

# QuantAS-Nat

## *Project description*

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# QuantAS-Nat Project

- Acronym: **QuantAS-Nat** (**Quant**ification of water mass transformation processes in the **Arkona S**ea) – **Nat**ural Processes.
- Aim: Quantification of mixing of ambient low density water into dense bottom water entering the Arkona Sea over Drogden Sill and Darss Sill. Special focus: medium strength inflow events.
- Status: Dec. 2003: submission; Sep. 2004: rejected; Oct. 2004: resubmission.
- Requested funds: 150.000 Euro
- Involved scientists: Hans Burchard, Hans Ulrich Lass, Volker Mohrholz, Frank Janssen, Lars Umlauf, Hannes Rennau.

# Relation to IOW research plan

- Major relation to Focal research area 1: Transport and transformation processes in the sea. There specifically: near-bottom transport and turbulence.
- Relation to other projects: (**QuantAS** – Impact of **Off**shore Wind Farms, 2004-2007, funding by German Federal Environment Ministry) investigates the physical impact of wind turbine foundations.
- Intensive use of IOW model environment:
  - GOTM (General Ocean Turbulence Model)
  - GETM (General Estuarine Transport Model)

# QuantAS Consortium

The international consortium **QuantAS** (**Quant**ification of water mass transformation processes in the **Arkona S**ea) has been built to discuss questions of natural and anthropogenic mixing in the Arkona Sea.



