

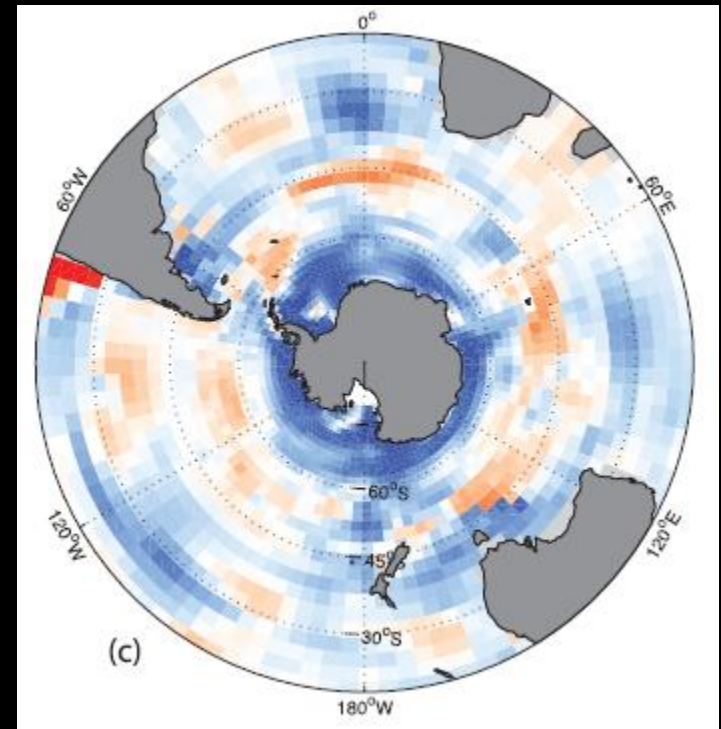
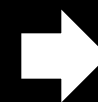
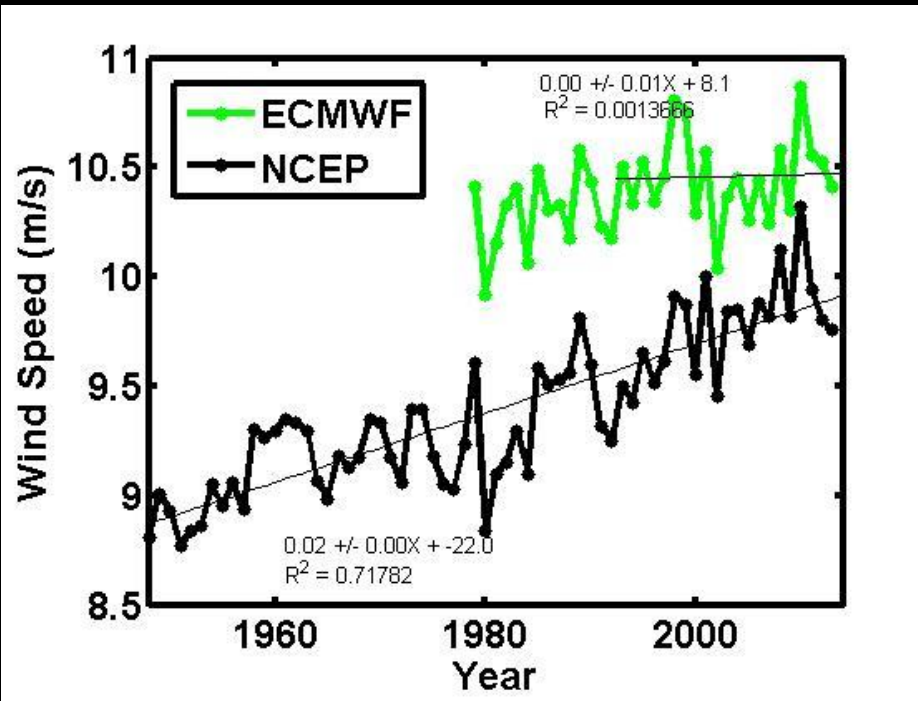
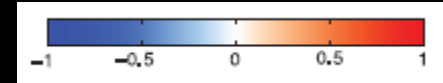
Aircraft and ship measurements in Drake Passage

