

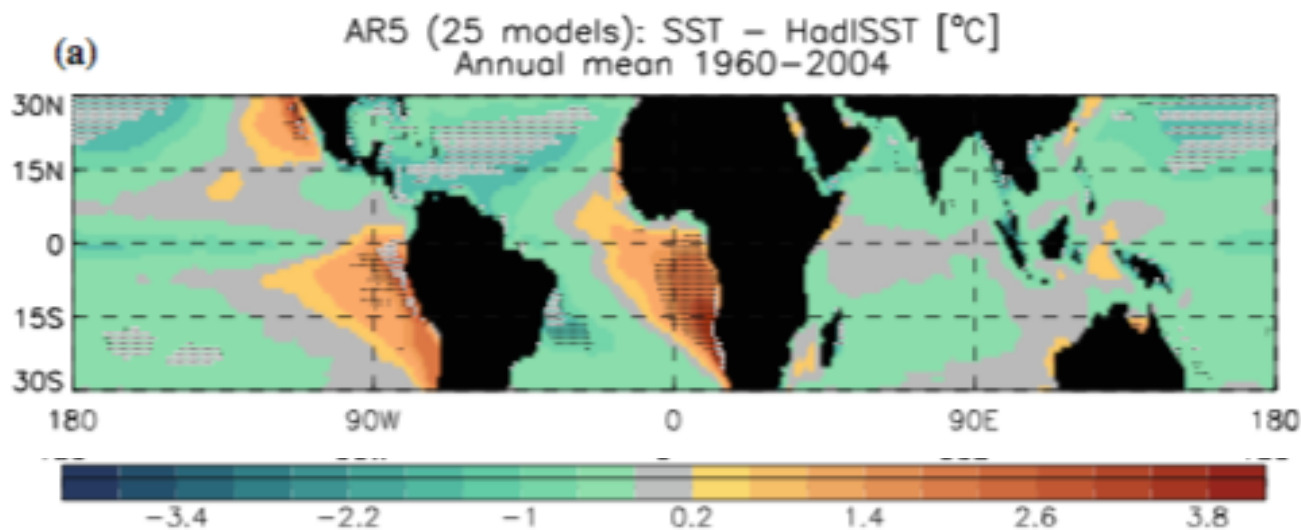
Team Ocean's Stories from the Sea

M120 Research Cruise: Recife to Walvis Bay

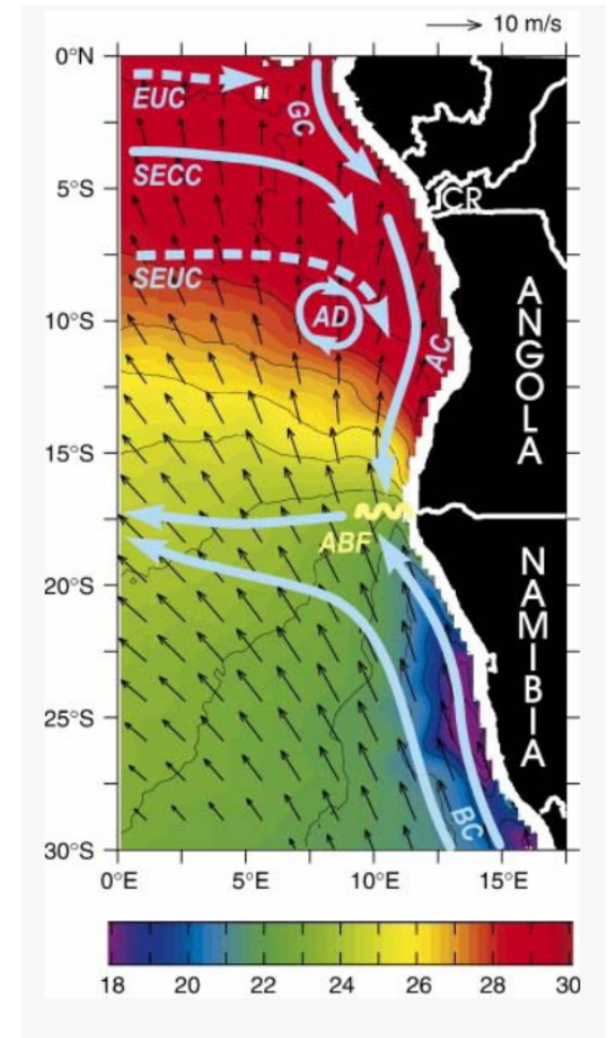


Research Area & Motivation

- Global climate is sensitive to tropical SST
- Physical mechanisms controlling SST variability are poorly understood
- Key are of uncertainty in future climate predictions
- Coastal countries in SW Africa depend heavily on marine ecosystem



