

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.



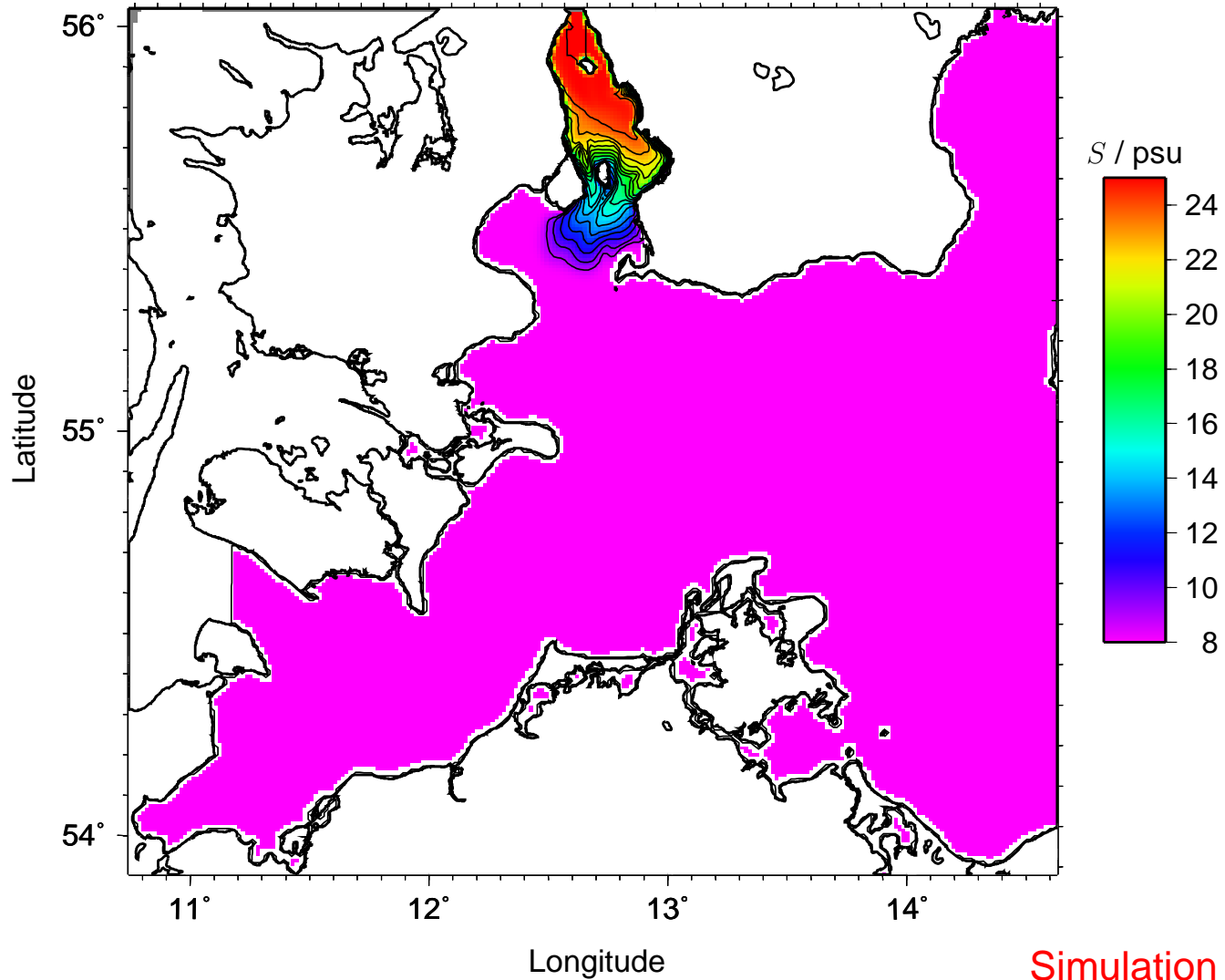


General Estuarine Transport Model

