Uncovering multi-scale variations in NCP in the Kuroshio Extension in spring and summer



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Dissolved gas tracers of net community production



Net Community Production (biological carbon export)

Photosynthesis -= (Gross primary prod.) (Auto + heterotrophic)

Respiration

O₂/Ar ratios

Dynamics of community production occur at fine scales



adapted from Dickey, 1991

Dynamics of community production occur at fine scales



mesoscale 10-100km submesoscale 1-10km

adapted from Dickey, 1991

Non-incubation-based dissolved gas tracers provide the means to get **synoptic**, **high-resolution** estimates of biological carbon export in dynamic regions.



 $\Delta x \sim 1 \text{ km}, \tau \sim 1 \text{ week}$ combine underway gas measurements with TSG and Fluo

Data collected from container ships in spring and summer



Relating NCP to sea level anomaly



NCP strongly correlates with SLA in sub polar waters in spring



Similar to results of Kouketsu et al, 2016

High NCP coincides with the density surfaces that outcrop in the Kuroshio Extension



High resolution underway NCP and Chlorophyll highlight regional and seasonal differences



NCP and Chl are decoupled in spring in the KE



NCP and Chl are coupled in summer across transition zone



Consistent decoupling of NCP and Chlorophyll in aggregate



NCP hotspot just north of KE front

Chl increases with density and latitude

... it would be great to add more data here!

Concluding thoughts

1. Underway measurements provide a high resolution synoptic view of biogeochemical properties.

2. Mesoscale processes strongly modulate NCP in KE in spring. **KE is NCP hotspot.**

3. Seasonal and regional decoupling of NCP and Chl. *Chl isn't always a great proxy for PP or NCP!*