



# Barents Sea splitting



Øystein Skagseth<sup>1,2</sup>,

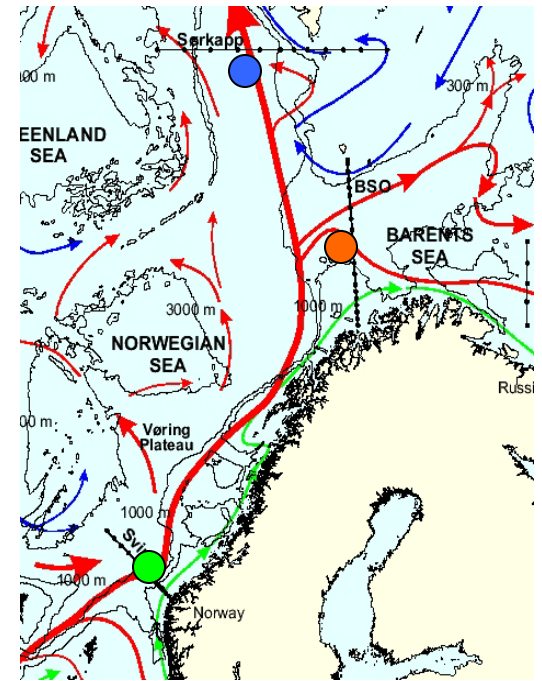
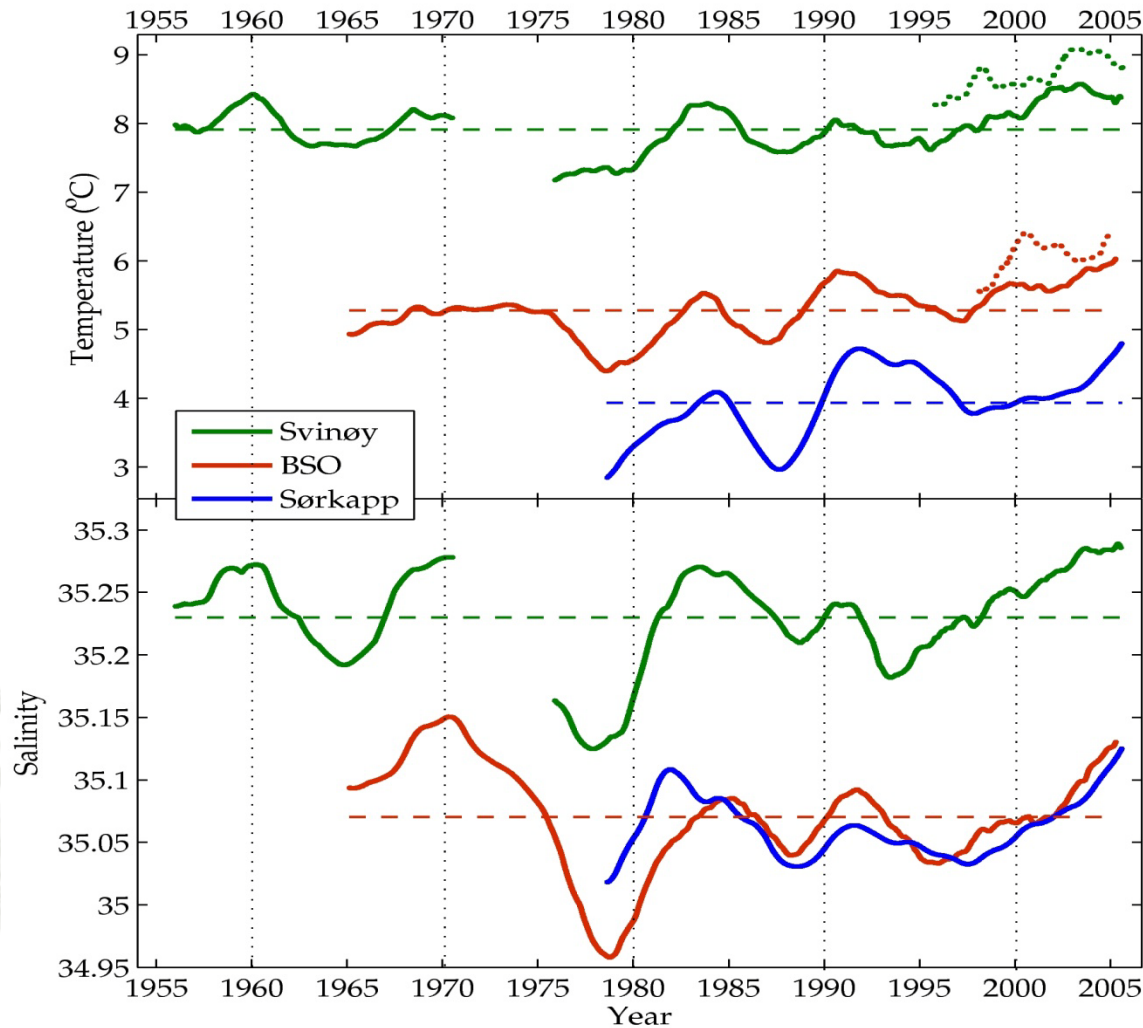
with contribution from

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- 3) *Alfred Wegner Institute, Germany*
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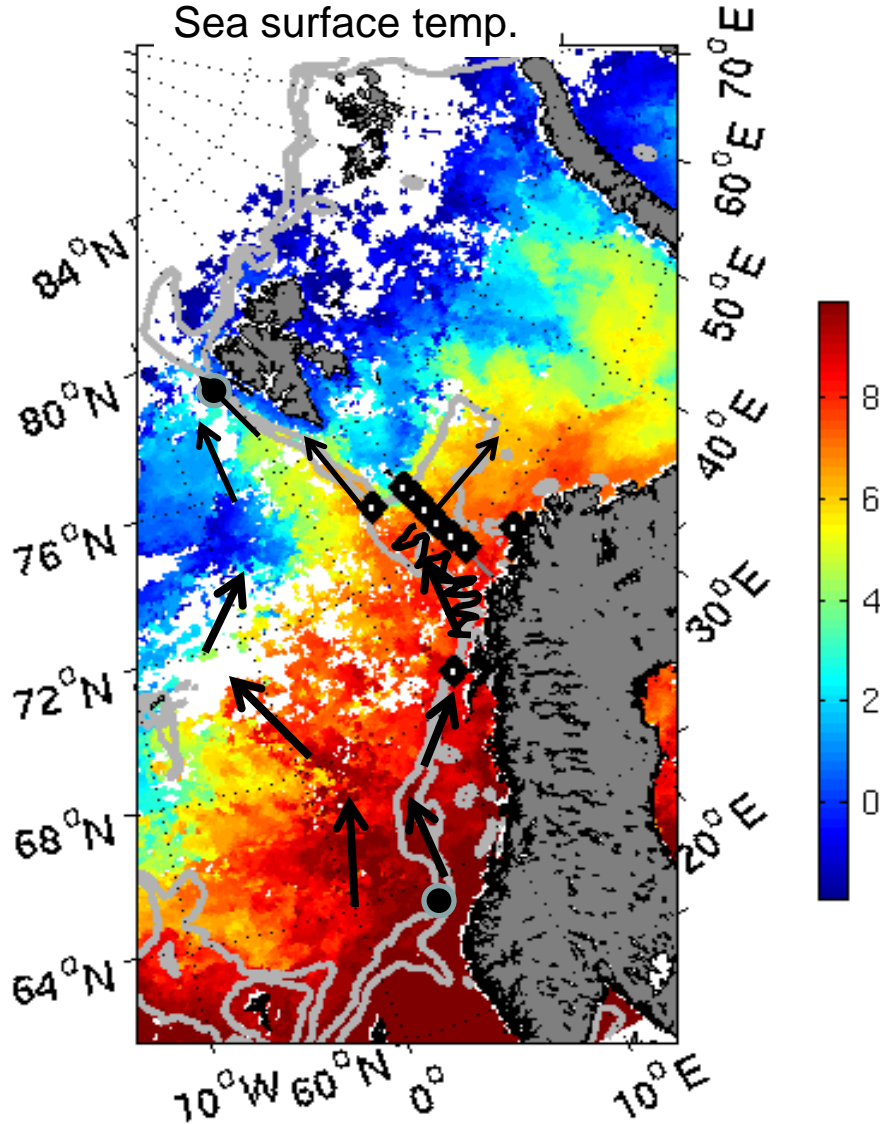
# Inter-annual variations in Atlantic water



- trend since 1970'ies
- inter-annual variations
- anomalies trough the system, in general **not** dampened.