- 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

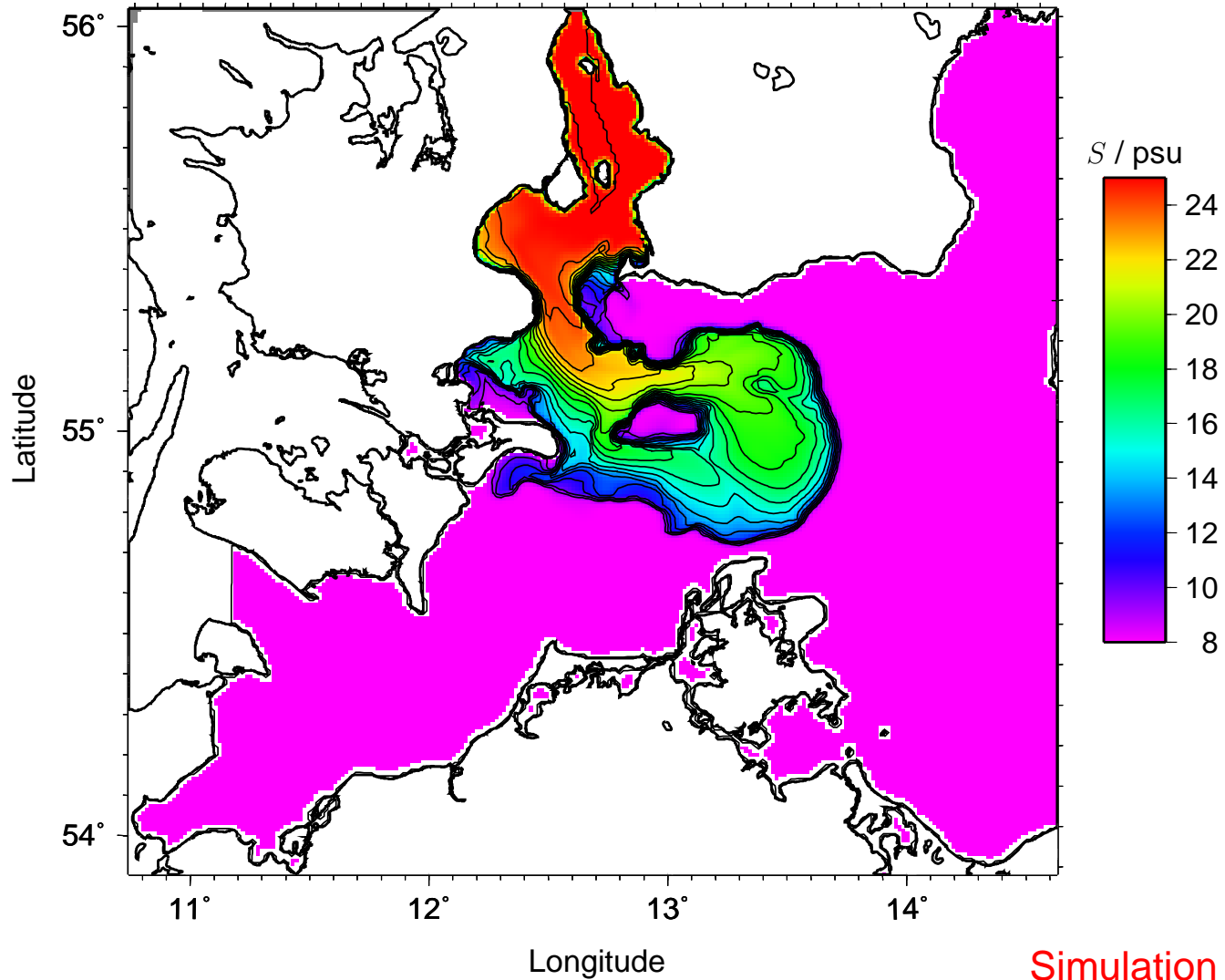
Bottom salinity after 5 days



