Idealised modelling of mixing in Arkona Sea

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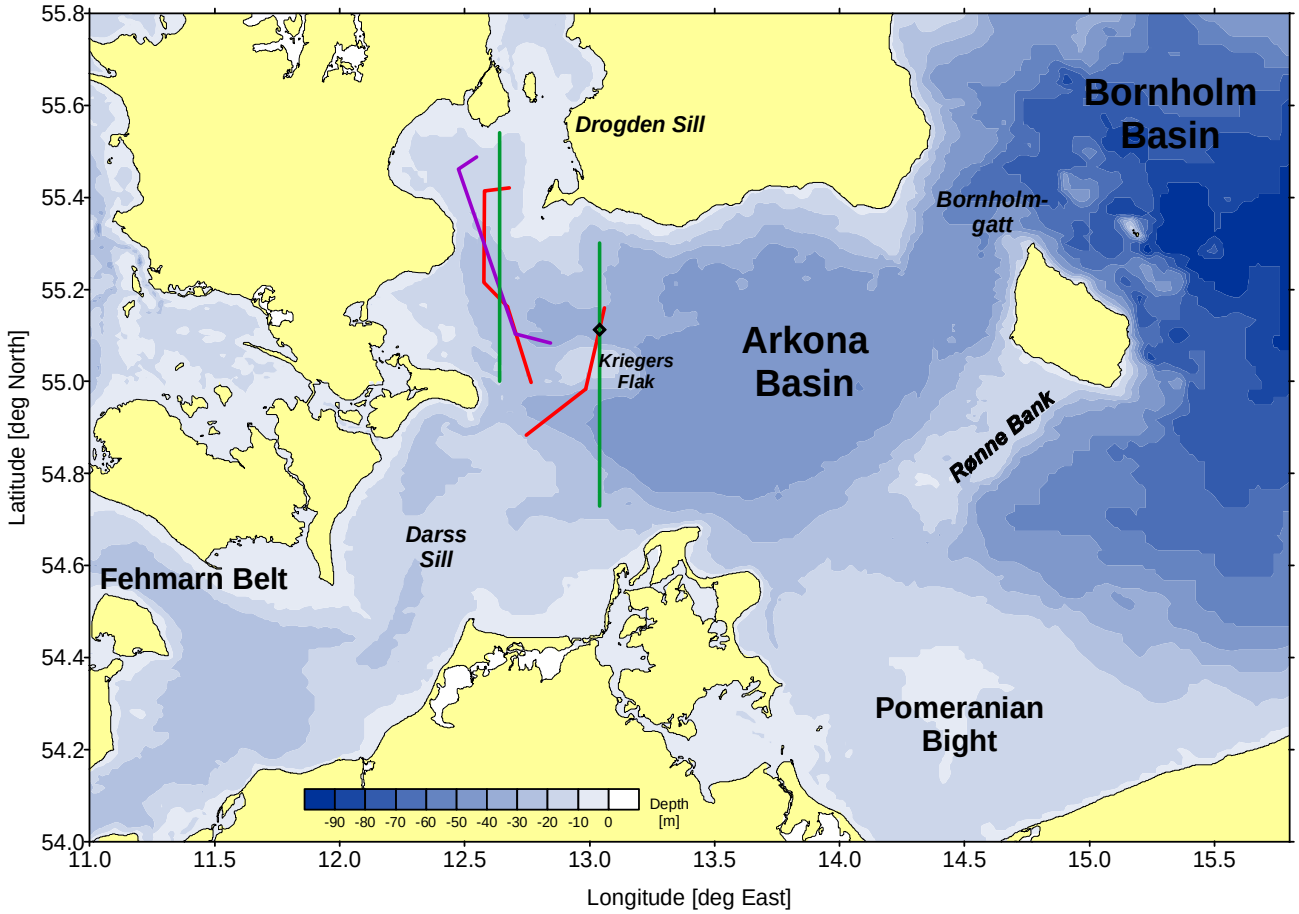
Contents

- Description of idealised simulation with GETM.
- Model results for idealised inflow.
- Comparison of simulation with observational data.
- Future work.

Arkona Sea map

Map with observational sections and stations and model transects



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

Simulation with GETM

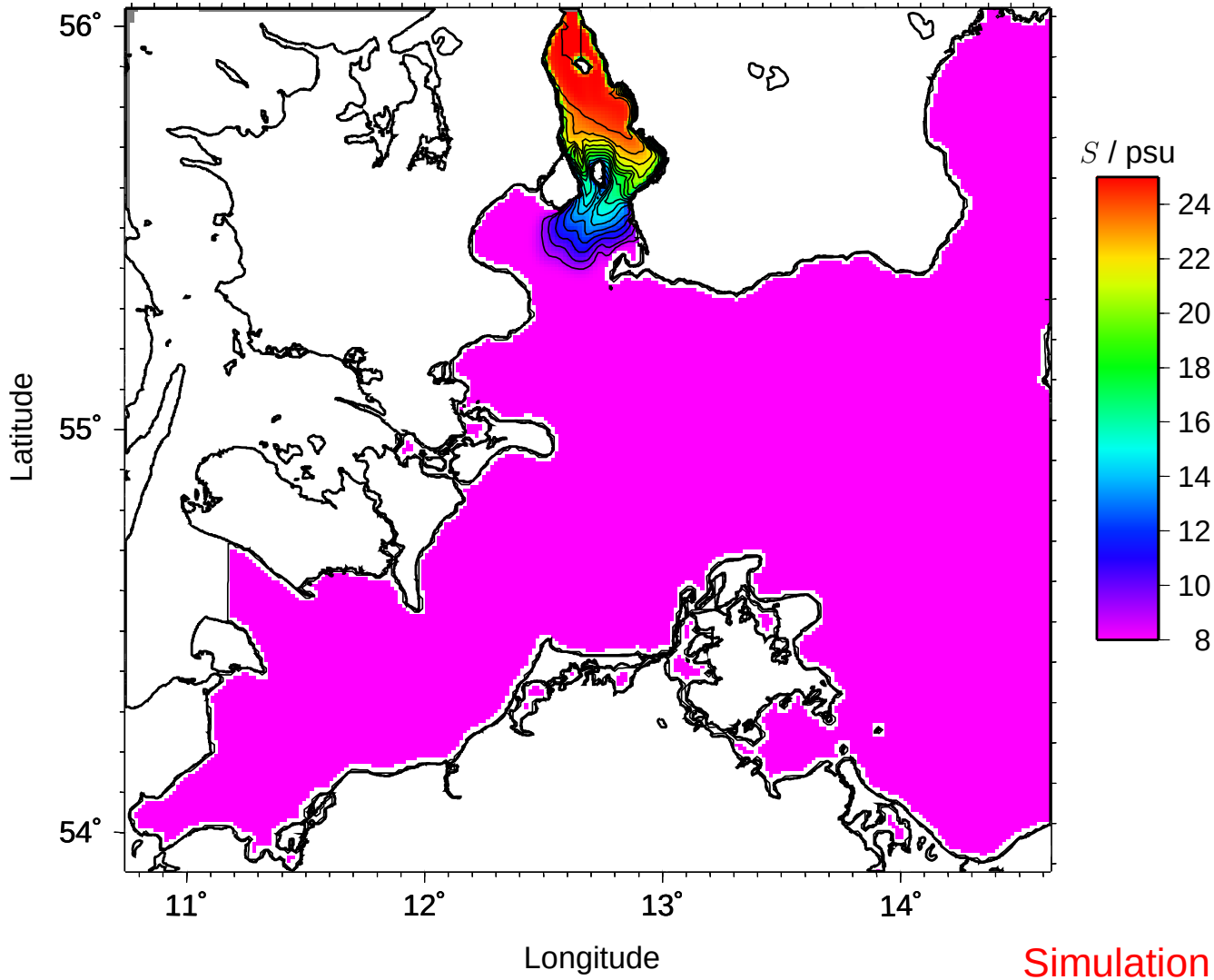
Idealised simulations with the General Estuarine Transport Model (GETM) are carried out for the Arkona Sea.