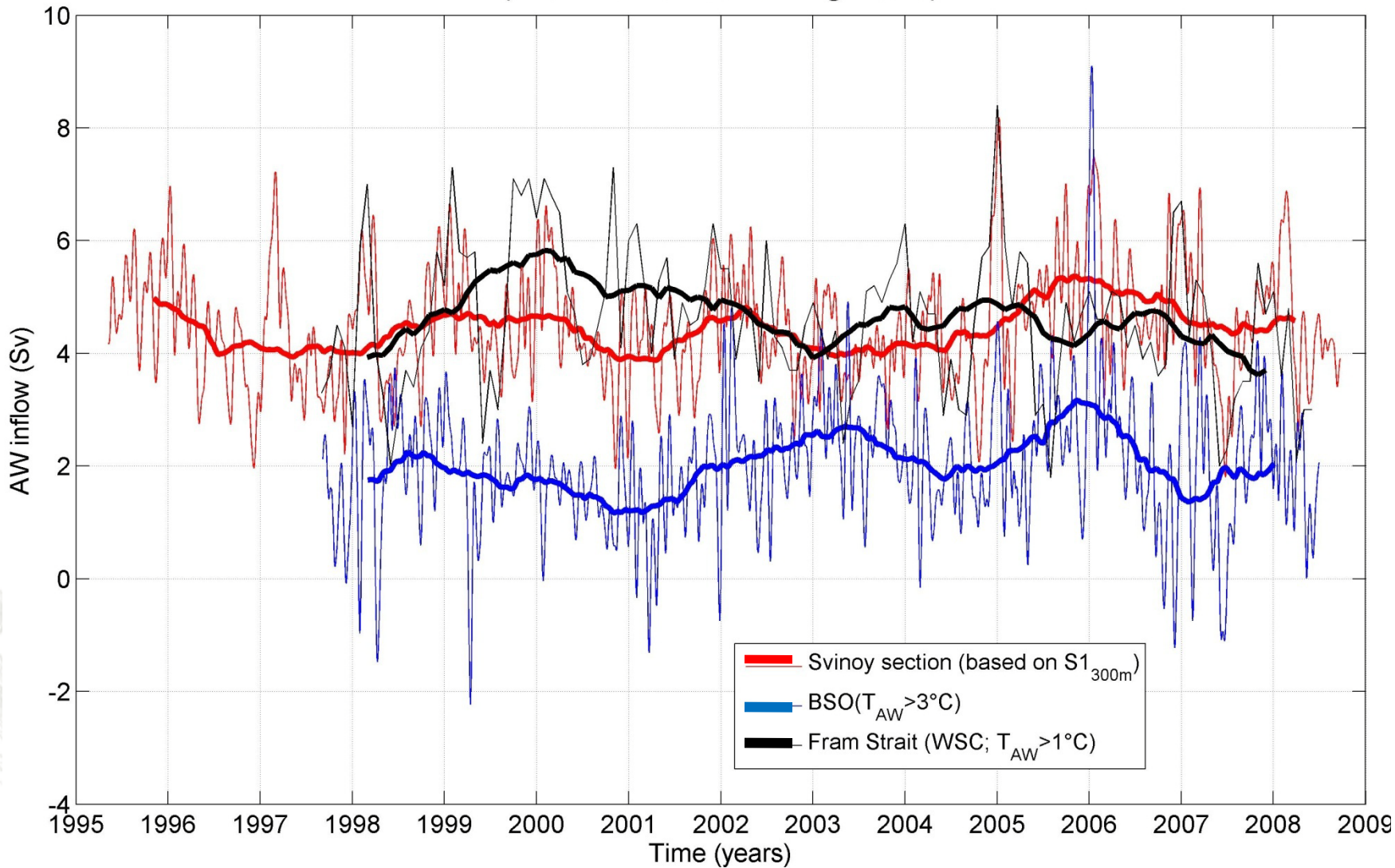


# The northward Atlantic Water fluxes through the Norwegian Sea



- Covariability of the NwAC
- Splitting of the current in western Barents Sea

**AW inflow at Svinoy section, through the Barents Sea Opening and through Fram Strait (only in the WSC)**  
(thick lines - annual running means)





# Comparison Svinoy section and Barents Sea

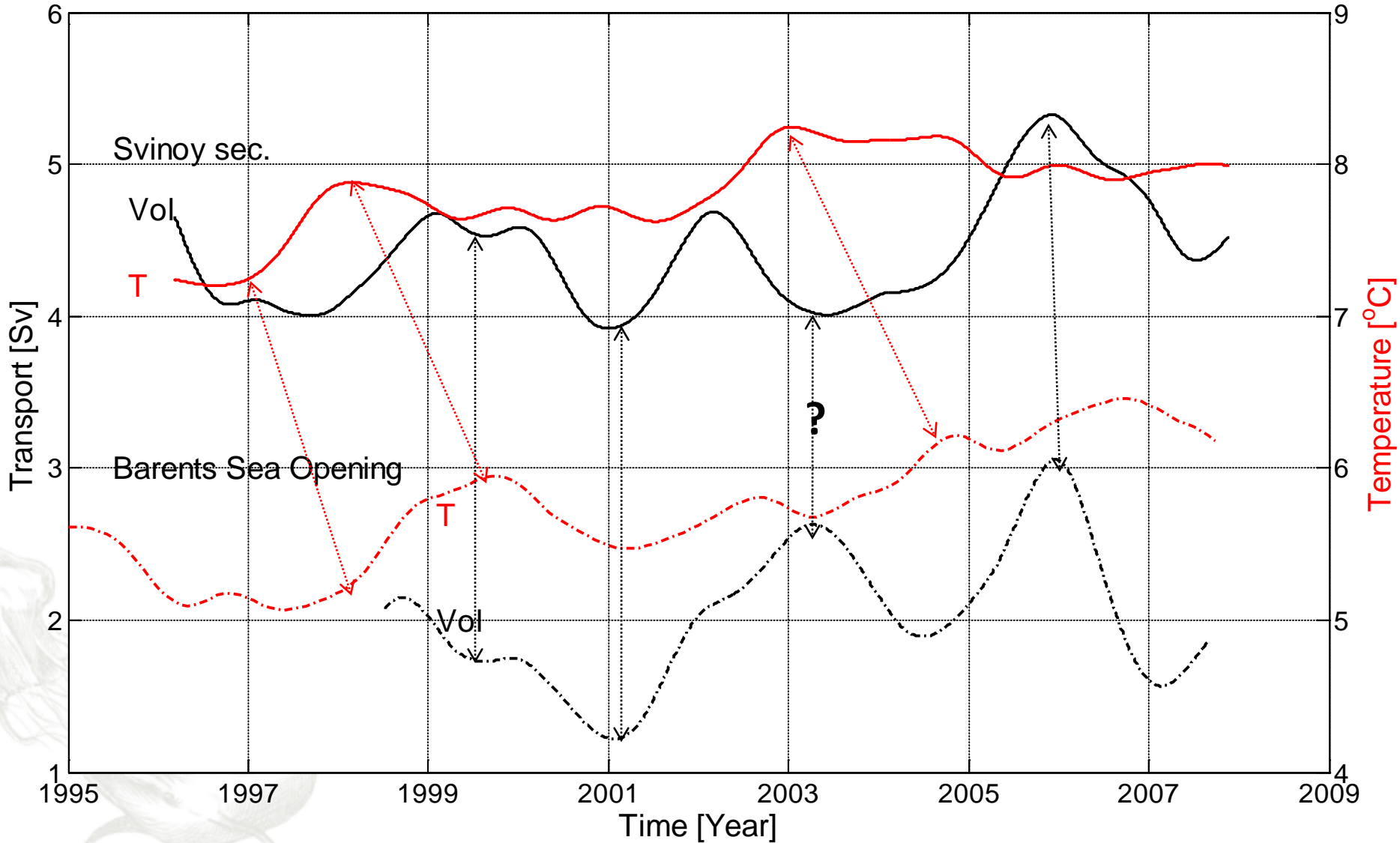


Figure: Time series of Atlantic Water in the Svinøy section and in the Barents Sea Opening. One-year smoothed data.

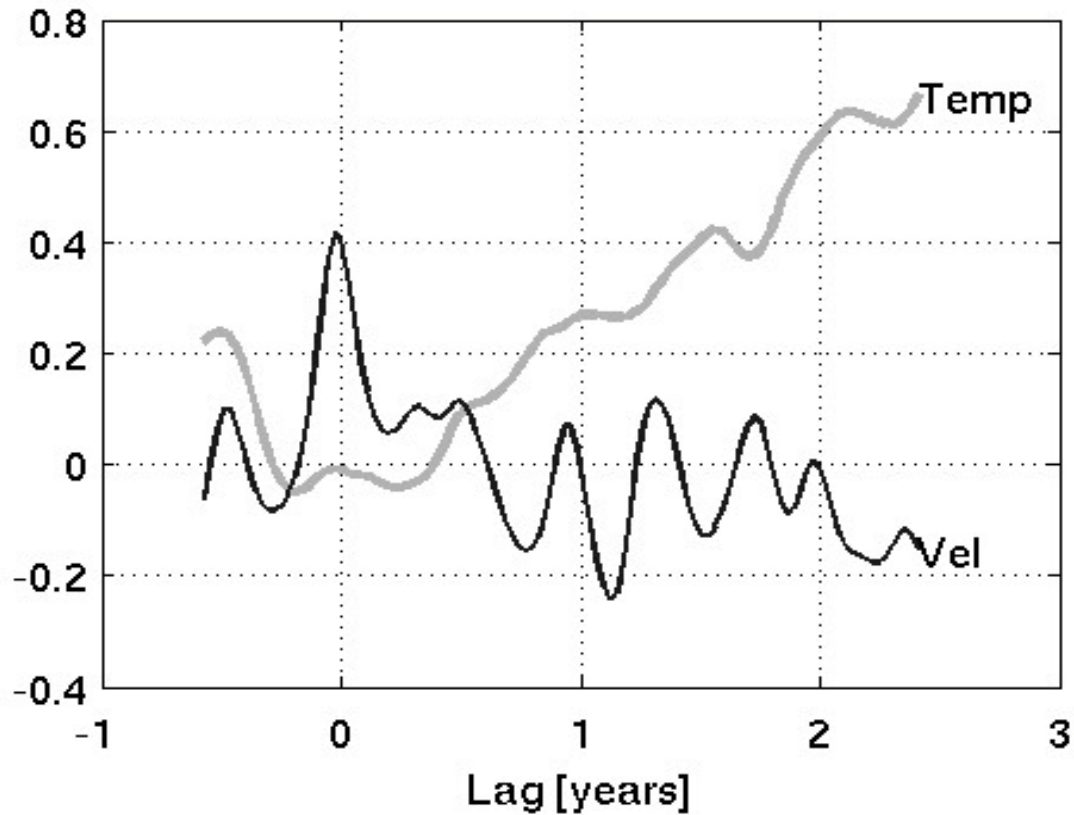
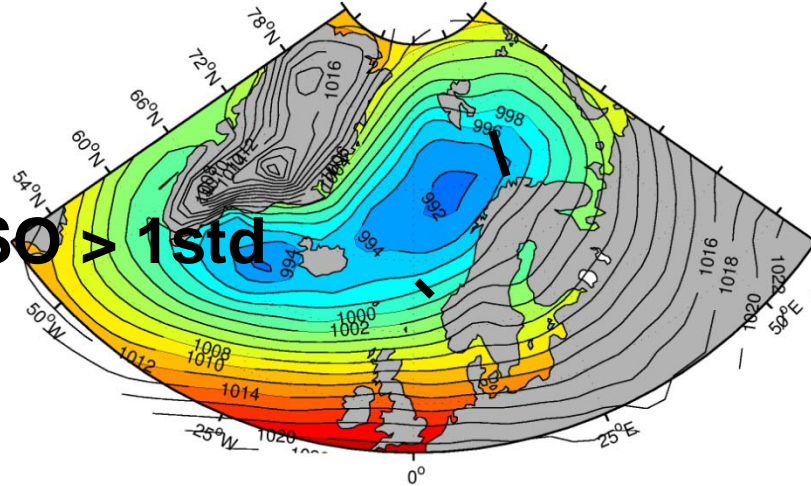