Simulation with GETM

Idealised simulation

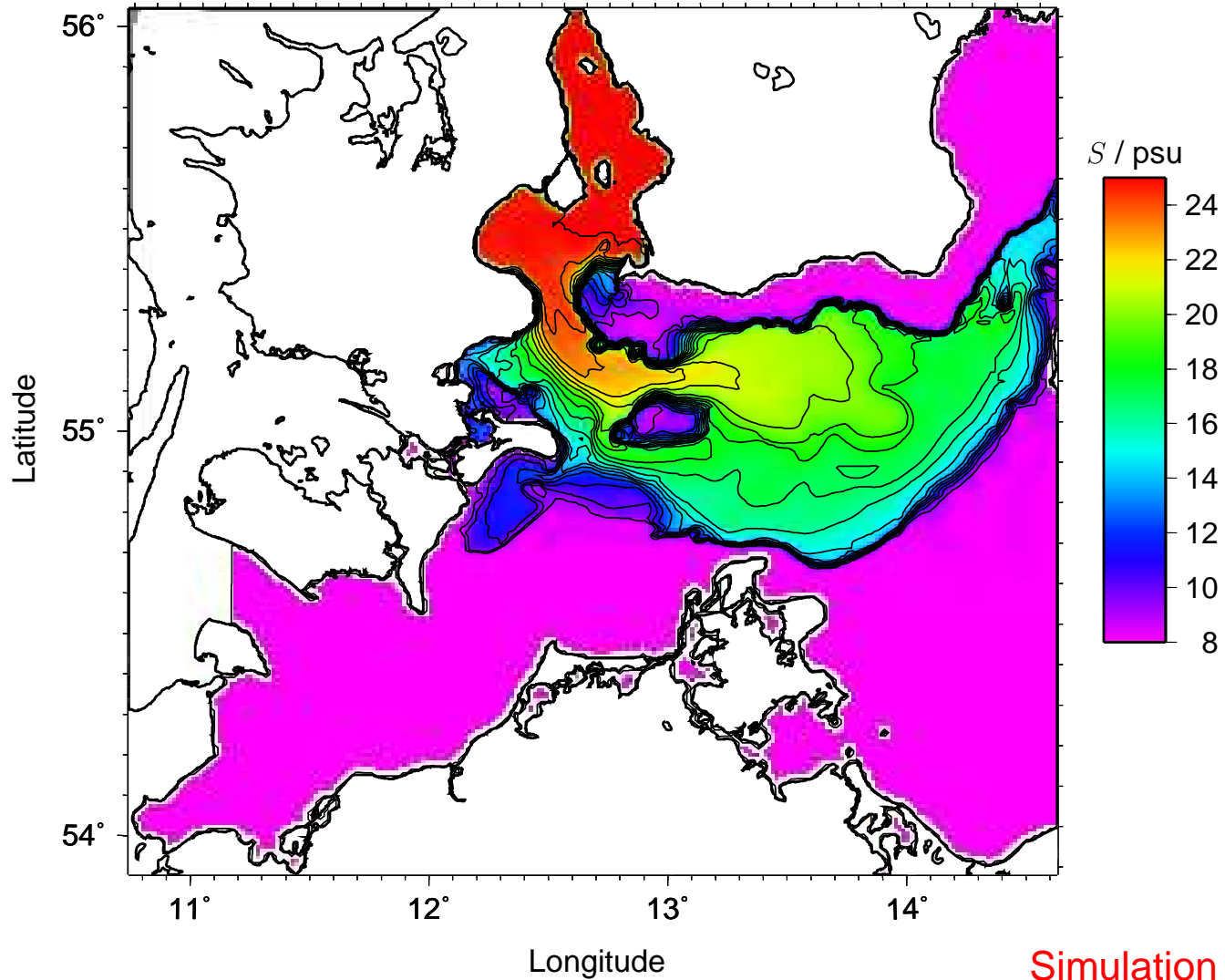
Bottom salinity after 15 days



Simulation with GETM