Toniazzo & Woolnough 2013



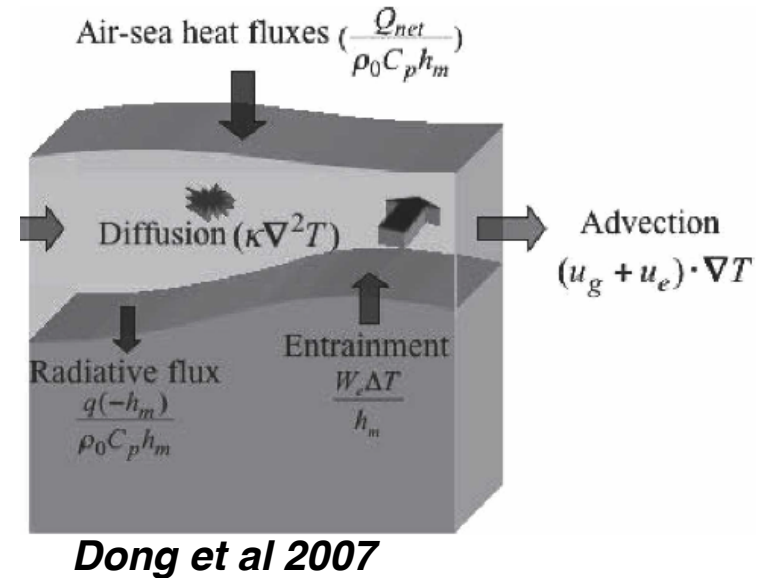
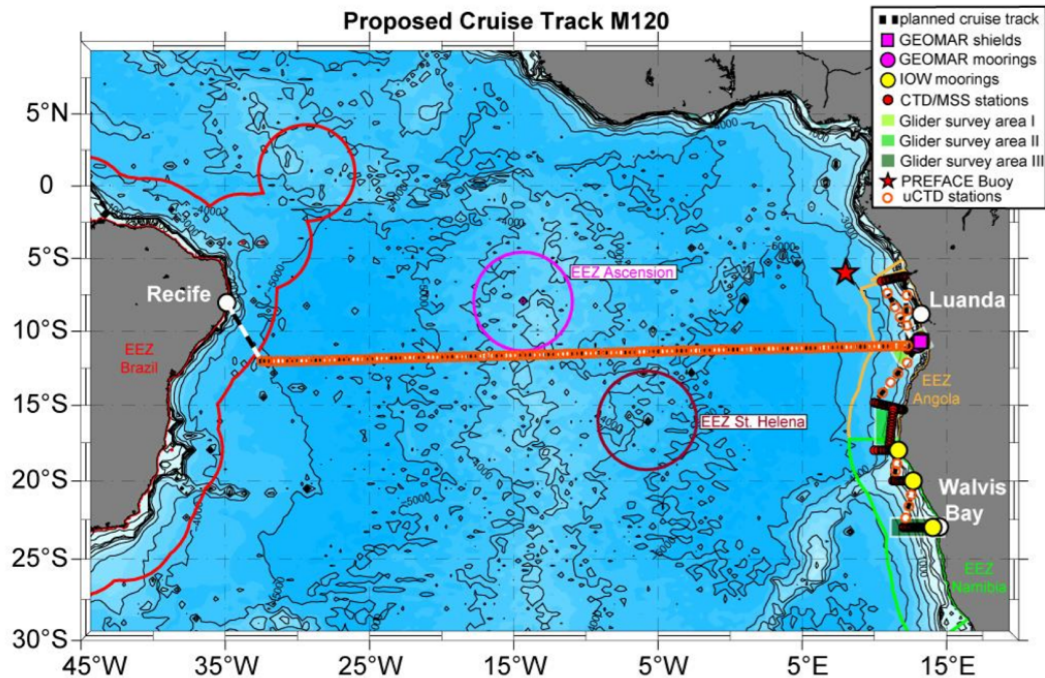
*SouthWestern African coastal upwelling region in late austral summer with SST (contours) and wind (vectors) (**Rouault 2007**)*

Suggested Sources of Tropical Atlantic SST bias

- Missing **land surface processes** (e.g albedo & soil moisture, leading to errors in terrestrial precipitation)
(*Richter et al. 2012*)
- Equatorial **wind biases (originating in the atmospheric model)**
(*Chang 2007, Richter & Xie 2008, Wahl et al. 2009*)
- Errors in the **surface freshwater** budget (e.g due to excess runoff, leading to barrier layer formation)
(*Breugem et al. 2008*)
- Missing **cloud physics** (leading to excessive surface shortwave radiation)
(*Huang et al. 2007, Wahl et al. 2008, Hu et al. 2010, Tozuka et al. 2012*)
- Misrepresentation of **ocean dynamics** (e.g boundary current structure and separation)
(*Large & Danabasoglu 2006*)
- Missing (or misrepresentation of) **ocean vertical mixing** (e.g Equatorial deep jets, NIWs)
(*Hazeleger & Haarsma 2005, Brandt et al. 2011, Jochum et al. 2013*)

Research Aims of M120

1. Evaluation of variability of eastern boundary wave and advective pathways and water mass properties
 2. Quantification of physical processes controlling mixed layer heat and freshwater budgets
- > underway measurement of upper ocean T & S, 7 CTD/MSS transects, mooring work, glider/float release