Some specifications:

- Backround salinity: 8 psu, salinity at inflow: 25 psu.
- Sea level elevated by 2 cm at inflow boundary.
- Constant wind from south-west.
- 1/2 nm horizontal resolution.
- Bottom-fitted general vertical coordinates with 25 layers.
- One month simulation time until quasi-steady state.

Idealised simulation

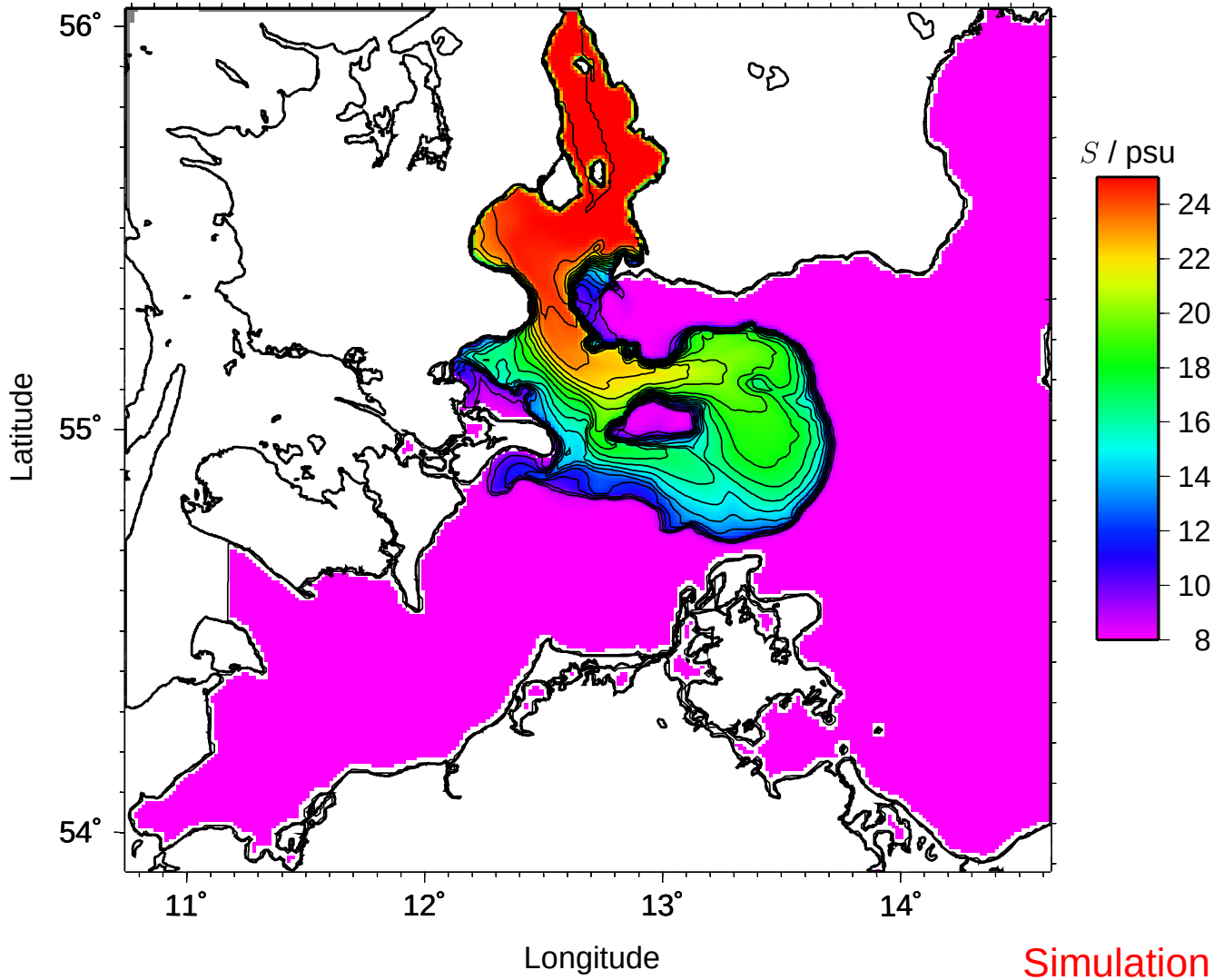
Bottom salinity after 5 days