Idealised simulation

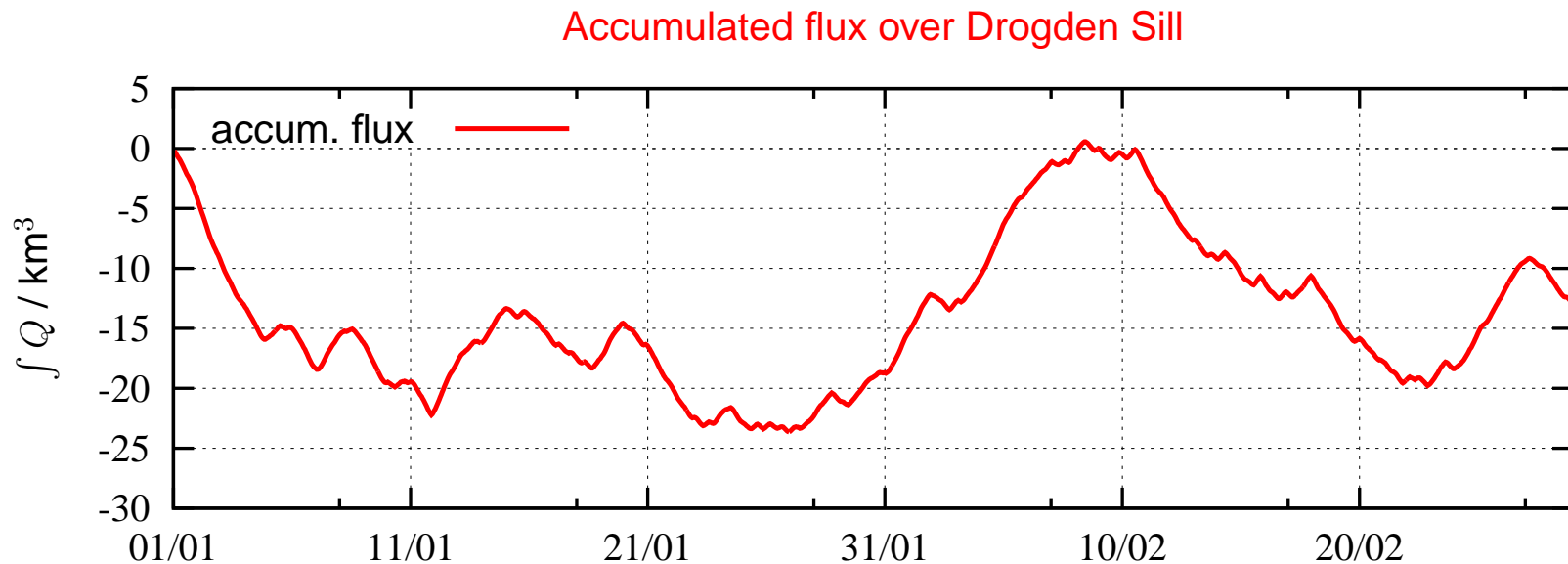
Bottom salinity after 30 days



Simulation with GETM