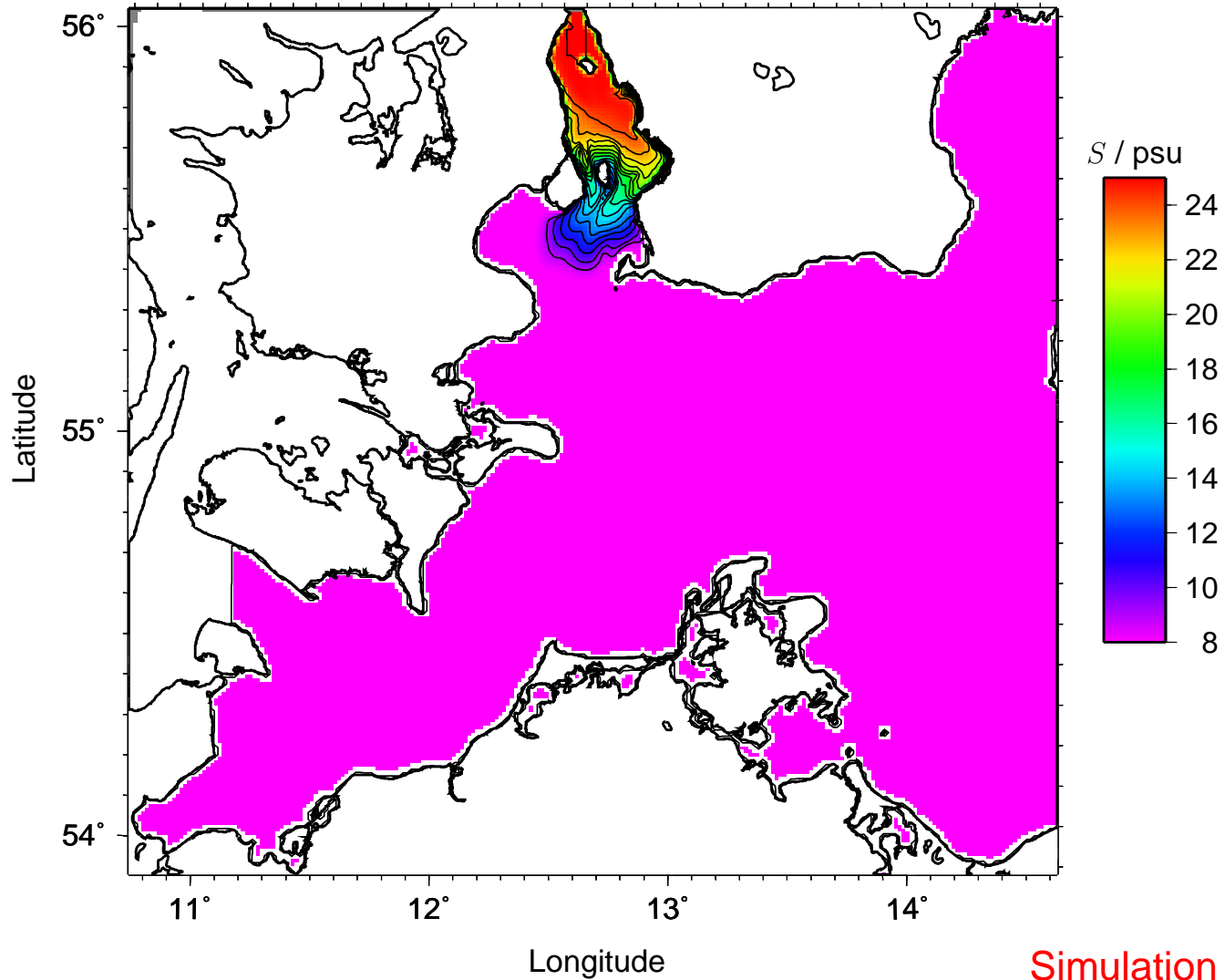


## General Estuarine Transport Model

- Three dimensional, hydrostatic, free surface, baroclinic
- Mode-splitting, Arakawa-C grid
- Horizontal coord.: Cartesian, spherical or orthogonal
- Vertical coord.: Sigma, z-levels or generalised
- Turbulence closures from GOTM (<http://www.gotm.net>)
- Various advection schemes for momentum and tracers
- Stable drying and flooding algorithm
- Fully parallelised (domain decomposition)
- Public Domain (<http://www.bolding-burchard.com/getm>)

