

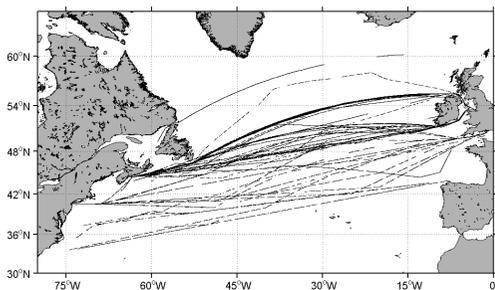
Eddy-Kovarianz-Messungen an Bord von Handelsschiffen

Tobias Steinhoff, Alex Zavarsky, Melf Paulsen, Arne Körtzinger und Christa Marandino



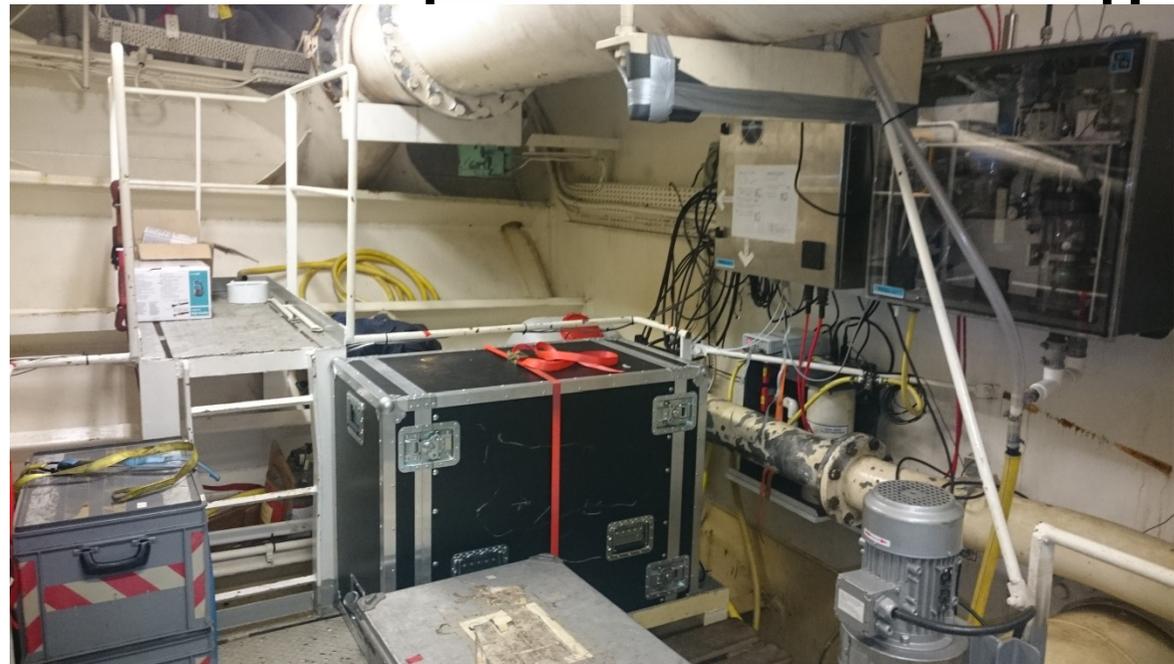
Helmholtz-Zentrum für Ozeanforschung Kiel

VOS Linie im subpolaren Nordatlantik



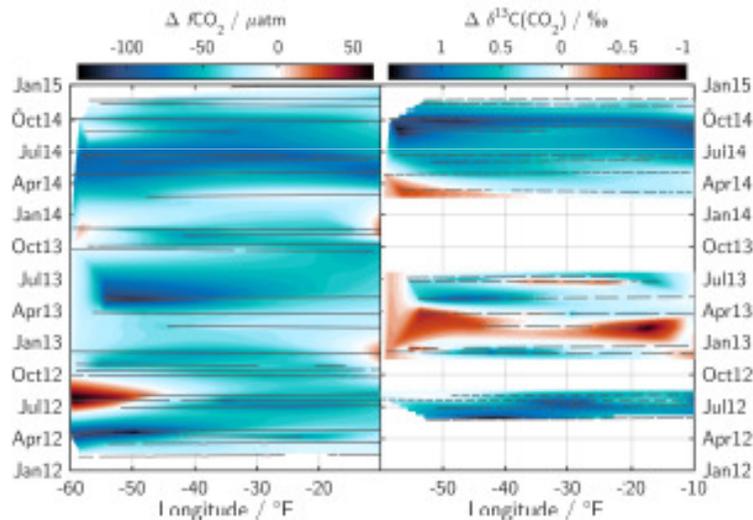
- 2002-2005: M/V Falstaff, Wallenius Lines (CAVASSOO/CARBOOCEAN)
- Seit 2006: MV Atlantic Companion, Atlantic Container Lines (CARBOCHANGE/CARBOOCEAN/ICOS)
- Underway Messungen von $p\text{CO}_2$ (Ozean und Atmosphäre), SST, SSS, (Sauerstoff); >400,000 Datenpunkte
- Diskrete Probennahme von DIC, Alkalinität, Nährstoffe, organischer Kohlenstoff