Simulation with GETM

Idealised simulation

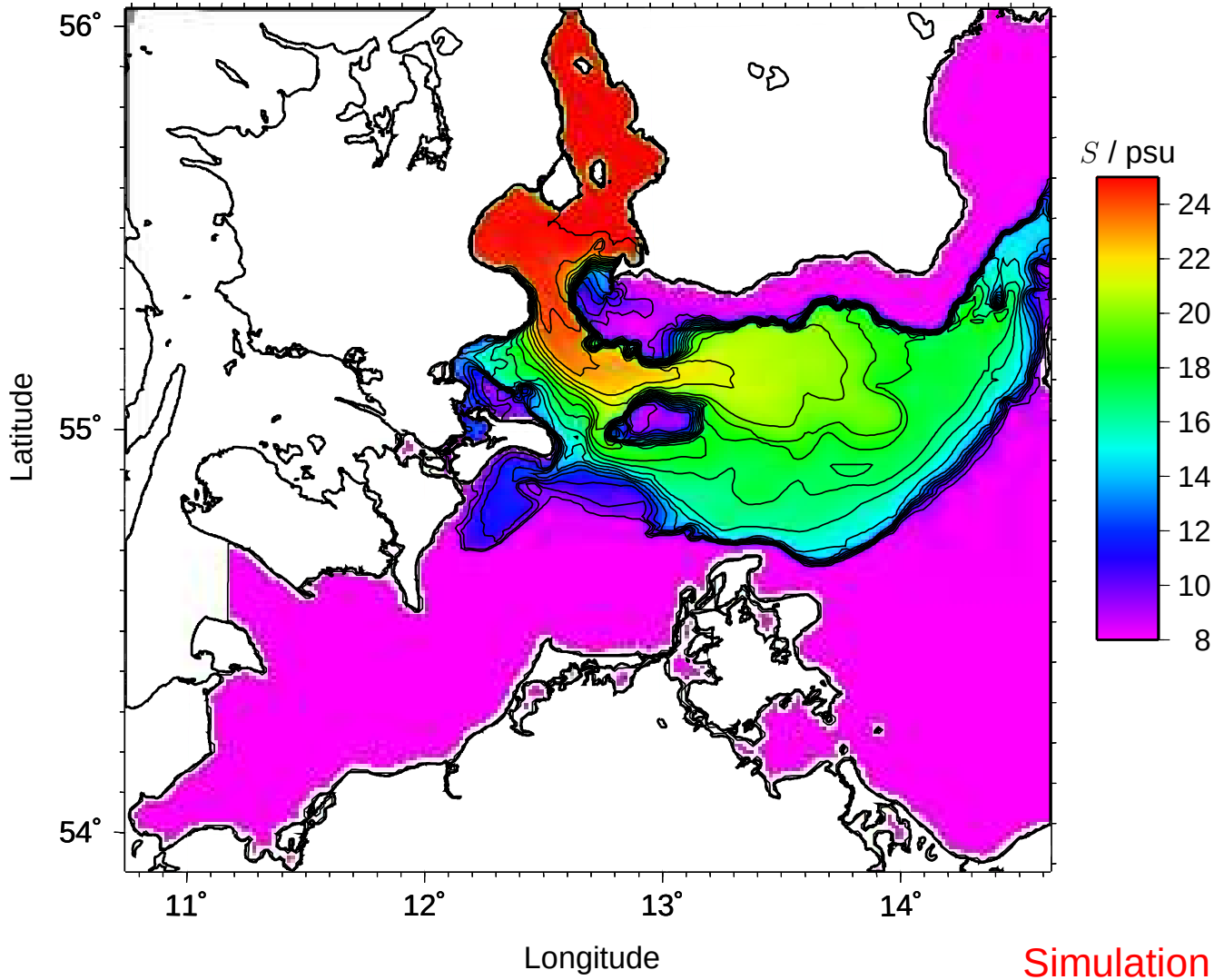
Bottom salinity after 15 days



Simulation with GETM

Idealised simulation

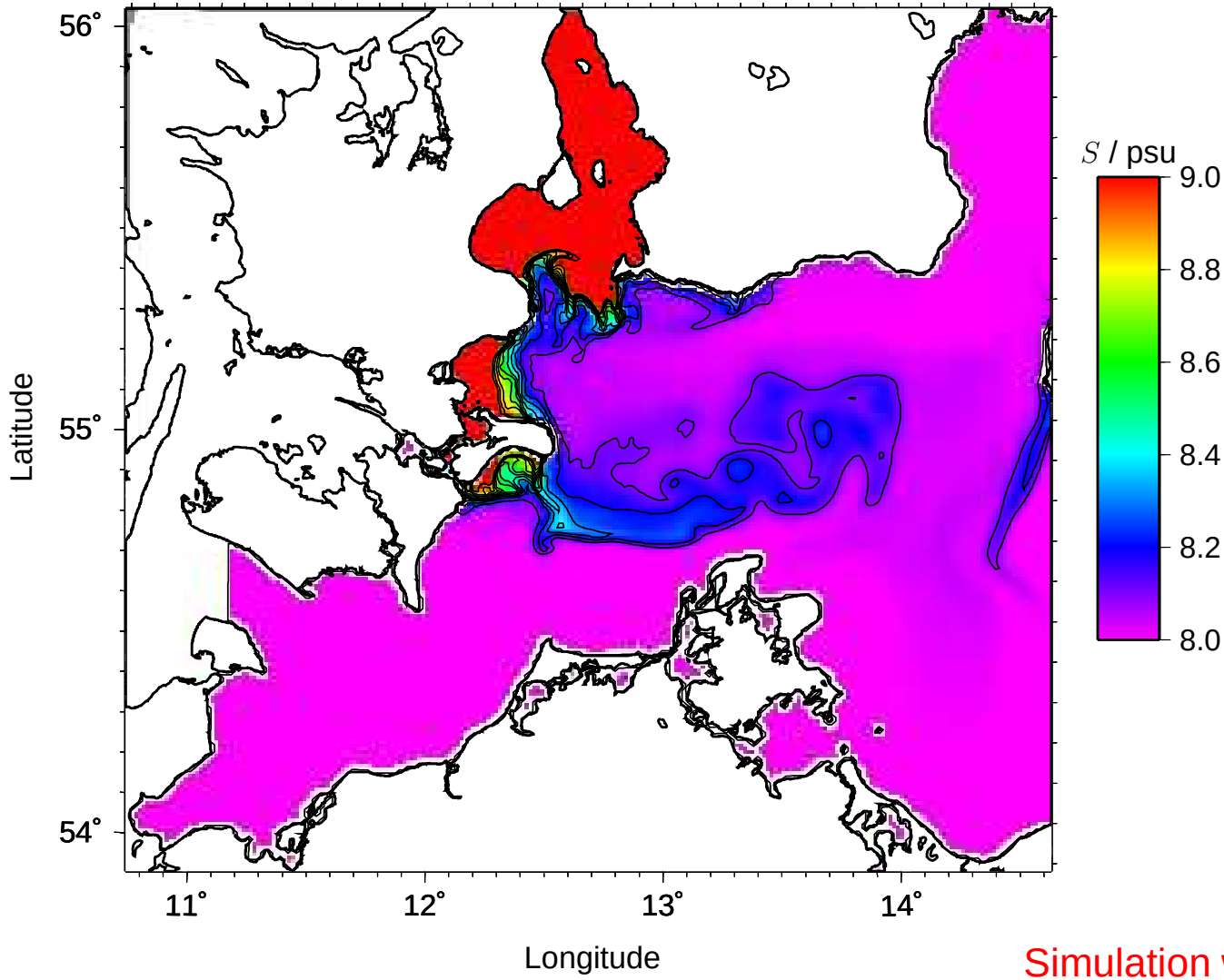
Bottom salinity after 30 days



Simulation with GETM

Idealised simulation

Surface salinity after 30 days

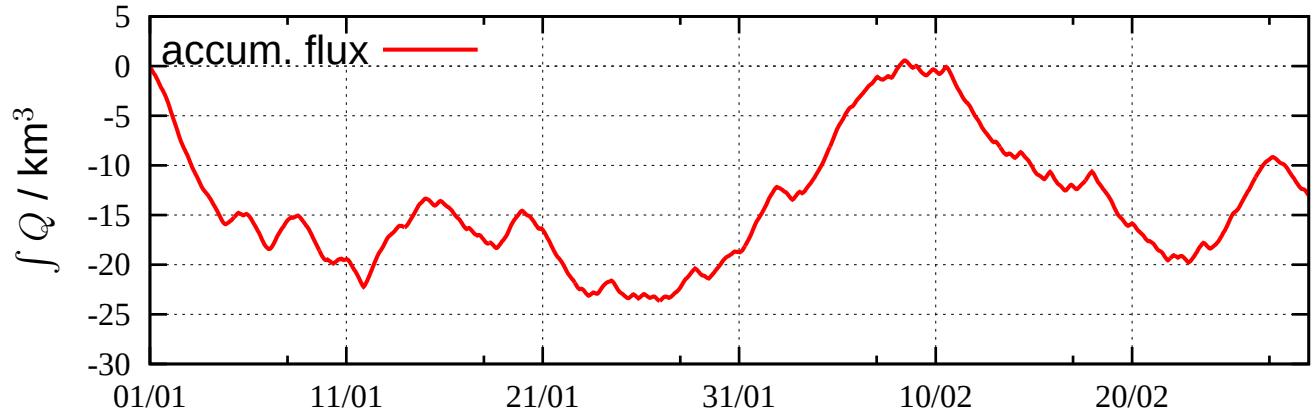


Simulation with GETM

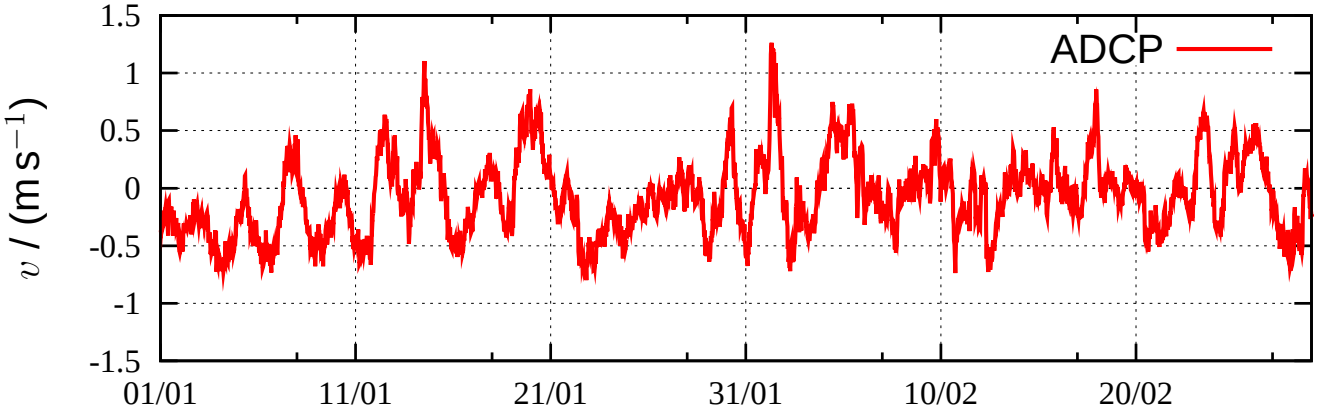
