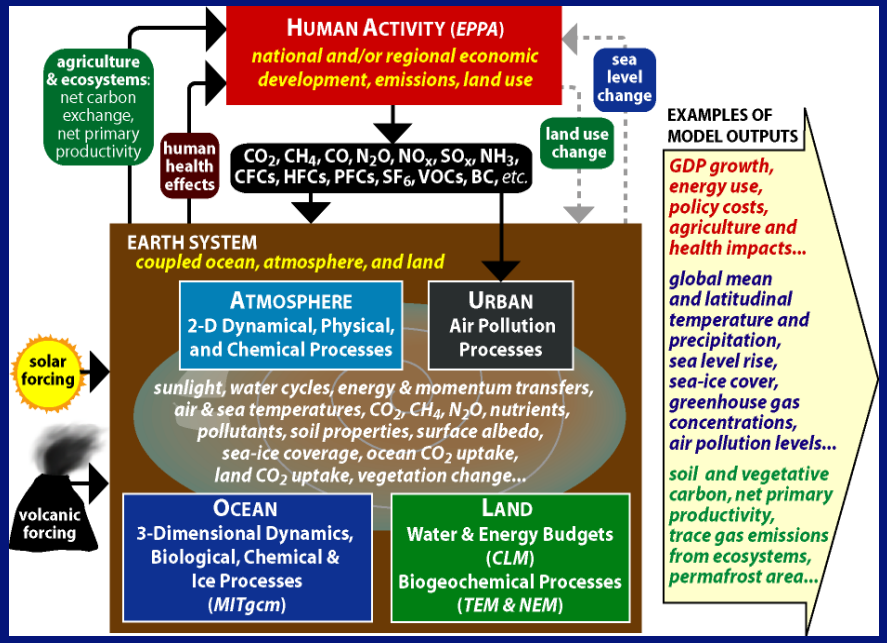
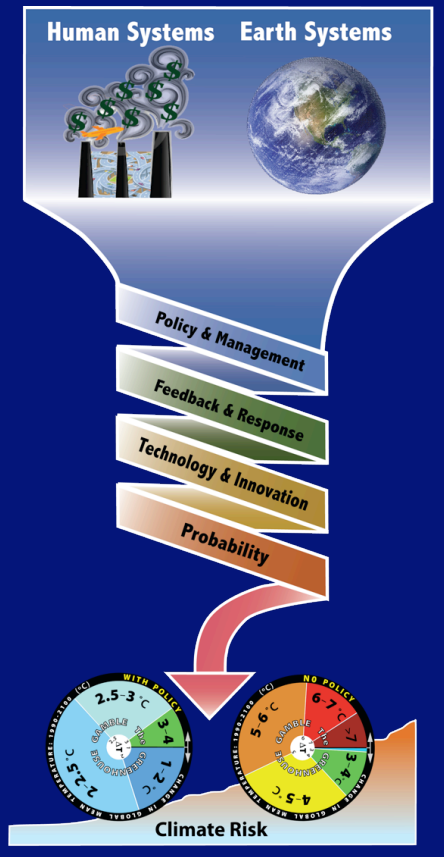
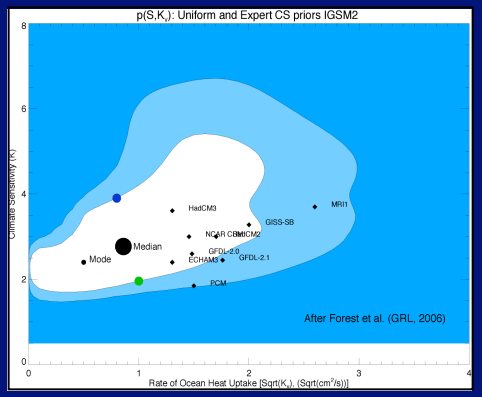
WaterNet:
Enhancing an Integrated Assessment Model (IAM)







- Enhancing Ecologic and Hydrologic Links
- Land-Use and Hydro-Ecologic Models
- Economic Adaptation to Climate Change

