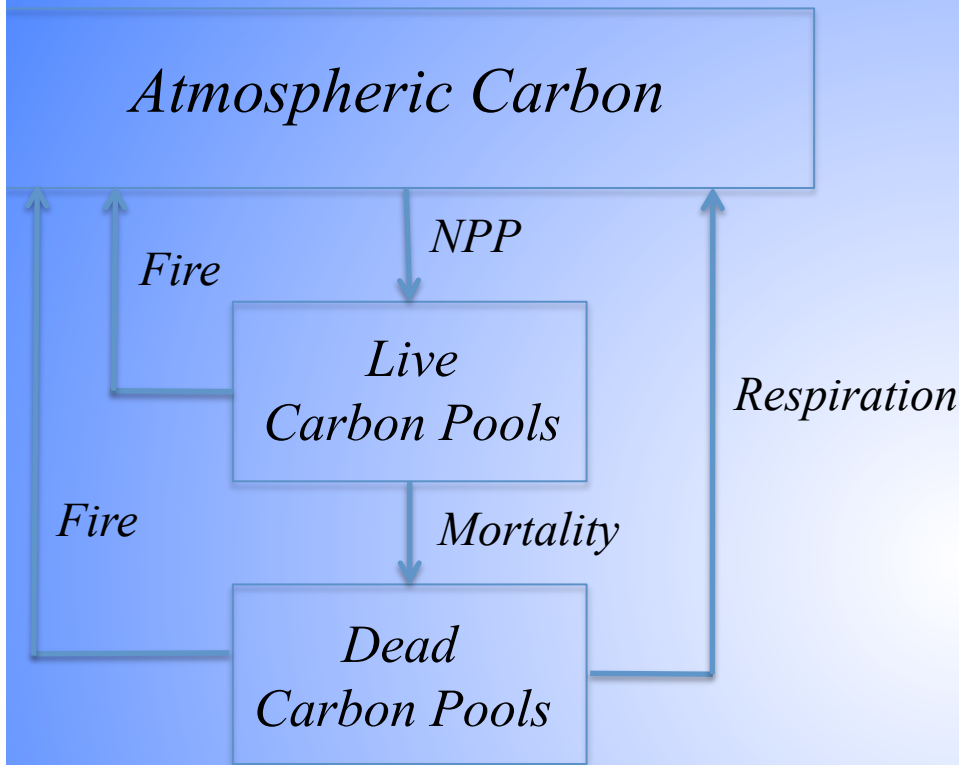


Goddard CASA-GFED3 Global Land Carbon Cycle



Dissaggregated to 3 hourly for atmospheric transport
(Olsen and Randerson, '04)

R : Incident Surface Solar Radiation
 T_a : Surface Air Temperature
 RE : Ecosystem Respiration
 RH : Heterotrophic Respiration
 RA : Autotrophic Respiration
 GPP : Gross Primary Production

Inputs: Meteorology (MERRA), Satellite derived vegetation states, Satellite derived burned area

Outputs: NPP, Rh, Fire emissions (deforestation, forest fires, grassland fires), NEP, NBP, Biomass

monthly, 0.5° Resolution
 2003-2011 NACP
 2009-2011 CMS
 2012 is now available

$$RScale_{3hr} = \frac{R_{3hr}}{\sum R_{3hr}} \text{ month}$$

$$TScale_{3hr} = \frac{Q10_{3hr}}{\sum Q10_{3hr}} \text{ month}$$

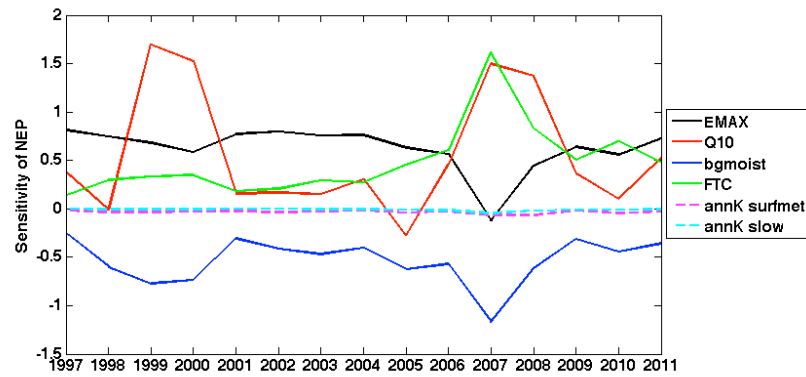
$$GPP_{3hr} = RScale_{3hr} \times (2 \times NPP_{month})$$