FWG cruise

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

Accumulated flux over Drogden Sill



Southward current velocity

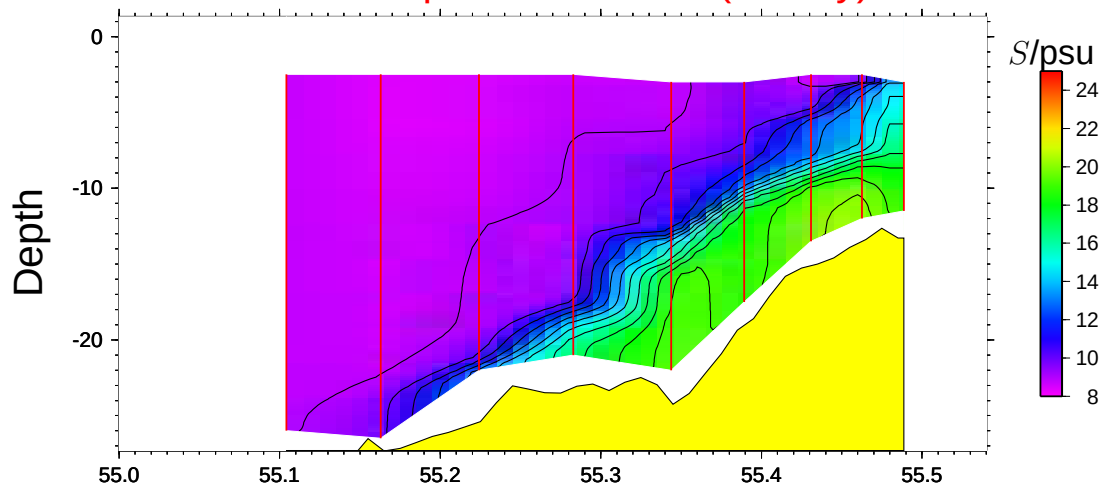


Date in 2004

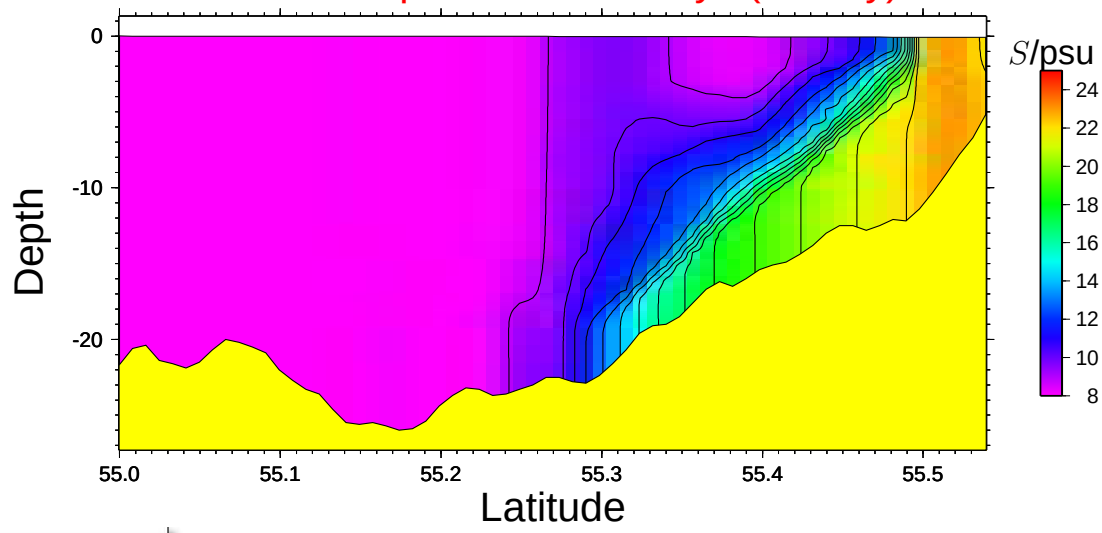
Observed & simulated plume

South-north section south of Drogden Sill

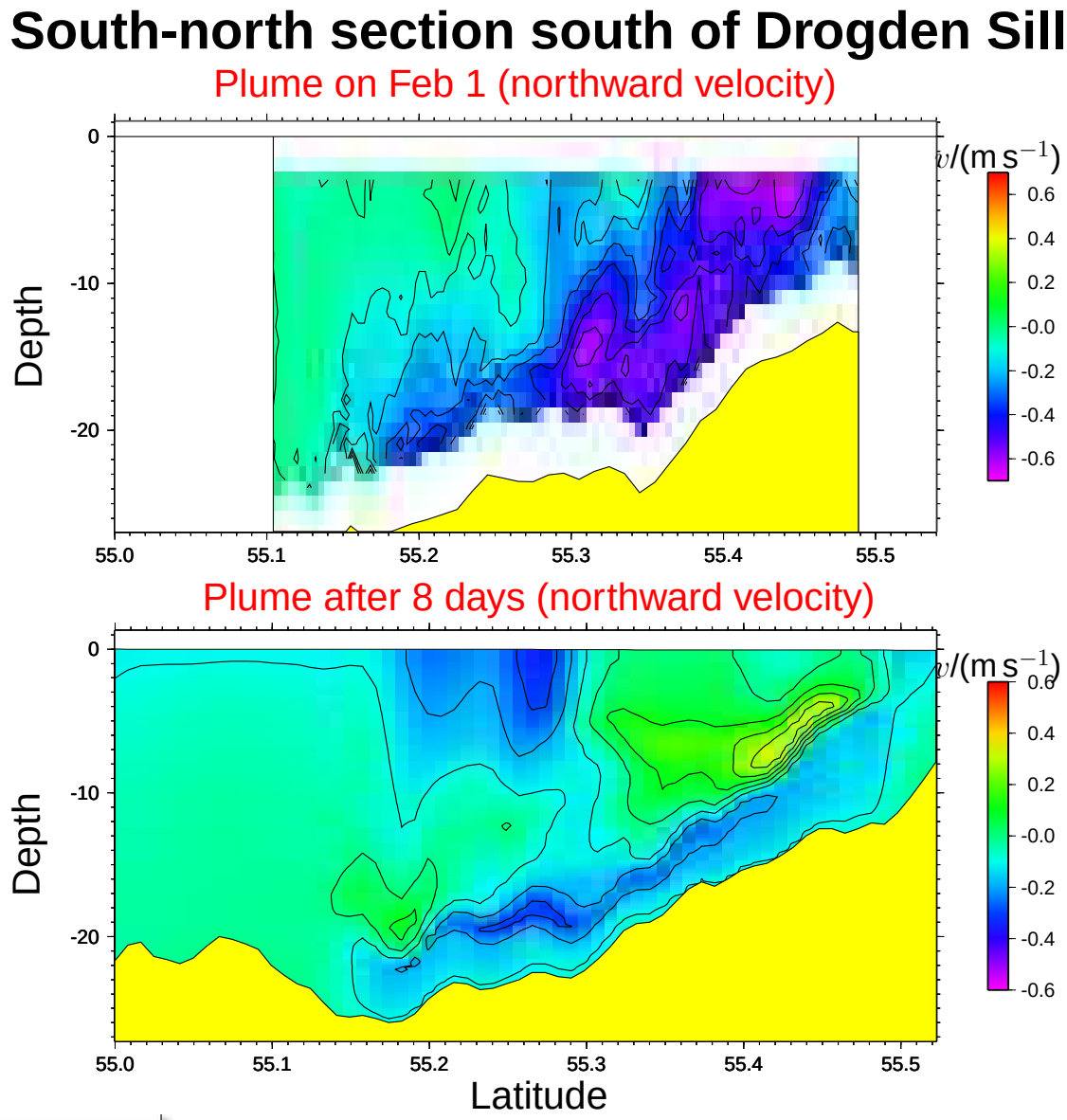
Observed plume on Feb 1 (salinity)



