Pteropod abundance in correlation to sea ice- finally some good news for Southern Ocean pteropods?
Results from a 20-year sediment trap study

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Pteropods are the canaries of the coal mine
Pteropods are the canaries of the coal mine

Bednaršek et al., 2014
Why study pteropods?

• “Canaries of the coal mines”
• highly abundant (all water masses)
• Important part of the food web (e.g. Norwegian salmon)
WAP: West Antarctic Peninsula

Meredith et al., 2013
Climate change at WAP

Ducklow et al., 2013
20 year sediment trap: 170m depth

Pictures: courtesy of Hugh Ducklow
Summer abundances

Steinberg et al., 2015
Pteropod Flux and ice

Keul et al. in prep
EOF: empirical orthogonal functions & PCA (principal component analysis)

- PC1 (52%) - PAL
- PC2 (21%) - PAL
- PC3 (17%) - PAL
- PC4 (7.4%) - PAL
- PC5 (1.6%) - PAL

52% 21% of total variance

Keul et al. in prep
Anomalies

Keul et al. in prep
Correlation to Chlorophyll (bloom from Dec. to March)

PC1 vs. Chlorophyll
PC1: p = 0.032, r = 0.63
Correlation to Chlorophyll (bloom from Dec. to March)

PC1 vs. Chlorophyll
PC1: $p = 0.032$, $r \approx 0.63$

Saba et al., 2014

Steinberg et al., 2015
Correlation to SAM (Southern Annular Mode)

PC1 vs SAM July  
p = 0.034, r = -0.52

PC2 vs SAM July  
p = 0.014, r = 0.62

Saba et al., 2014
Correlation to sea ice extent

PC2 vs. sea ice extent
- Sept: $p=0.002$, $r=0.70$
- Oct: $p=0.005$, $r=0.73$
- Nov: $p=0.008$, $r=0.65$
- Dec: $p=0.007$, $r=0.51$
**Future Outlook**

- Increasingly ice-free, warmer, and productive waters:
- More favorable (and expanding) environment for *L. helicina*

*L. helicina* abundance linked to phytoplankton: larger amount of energy cycled through *L. helicina* if this trend in increasing flux continues.

Ducklow et al., 2013
Pteropods are the canaries of the coal mine
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