# Idealised simulation

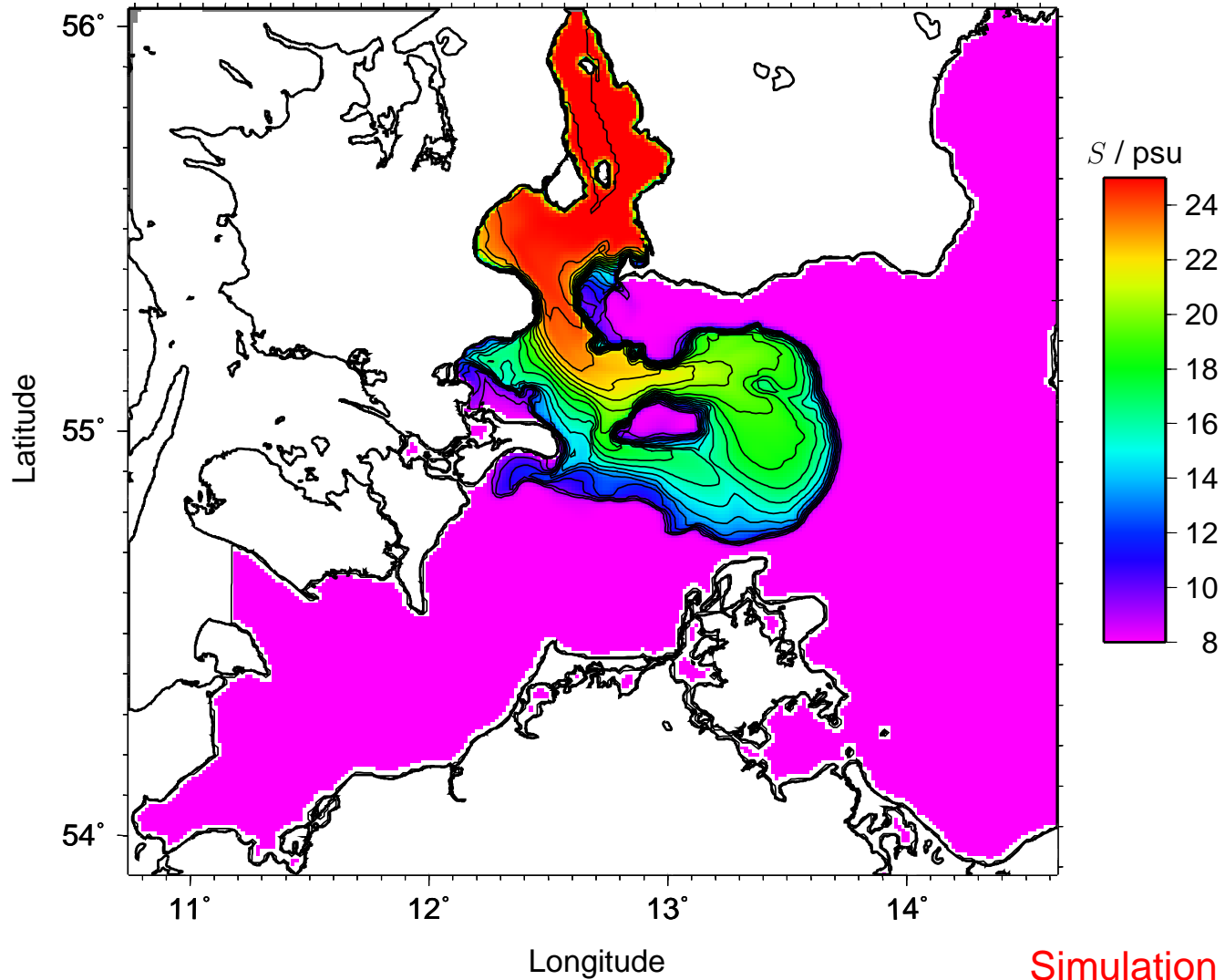
Bottom salinity after 5 days



Simulation with GETM

