NGEE-Tropics ENSO Model Simulation efforts

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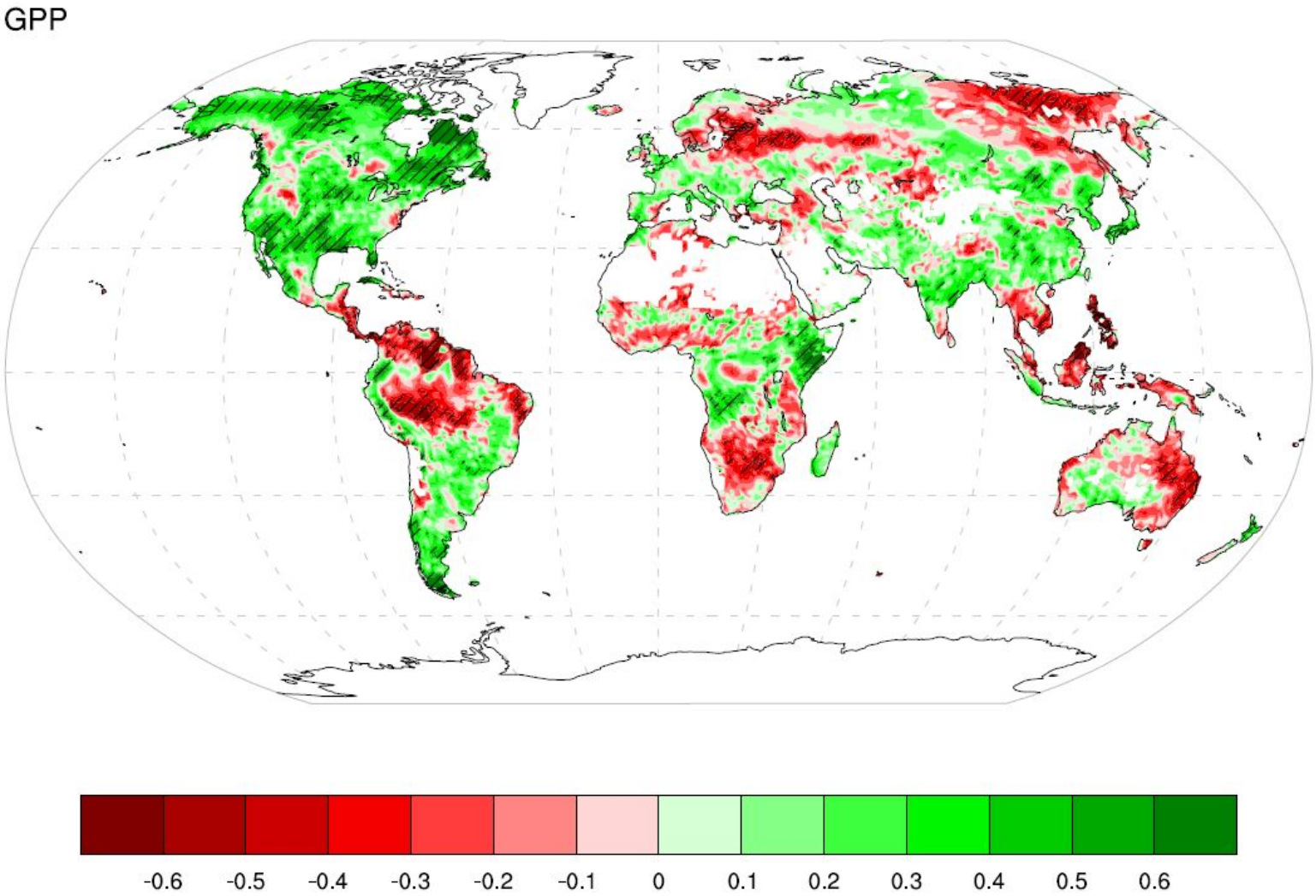
Rationale