Colm Sweeney

Dave Munro

Motivation

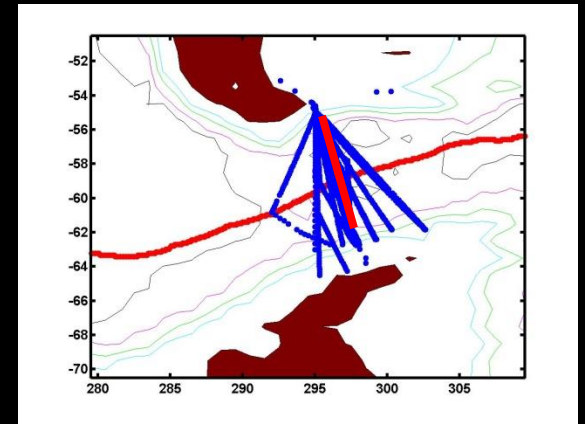
$\Delta p\text{CO}_2$



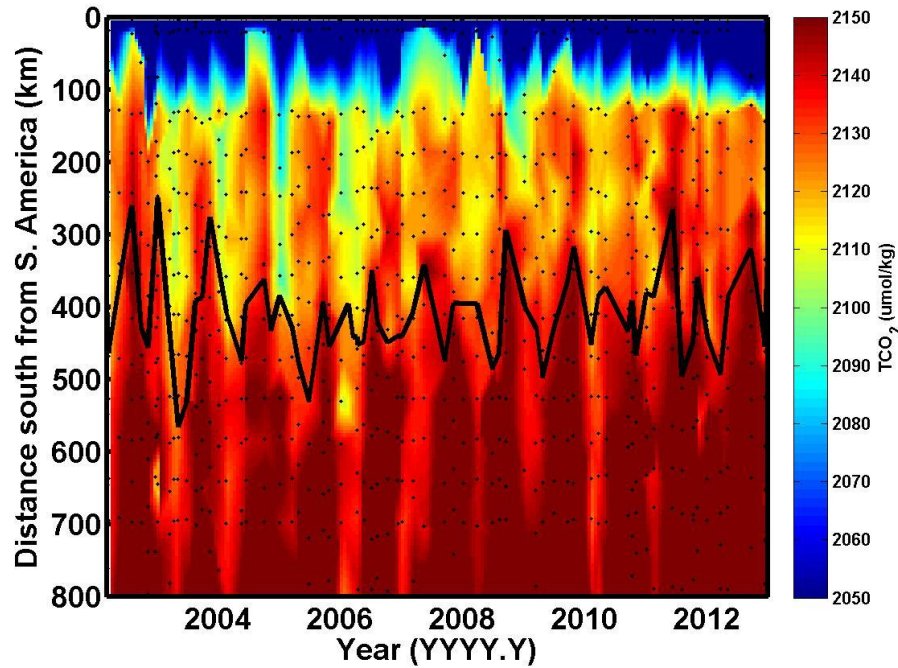
Lovenduski et al. (2008)

Increase in $\Delta p\text{CO}_2$ driven by increase overturning which is primarily forced by increase in surface winds

Underway sampling 2002-2015

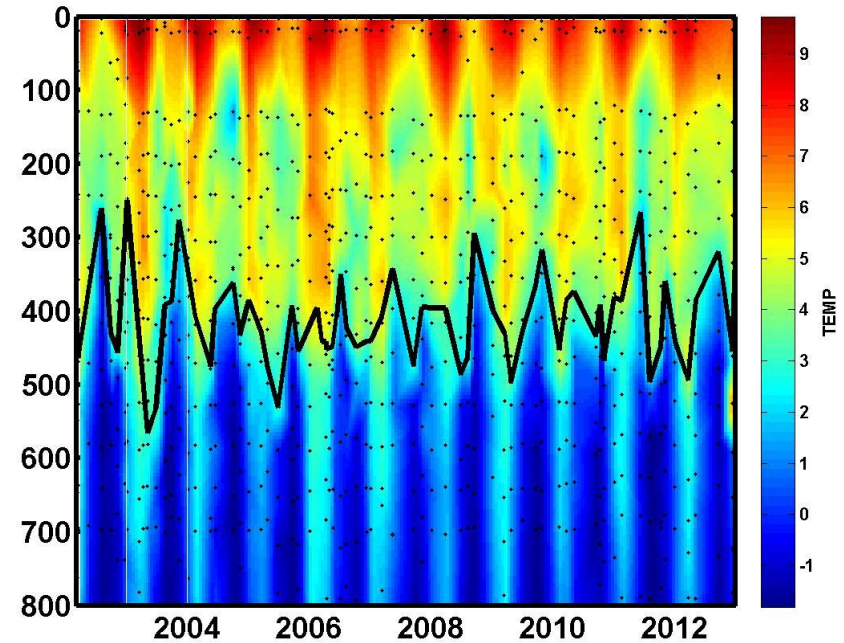


Surface TCO₂ at discrete locations



Total CO₂

SSTs at discrete locations



Surface Temperature

Drake Passage Measurements

- Underway (~18-24 crossing per year)