# Idealised simulation

Bottom salinity after 15 days

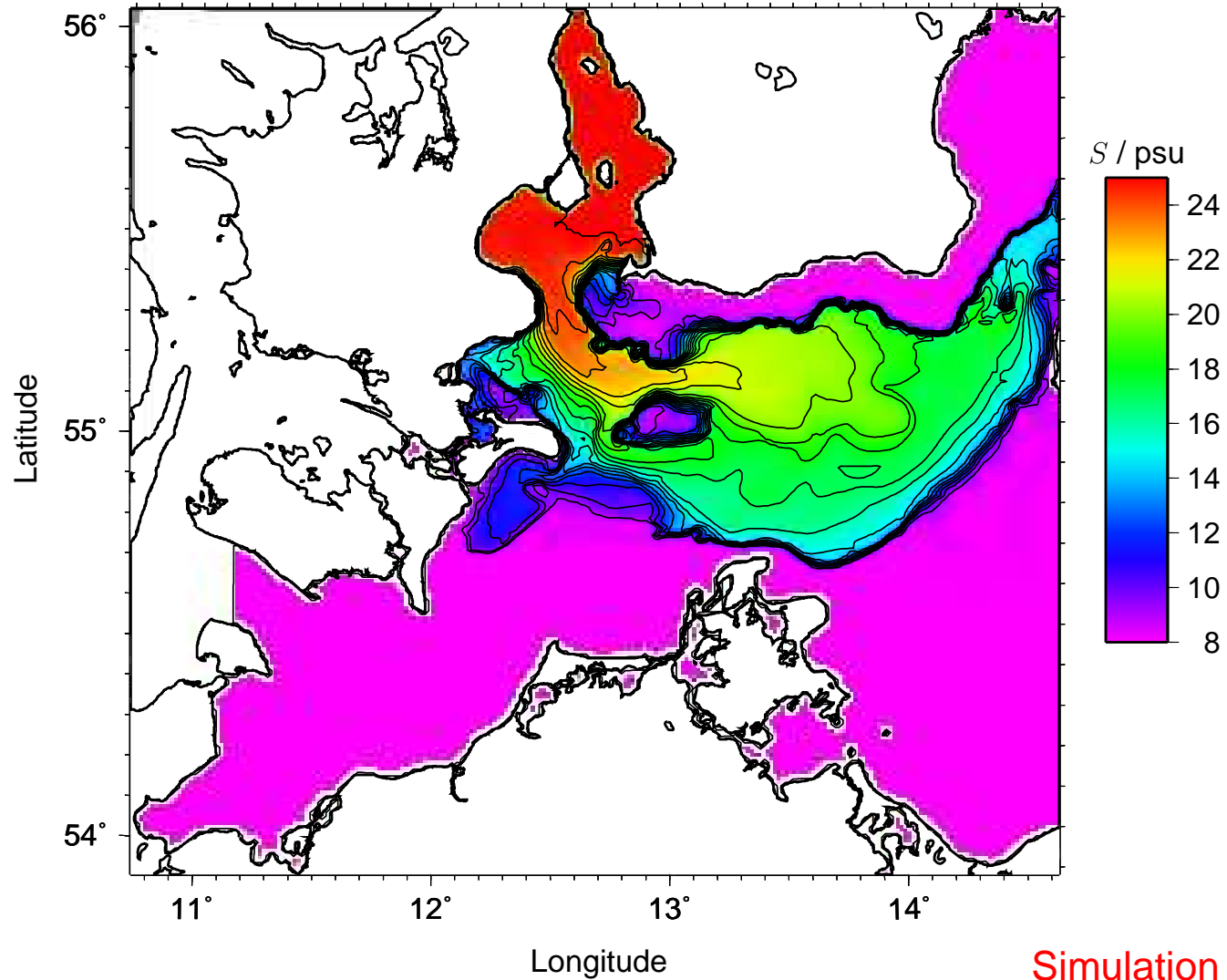


Simulation with GETM



# Idealised simulation

