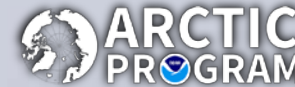
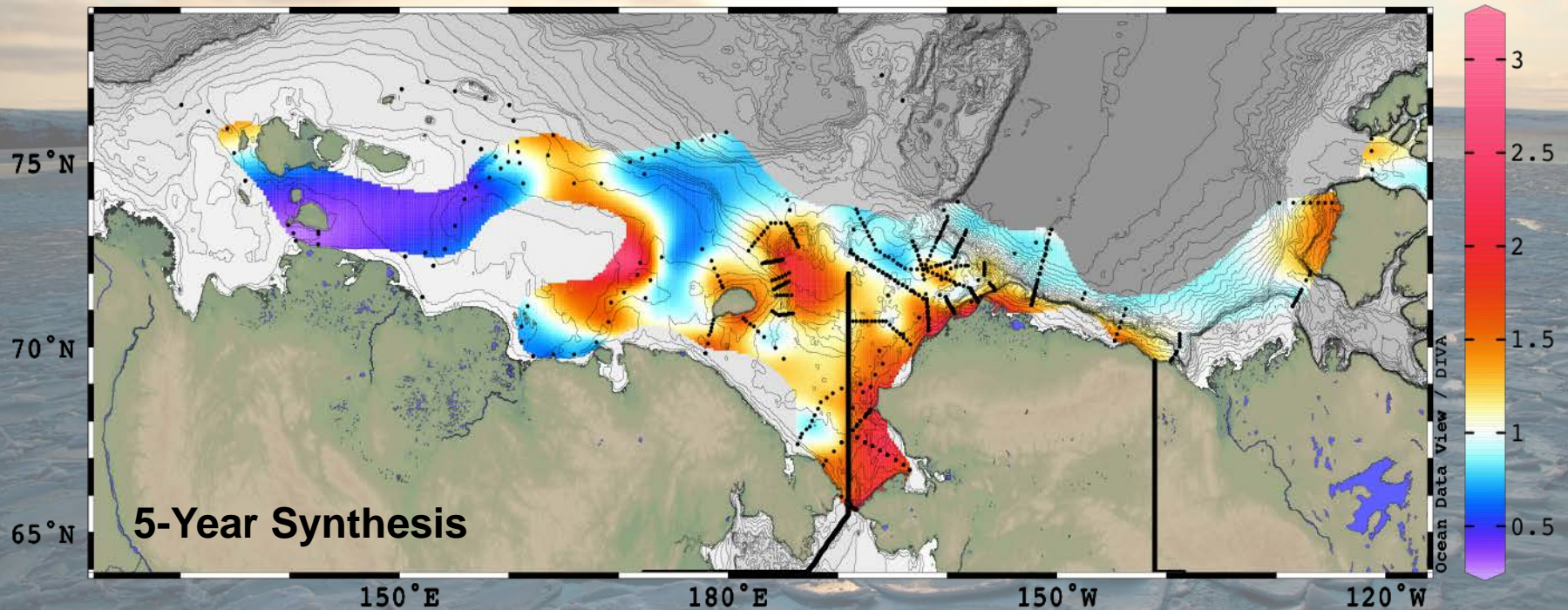