Simulated plume after 7 days (salinity)



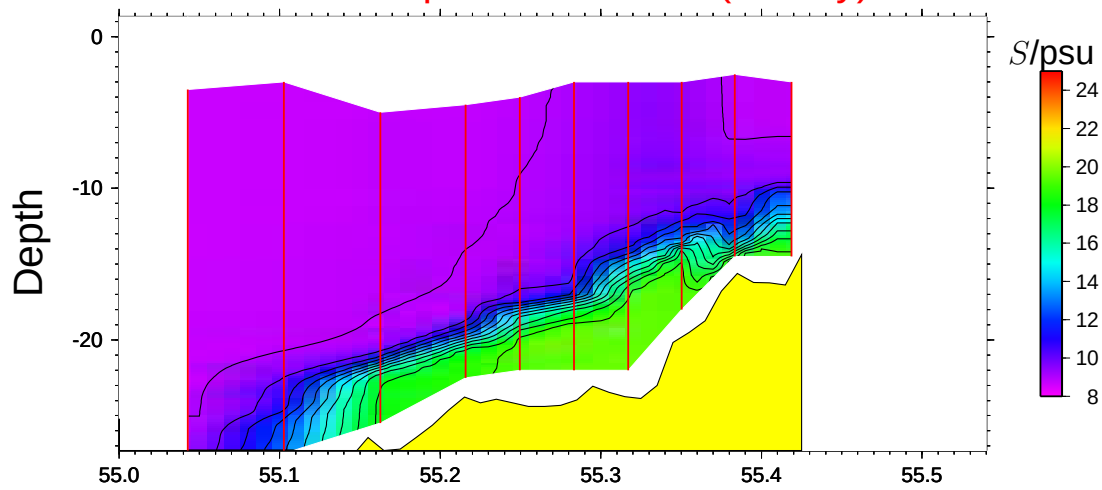
Observed & simulated plume



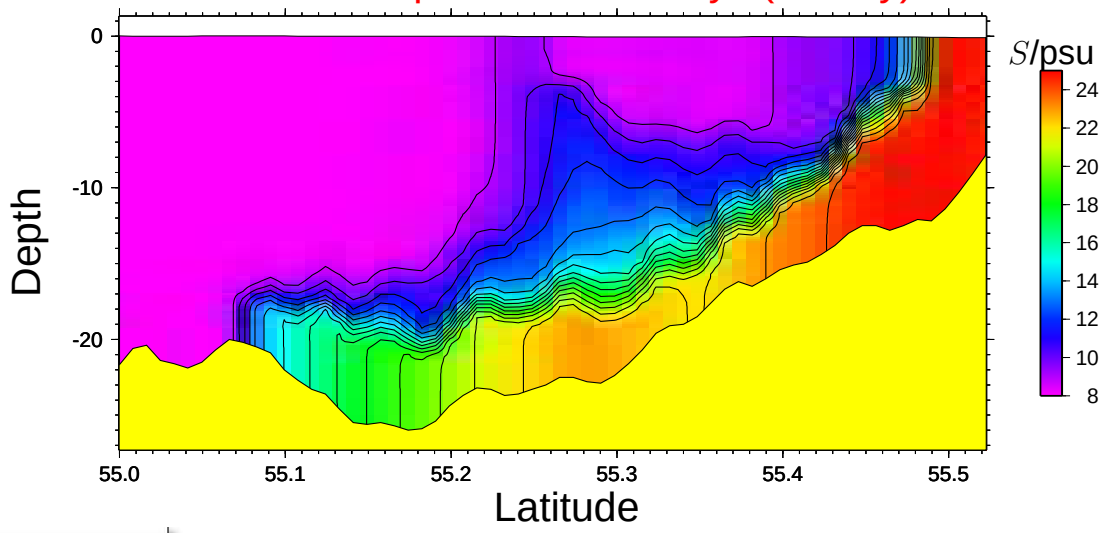
Observed & simulated plume

South-north section south of Drogden Sill

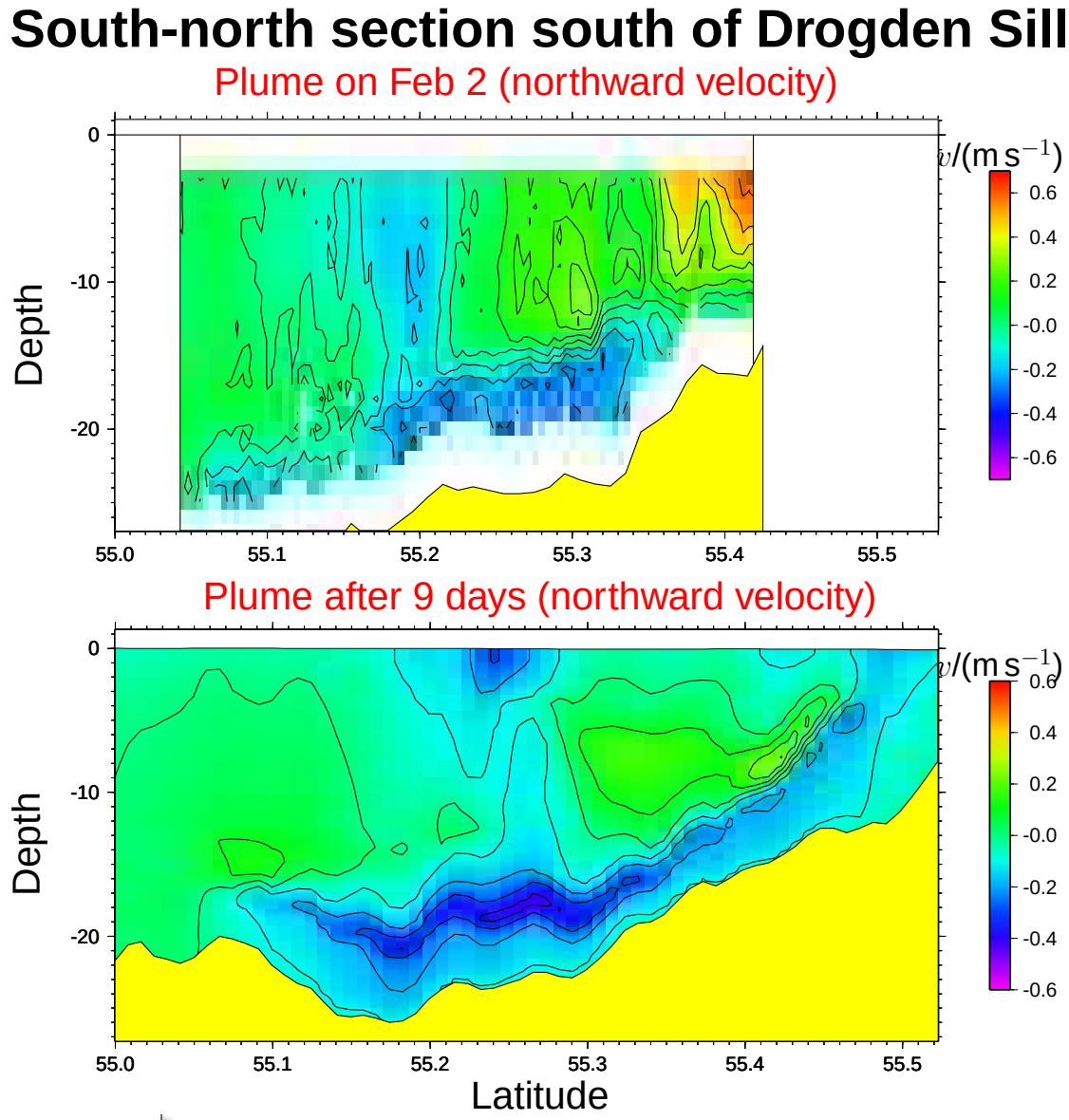
Observed plume on Feb 2 (salinity)