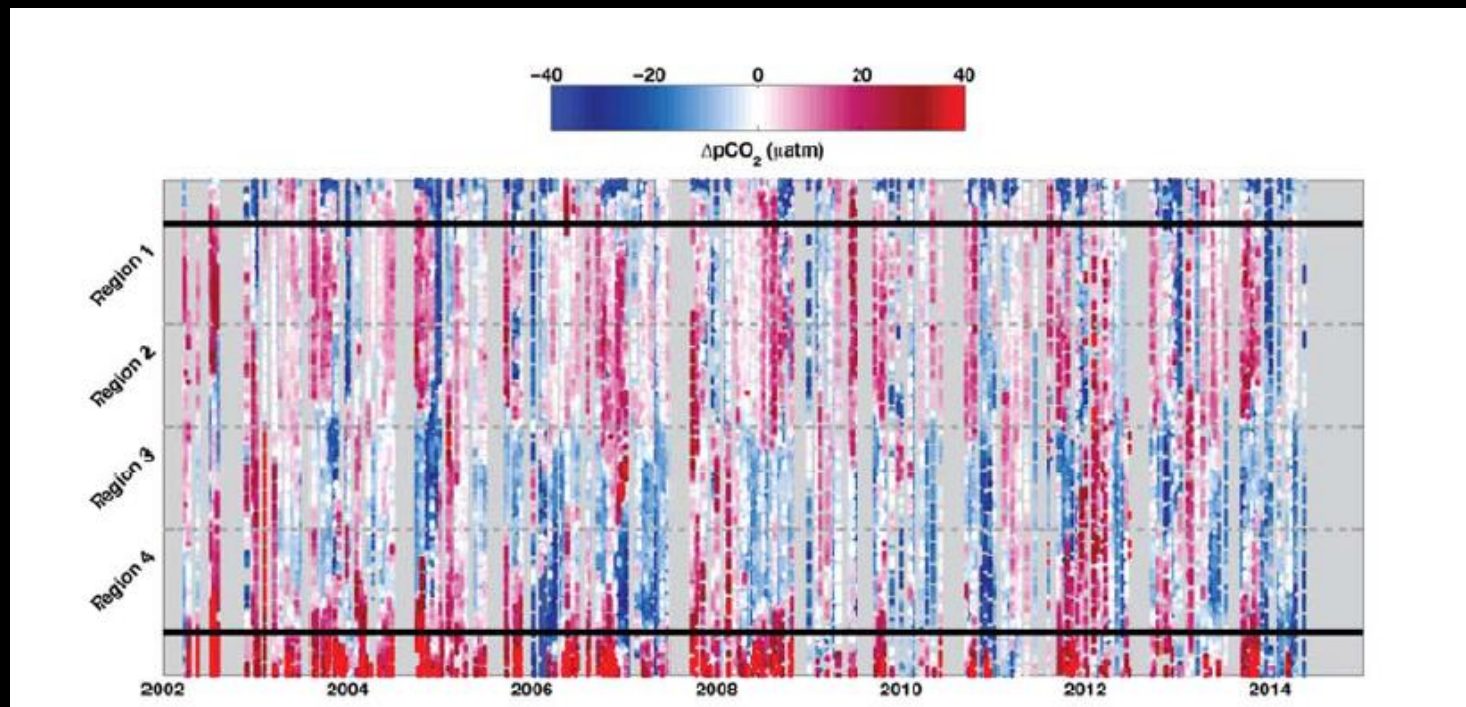
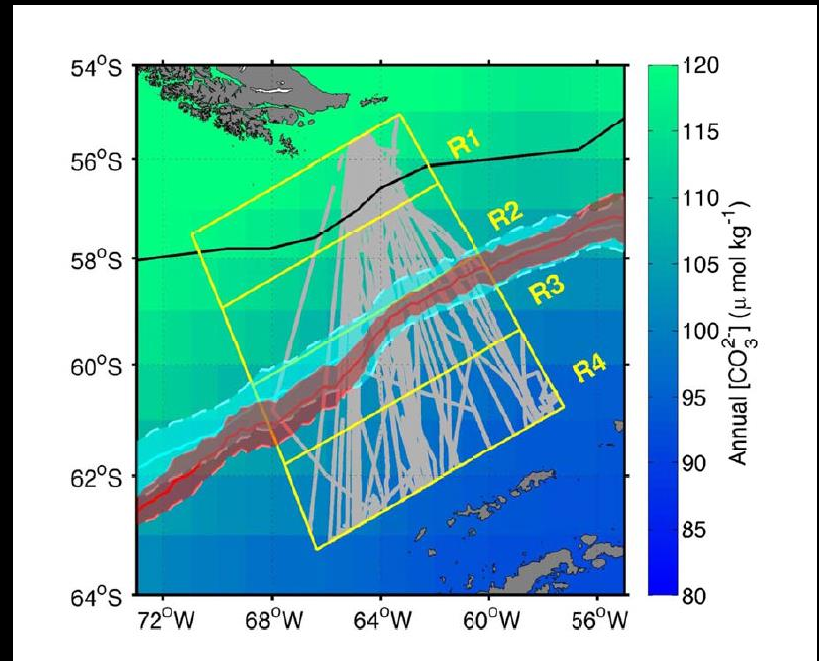
- ADCP (since 1996)
- Atmospheric CO₂, and Ocean CO₂ and O₂ (since 2002)
- Atmospheric O₂ (since 2012)

– Discrete (6-8 crossing per year)