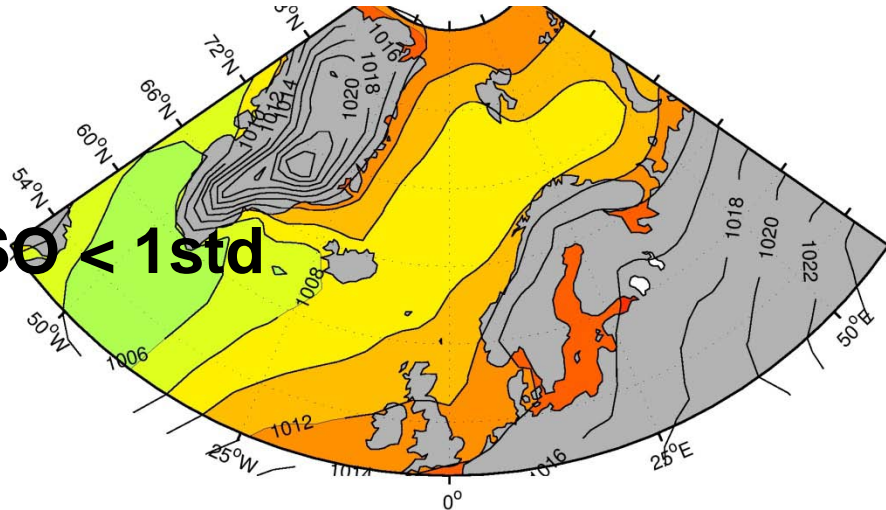
Figure: Correlation for V and T between Svinøy section and the Barents Sea Opening in time series on previous slide.

# Forcing: MSLP patterns

Case: Svinøy > 1std & BSO > 1std



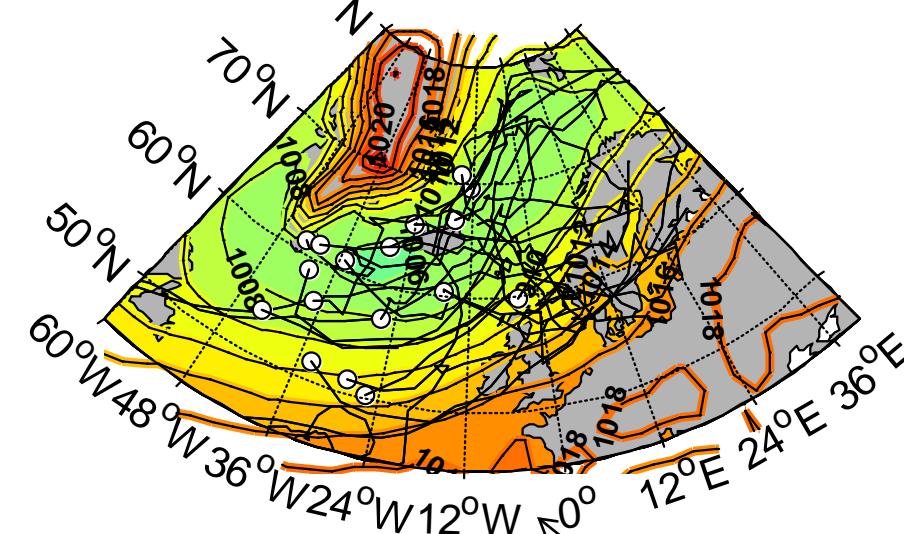
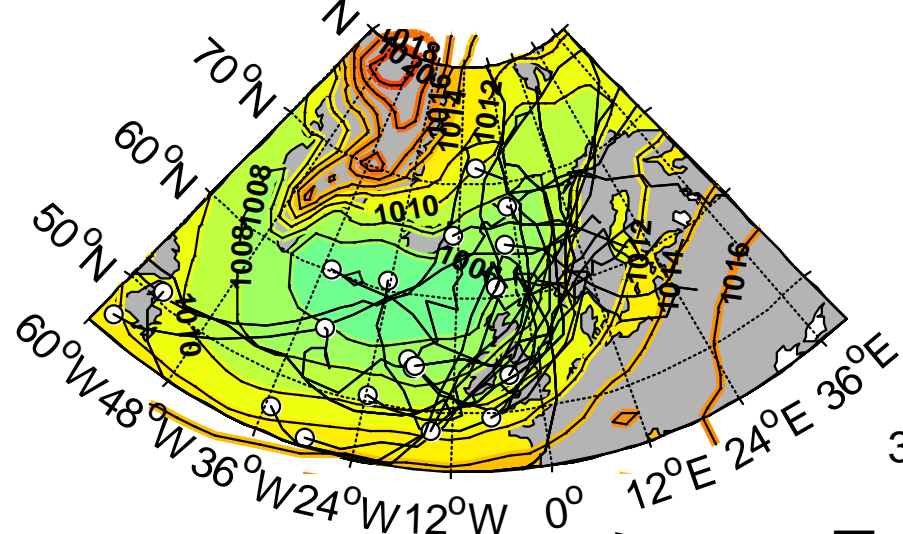
Case: Svinøy < 1std & BSO < 1std



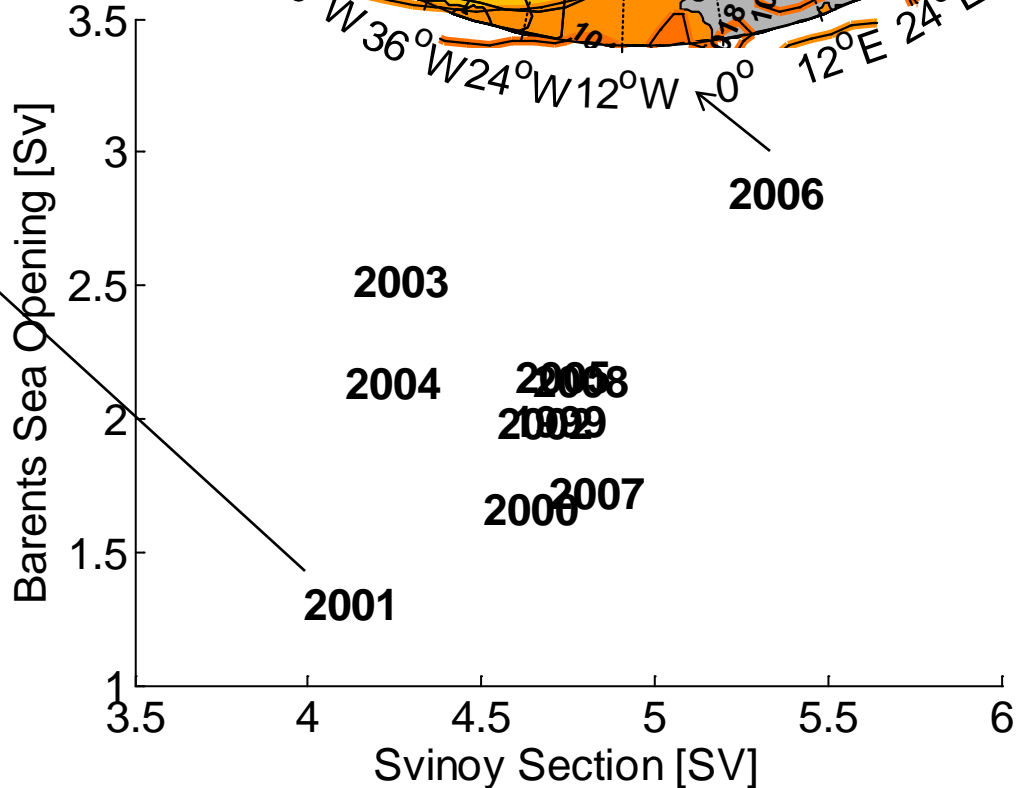
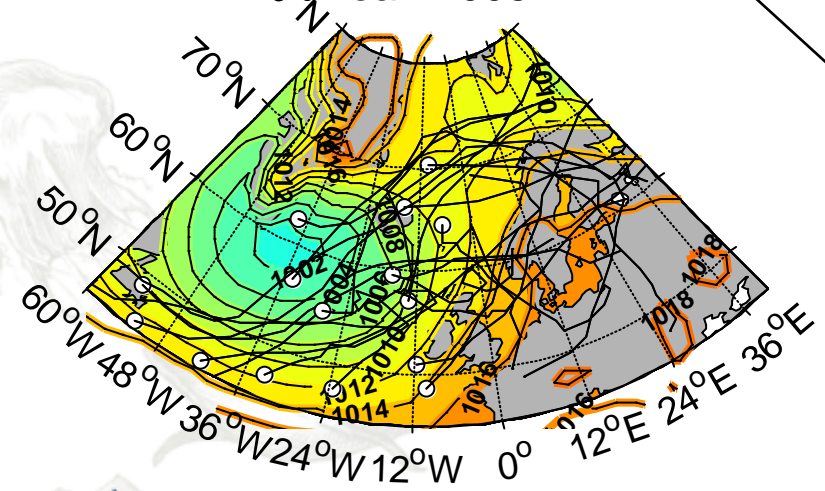
# Svinøy vs Barents: Transport and forcing