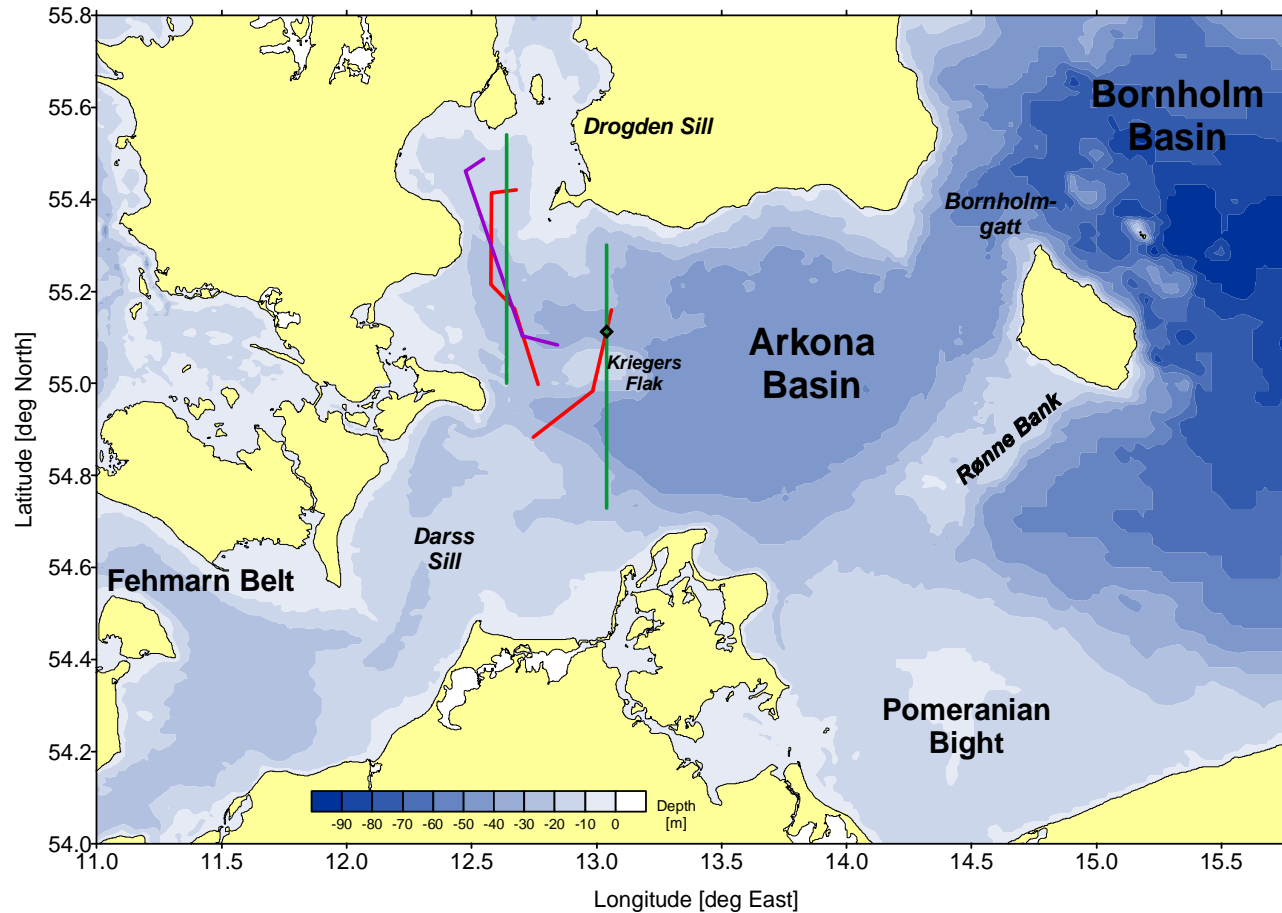
FWG cruise

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



Arkona Sea map