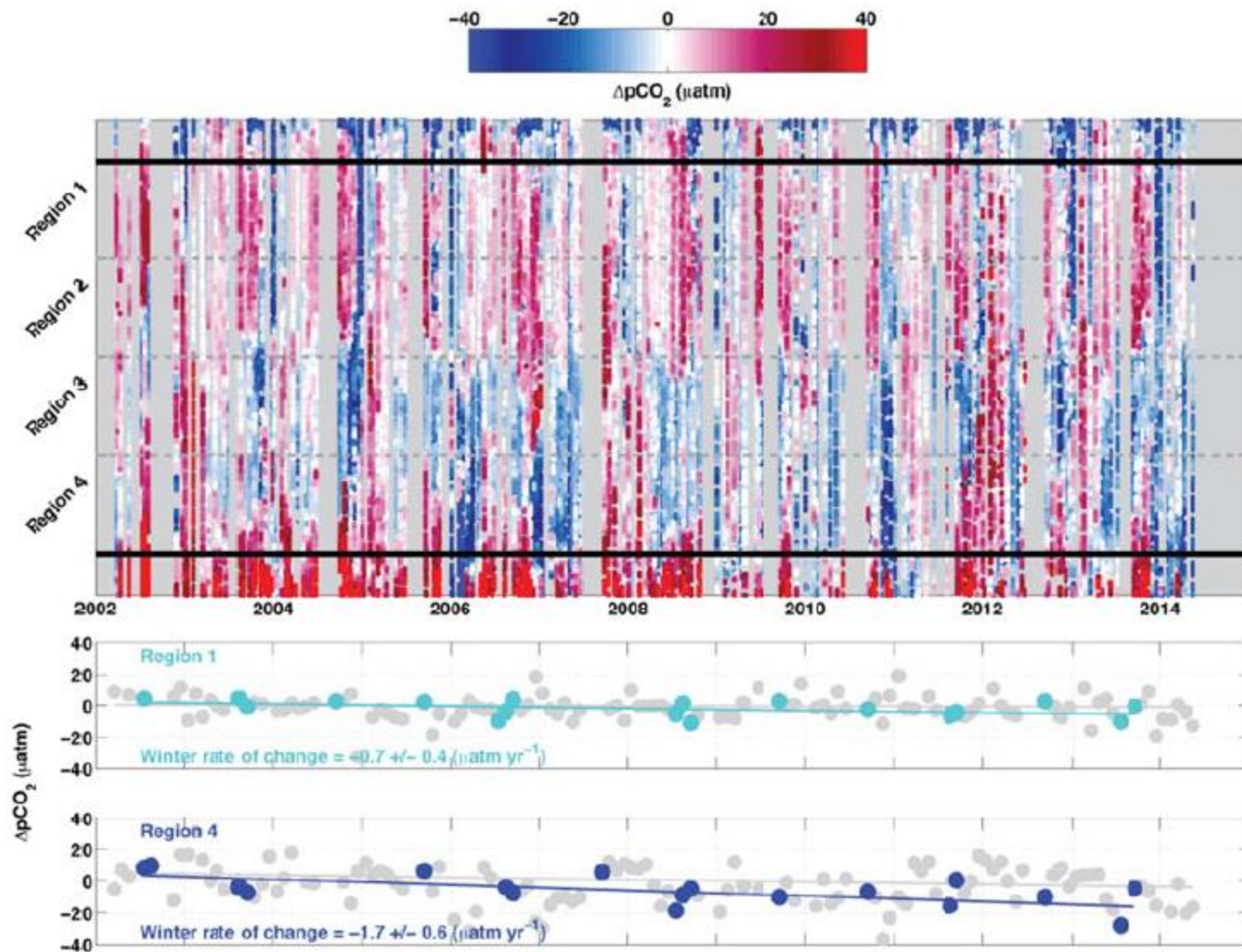
- XBT/XCDT (since 1996)
- TCO₂ measurements (since 2002)
- Nutrients (PO₄, NO₃, SiO₄) (Since 2005)
- C-13 of TCO₂ (since 2005)
- C-14 of TCO₂ (2006 – 2009)

– Total water column measurements (2006 and 2009)