SACUS: Southwest African Coastal Upwelling System and Benguela Niños

PREFACE: Enhancing Prediction of Tropical Atlantic Climate and its Impacts

M120 Organization

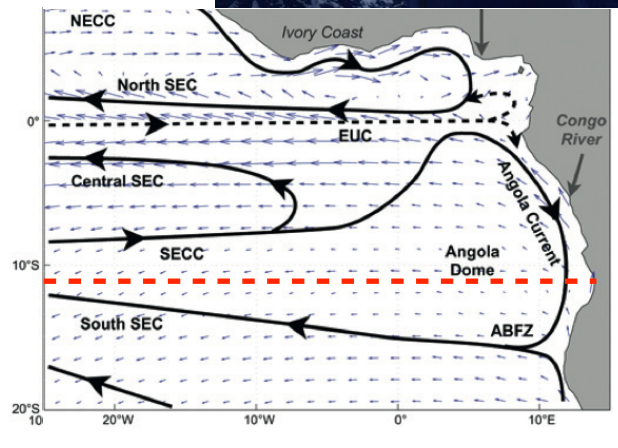
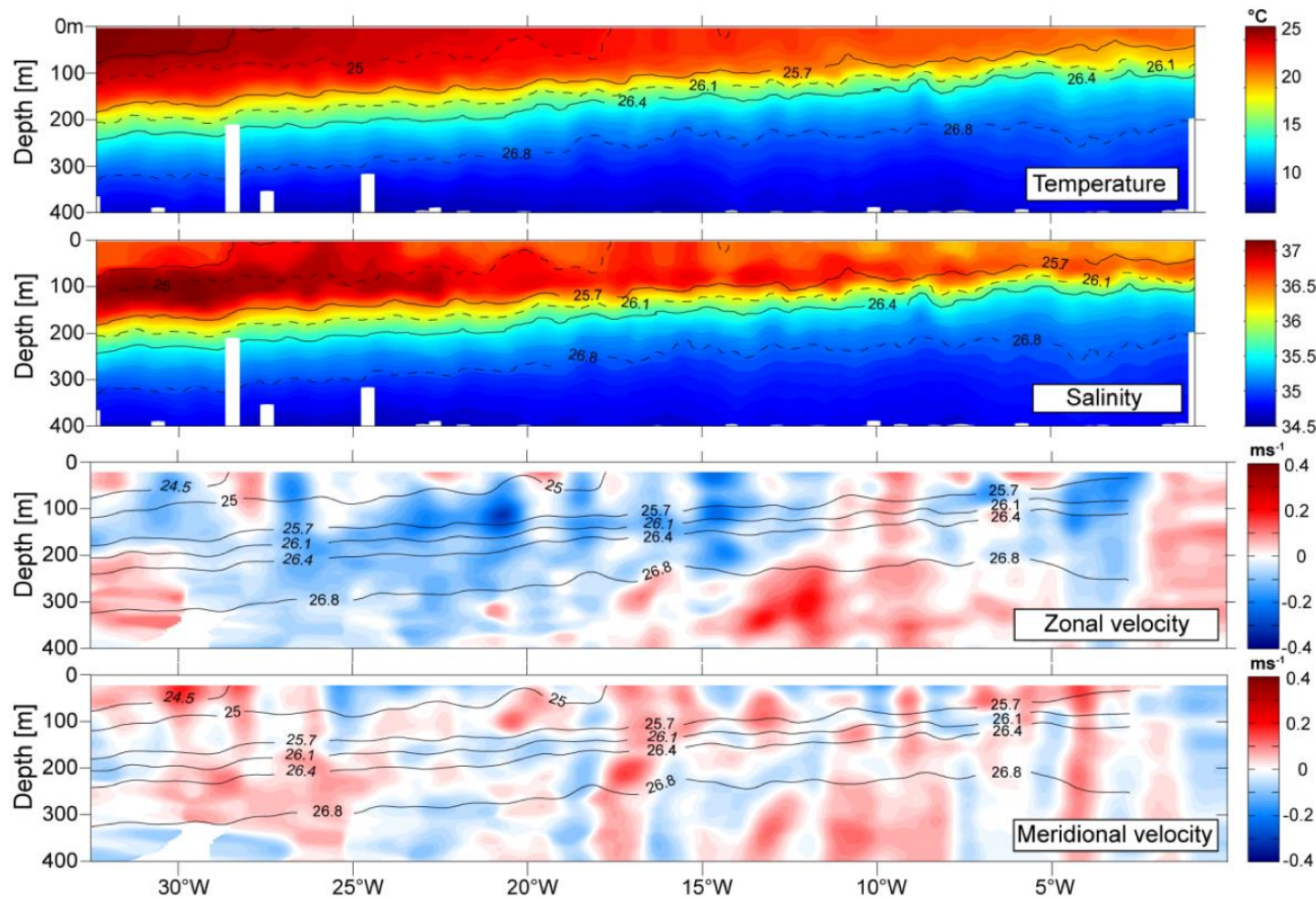
- 22 scientists
- Participating Institutions: GEOMAR, Leibniz Institute, MPI (Germany)
NBI (Denmark)
IMR (Norway)
National Institute of Fisheries (Angola)



RV Meteor facts

length = 98 m
capacity = 33 crew + 28 scientists
cruising speed = 11.5 knots
endurance = 50 days
areas = Atlantic, east Pacific, west Indian Ocean, Mediterranean, Baltic