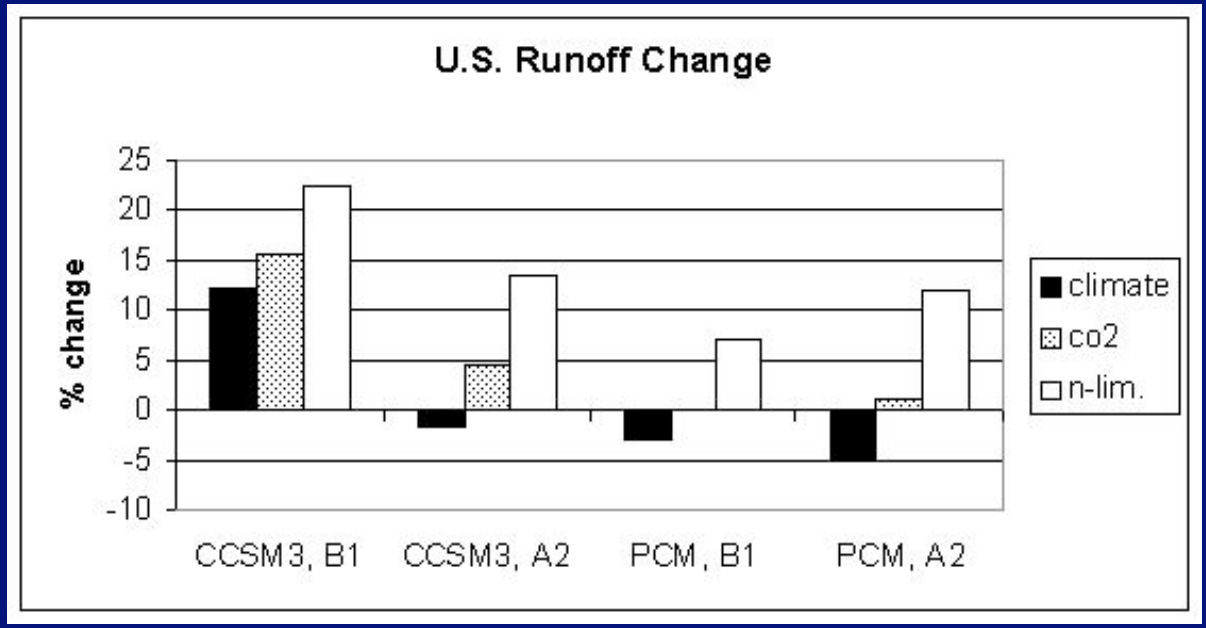
WaterNet Colleagues:

Angelo Gurgel (U. Sao Paulo), John Reilly (MIT), David Kicklighter (MBL), Jerry Mellilo (MBL), Ben Felzer (Lehigh Univ.), Tim Cronin (MIT), Ken Strzepek (U. of CO/MIT and colleagues of the World Bank EACC TEAM), and MIT Joint Program

WaterNet Team Meeting

Importance of Carbon-Nitrogen Interactions and Ozone on the Hydrologic Response to Climate Change