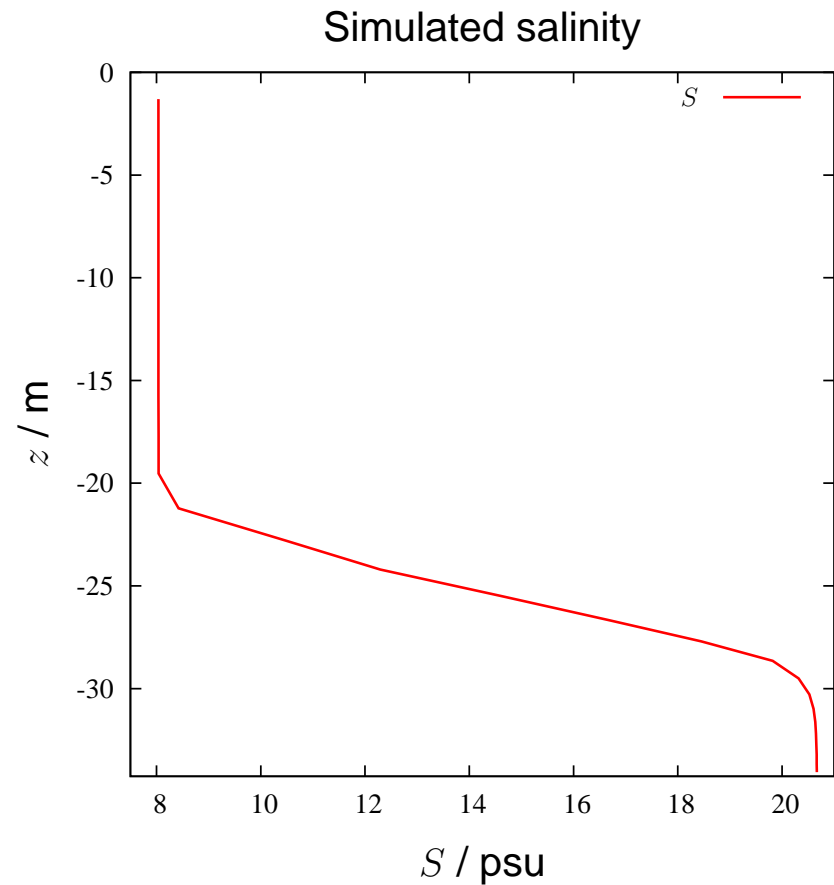
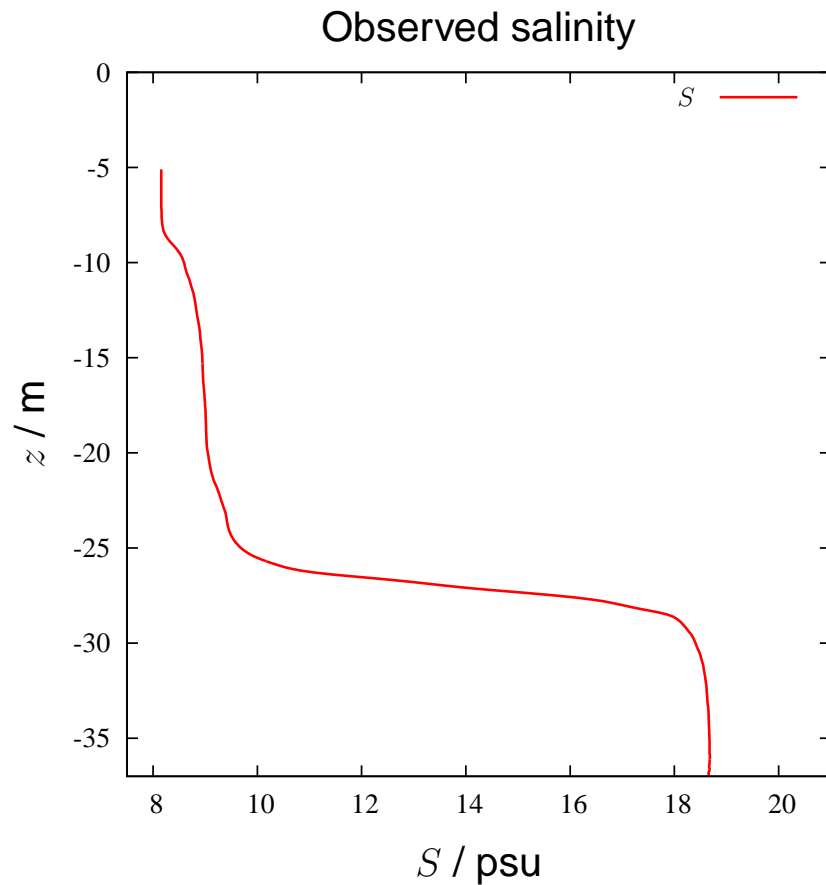
Map with observational sections and stations and model transects