Day 1-11: Cross Basin Transect at 12S



Underway Measurements

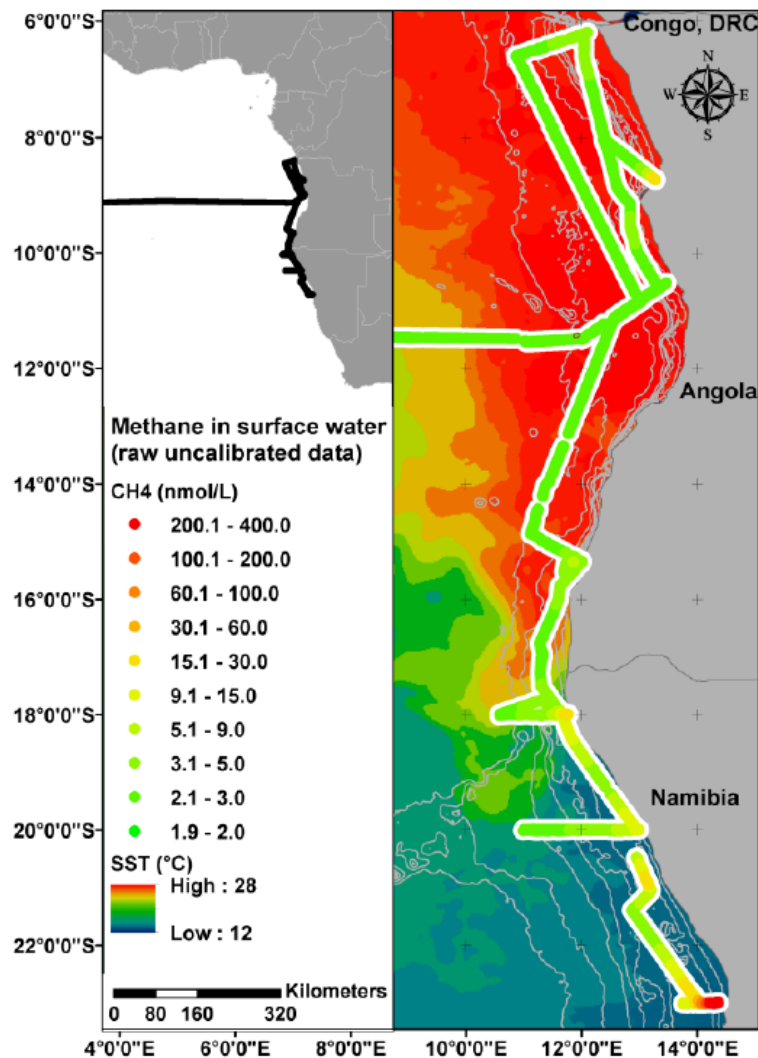
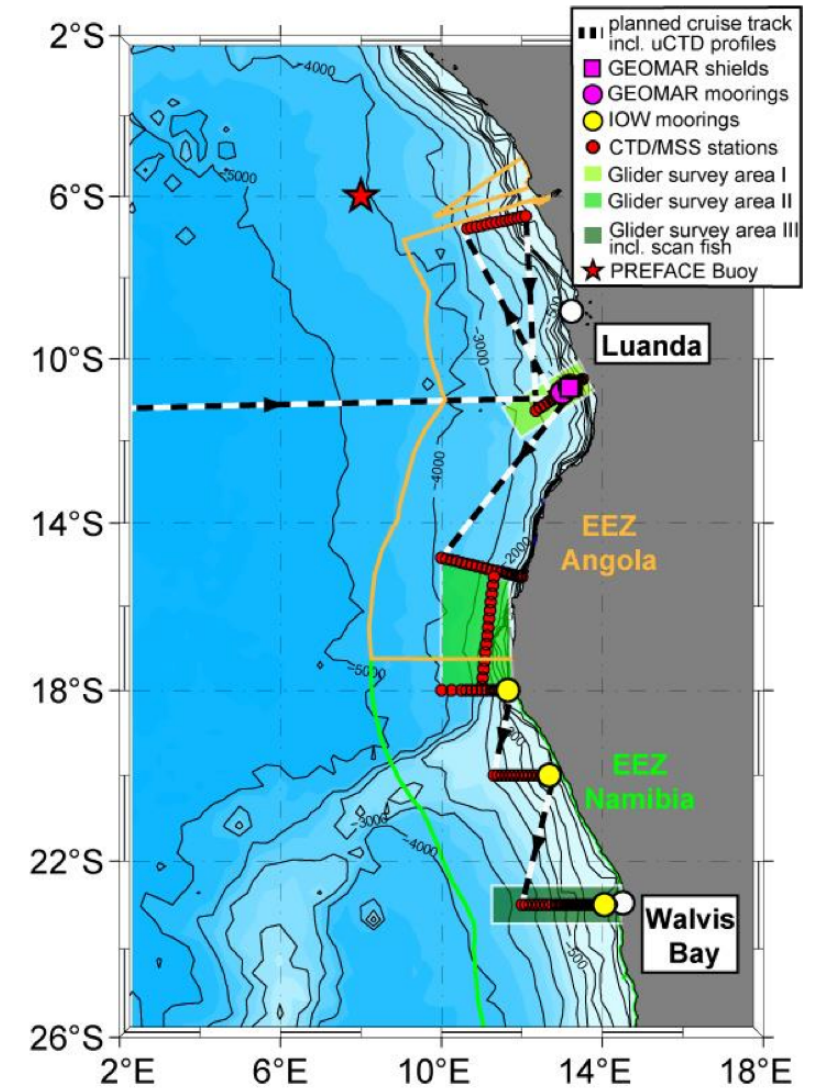
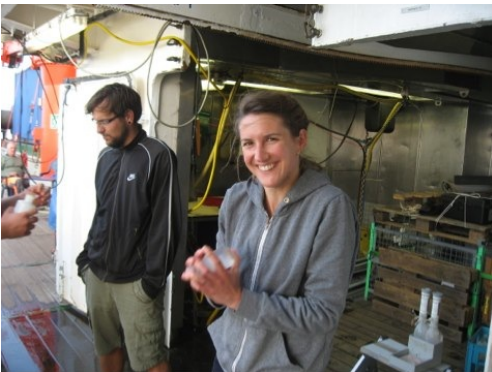


Fig. 2: Near-surface concentrations of methane (circles) measured during M120 and sea surface temperatures from satellite retrievals (contours).