CRDS based CO₂ detection

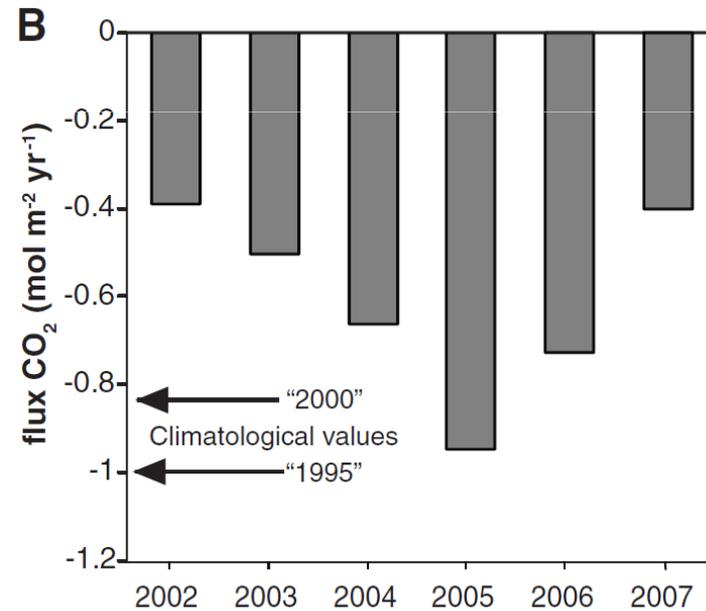
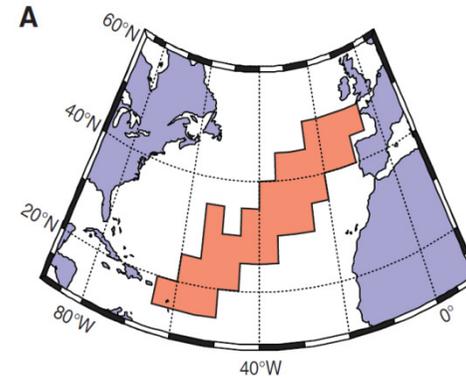


CO₂ Fluss im Nordatlantik

- CO₂ Fluss = $f(\Delta p\text{CO}_2, k, \text{wind})$
- High interannual and seasonal variability

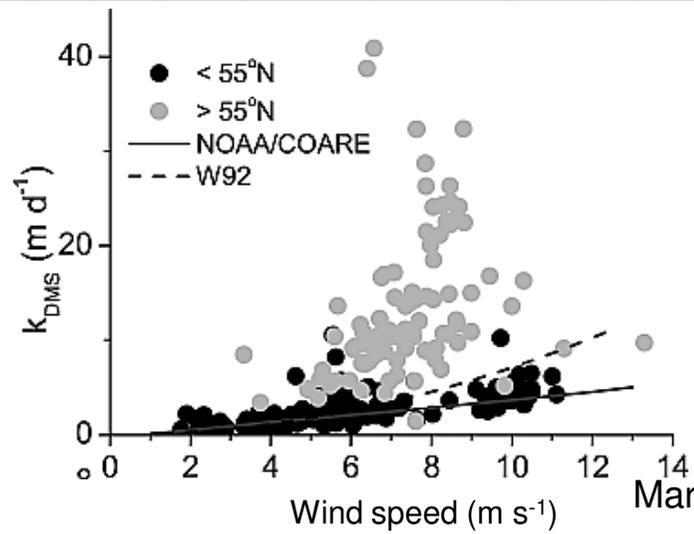
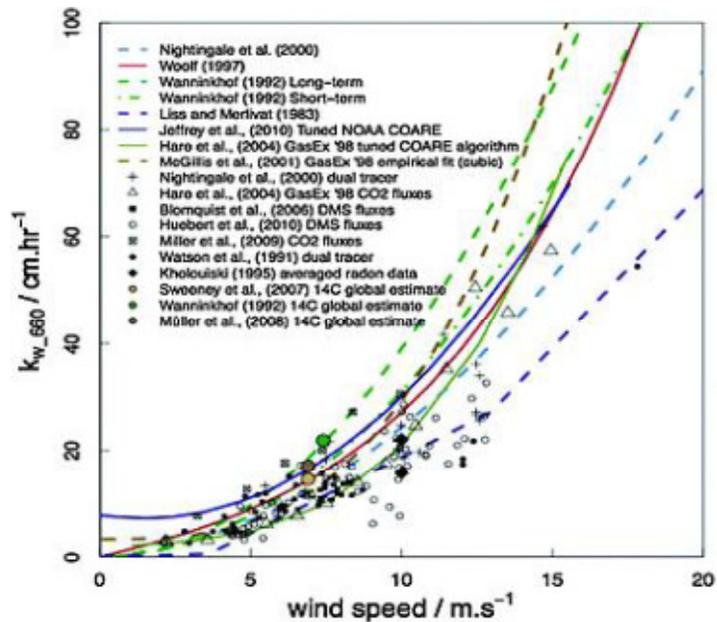