$$RE_{3hr} = TScale_{3hr} \times [NPP_{month} + RH_{month}]$$

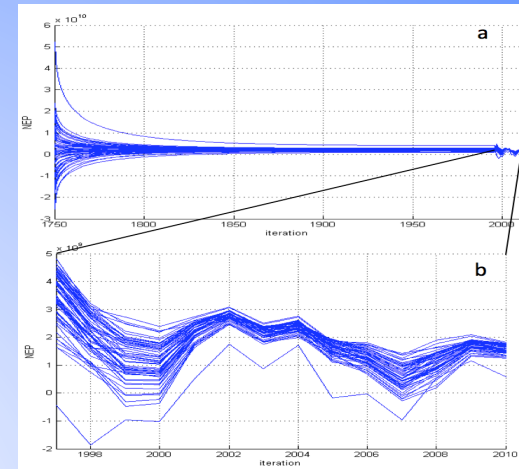
$$NEE_{3hr} = RE_{3hr} - GPP_{3hr}$$

Flux and Biomass Uncertainty

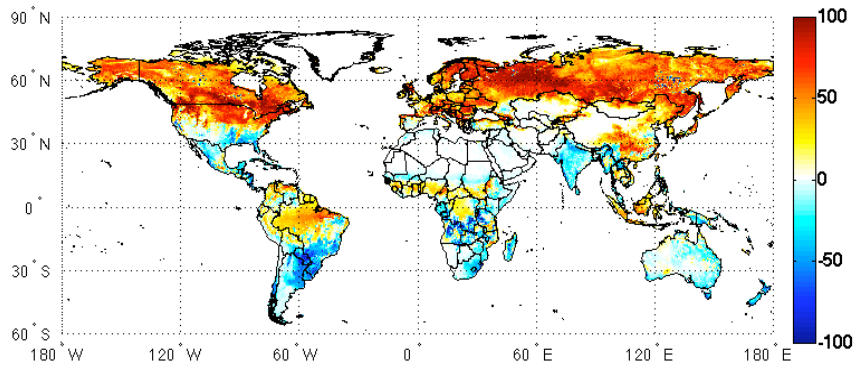
Parameter sensitivity



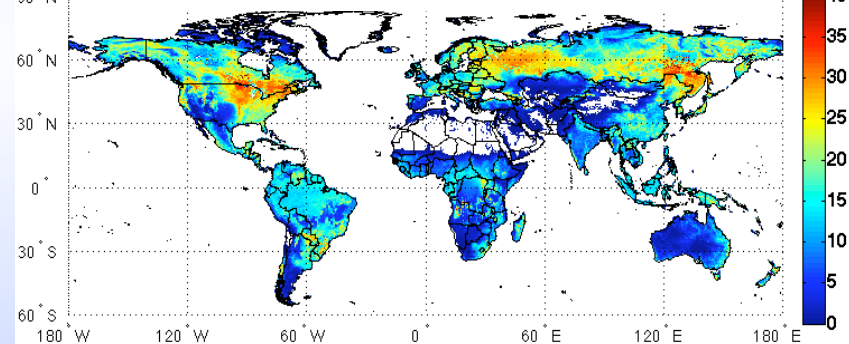
Monte Carlo Ensemble



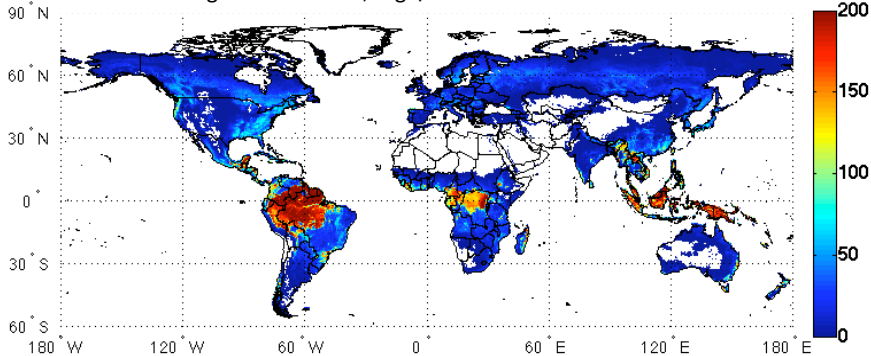
2011 Jul NBP, $\text{gC m}^{-2} \text{mo}^{-1}$



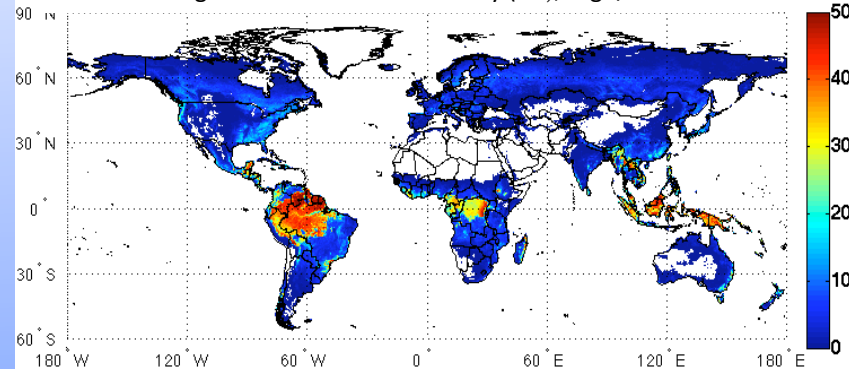
2011 Jul NBP Uncertainty (1σ), $\text{gC m}^{-2} \text{mo}^{-1}$