Day 12-33: Coastal Profiling and Mooring Work



Turbulence Profiling

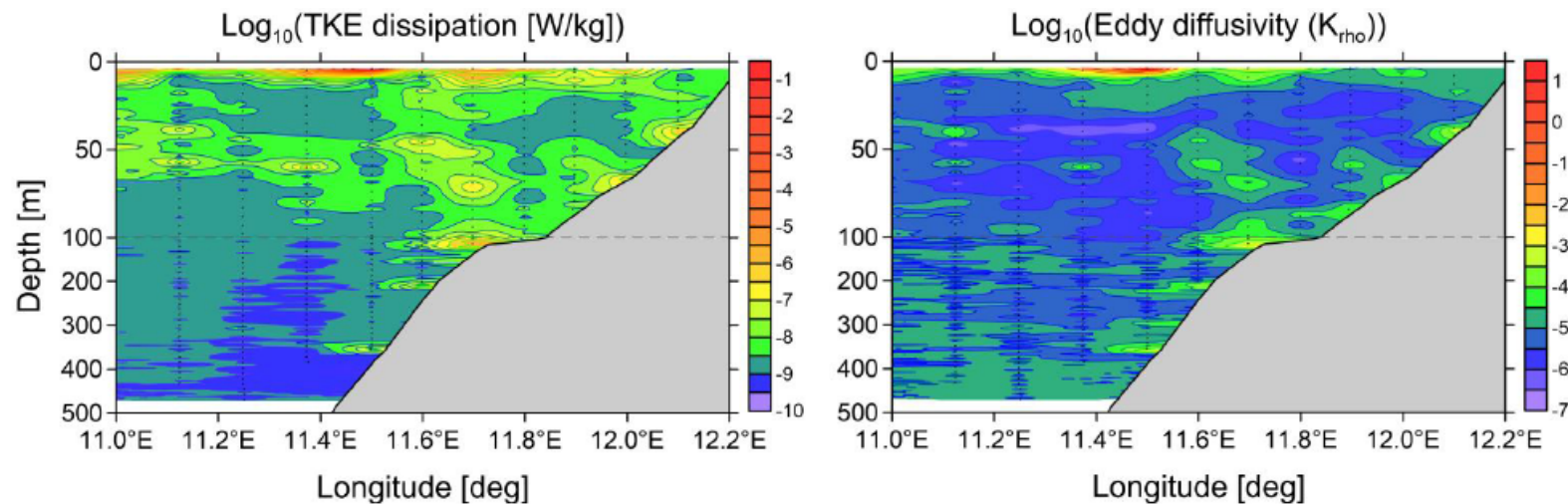
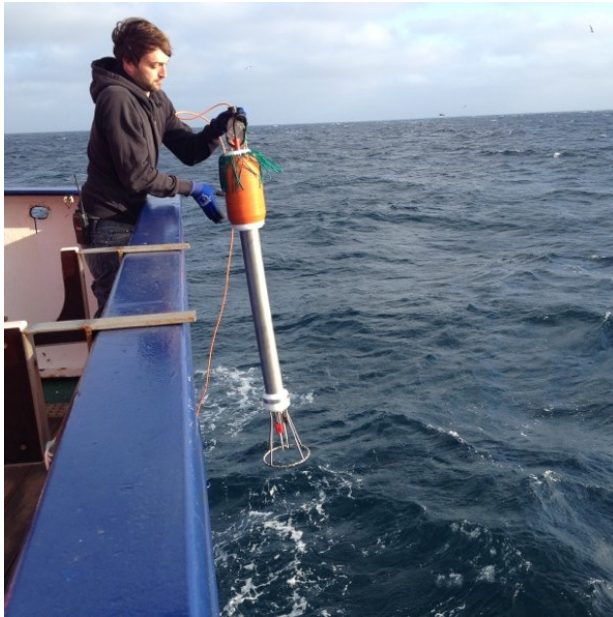


Fig. 2.: Dissipation rate of turbulent kinetic energy (left panel) and turbulent eddy diffusivities (in m^2s^{-1} , right panel) along the 6°S section. Elevated turbulence is found near the sea surface and near the ocean floor.