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

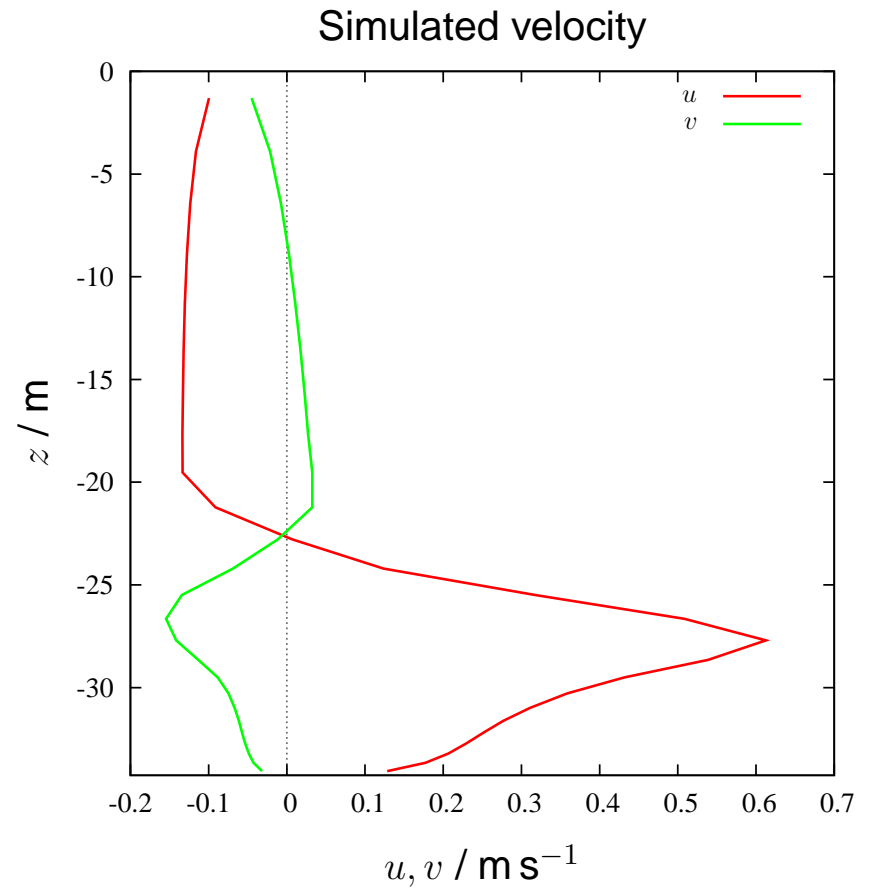
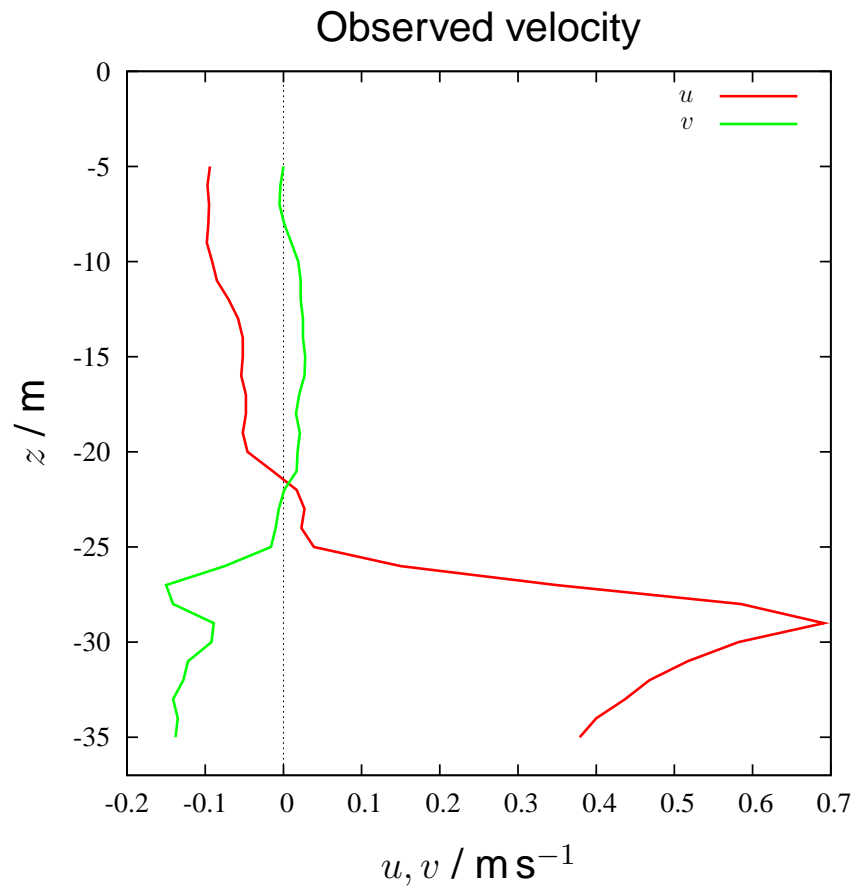
Observed & simulated profiles

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.