# Ocean Acidification in the Distributed Biological Observatory 2017

**Jessica Cross**  
**18 June 2018**  
**PAG Spring Meeting**



# OA in the Pacific Arctic Sub-Surface



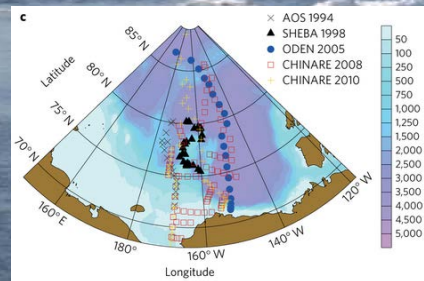
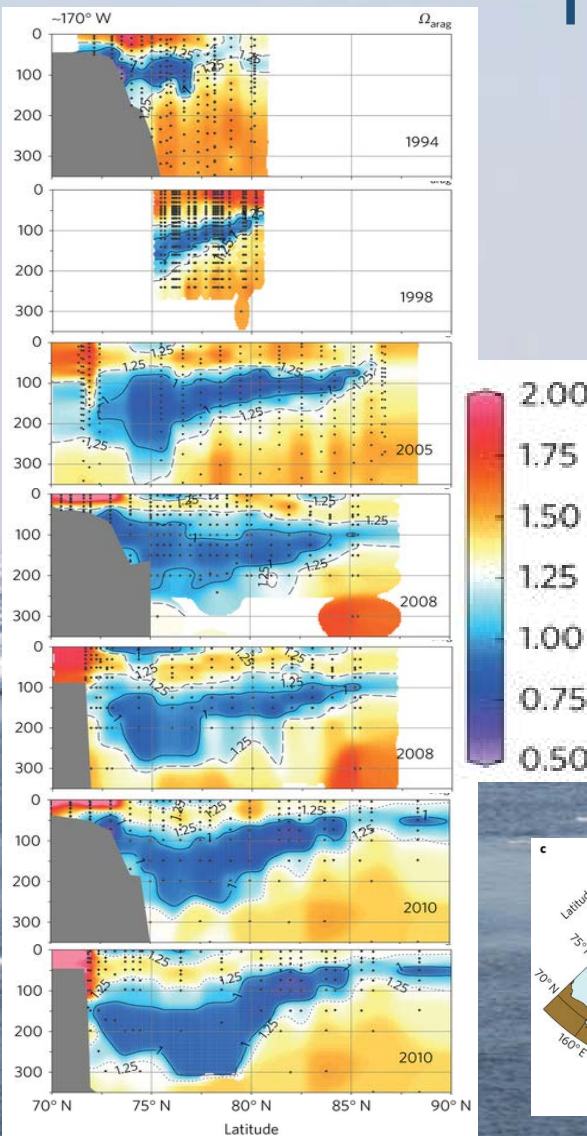
*Cross et al., Accepted (SOAR)*

At least 40% of the Chukchi Sea benthos is exposed to bottom waters that are corrosive to  $\text{CaCO}_3$  during summertime.

*Bates et al., 2015*

# Expanding aragonite corrosivity in the Pacific Arctic

- 1994 – 2010: Corrosive water volume in upper 250m increased from 5% to 31%.
- Much of this is related to increased PWW formation, but OA also contributes.



NATURE CLIMATE CHANGE | LETTER



## Increase in acidifying water in the western Arctic Ocean

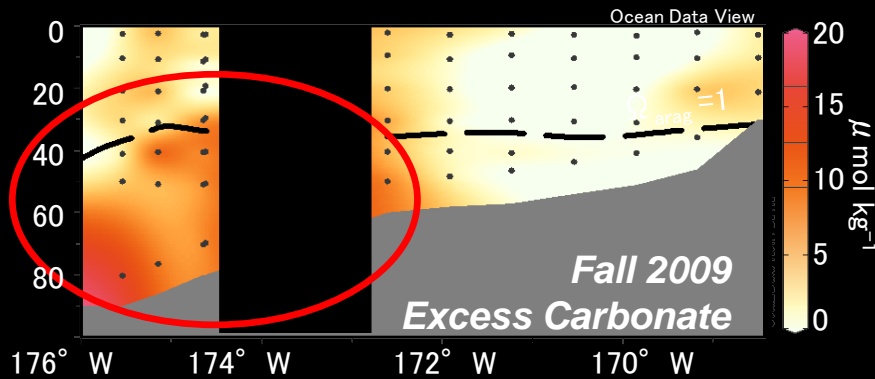
Di Qi, Liqi Chen, Baoshan Chen, Zhongyong Gao, Wenli Zhong, Richard A. Feely, Leif G. Anderson, Heng Sun, Jianfang Chen, Min Chen, Liyang Zhan, Yuanhui Zhang & Wei-Jun Cai



Eskimo Walrus Commission

"To protect the Pacific walrus population."