Mooring Recovery and Redeployment

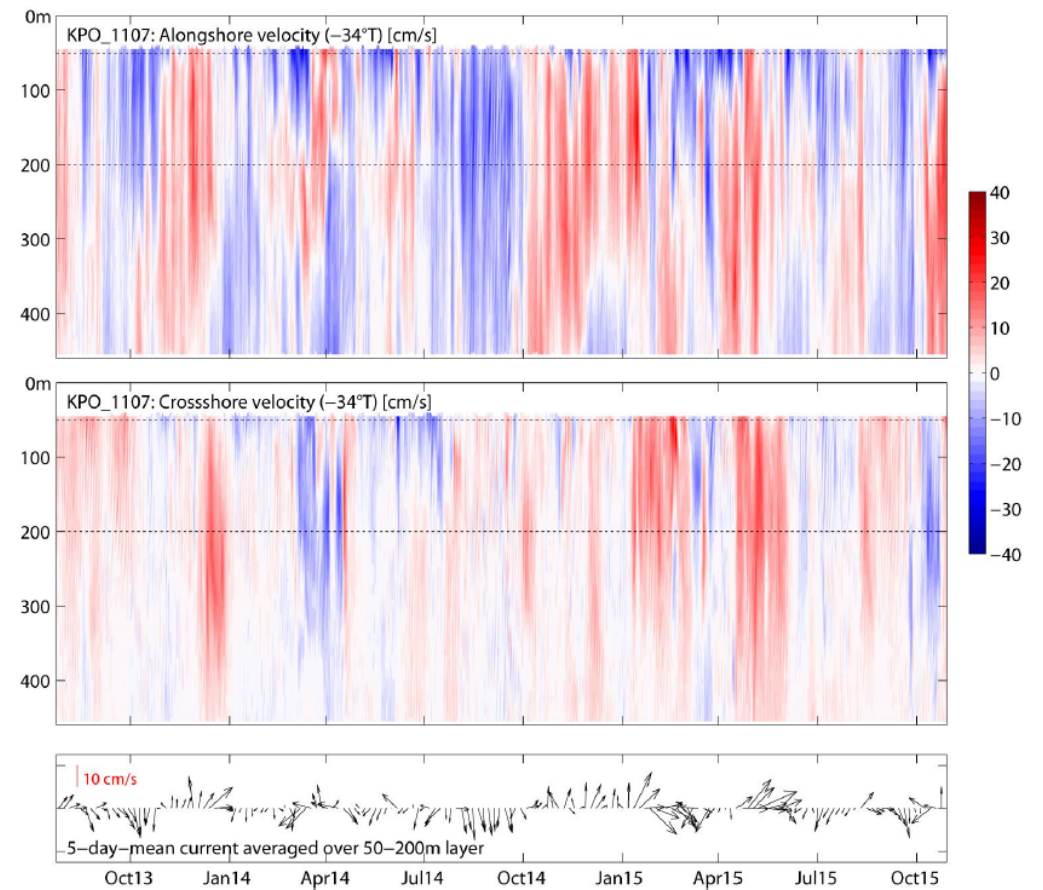
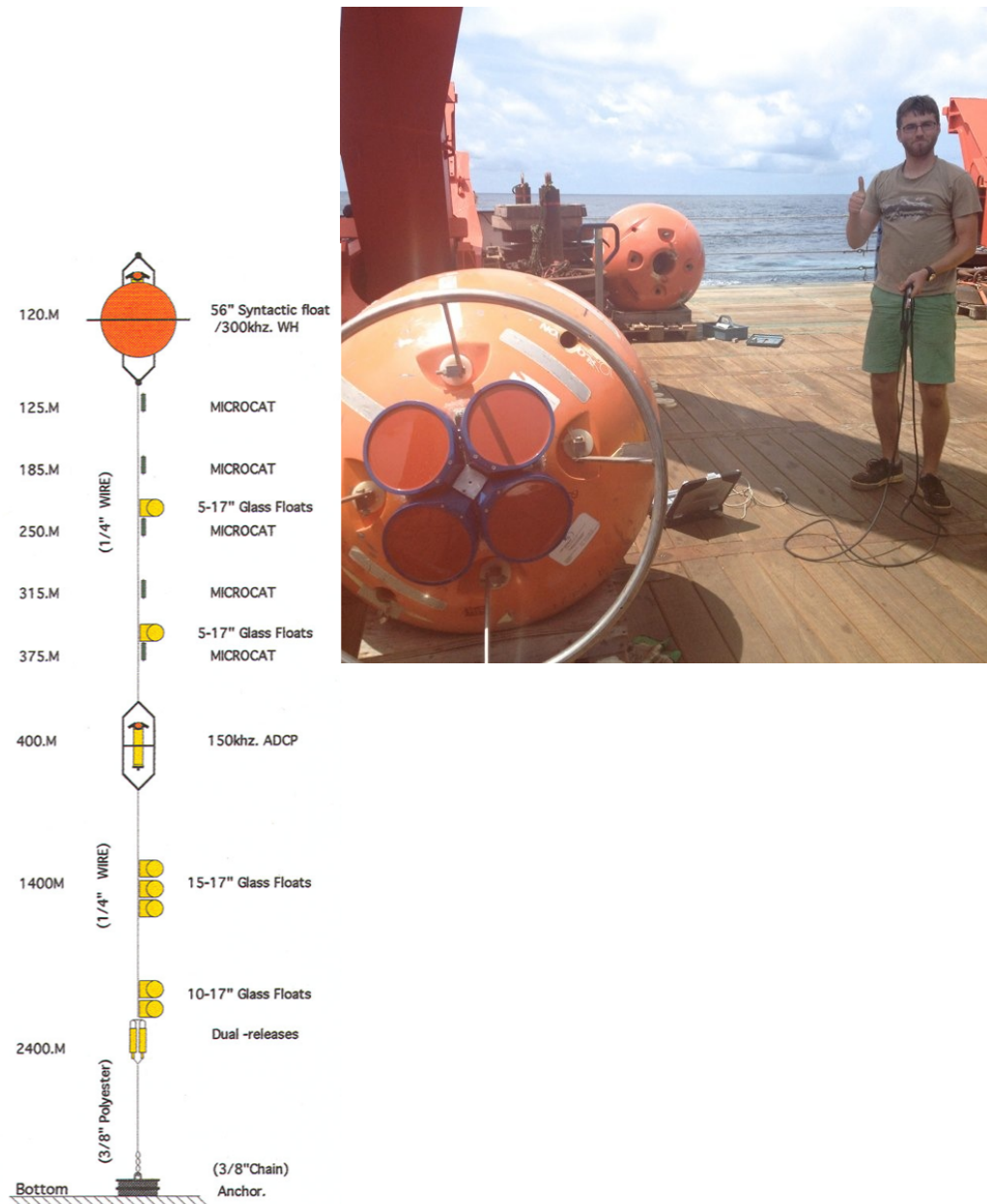


