DIAGNOSIS AND VALIDATION OF LAND-ATMOSPHERE FEEDBACKS IN TWO GLOBAL MODELS

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- Dirmeyer et al. (2016) evaluated four models (NASA/GMAO, NCEP, NCAR and ECMWF) in three configurations (stand-alone land surface model, coupled land-atmosphere, and reanalysis) regarding their simulation of the temporal and spatial variability of soil moisture over the US versus a multitude of *in situ* observational networks. The analysis was extended to surface fluxes and meteorology including radiation using FLUXNET2015 data by Dirmeyer et al. (2018) – *see figure at right*.
- This project has also produced a "cheat sheet" of land-atmosphere coupling metrics in wide use by the GEWEX community.
- An article in BAMS (Santanello et al. 2018) reviews efforts to understand the local coupling between land and atmosphere that serves as the feedback pathway between anomalies in land surface states and the evolution of the atmosphere on weather and climate time scales.
- More about this project including an animation of the seasonal cycle of land-atmosphere coupling, can be found at the project web site.

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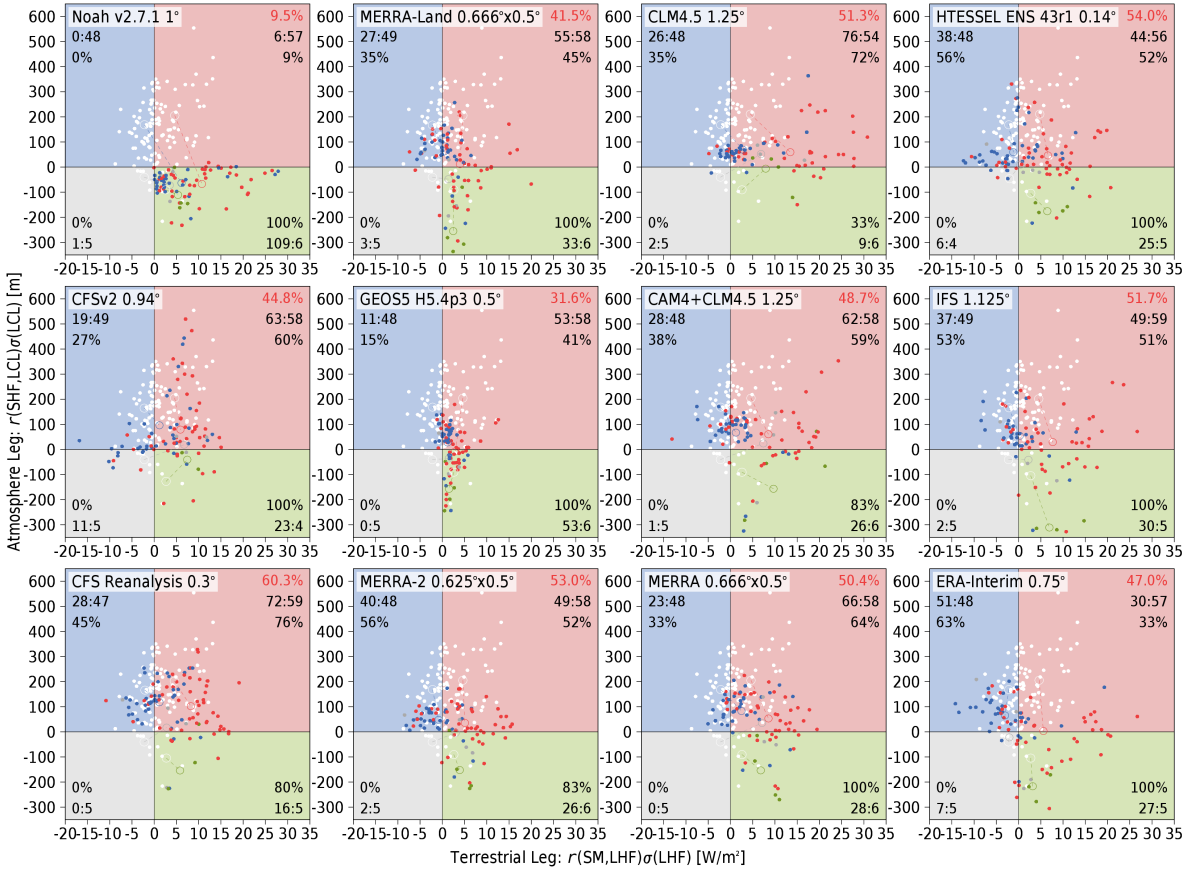

Distribution of coupling indices for the terrestrial (x-axis) and atmospheric (y-axis) legs for the warmest consecutive 3 months of the annual cycle for FLUXNET2015 sites (white dots; identical in each panel) and for each model as indicated. Colors of dots indicate in which quadrant that FLUXNET2015 site lies: red = both indices positive; green = terrestrial positive, atmospheric negative; blue = atmospheric positive, terrestrial negative; grey = both negative. The white circle indicates the centroid of all FLUXNET2015 stations that are in that quadrant, connected by a colored dotted line to a colored circle that is the centroid of the same stations' corresponding grid boxes as simulated by the model. Numbers in the corners of each quadrant show the number of points in that quadrant according to the model and FLUXNET2015 data, separated by a colon, and the percentage of the FLUXNET2015 sites within that quadrant that the model placed in the same quadrant. The percentage in red at the upper right of each panel is the overall percentage of sites where model and FLUXNET2015 agree on the quadrant.