

Geophysical Fluid Dynamics Laboratory Review

June 30 - July 2, 2009



Ocean Ecosystems and Climate Change

Presented by
Charles Stock

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Ocean Ecosystems and Climate Change

- **Enhanced foodweb dynamics in GFDL biogeochemical model (TOPAZ)**
- **Expanded applications of GFDL models to marine resource prediction**

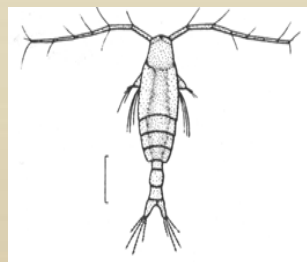
How will climate change impact global fisheries production?

"We have low confidence in predictions of future fisheries production because of uncertainty over future global aquatic net primary production and the transfer of that production through the food chain to human consumption."

-K.M. Brander, 2007, Global fish production and climate change, PNAS, 104(50), 19709-19714

The ratio of mesozooplankton production to primary production

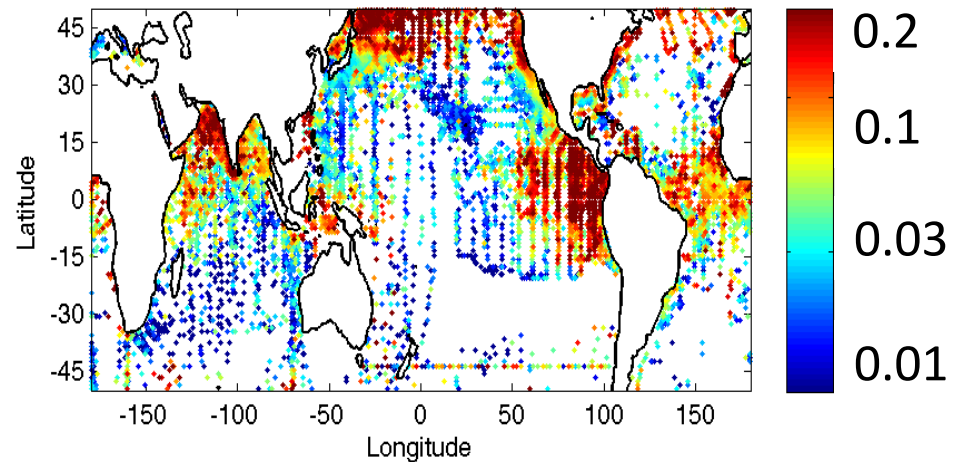
~10% of primary production transferred to mesozooplankton production in upwelling systems; ~1% in sub-tropical gyres