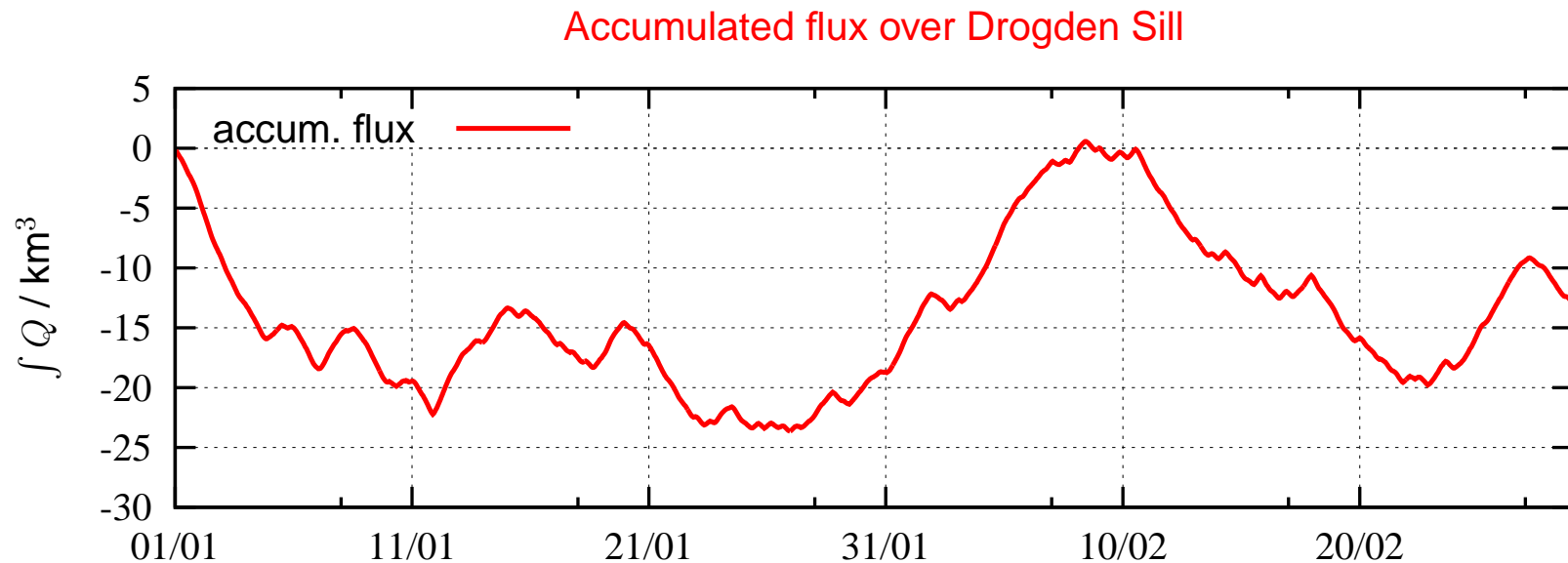
Bottom salinity after 30 days



Simulation with GETM

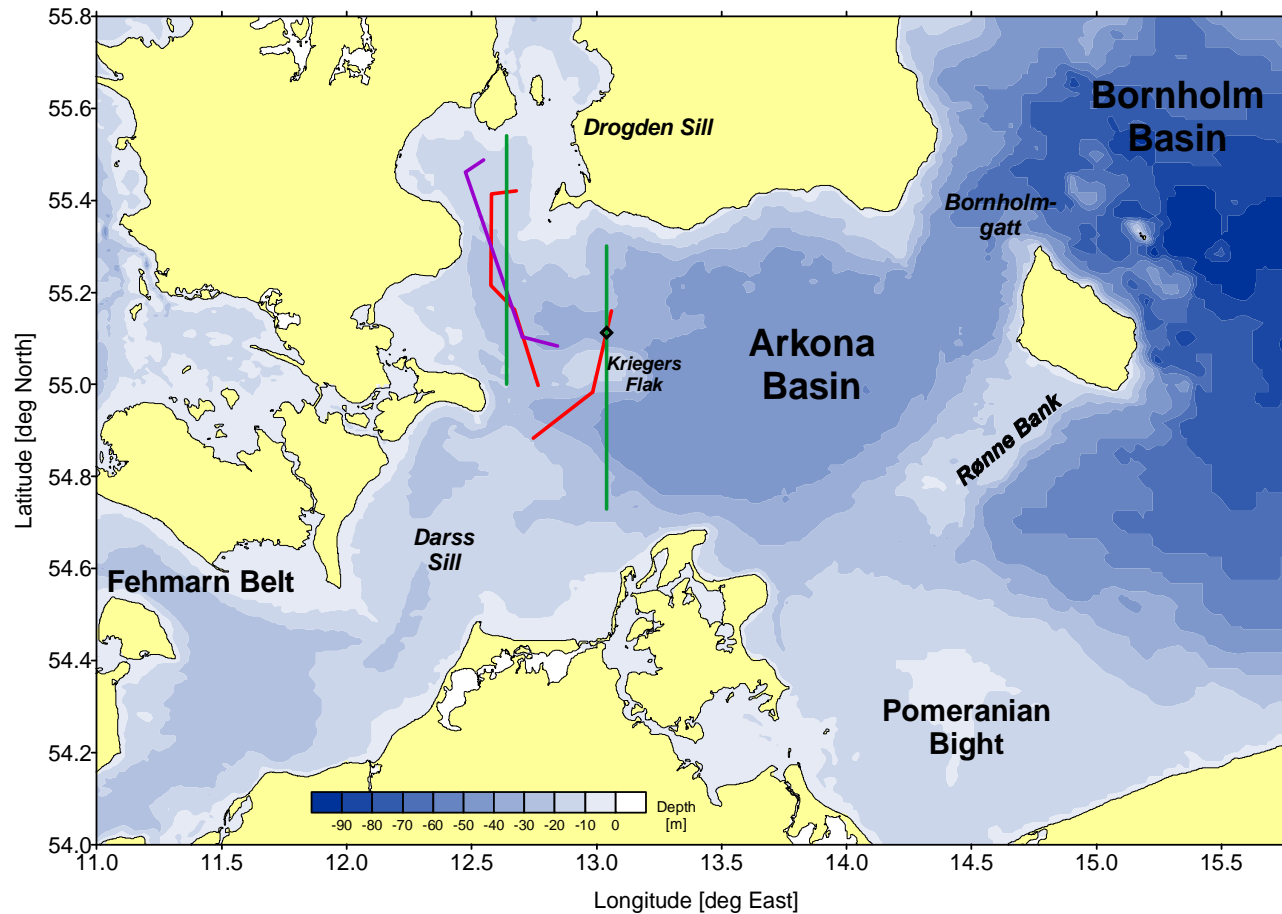