Year: 2001

Year: 2006

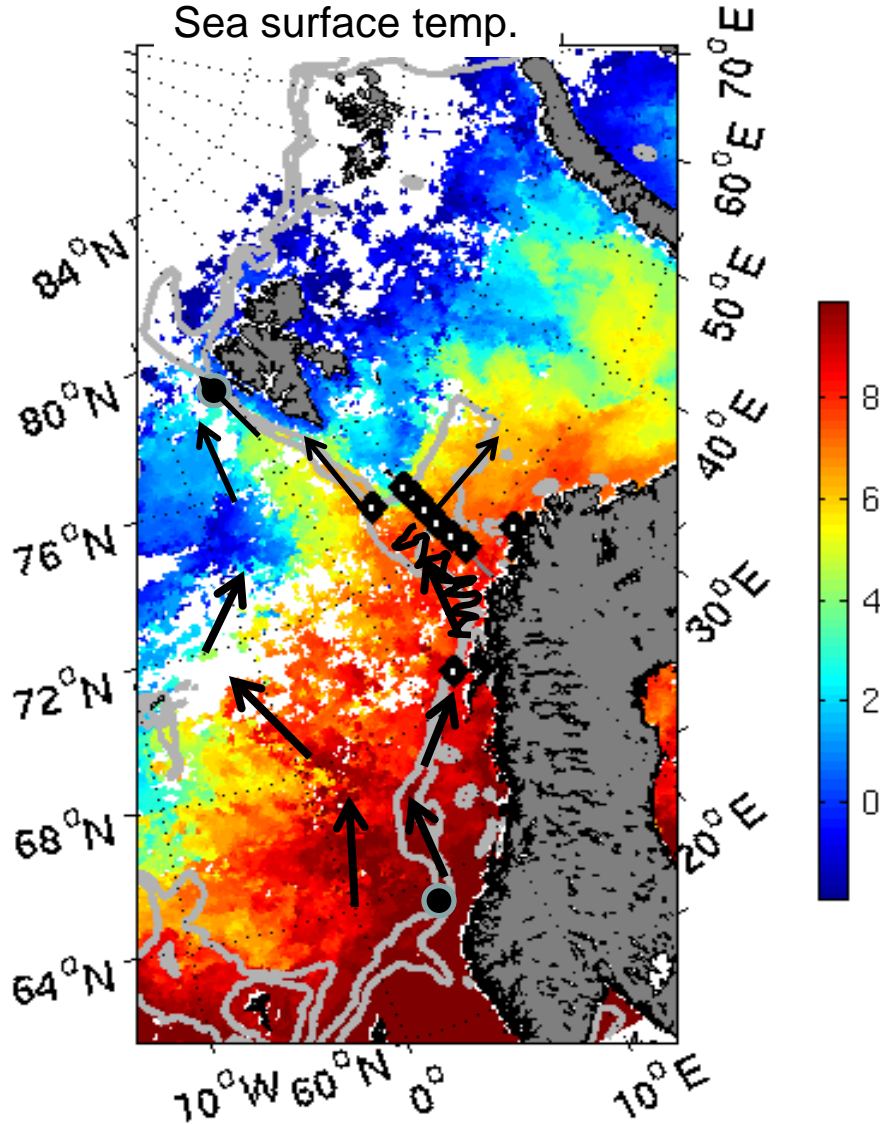


Year: 2003



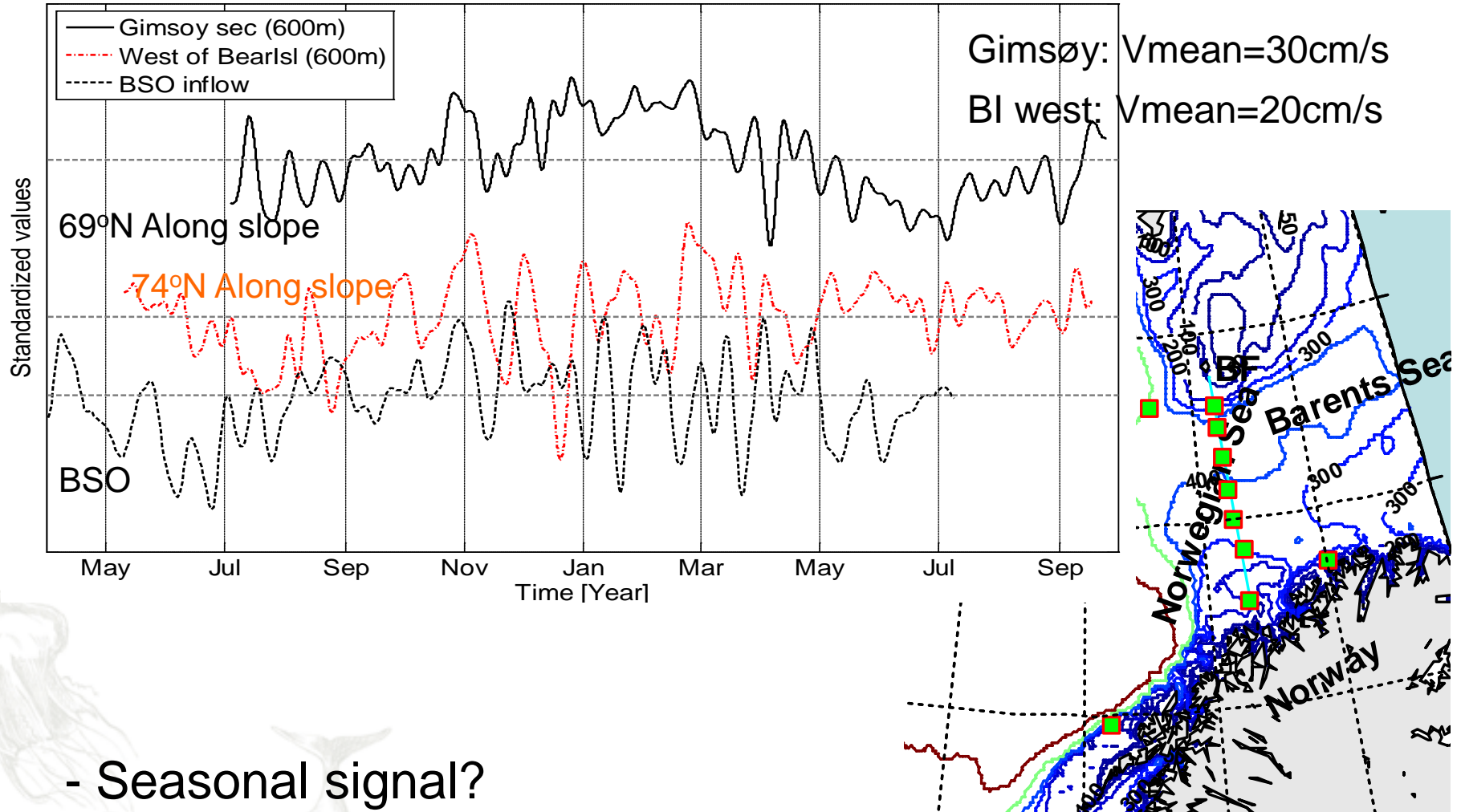


# The northward Atlantic Water fluxes through the Norwegian Sea



- Covariability of the NwAC
- Splitting of the current in western Barents Sea

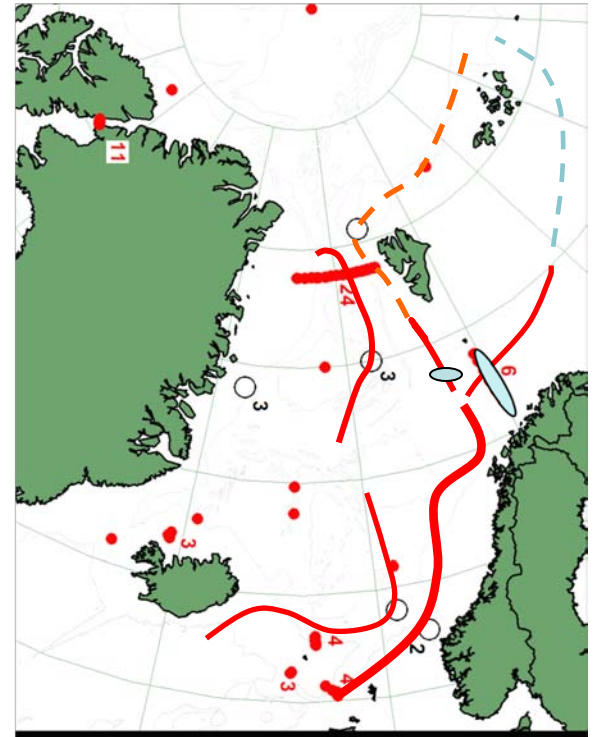
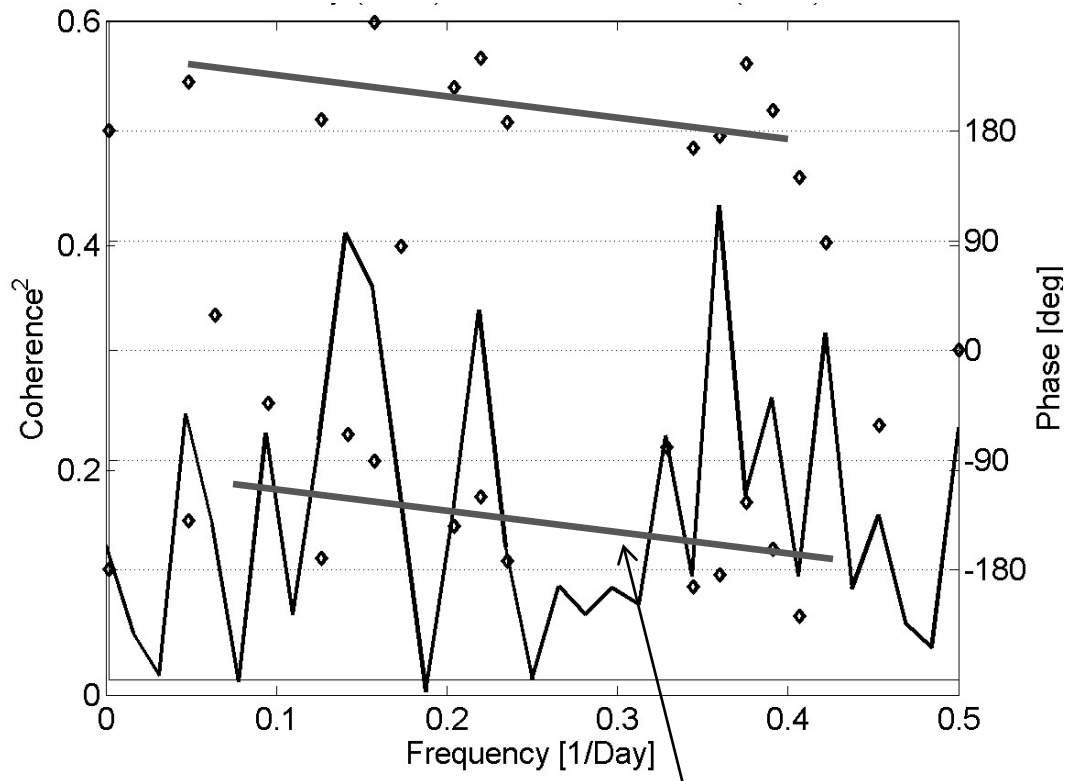
Circulation in the western Barents Sea