Becker, Dissertation, 2016



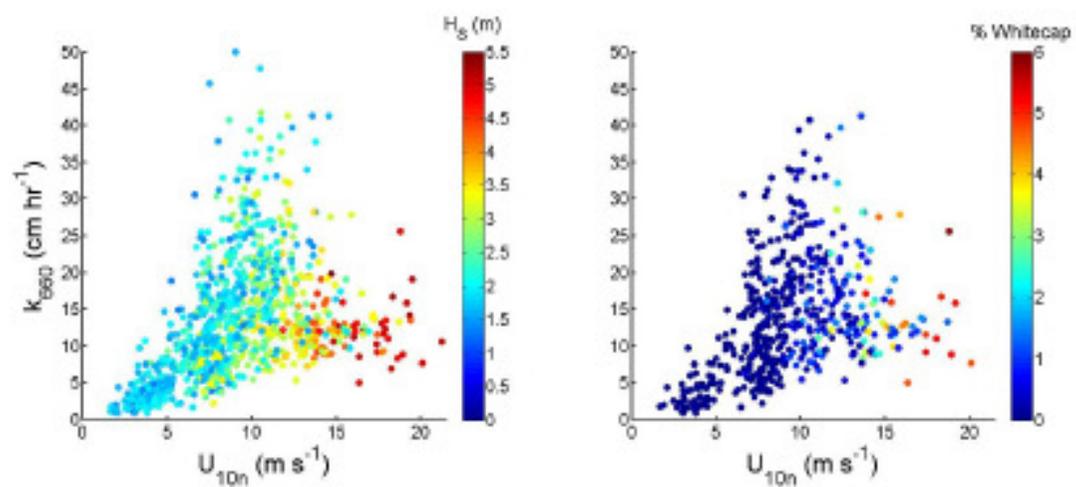
Watson et al., Science, 2009

Was treibt den Austausch von Gasen?