Fig. 2: Time series of the flow parallel to the continental slope (upper panel), across the continental slope (middle panel) and horizontal velocity vectors at 11°S . The time series was recorded by acoustic Doppler current profiler mounted to the mooring deployed at 1200m depth at 13°E (see Fig. 3 for mooring position)

Bottom Shield Recovery and Redeployment

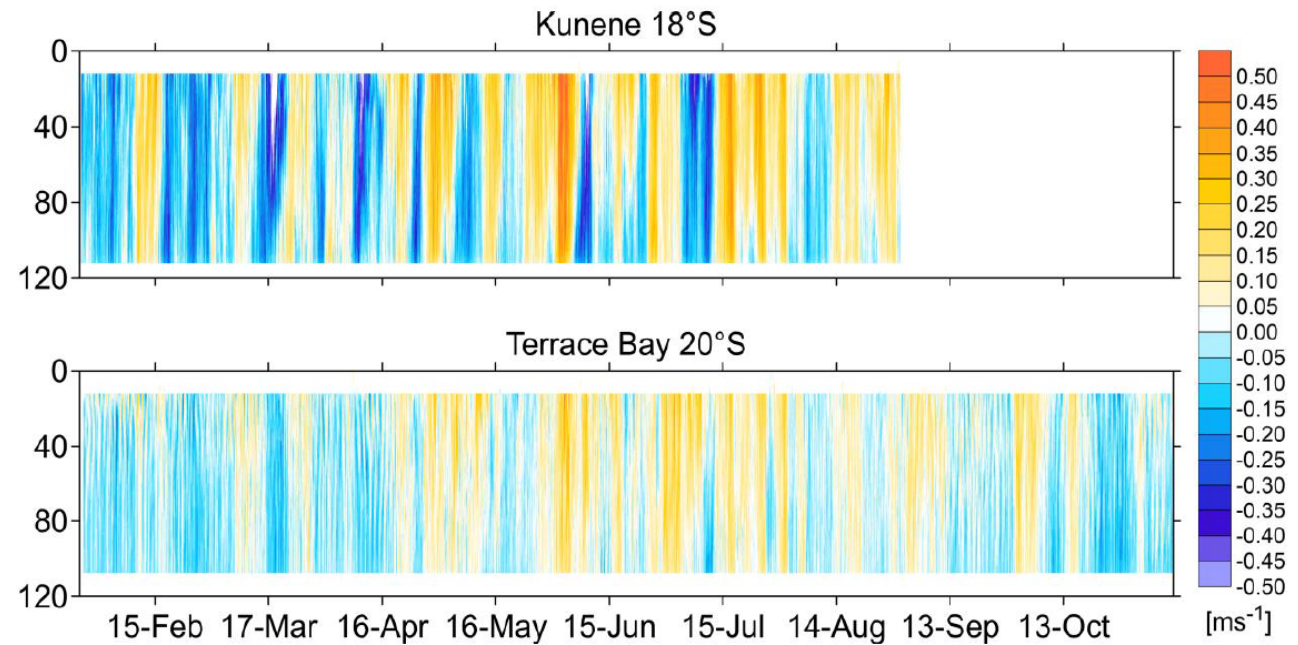