Simulated plume after 9 days (salinity)



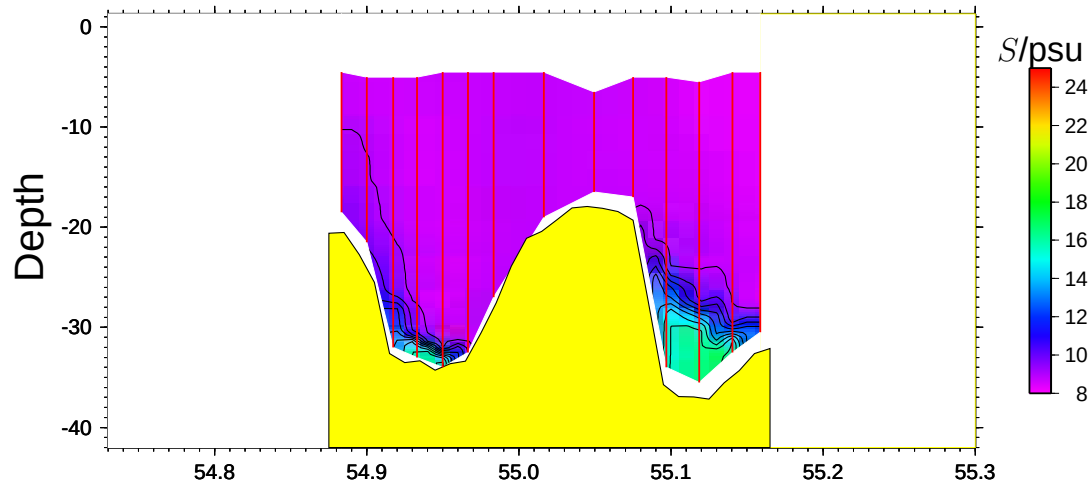
Observed & simulated plume



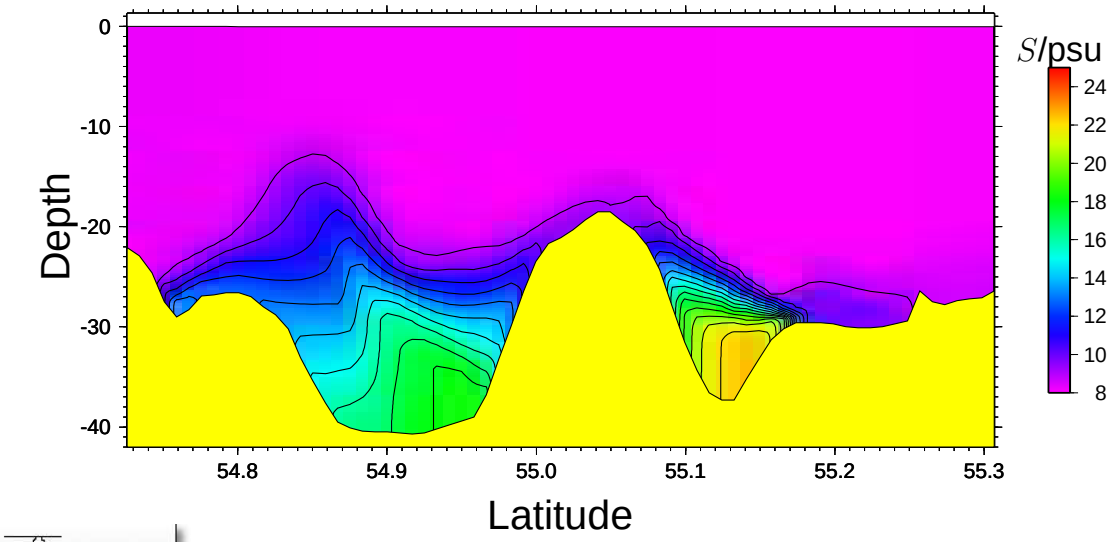
Observed & simulated plume

South-north section across Kriegers Shoal

Observed plume on Feb 5 (salinity)



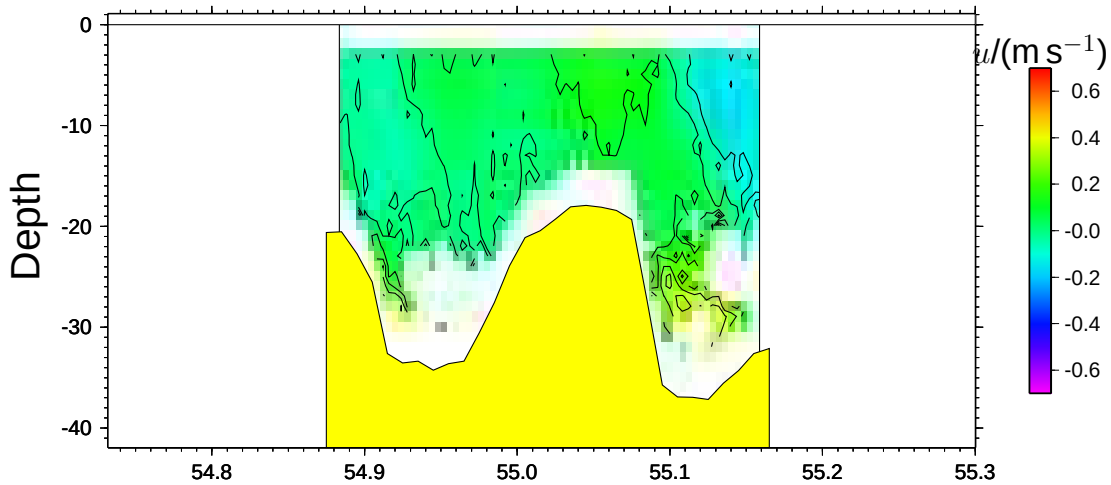
Simulated plume after 30 days (salinity)