Underway sampling 2002-2015

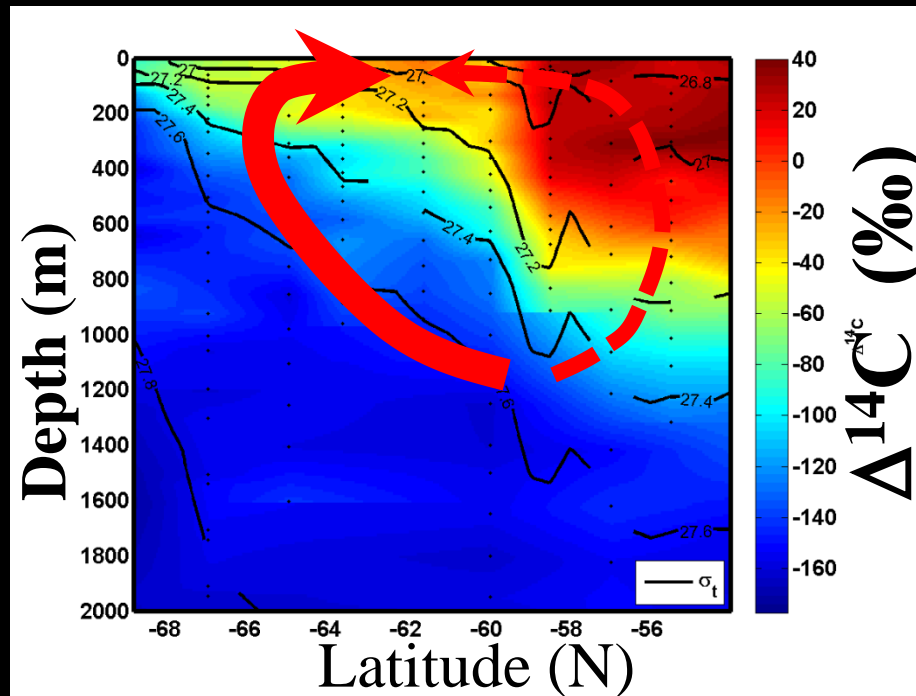


Trends

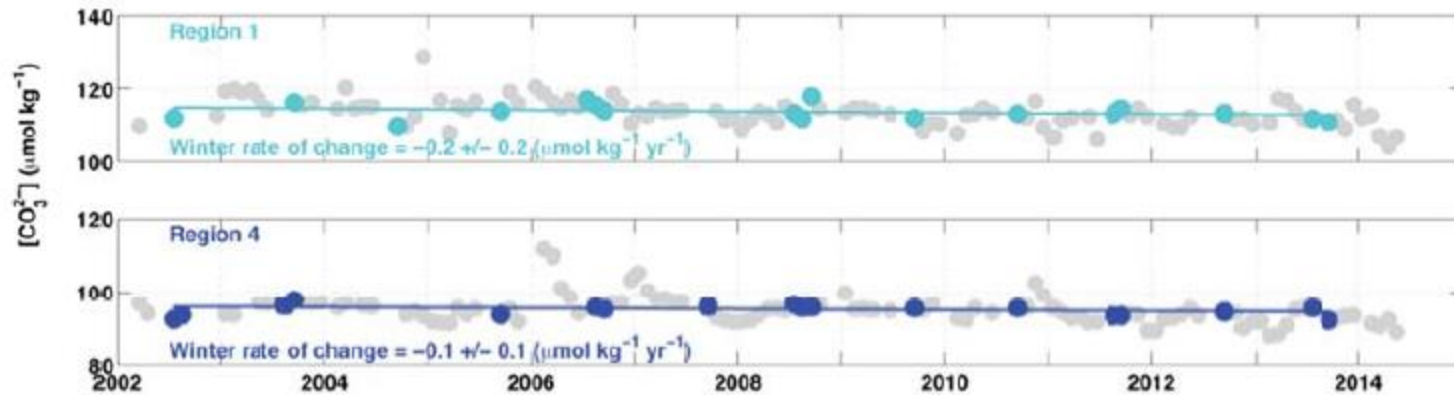


Arctic Deep Waters

— Ekman
- - - Eddy



Ocean Acidification

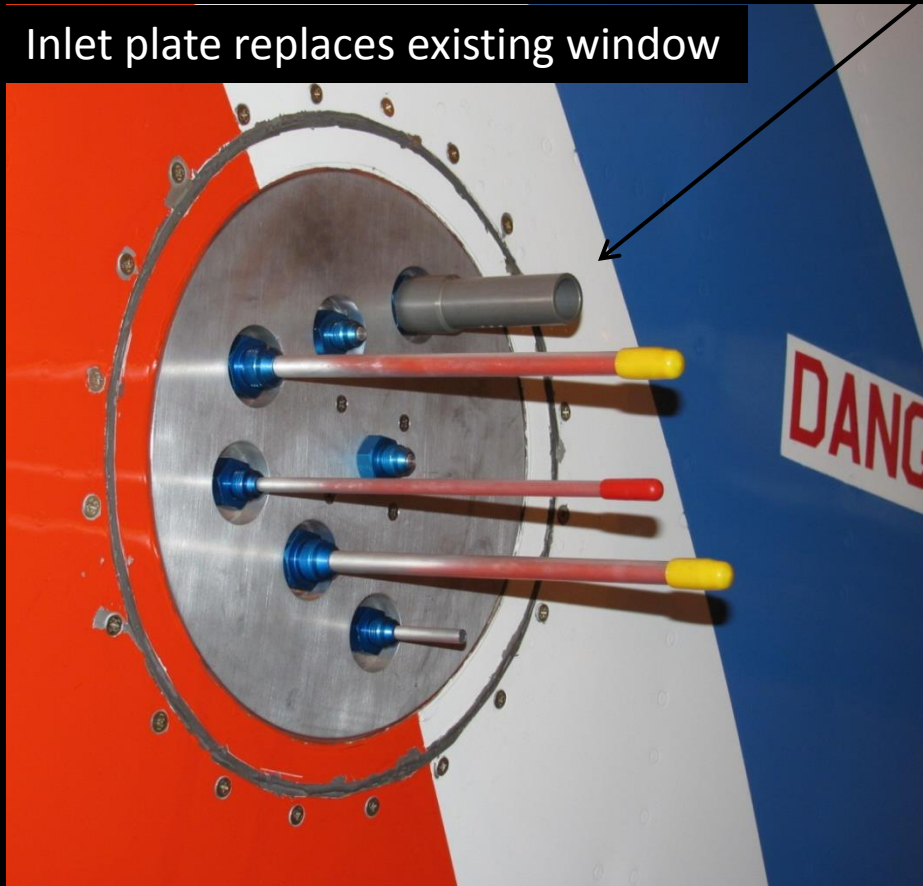


Stabilization of pCO_2 by deep wintertime mixing
also stabilizes increase in CO_3^{2-}