# Ocean acidification could impact ecosystem services.



Conservative and non-conservative variations of total alkalinity on the southeastern Bering Sea shelf

Jessica N. Cross <sup>1,\*</sup>, Jeremy T. Mathis <sup>1,3</sup>, Nicholas R. Bates <sup>2</sup>, Robert H. Byrne <sup>4,3</sup>



Implications of ocean acidification in the Pacific Arctic:  
Experimental responses of three Arctic bivalves to  
decreased pH and food availability

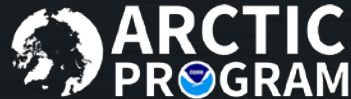
Christina L. Goethel , Jacqueline M. Grebmeier, Lee W. Cooper, Thomas J. Miller



ESKIMO WALRUS  
COMMISSION:

*To protect the Pacific  
walrus population*

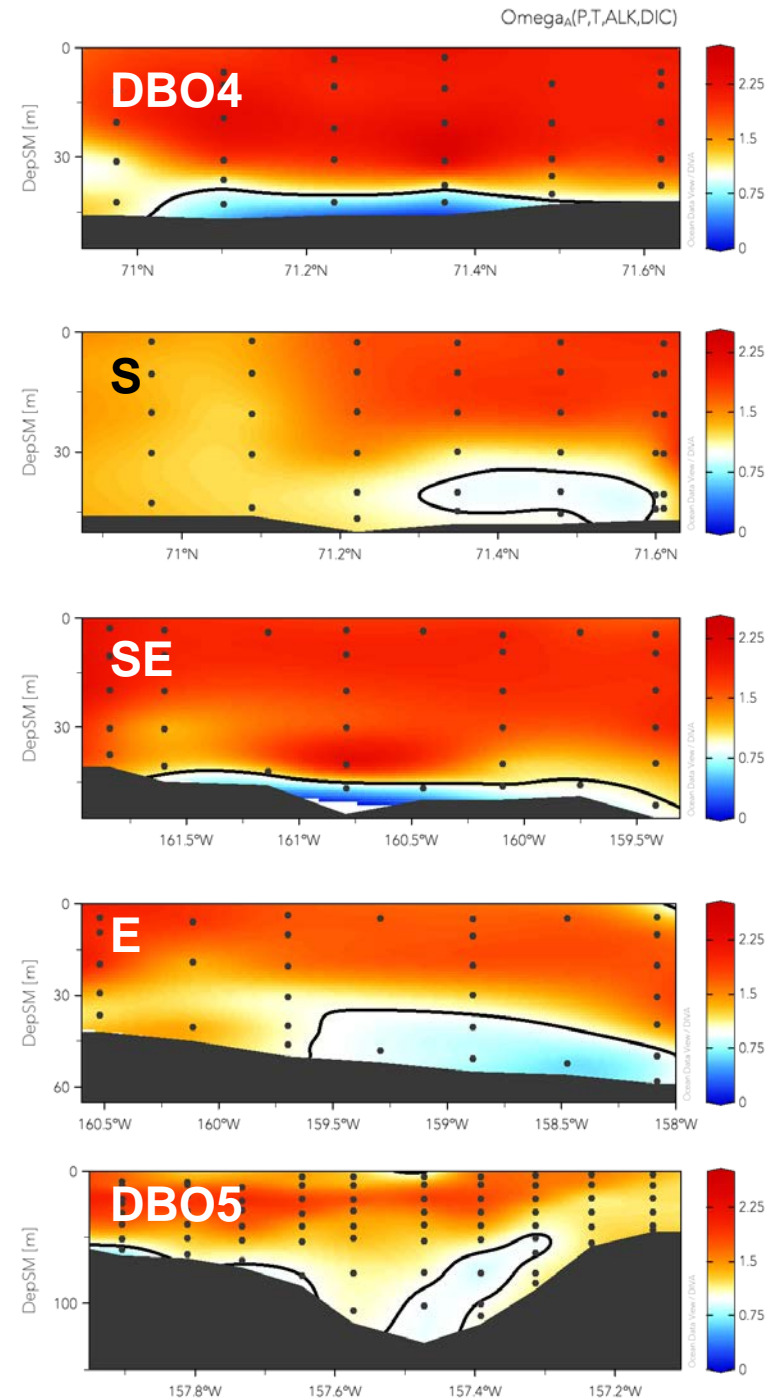
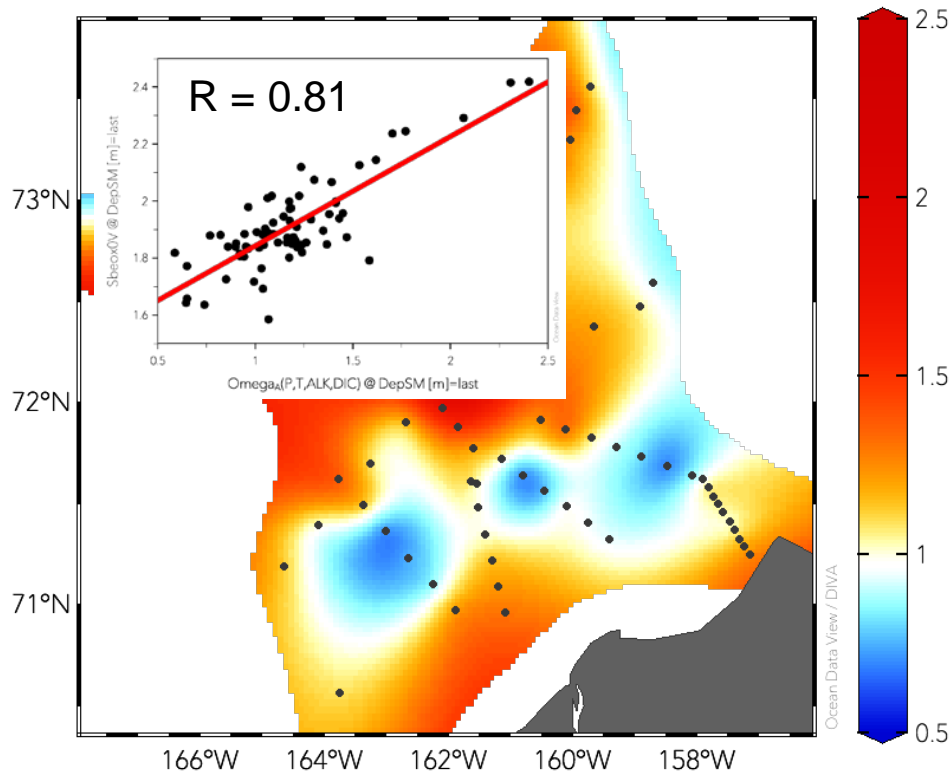
# ARCTIC DBO- NCIS 2017