- Seasonal signal?
- BSO and 74°N in opposite phase? On what time scale?
- Of relevance for the BSO – Fram Str comparison?

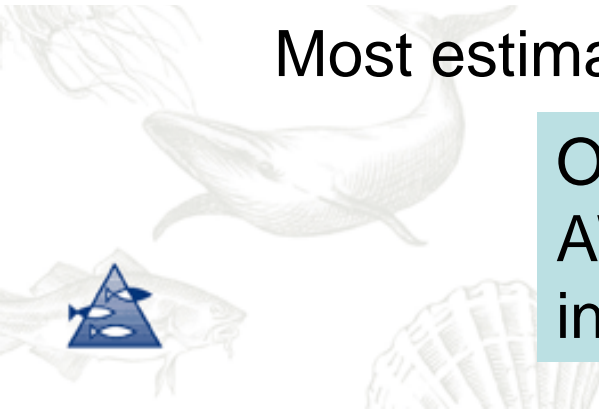


# Barents Inflow versus Bear Island west; Phase relation?

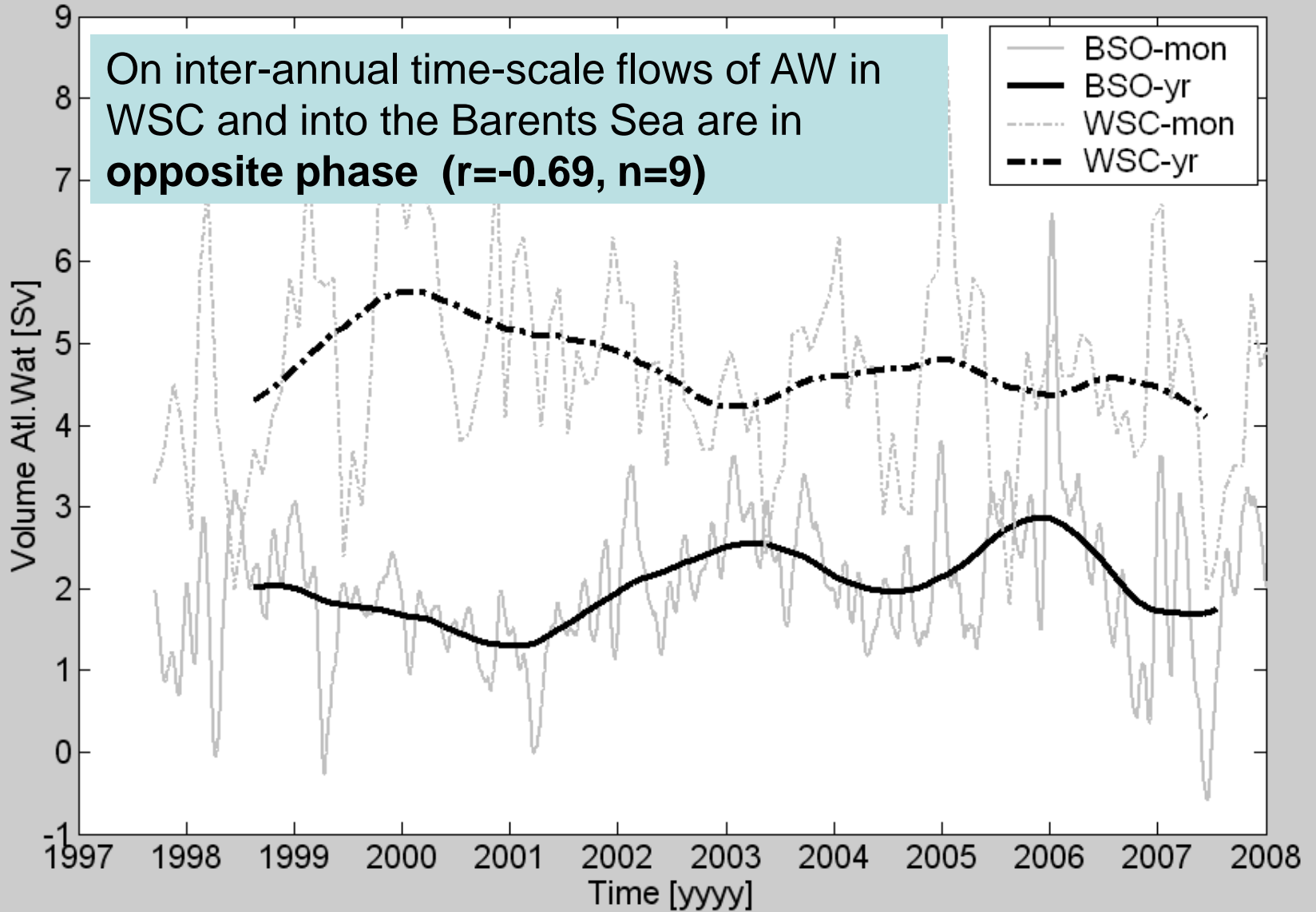


Most estimates in range [-270 to -90]

On time-scale [days to weeks] the flows of AW in WSC and into the Barents Sea are in **opposite phase**

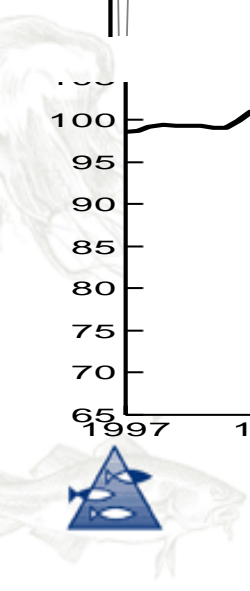
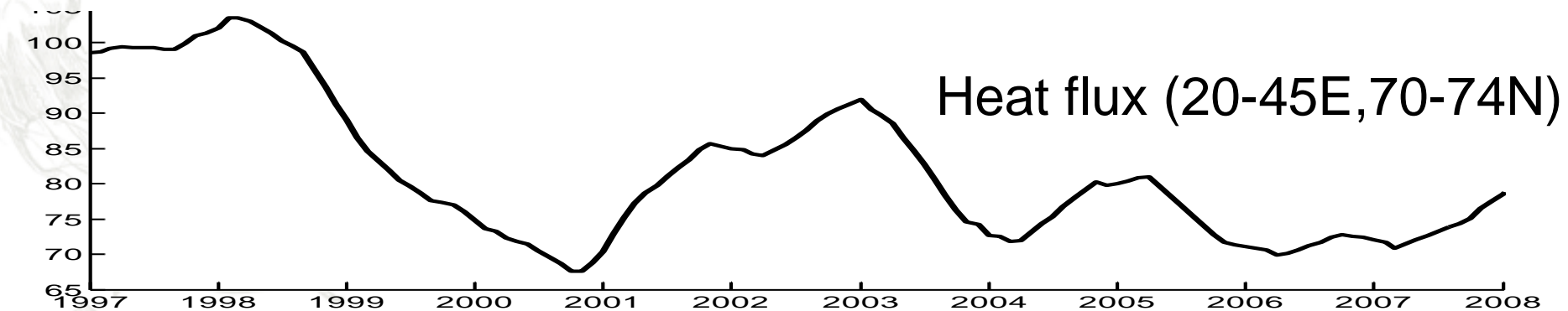
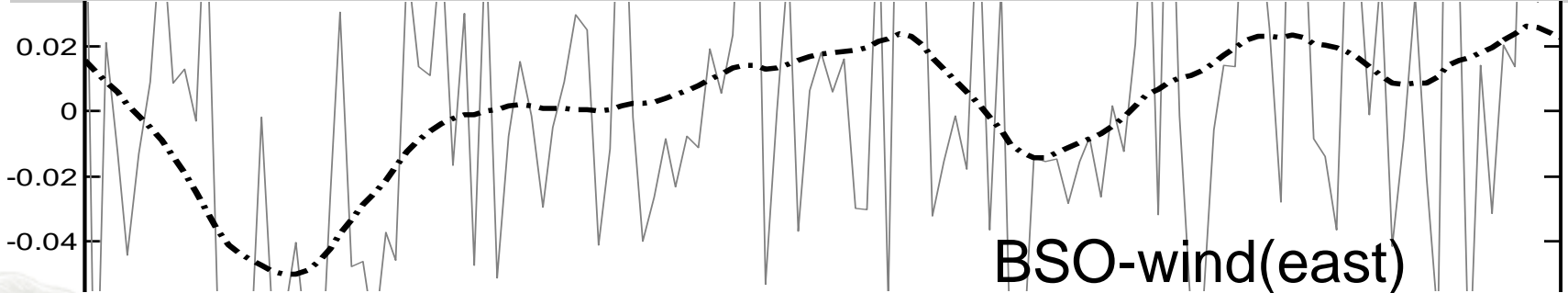
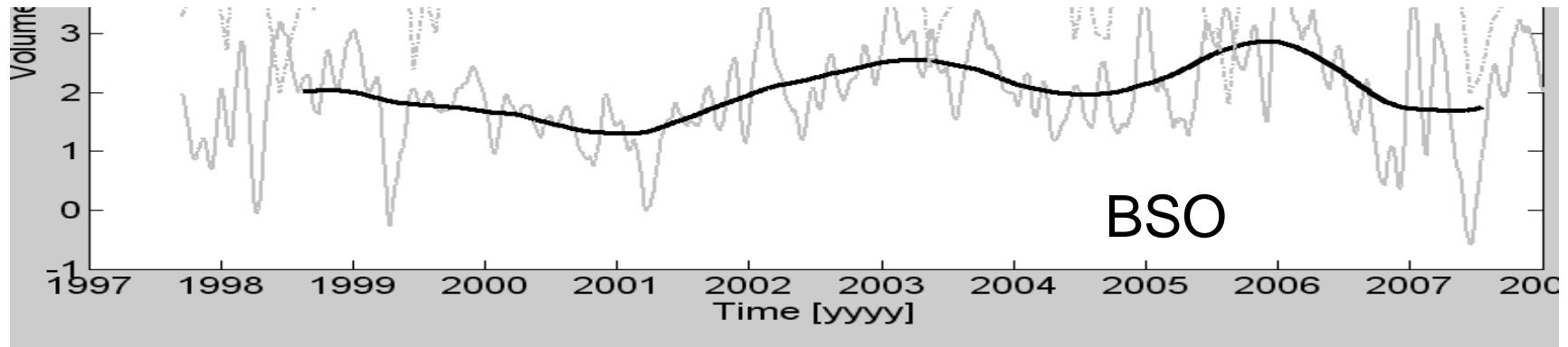


