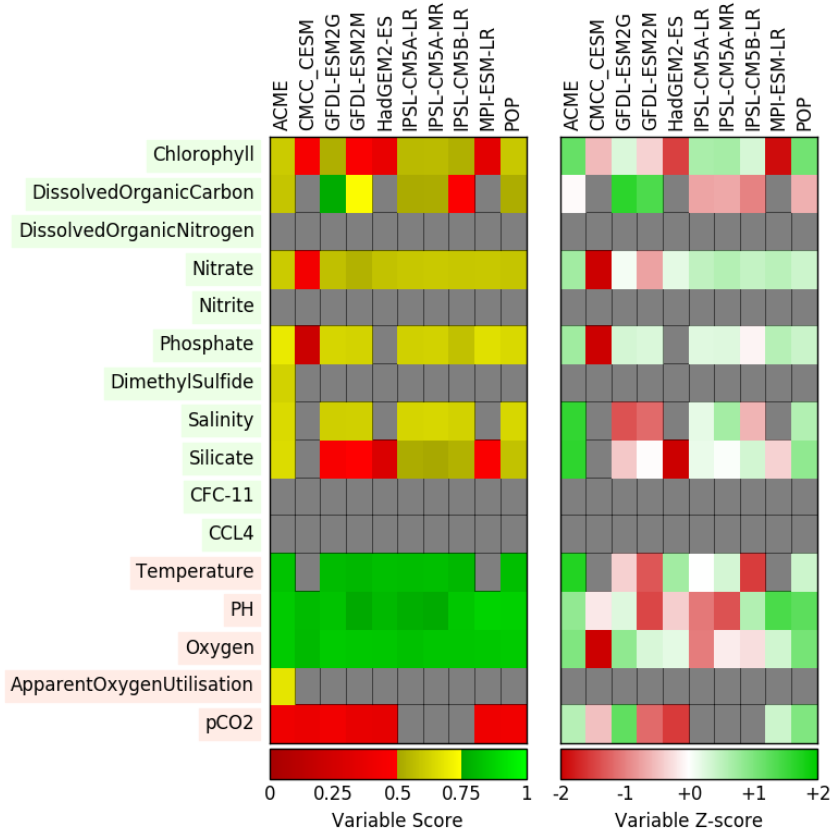


Logfiles

```
[INFO][0][<module>] Linux phoebus.ornl.gov 4.9.6-200.fc25.x86_64 #1 SMP Thu Jan 26 10:17:45
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/ILAMB (2.1)
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/numpy (1.12.0)
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/matplotlib (2.0.0)
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/netCDF4 (1.2.4)
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/cfunits (1.5)
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/sympy (1.0)
[INFO][0][<module>] /home/ncf/.local/lib/python2.7/site-packages/mpi4py (2.0.0)
[INFO][0][<module>] 2017-03-01 16:12:17.342589
[INFO][1][confront][GrossPrimaryProductivity/Fluxnet][CLM45bgc_CRUNCEP] Success
[INFO][1][confront][GrossPrimaryProductivity/Fluxnet][CLM45bgc_GSWP3] Success
[INFO][0][confront][Biomass/GlobalCarbon][CLM45bgc_CRUNCEP] Success
[INFO][0][confront][Biomass/GlobalCarbon][CLM45bgc_GSWP3] Success
...
[INFO][1][modelPlots][GrossPrimaryProductivity/Fluxnet][CLM45bgc_GSWP3] Success
[INFO][6][modelPlots][SurfaceAirTemperature/CRU][CLM45bgc_GSWP3] Success
[INFO][7][modelPlots][Precipitation/GPCP2][CLM45bgc_GSWP3] Success
[INFO][5][modelPlots][Albedo/MODIS][CLM45bgc_GSWP3] Success
[INFO][1][modelPlots][GrossPrimaryProductivity/Fluxnet-MTE][CLM45bgc_CRUNCEP] Success
[INFO][1][<module>][process time] 281.7 s
[INFO][3][<module>][process time] 215.3 s
[INFO][7][<module>][process time] 440.5 s
[INFO][4][<module>][process time] 272.6 s
[INFO][0][<module>][process time] 58.0 s
[INFO][2][<module>][process time] 214.4 s
[INFO][6][<module>][process time] 418.5 s
[INFO][5][<module>][process time] 333.3 s
[INFO][0][<module>][total time] 494.8 s
[INFO][0][<module>][process balance] 7.60
[INFO][0][<module>][parallel efficiency] 56%
```

Support for layered data

The `ILAMB.Variable` object now supports layered data, including a new member function `integrateInDepth`. This has enabled work on marine biogeochemistry (Ogunro Oluwaseun).



Remarks

- We are actively developing ILAMB in new directions, looking to improve our analysis capabilities as well as extend to new domains.
- We are also dedicating resources to improving the user experience.
- Many of the features we have added are direct suggestions from our users (thanks NCAR, especially Dave).