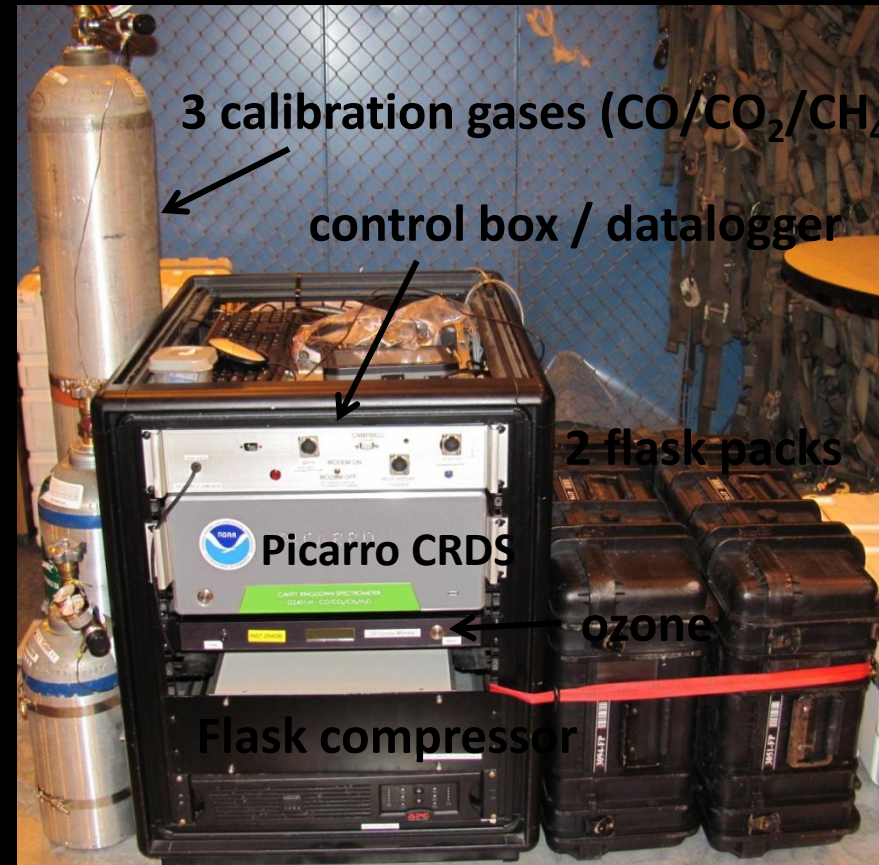
Alaska Coast Guard (ACG) Aircraft Site

Temperature, RH, and Pressure

Inlet plate replaces existing window