Forest Aboveground Biomass, MgC/ha

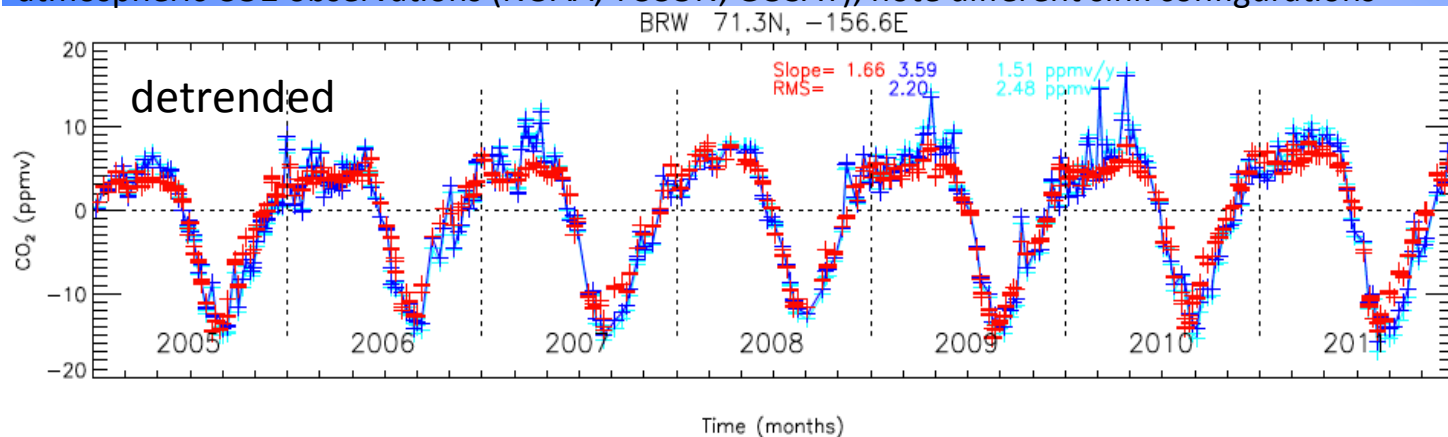


Forest Aboveground Biomass Uncertainty (1σ), MgC/ha



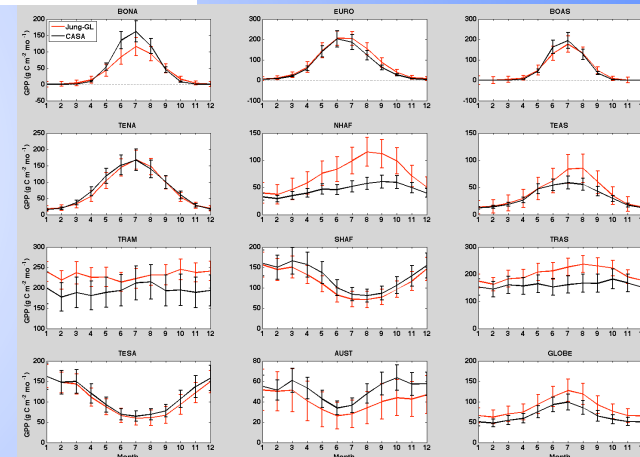
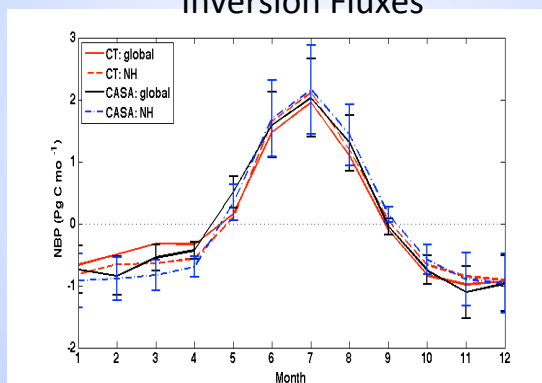
Evaluation:

atmospheric CO₂ observations (NOAA, TCCON, GOSAT), note different sink configurations



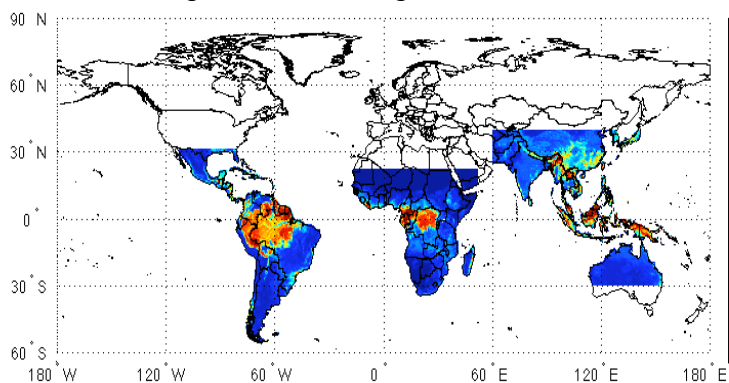
Eddy Covariance Fluxes

Inversion Fluxes



other independent biomass estimates

Forest Aboveground Biomass, MgC/ha, Saatchi et al., '11



Tropical forest biomass carbon (MgC/ha): America