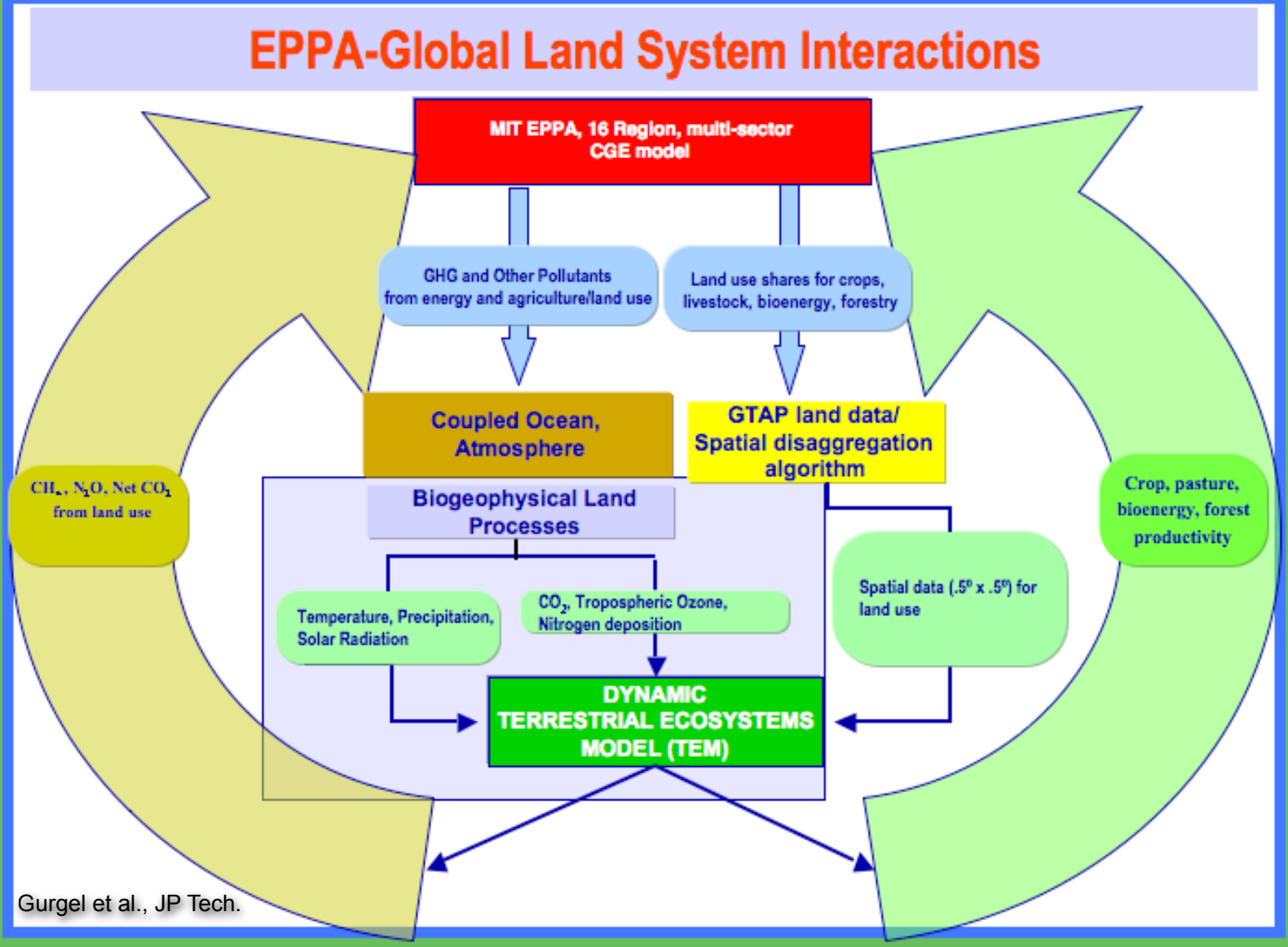
A new version of the Terrestrial Ecosystem Model (TEM-Hydro) was developed to examine the effects of carbon and nitrogen on the water cycle.to examine the effects of climate, elevated CO2, nitrogen limitation, and ozone exposure on the hydrological cycle in the eastern United States.