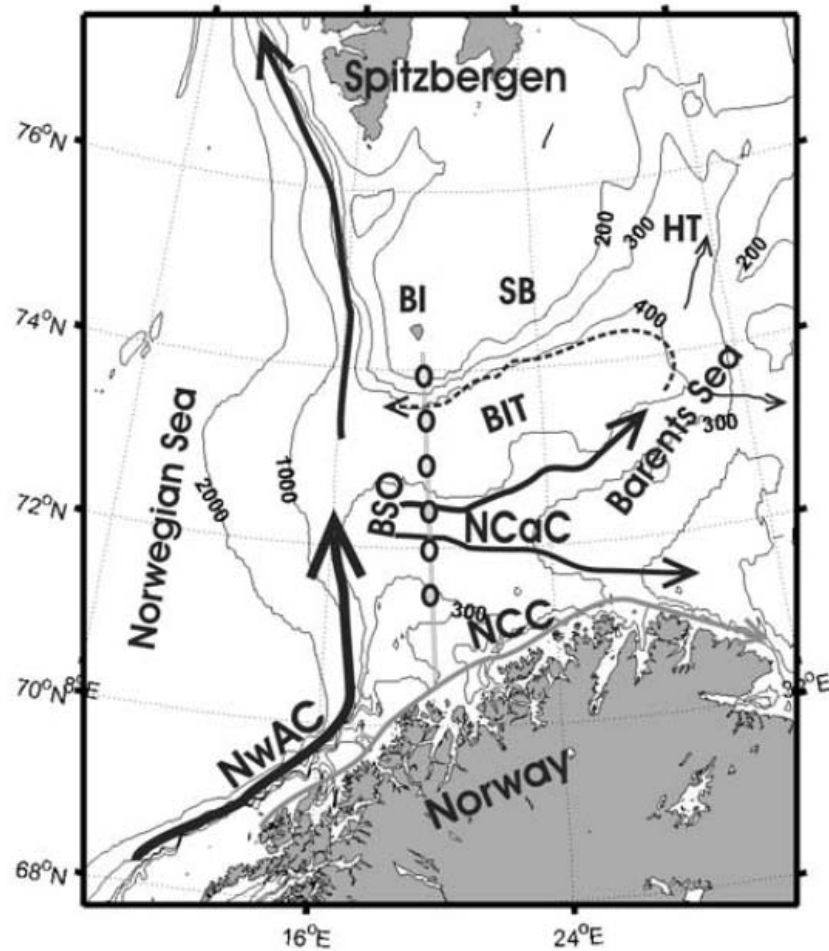
### Barents Sea vs West-Spitzbergen Current



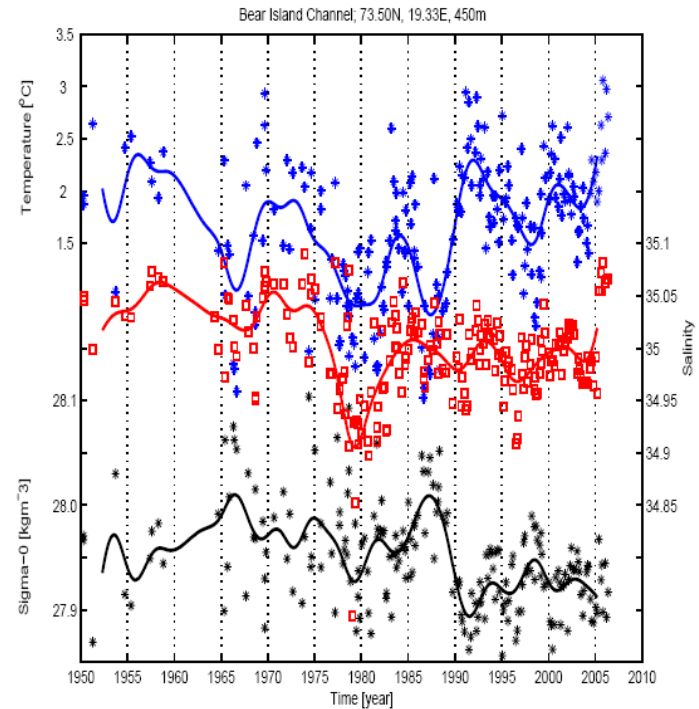


# What controls the variability of the Barents Sea inflow?





**Figure 1.** Map of the investigation area including selected depth contours and schematic of the currents. The BSO along the 20°E meridian is indicated in gray with filled circles showing the mooring positions. Abbreviations are explained in the text.



**Figure 3.** Temperature, salinity and sigma-0 in the Bear Island Channel at 450 m depth in position 73°30'N, 19°20' E (Fig.1). The dots are the raw data, and two-year low-pass filtered data are solid lines.