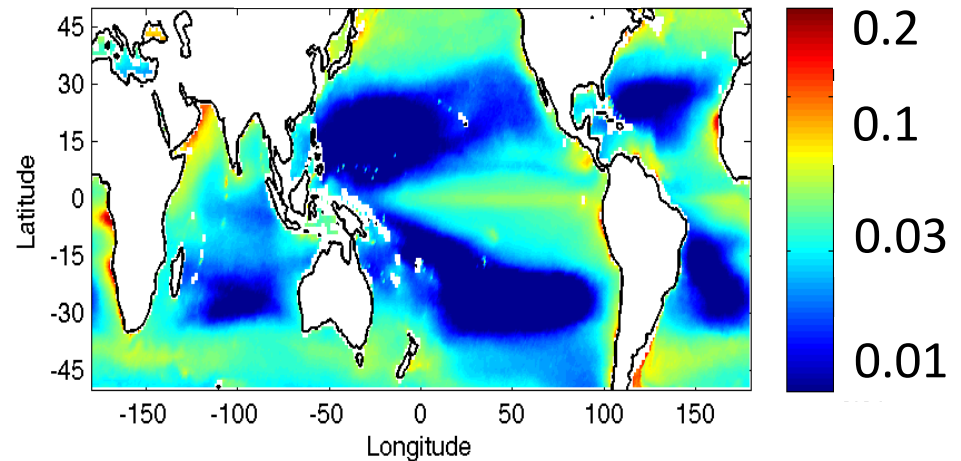
~1mm

Stock and Dunne, Deep-Sea Research, Part I, submitted

Independent z-ratio estimates

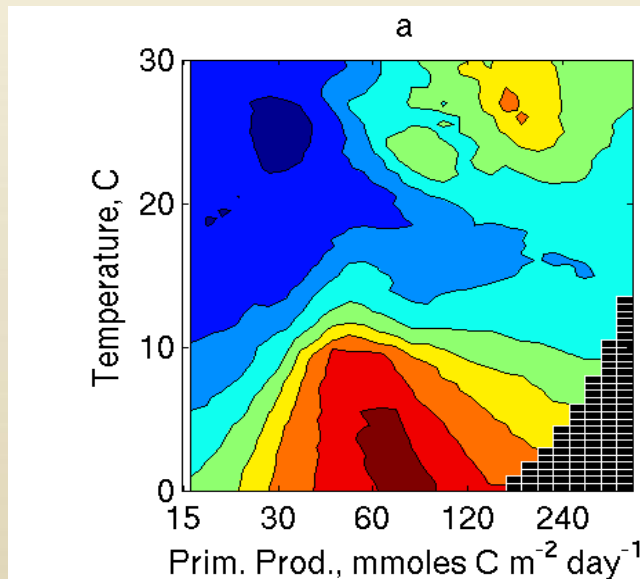


Modeled z-ratio

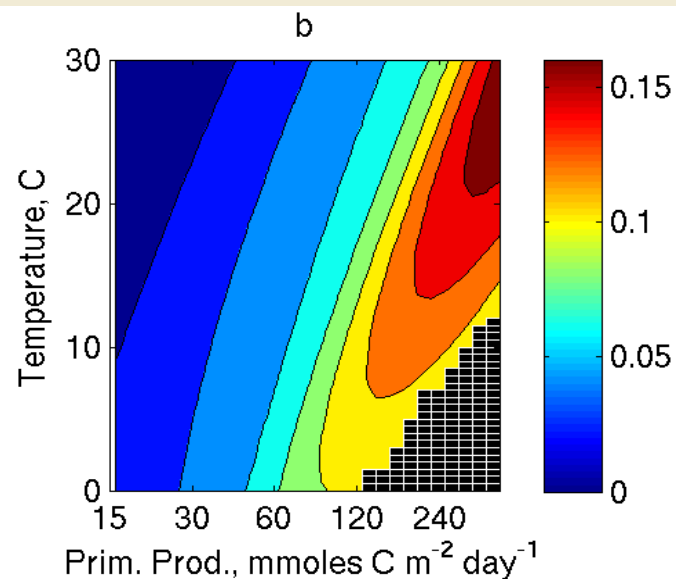


A fractional change primary production causes a larger fractional change in mesozooplankton production

Independent estimates



model



Implication: heightened sensitivity of mesozooplankton to climate change

Stock and Dunne, Deep-Sea Research, Part I, submitted

Toward marine resource prediction at interannual to centennial time-scales

- **Incorporate enhanced ecosystem dynamics into:**
 - Historical ocean/ice simulations forced with atmospheric reanalysis
 - Century-scale climate simulations
 - Interannual and decadal scale "initial value" simulations
- **Develop capacity to link with fisheries foodweb models**
(see Kearney poster)
- **Engage NOAA fisheries laboratories through postdocs and workshops to develop new and innovative applications of GFDL models**

Workshop to develop new GFDL model applications to fisheries prediction

Applying IPCC-class Models of Global Warming to Fisheries Prediction

June 15-17, 2009

Princeton University

**Sponsored by: The Cooperative Institute for
Climate Sciences between GFDL and Princeton
University**

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