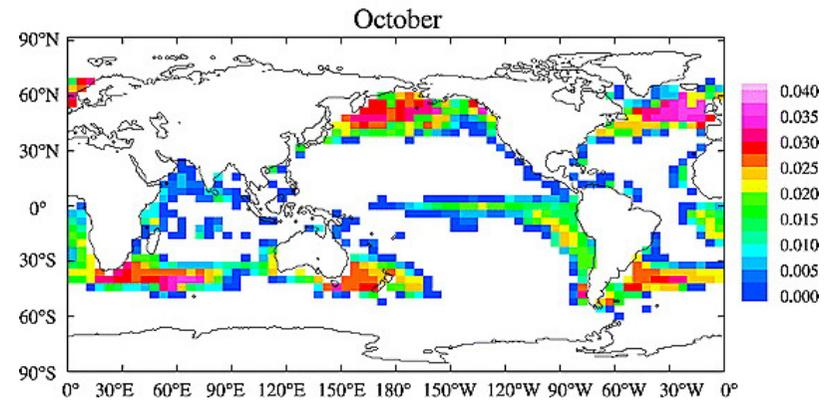
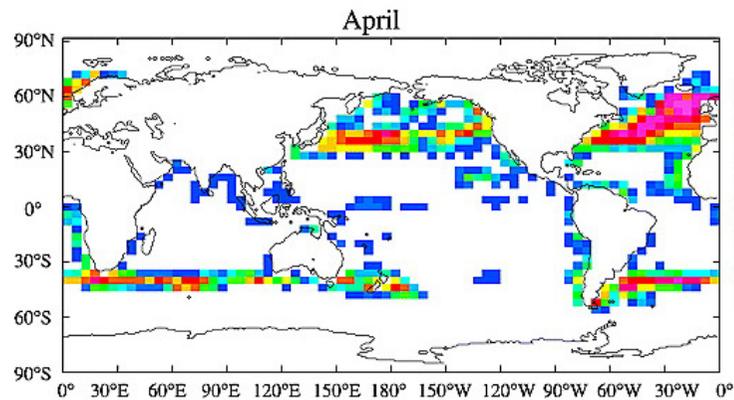
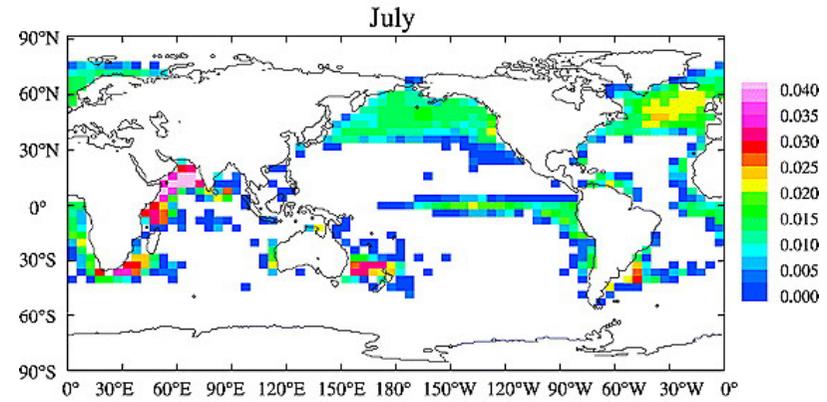
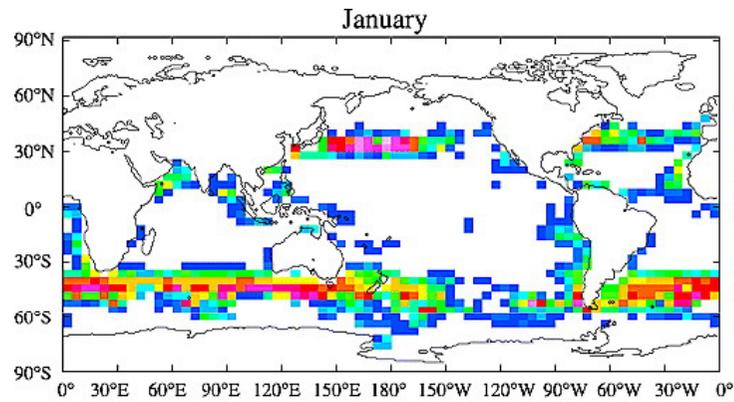
Marandino et al., 2008