# Corrosive waters prevalent on SE side of Hannah Shoal

- Similar to 5-year synthesis
- How persistent is this feature?
  - *Remnant Winter Water (DBO5)*
- What mechanism drives it?
  - *Focused Deposition & Respiration*

$\Omega_{A(P,T,ALK,DIC)} @ \text{DepSM [m]=last}$

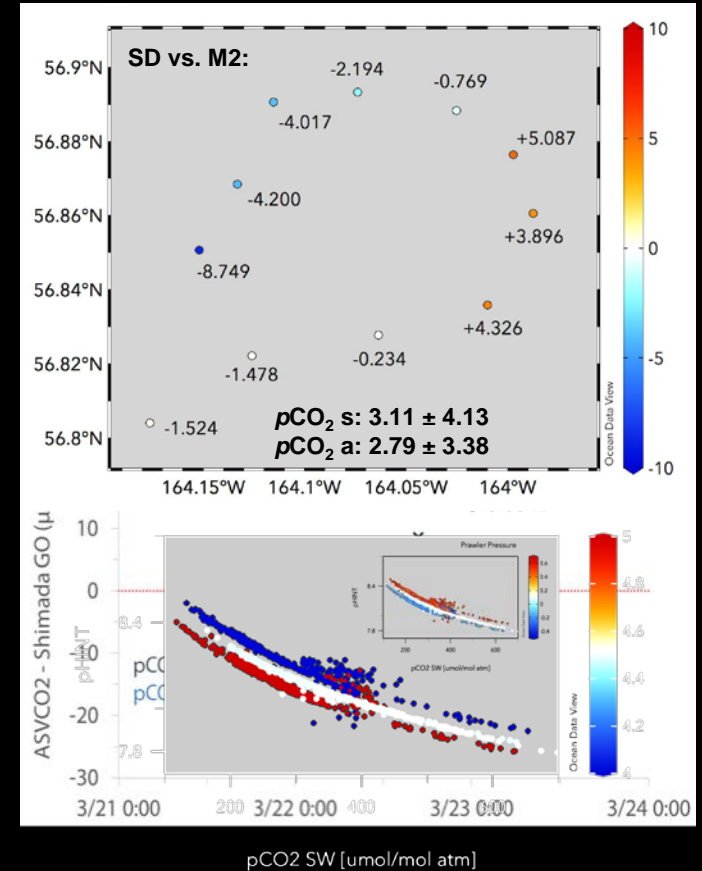


# AUTONOMOUS SURFACE VEHICLE CO<sub>2</sub> SYSTEM (ASVCO<sub>2</sub>)

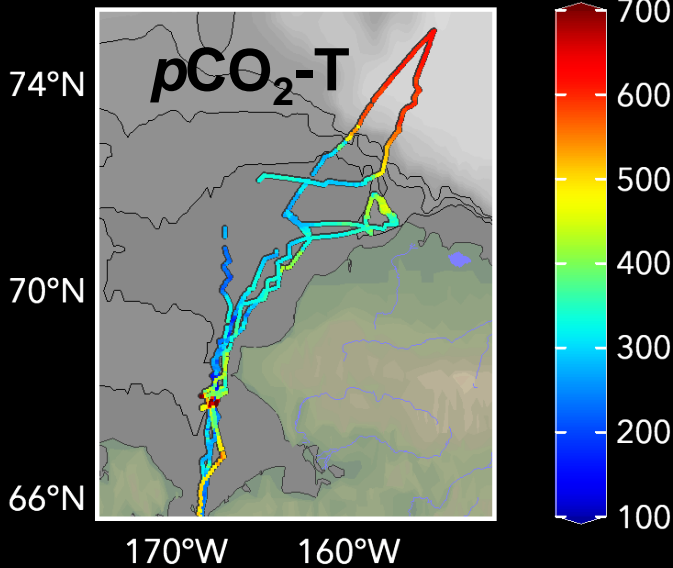