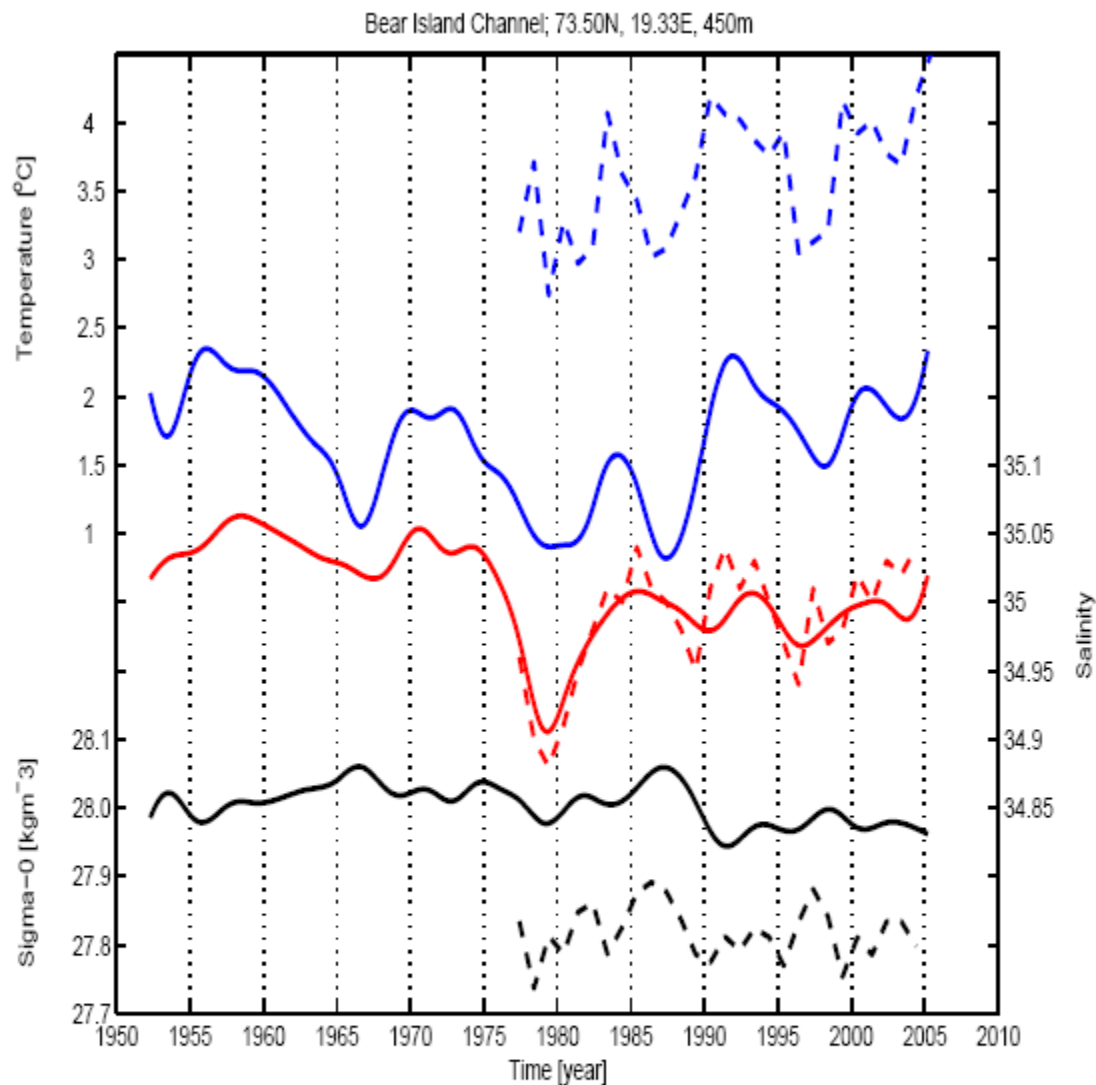
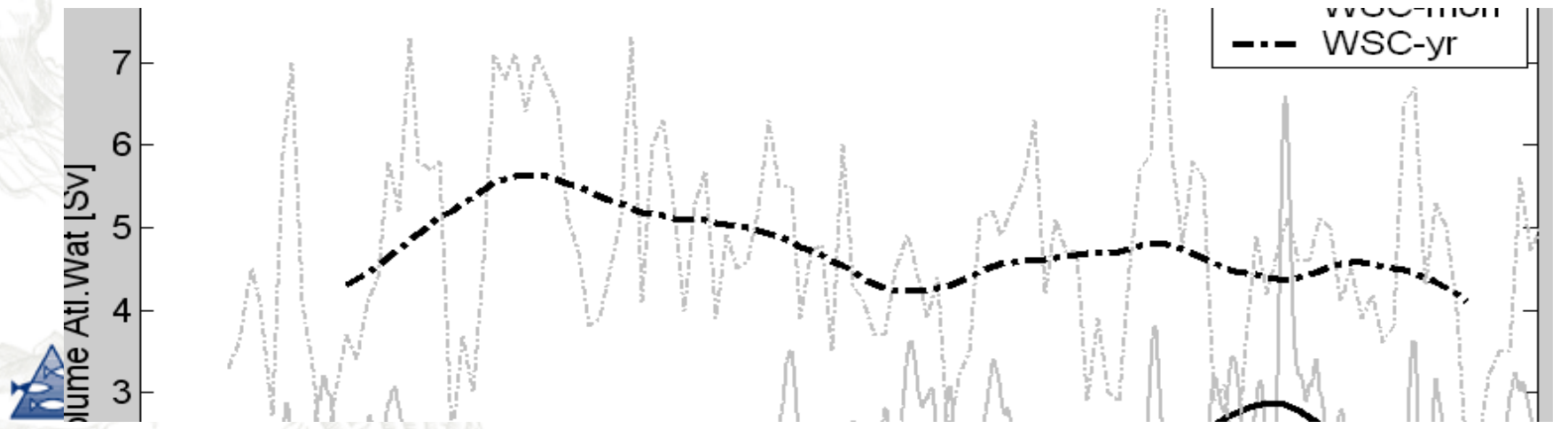
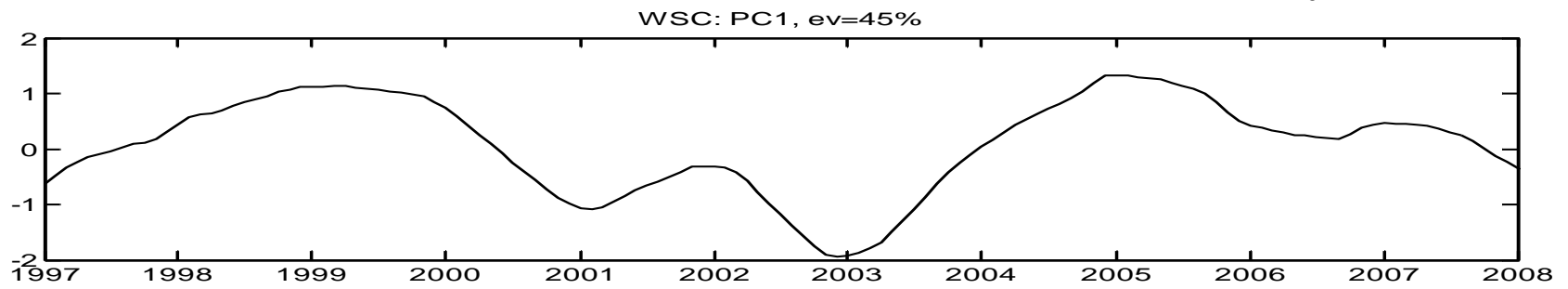
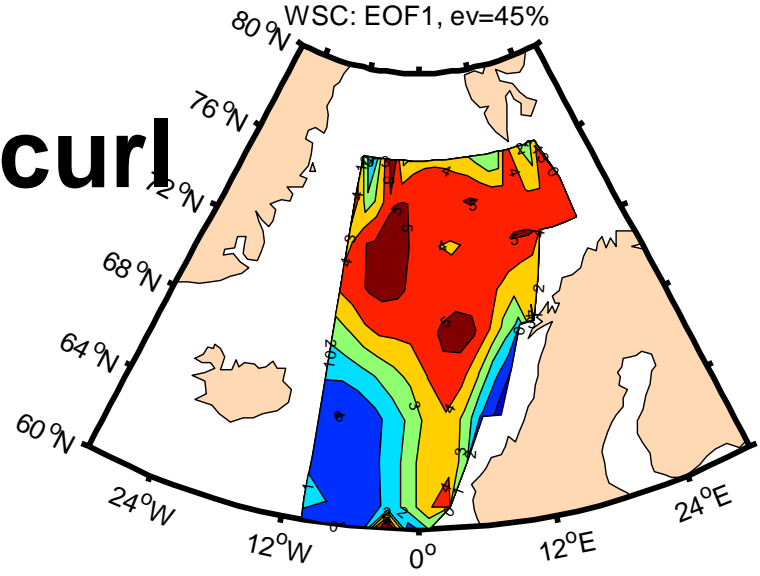
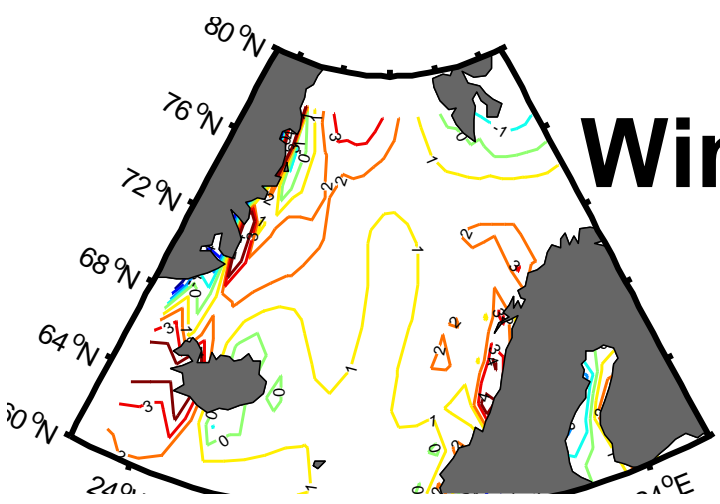


Figure 4. Solid line are the two-year low pass filtered temperature (blue), salinity (red) and sigma-0 (black) in the Bear Island Channel at 450 m depth in position 73°30'N, 19°20'E (Fig.1). Dashed lines are the Atlantic Water Barents Sea Inflow index. Defined as average between 71°30'N-73°30' N over the depth range 50-200m.

