### **Trends/patterns in APO seasonal cycle** Method based on harmonic fits to 3-year running time series segments



## Trends in BRW APO seasonal cycle

Alternative approach based on high frequency residuals, sort by month, plot v. year



### **Geophysical Research Letters**

**RESEARCH LETTER** 

10.1029/2019GL085667

#### **Key Points:**

• Significant correlations are found between winter atmospheric potential oxygen and the Southern Annular Mode at three long-term observing sites

#### Southern Annular Mode Influence on Wintertime Ventilation of the Southern Ocean Detected in Atmospheric O<sub>2</sub> and CO<sub>2</sub> Measurements

Cynthia D. Nevison<sup>1</sup>, David R. Munro<sup>2,3</sup>, Nicole S. Lovenduski<sup>1,4</sup>, Ralph F. Keeling<sup>5</sup>, Manfredi Manizza<sup>5</sup>, Eric J. Morgan<sup>5</sup>, and Christian Rödenbeck<sup>6</sup>





#### **Geophysical Research Letters**

#### **RESEARCH LETTER**

10.1029/2018GL079575

#### **Key Points:**

- Ocean models suggest that net DOC production contributes significantly to NCP, O<sub>2</sub> outgassing, and carbon export in the Southern Ocean
- The observed APO<sub>NCP</sub> cycle supports the model results and suggests that satellite-based estimates underestimate the seasonal amplitude of NCP
- The underestimate is due in part to early spring NCP, which is not well represented by in situ and satellite-based approaches

#### Net Community Production in the Southern Ocean: Insights From Comparing Atmospheric Potential Oxygen to Satellite Ocean Color Algorithms and Ocean Models

Cynthia Nevison<sup>1</sup> (D), David Munro<sup>1,2</sup> (D), Nicole Lovenduski<sup>1,2</sup> (D), Nicolas Cassar<sup>3</sup> (D), Ralph Keeling<sup>4</sup> (D), Paul Krummel<sup>5</sup> (D), and Jerry Tjiputra<sup>6</sup> (D)

#### Satellite NCP

Ocean Model NCP





## Net Community Production latitudinal gradient: satellite vs. in situ data



### Modeled total APO captures observed gradient in West Pacific



## **CESM net biological signal**

NCP component zeroed at 24N, net biological component zeroed at 41S



#### APOncp gradient: Compare CESM, VGPM & in situ NCP



#### **APOncp gradient: Compare CESM and 2 satellite products**



#### **Extra Slide**

# Satellites predict higher Arctic NCP than CESM. Satellites also differ substantially on fraction of NCP in Southern v. Northern Hemisphere

CESM: ~ 55% of NCP occurs from 90S-0N VGPM: only ~37% of NCP occurs from 90S-0N CbpM: 50% of NCP occurs from 90S-0N Li and Cassar,: ~ 60% of NCP occurs from 90S-0N