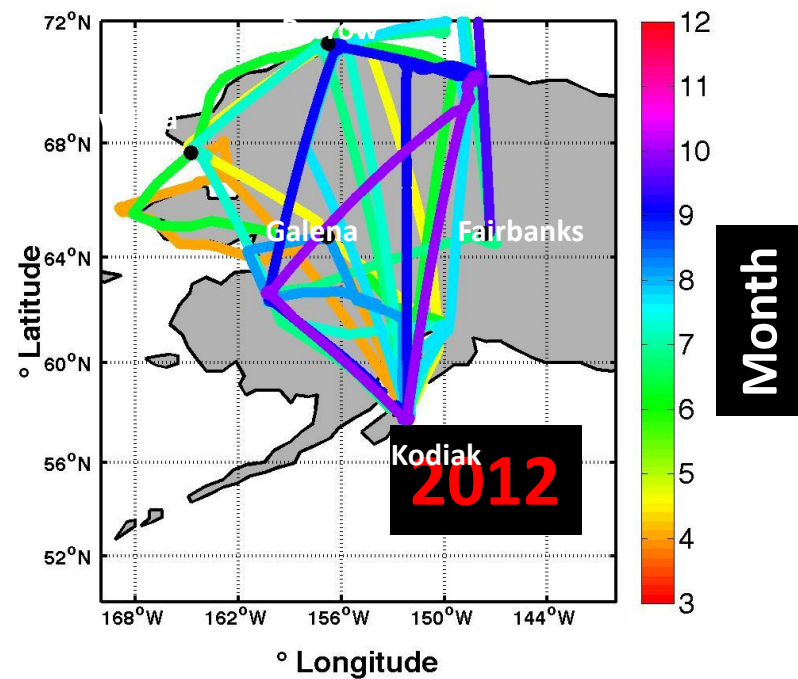
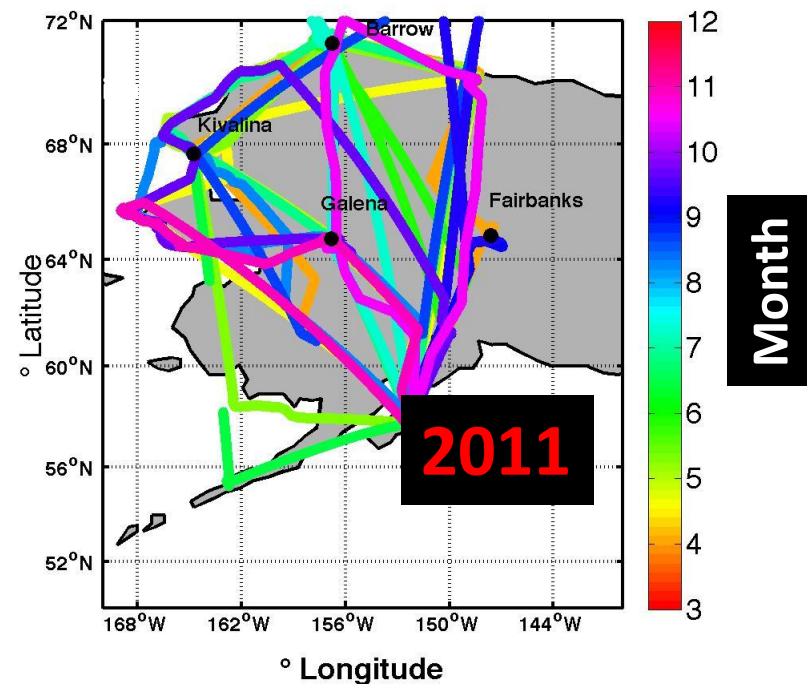
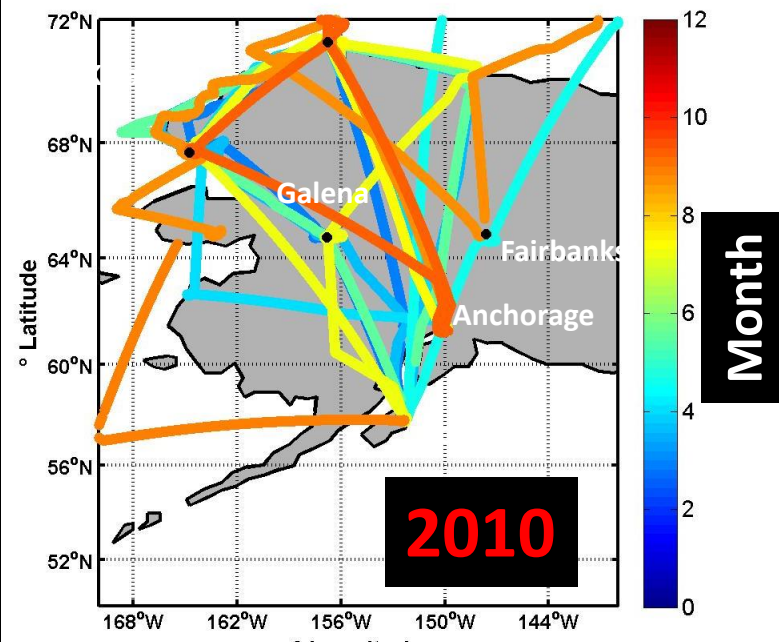
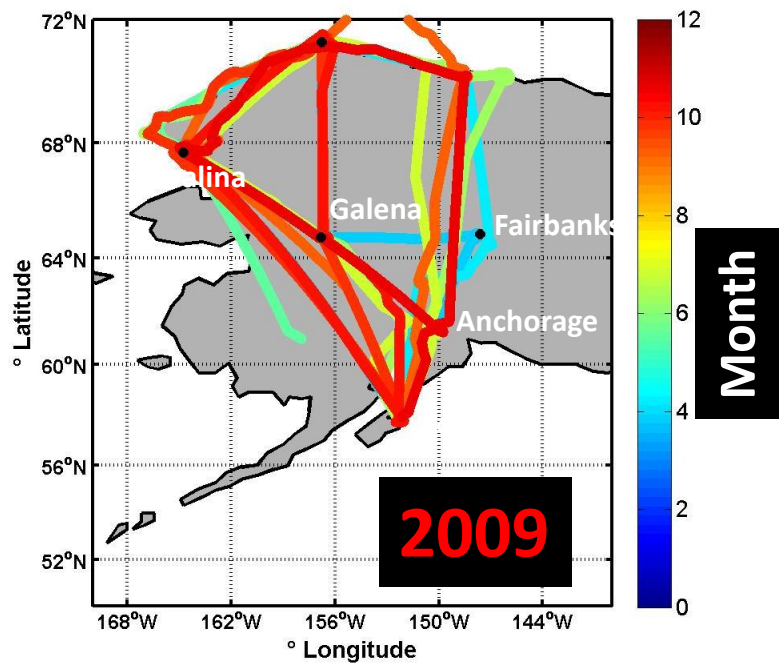