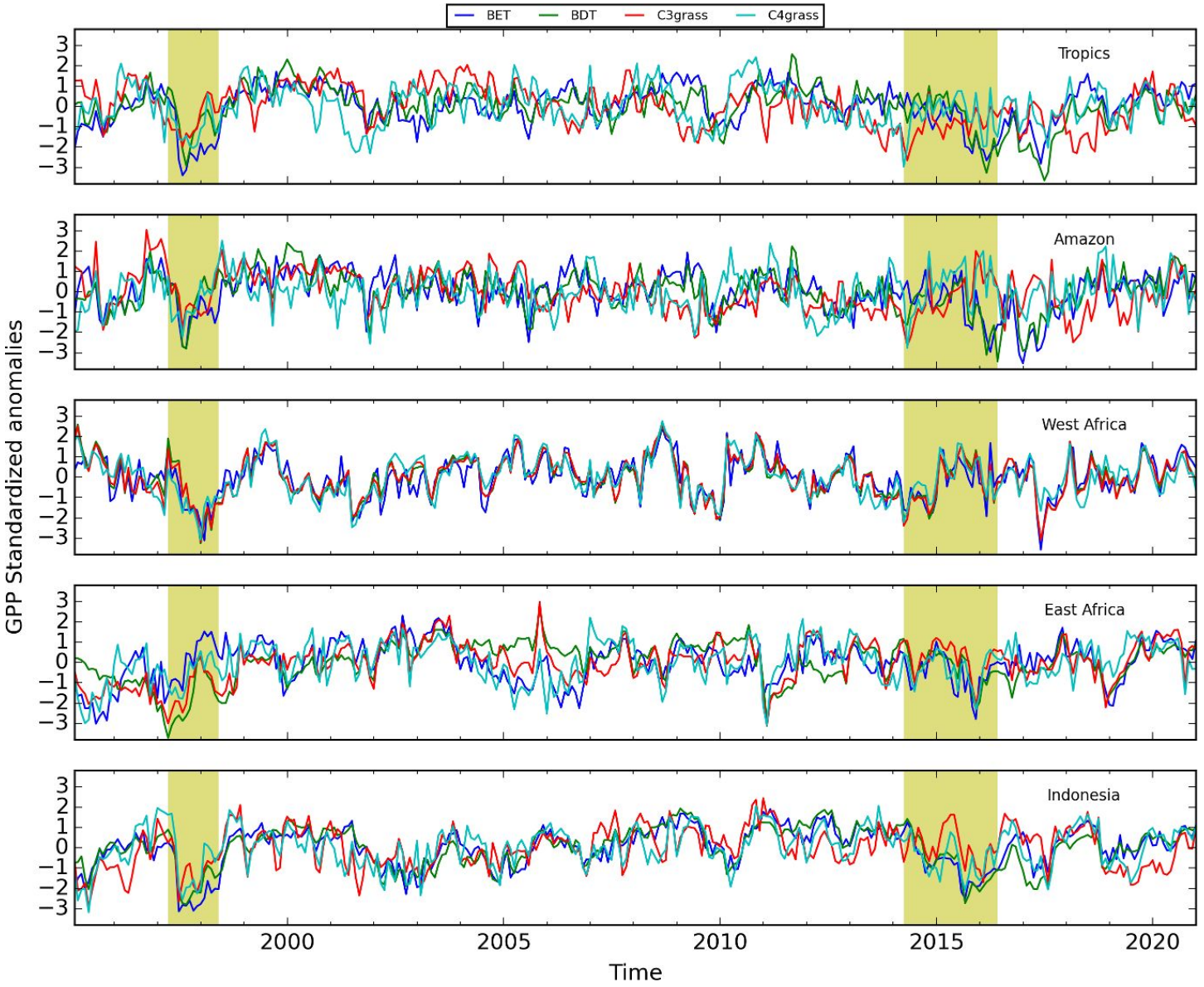
- To study responses and feedbacks of tropical droughts induced by 1997–1998 and 2014–2016 El Niño events in the ACME land model (baseline model)
- To study model responses of the 2005 and 2010 Amazon droughts, which were a consequence of Atlantic Ocean conditions
- To construct a set of meteorological forcing data, including strong tropical land–atmosphere interactions, from CAM5-SE for use in process model development and testing
- To test the utility of the ACME framework for tropical carbon cycle forecasting

Global gross primary productivity (GPP)



Correlation of annual gross primary production with 5-month averages of sea surface temperatures over the Niño 3.4 region (November–February) during 1995–2016. The hatching indicates locations where the correlation is at a 90% confidence level or higher.

Regional PFT-level GPP anomalies



Summary and Next Steps

- Analysis of spin up simulation indicated that land carbon pools approached equilibrium when driven by OISSTv2 (1982–1994).
- ILAMB climate evaluation of the spin up run showed a +0.5 K bias in mean surface air temperature over land and a positive bias in mean precipitation at high elevations.
- Patterns of 2-m air temperature and precipitation correlations with Niño 3.4 SSTs were consistent with NCEP and ERA-Interim reanalyses.
- Patterns of GPP correlations with Niño 3.4 SSTs were consistent with expectations, especially GPP reductions in the Amazon and Indonesia.
- Patterns of precipitation and soil moisture for the 2010 Amazon drought were consistent with data reported by Lewis et al. (2011).
- We will decompose carbon fluxes (growth, respiration, fire), compare atmospheric CO_2 variability with observations, and compare with site plant measurements.
- We plan to upgrade to ACME v1 model and use methodology to investigate ENSO-related energy, water, and carbon questions.