$$\text{Flux} = k * \Delta C$$



Bell et al., 2013

Reduzierung des CO₂-Flusses: sog. Dampening factor

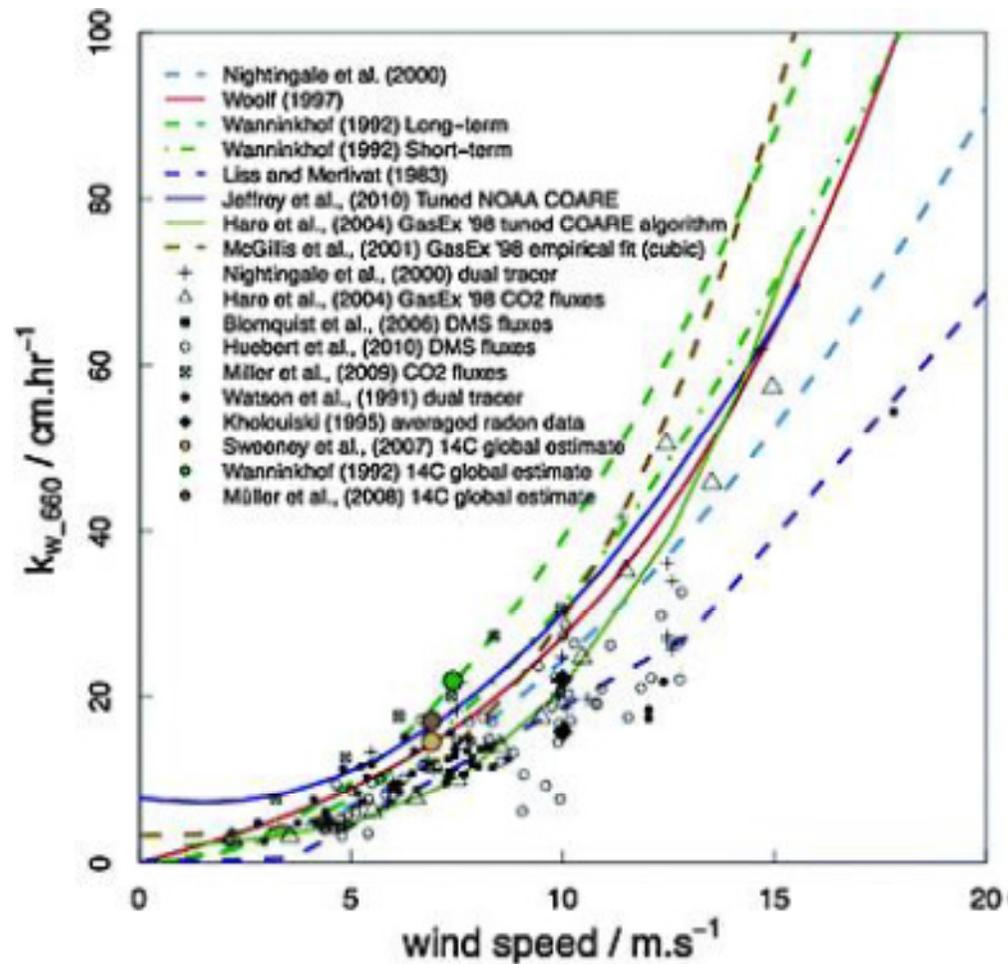