# FWG cruise

Water mass flux and current velocity during FWG cruise  
(Jan 26 to Feb 13, 2004):



# Arkona Sea map

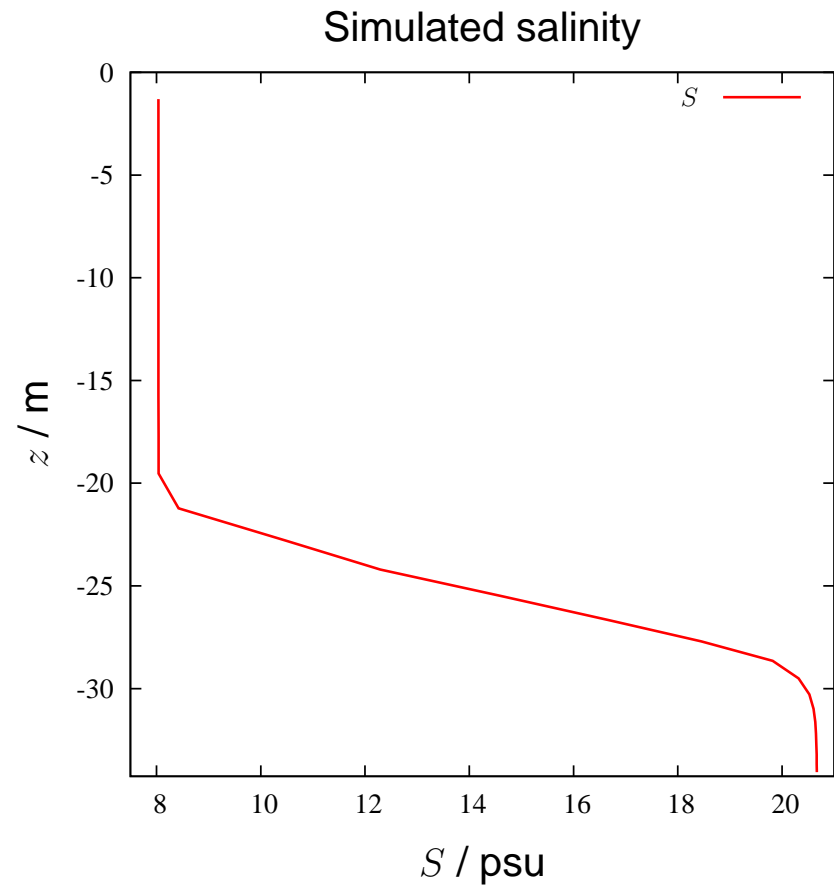
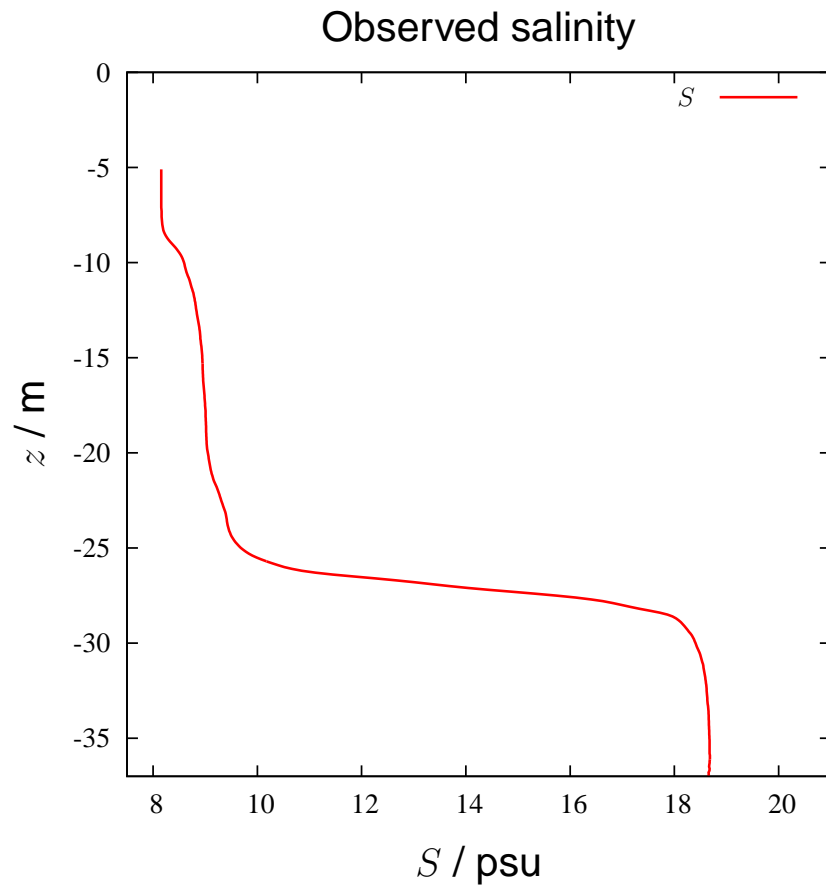
Map with observational sections and stations and model transects