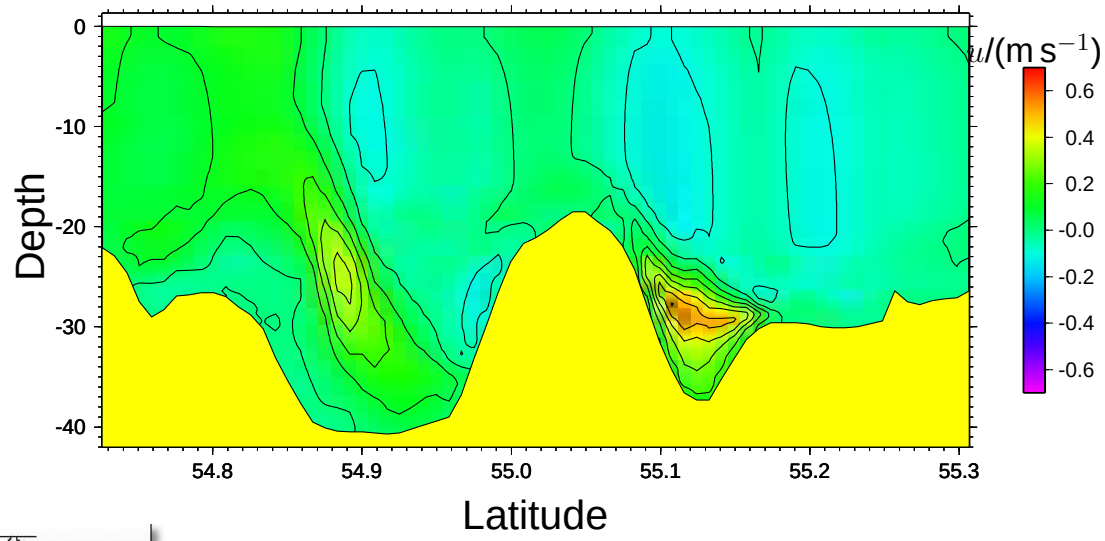
Observed & simulated plume

South-north section across Kriegers Shoal

Section on Feb 5 (eastward velocity)

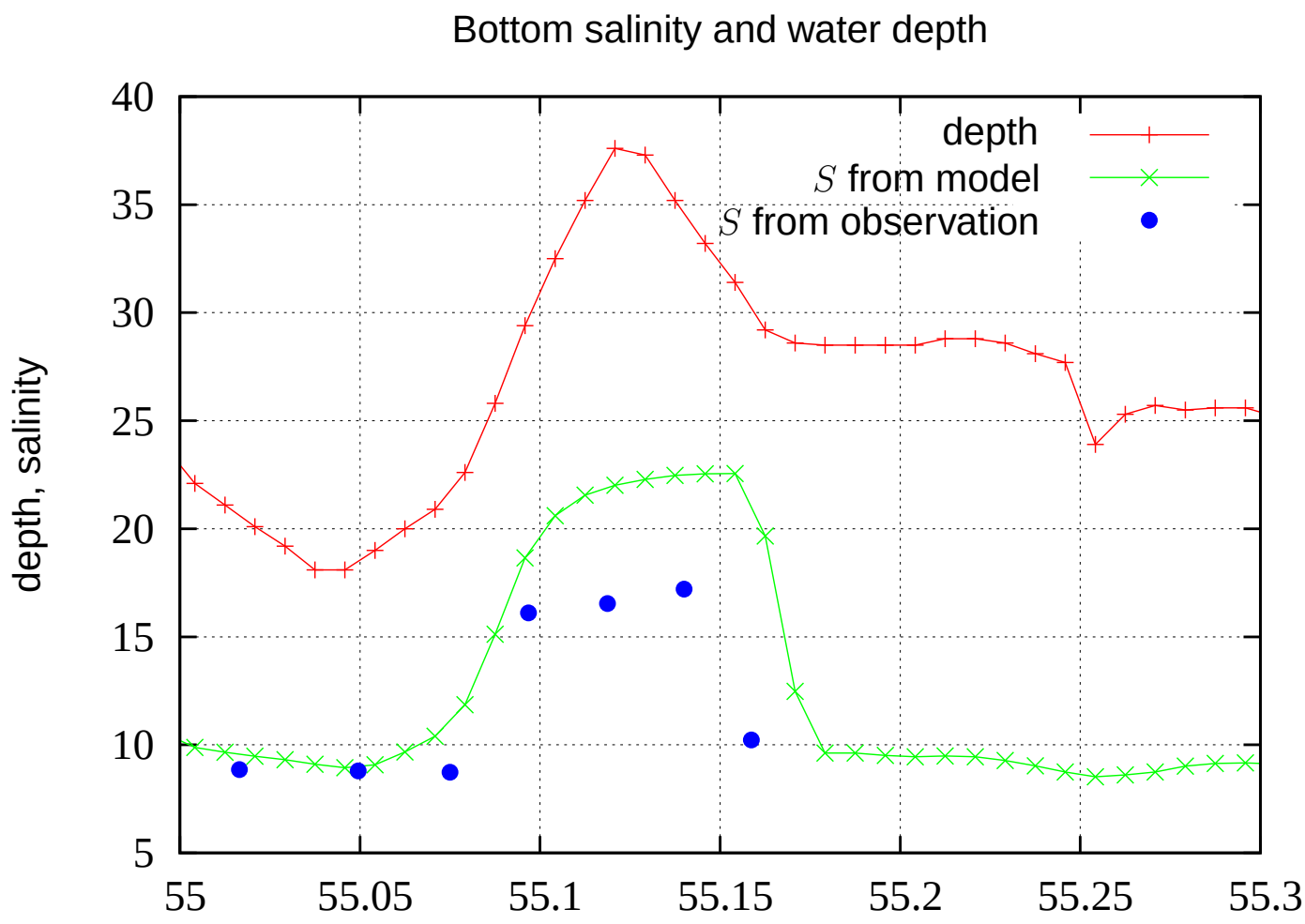


Eastward velocity in quasi-steady state



Observed & simulated plume

Bottom salinity from observations and idealised model simulation together with bottom topography.