Tsai und Liu, 2003

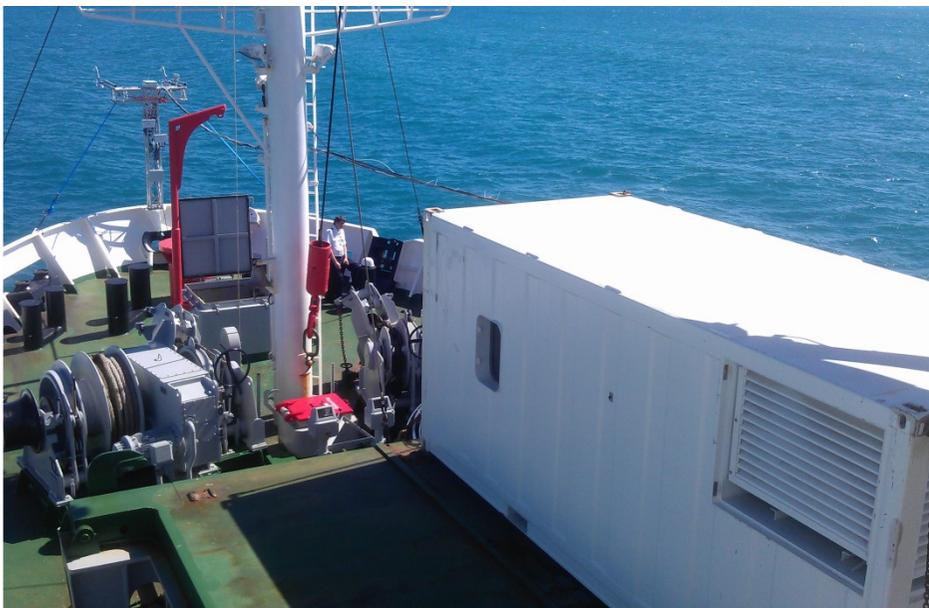
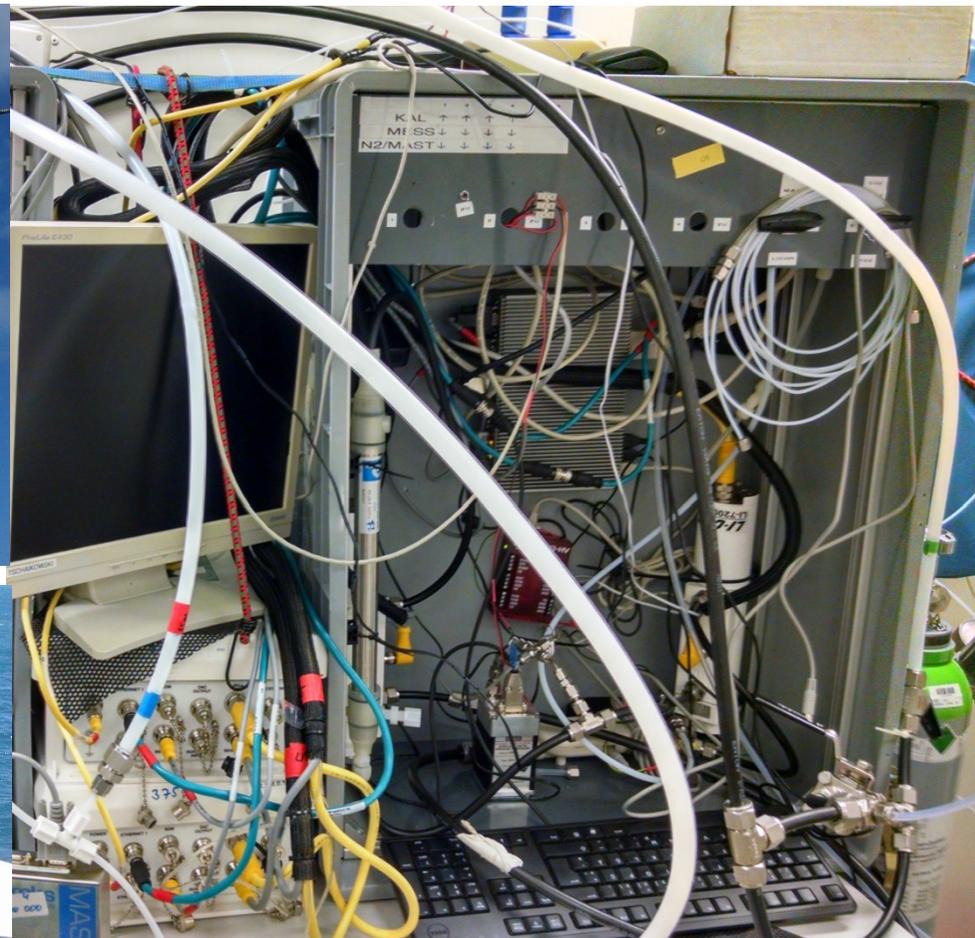
Austauschfluss: Bulk vs. Direkt