Red & purple: ship tracks; green: model transects; diamond: station

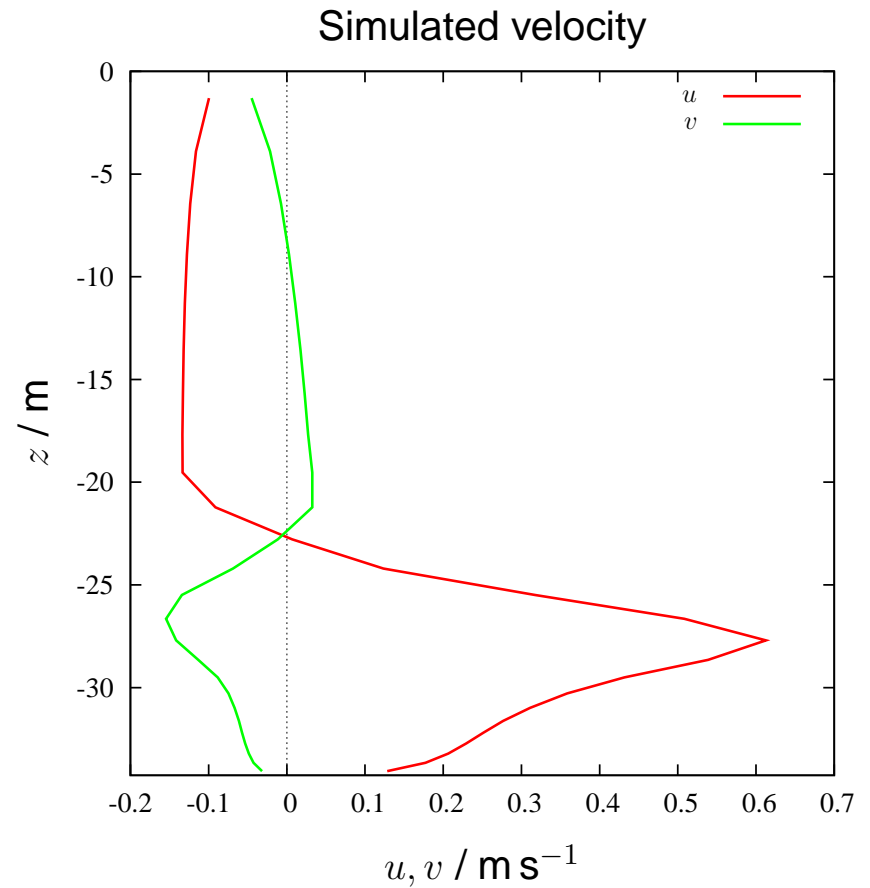
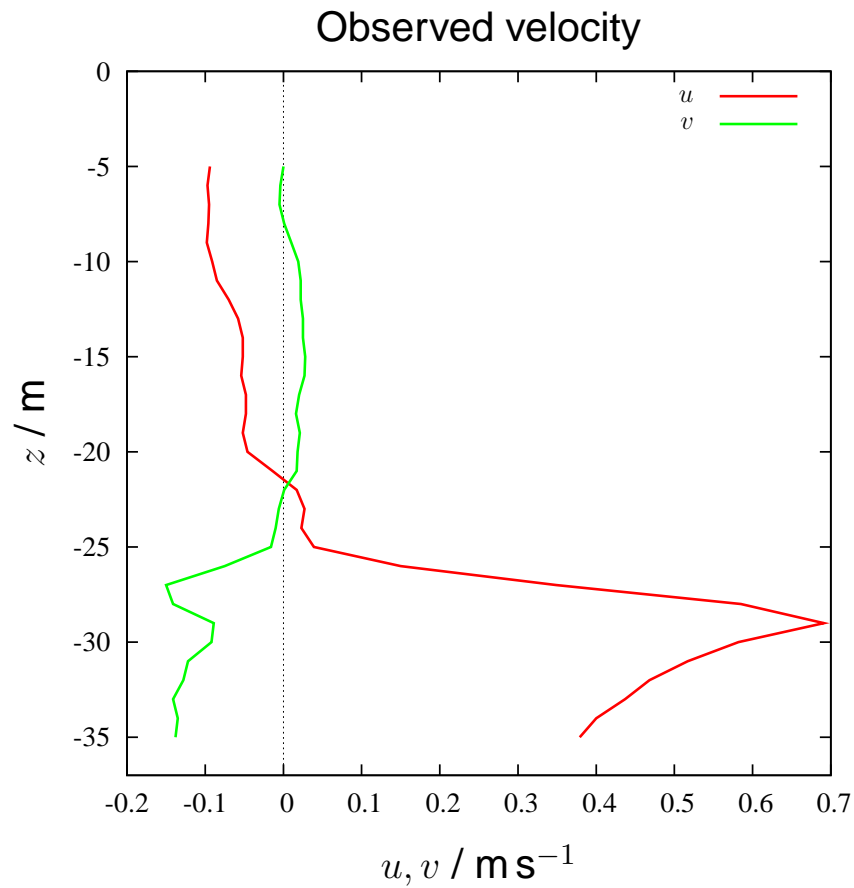
# Observed & simulated profiles

Position: North of Kriegers Shoal



# Observed & simulated profiles

Position: North of Kriegers Shoal



# Thank you !



Lars Arneborg & Hans Burchard operating the microstructure profiler by hand.