- Saildrone ASVCO<sub>2</sub> vs. R/V *Shimada* General Oceanics underway pCO<sub>2</sub> system
- Preliminary results from lab and field testing suggest ASVCO<sub>2</sub> measurement errors are comparable to MAPCO<sub>2</sub> systems deployed on buoys (< 2 μatm)



Photos courtesy Saildrone, Inc. & Noah Lawrence

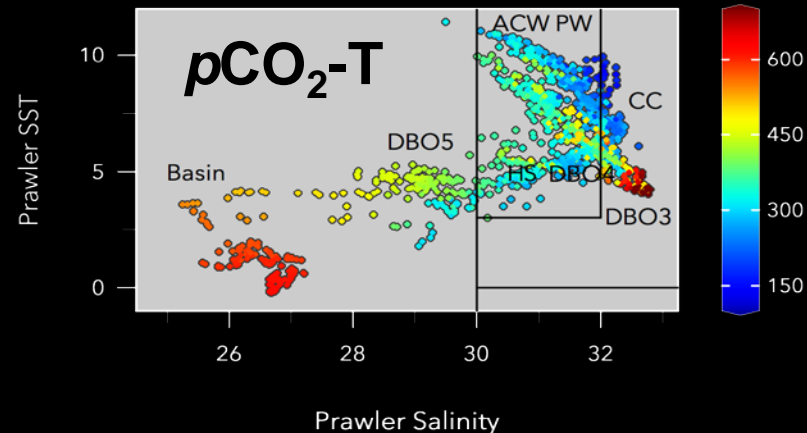
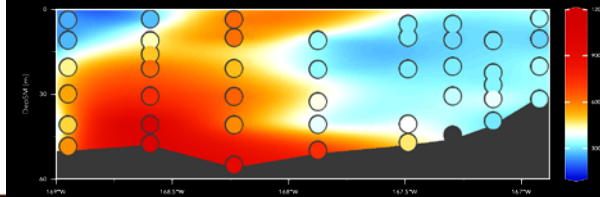
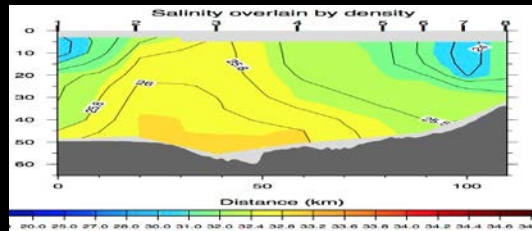
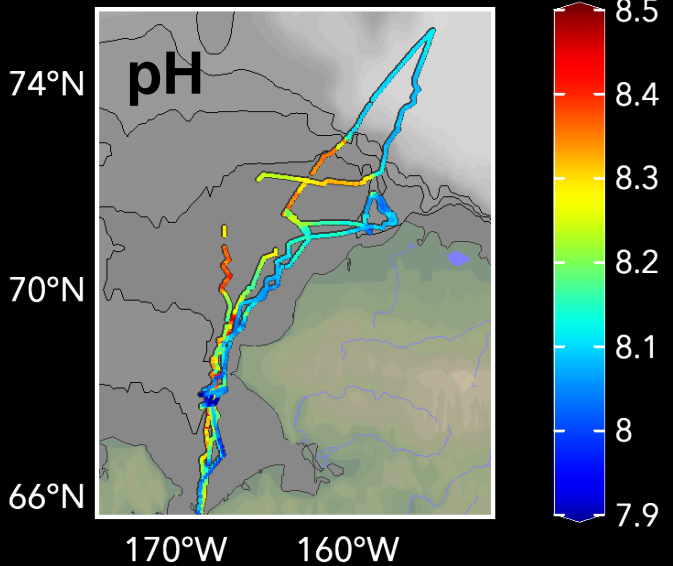