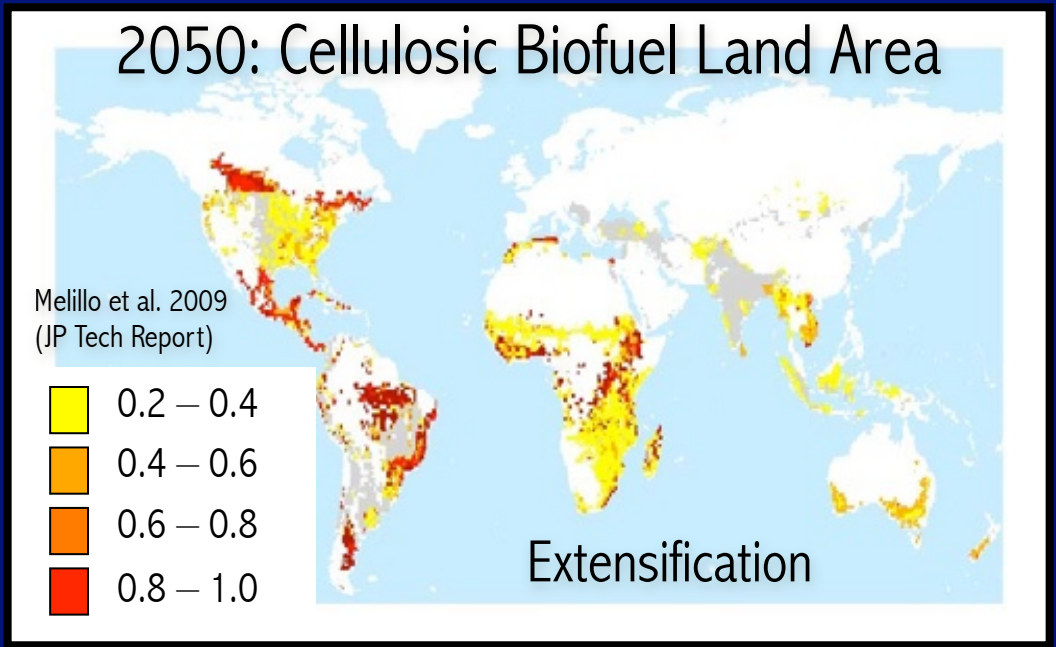
While the direction of future runoff changes is largely dependent upon predicted precipitation changes, the effects of elevated CO2 on ecosystem function (stomatal closure and CO2 fertilization) increase runoff by 3–7%, as compared to the effects of climate alone. Consideration of nitrogen limitation and ozone damage on photosynthesis increases runoff by a further 6–11%. **Failure to consider the effects of the interactions among nitrogen, ozone, and elevated CO2 may lead to significant regional underestimates of future runoff.**

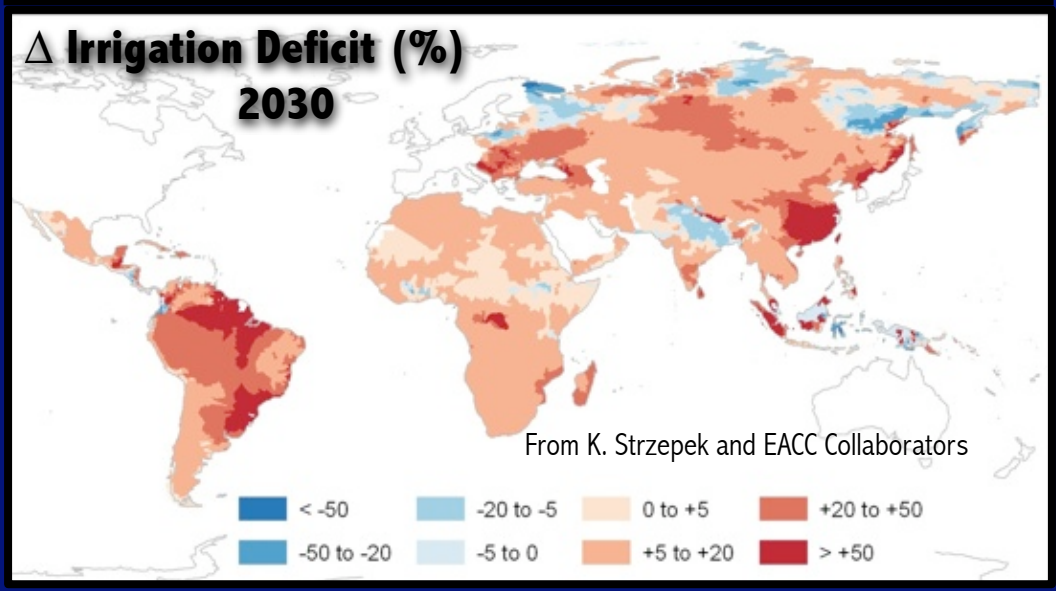
Felzer, B. S., T. W. Cronin, J. M. Melillo, D. W. Kicklighter, and C. A. Schlosser (2009), Importance of carbon-nitrogen interactions and ozone on ecosystem hydrology during the 21st century, J. Geophys. Res., 114, G01020, doi:10.1029/2008JG000826.

Enhancing Links Between Earth and Human Systems for IAMs



Land Use Change for Food, Water, Energy and Hydro-Climate Consequences





Further Investigations/Actions:

- **Regional/daily climate change**
- **Explicit crop modeling**
- **Irrigation (biofuel study rain-fed)**
- **Explicit BGC of fertilization**
- **Biogeophysical response/feedback**
- **Convey results to JP Sponsors**