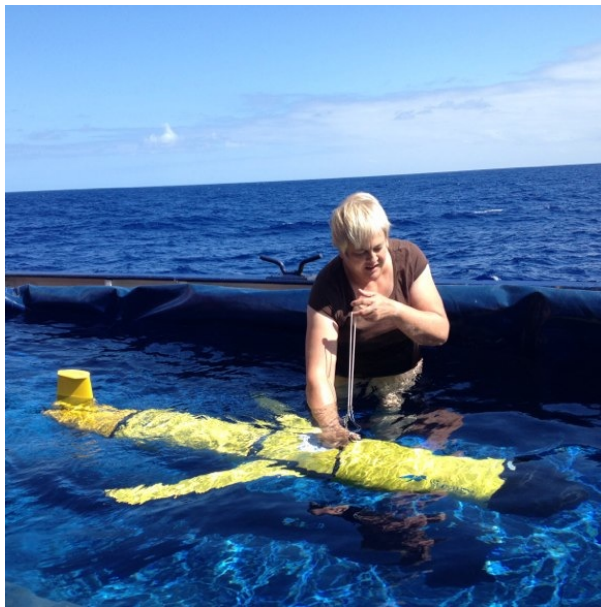
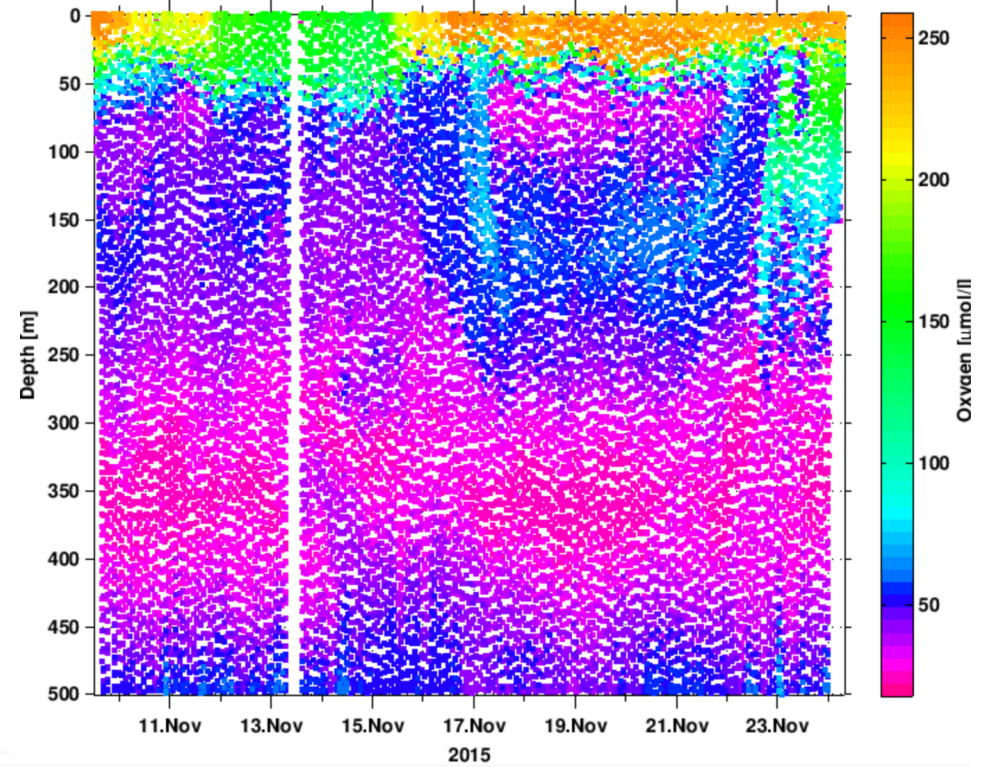
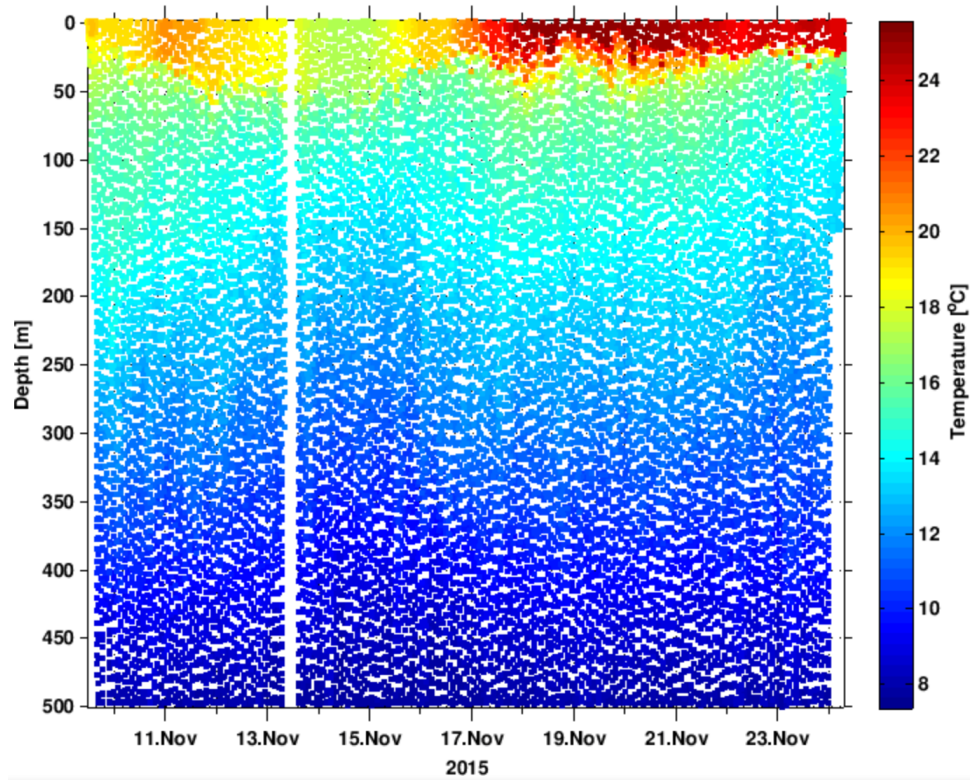


Fig. 1: Time series of alongshore flow on the shelf at 18°N and 20°N from end of January to November 2015. Both time series we collected by acoustic Doppler current profilers mounted in bottom shields and deployed at 125m depth.



Autonomous Measuring Platforms



Life onboard RV Meteor



Thanks for Listening!