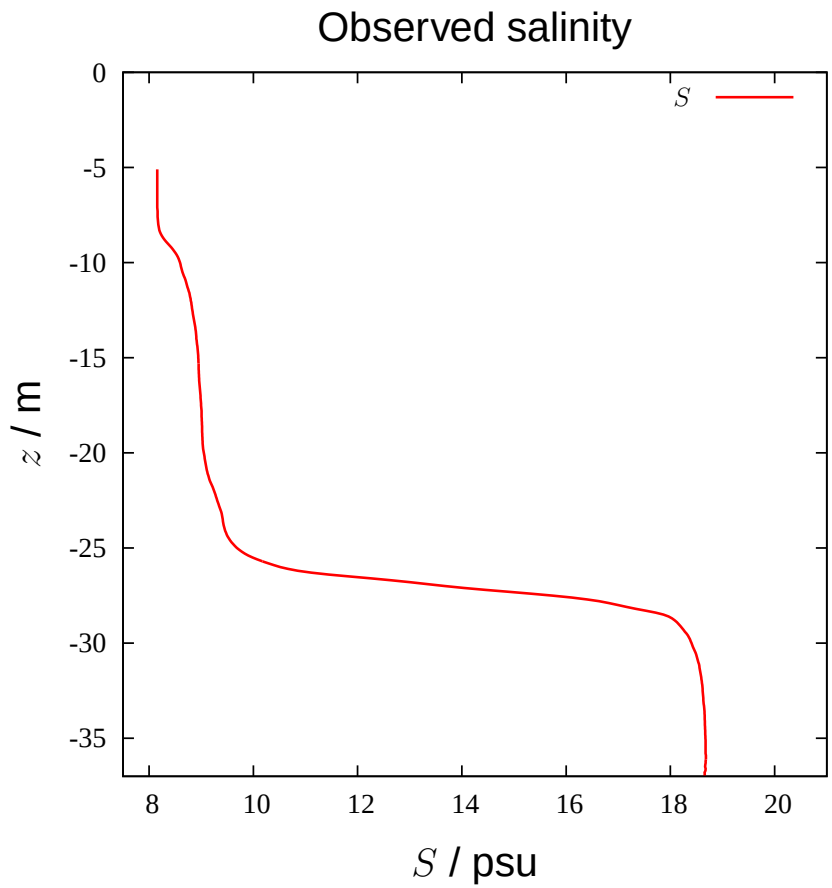


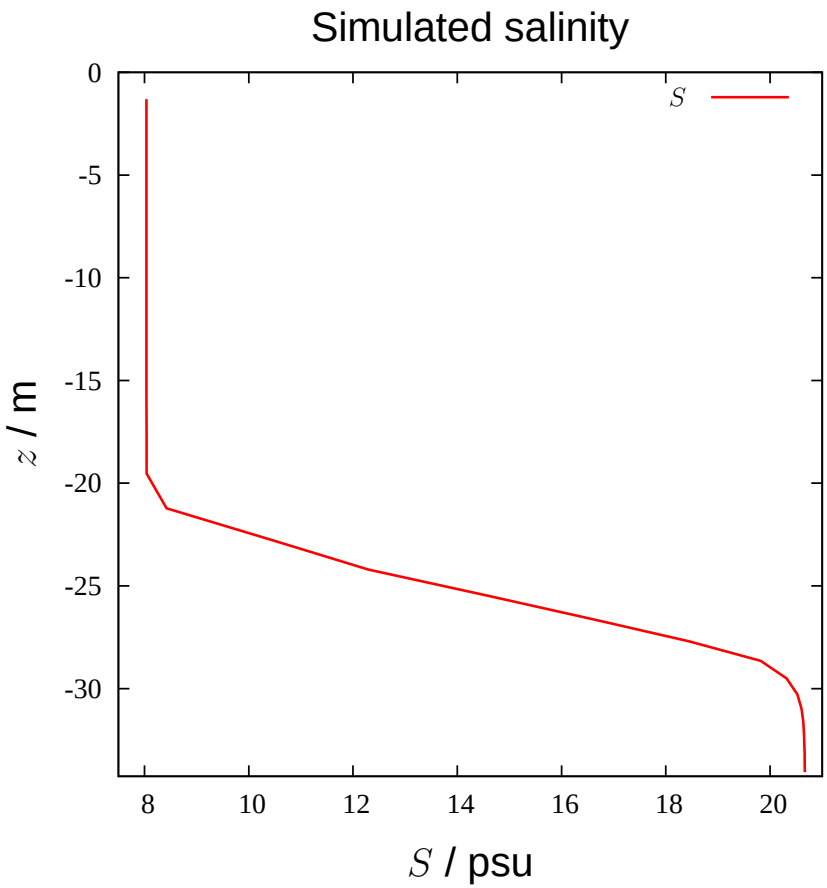
24-hour station data

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

Observed & simulated profiles

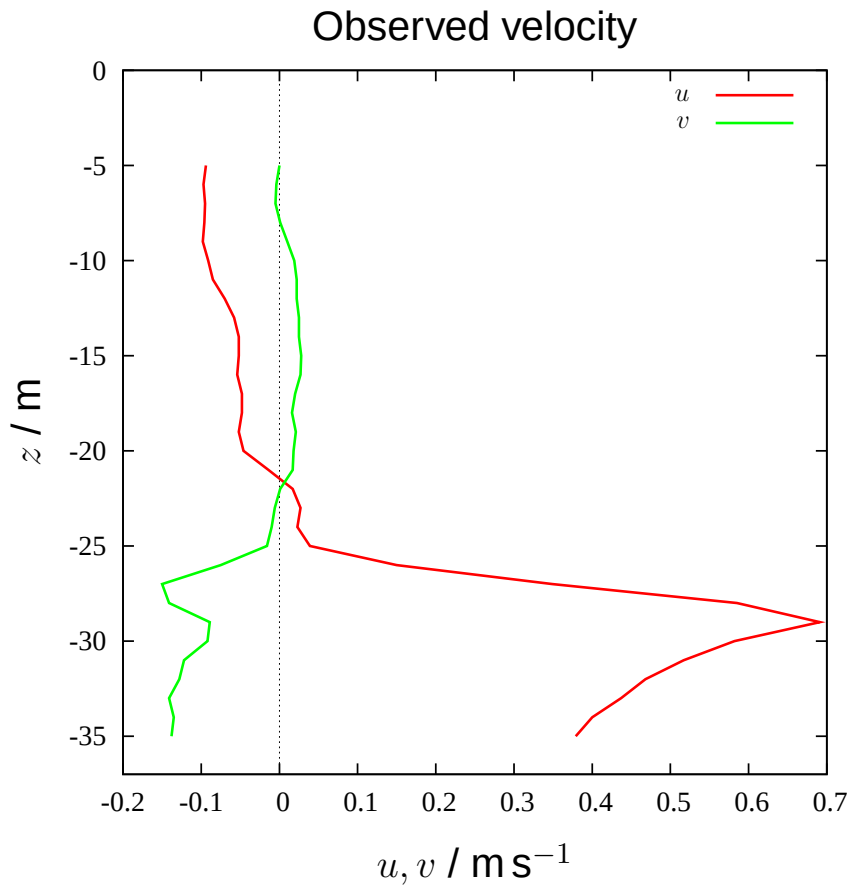
Position: North of Kriegers Shoal

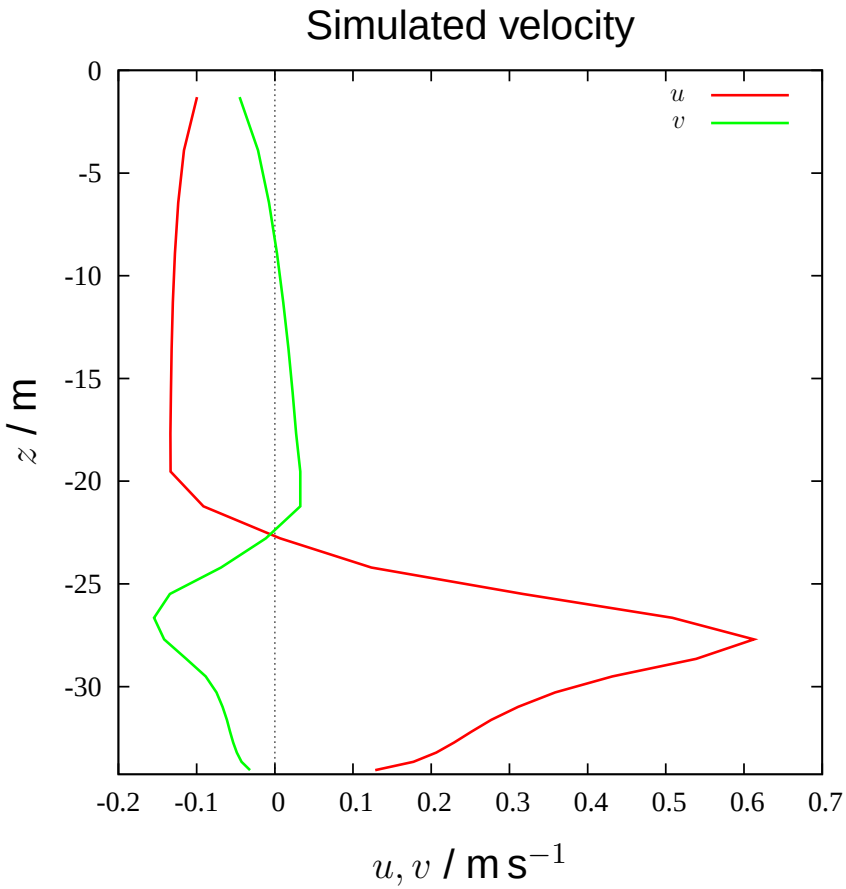




Observed & simulated profiles

Position: North of Kriegers Shoal





Future Research Questions

The **QuantAS-Off** project will try to answer the following upcoming questions:

- Which are the major mixing mechanisms for Baltic Sea inflow events.
- Can we quantify those by combining observations with numerical models ?
- How strong is the numerical mixing of the model ?
- How does increased mixing in the Arkona Sea affect the Baltic Sea ecosystem ?
- How strong can the additional vertical mixing due to projected offshore wind farms be ?