$$\text{Flux}_{\text{bulk}} = k * \Delta C$$

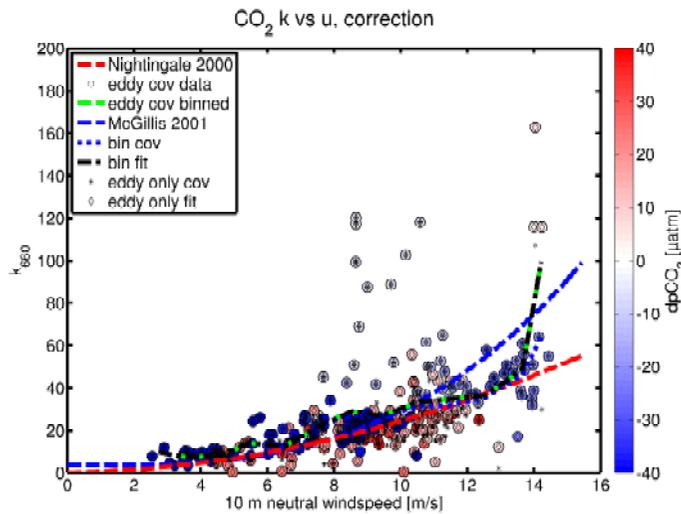
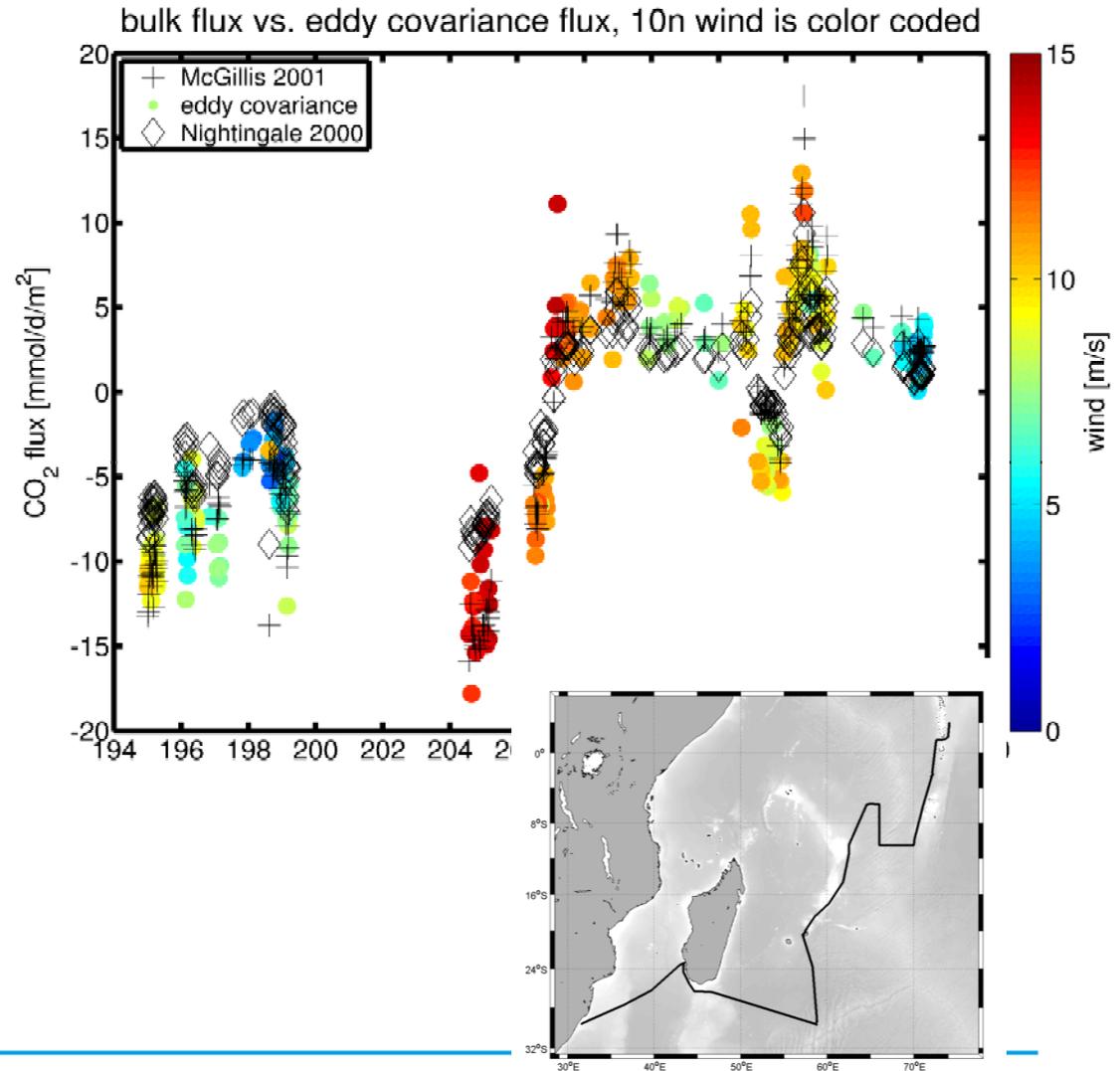
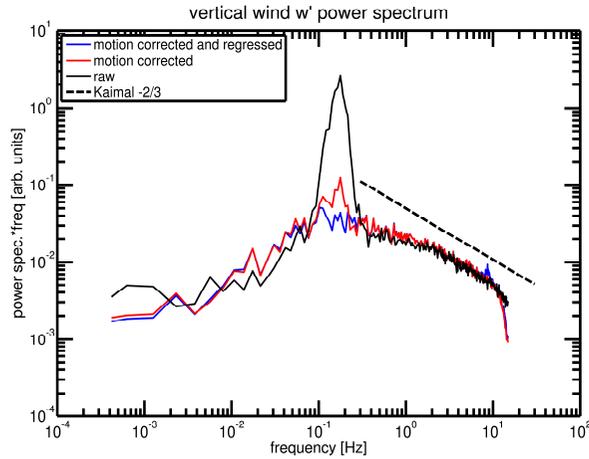
$$\text{Flux}_{\text{EC}} = \overline{w'c'}$$