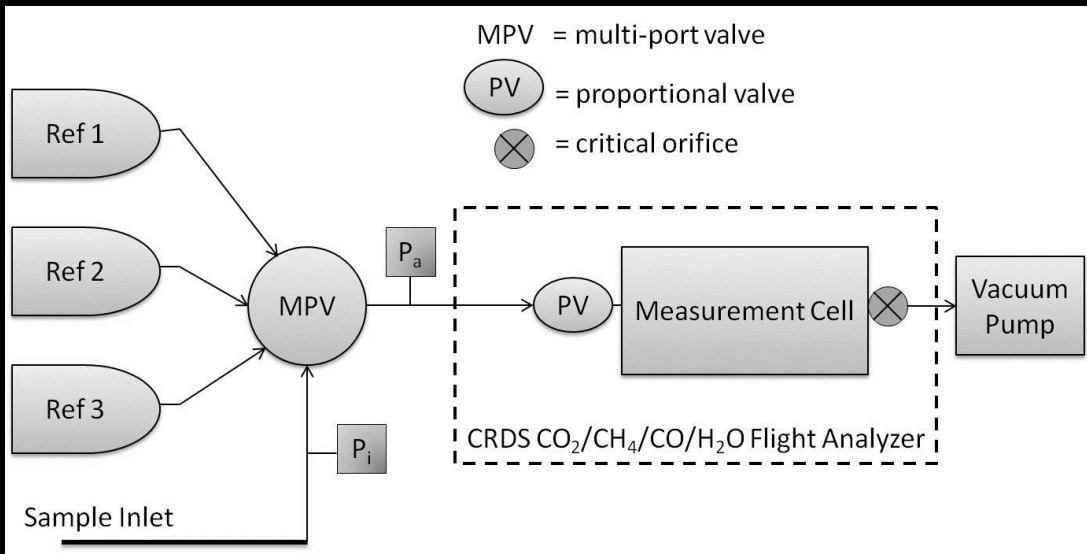
- continuous CO₂/CH₄/CO, O₃, T, RH, P
- 24 Flasks (PFP) with > 50 species



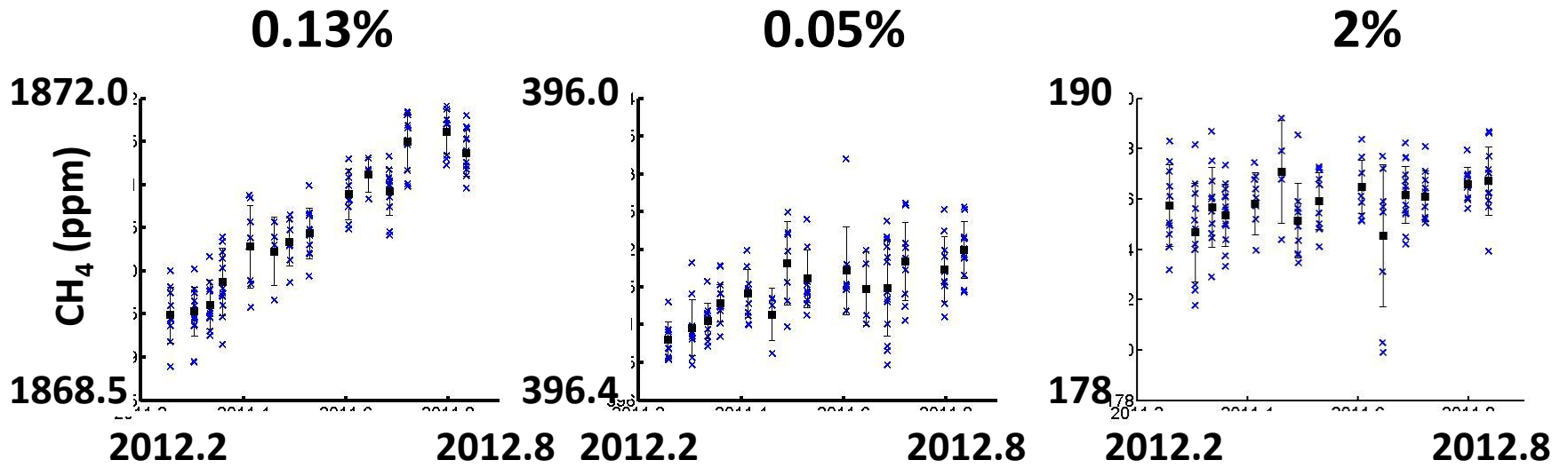
*Thanks to Duane Kitzis, Pat Lang, Paul Novelli, E. Dlugoceny for tanks and flask analysis.

*Thanks to Jason Manthey for on-site operation.





Simple system for measuring CO₂



CARVE aircraft 2012