# ARCTIC $p\text{CO}_2$ SURVEY



## KEY ACCOMPLISHMENTS:

- 7 NM FROM ICE EDGE
- OCCUPIED 3 DBO LINES
  - EXCELLENT CALIBRATIONS
  - *TRUST YOUR SENSORS WHEN YOU DESIGN THEM TO SEE FINESCALE FEATURES!*





# ARCTIC DBO- NCIS 2018

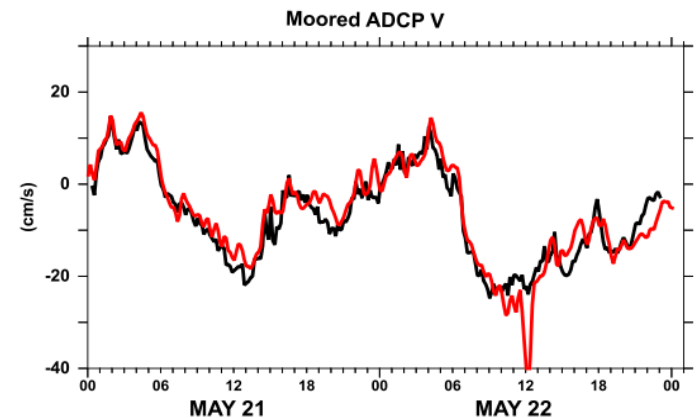
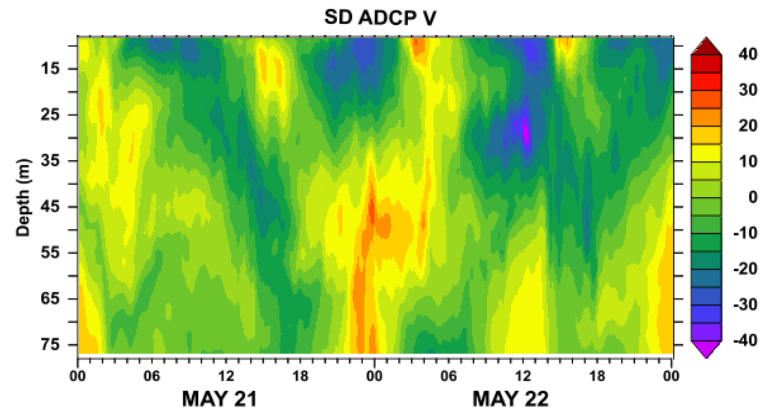
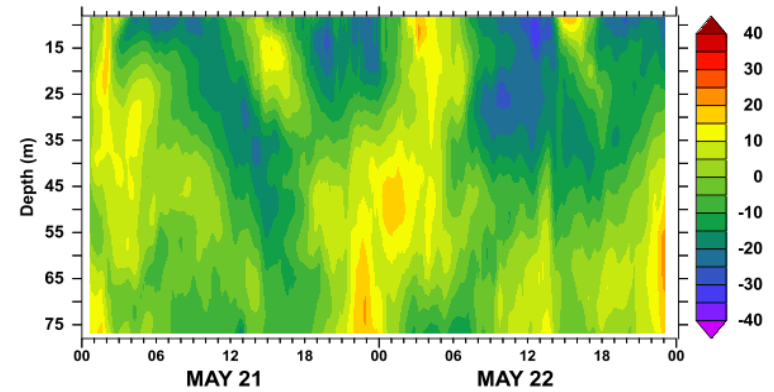


# Evaluating the Sailability ADCP



Moored upward looking ADCP  
300 khz RDI

Mean correlation 0.95  
Root Mean Square difference 3.3cm/s



SD vs. Moored V at 30m

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