EC auf dem Schiff



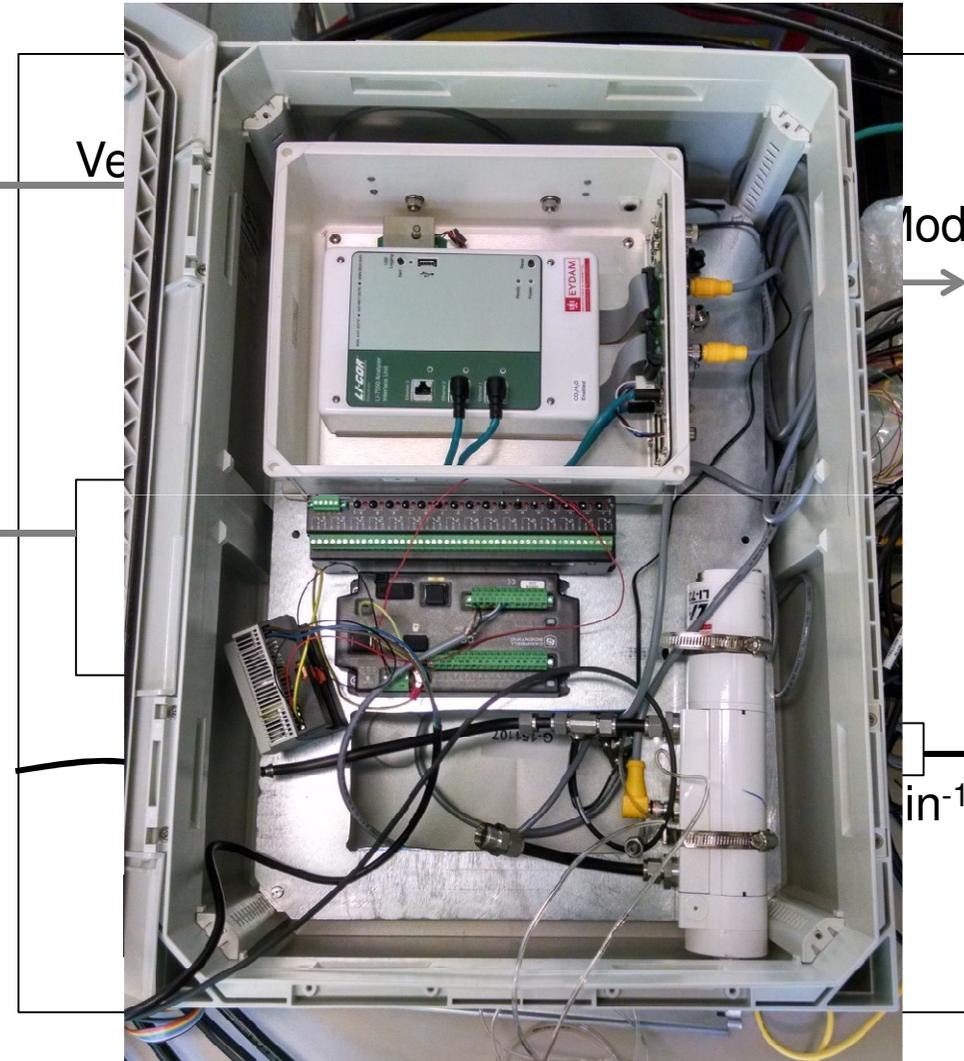
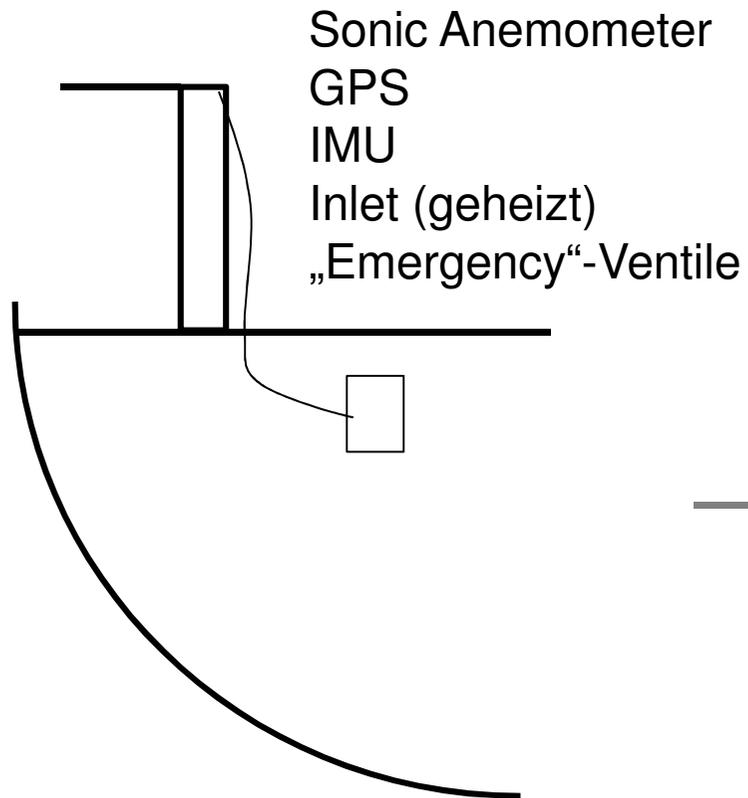
EC auf dem Schiff



EC auf dem VOS



EC auf dem VOS



EC auf dem VOS