# Wind stress curl vs WSC

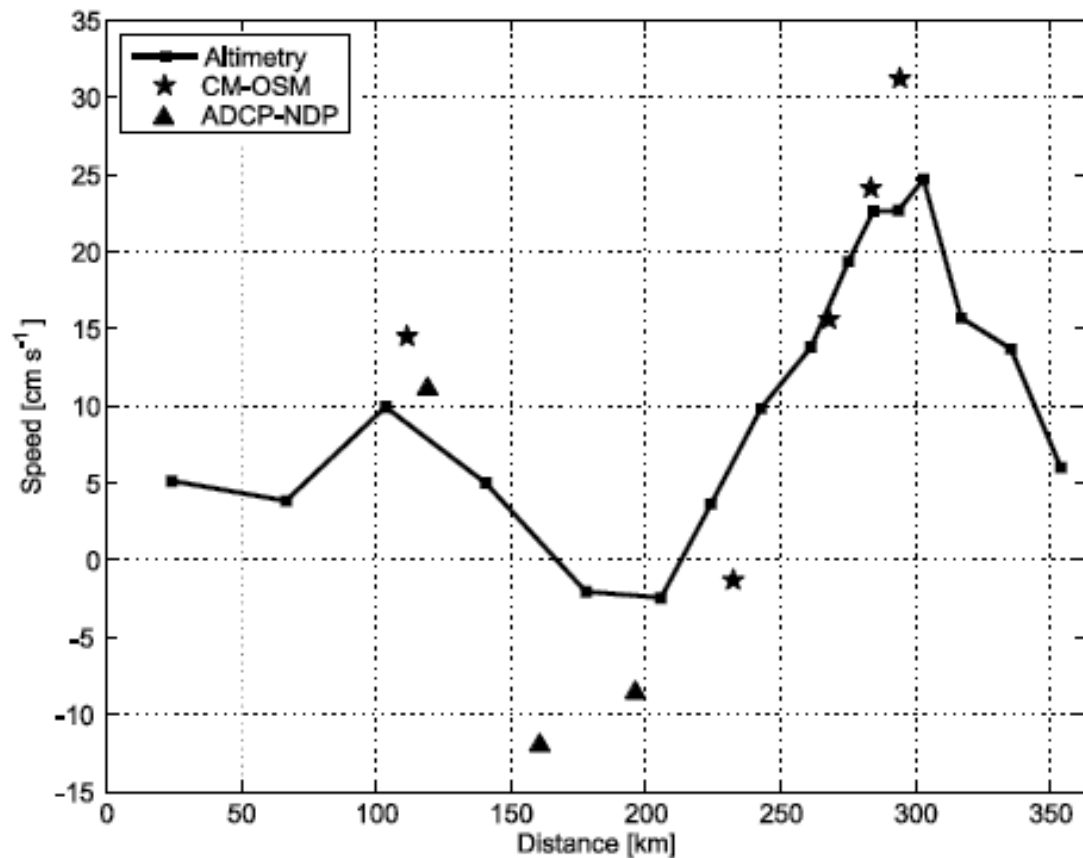




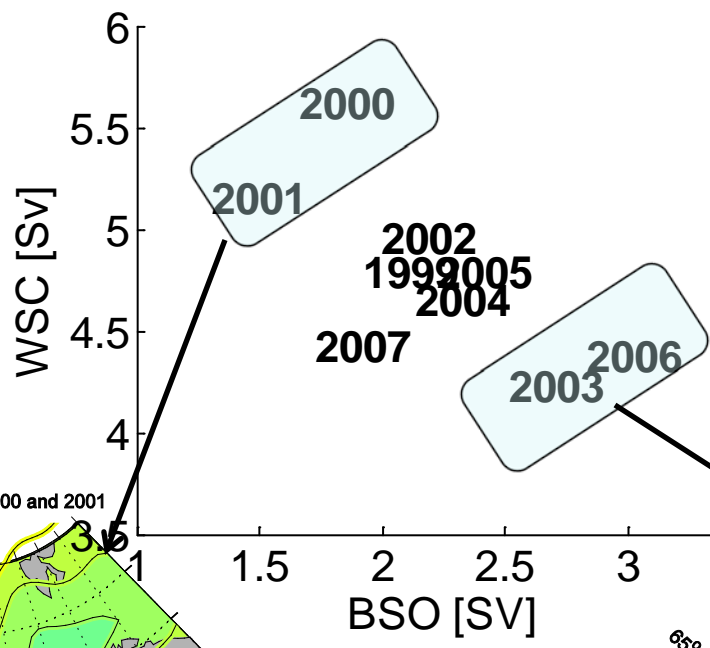
# Conclusion

- Atlantic Inflow to Barents Sea and WSC are **out of phase** [weeks to inter-annual]
- FramStr (WSC) varies with the WSC in the NS
- BSinflow varies with 1) the local easterly wind and 2) density contrast between BSwater and AI water.
  - 1) related to stormtracks
  - 2) connected to timescale of the BS circulation, and local air-sea heat loss

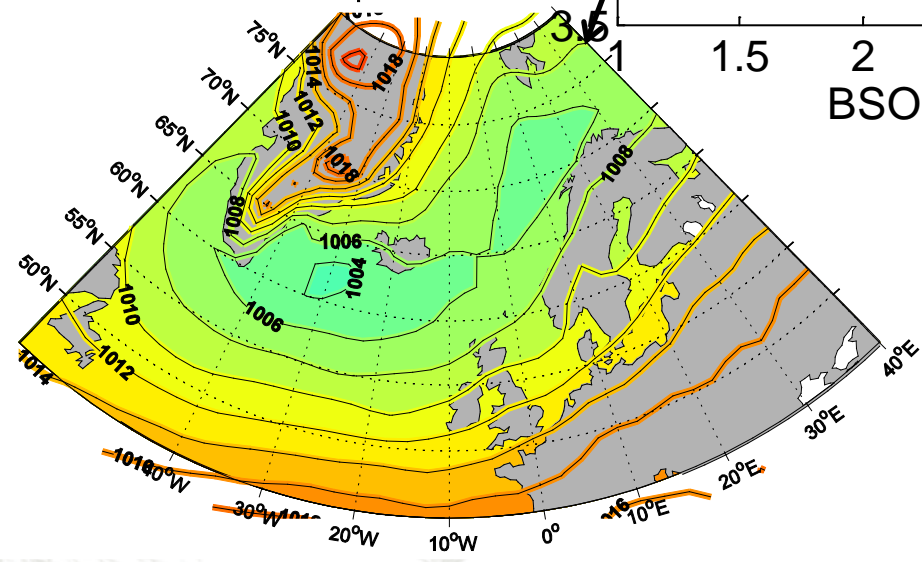




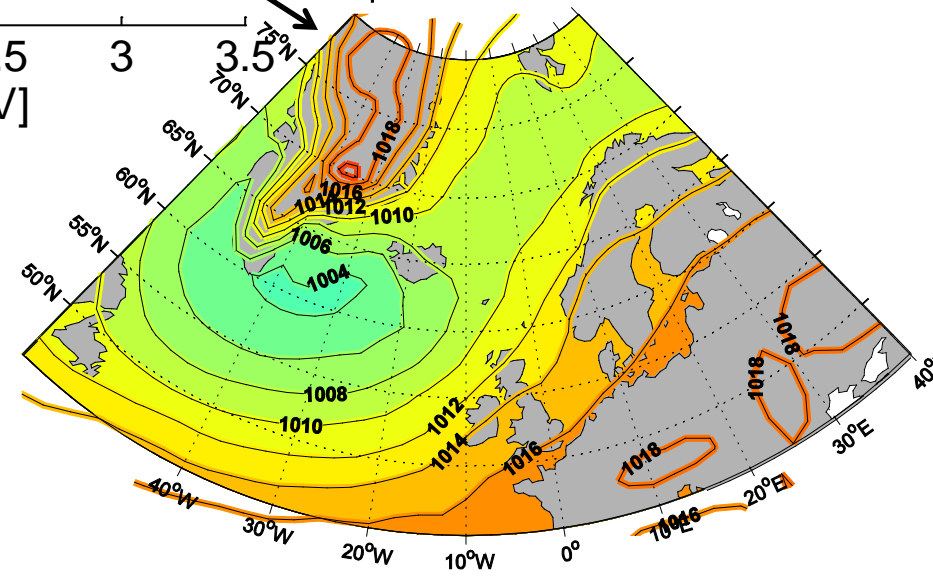
510 Figure 8. Mean speed of surface velocity across the Svinøy section from the altimetry data. Speeds, at 100 m depth, from single CMs from Orvik et al. (2001, ref OSM) and ADCPs from the Norwegian Deep Water Current programme (ref NDP) are included.



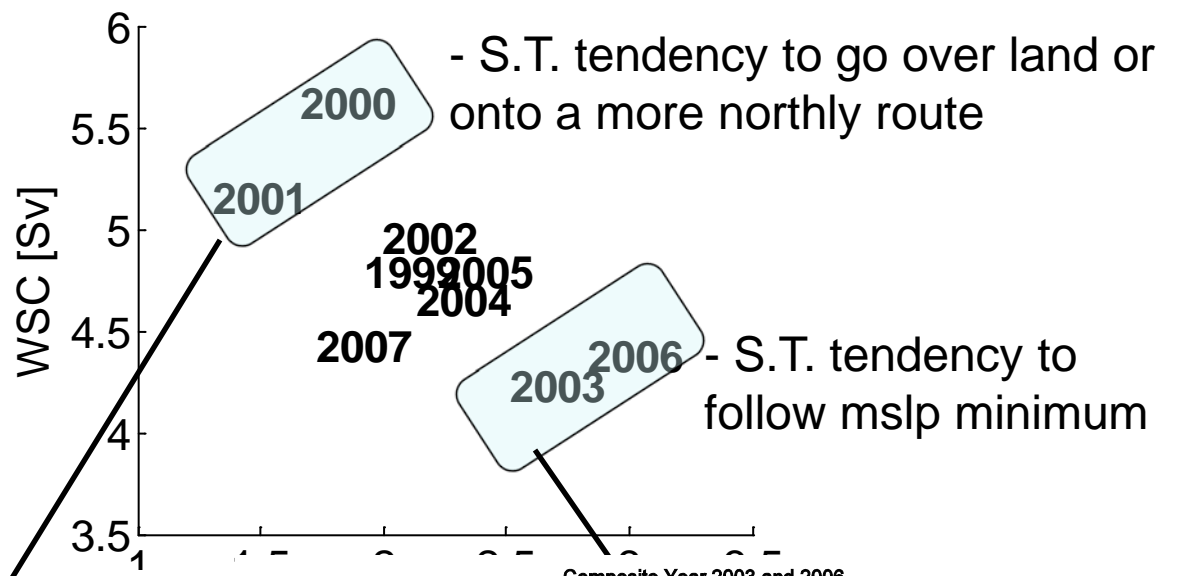
Composite Year 2000 and 2001



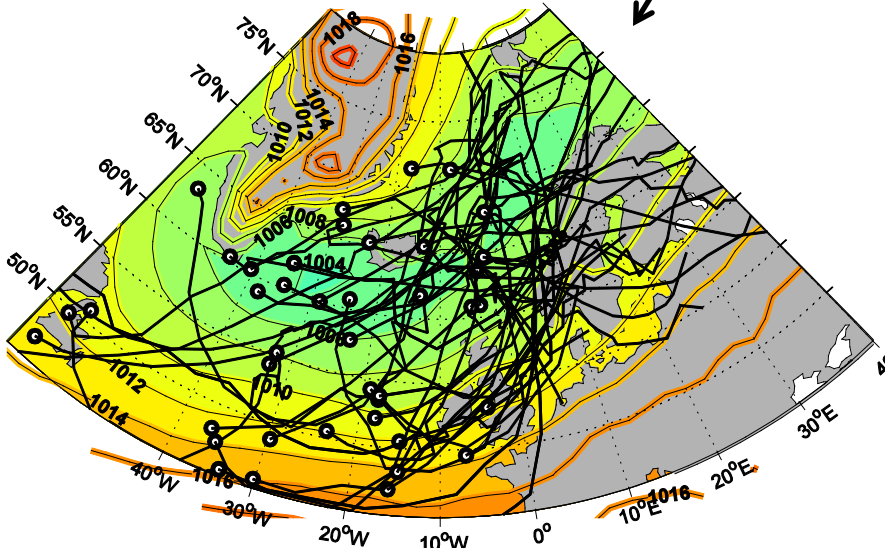
Composite Year 2003 and 2006



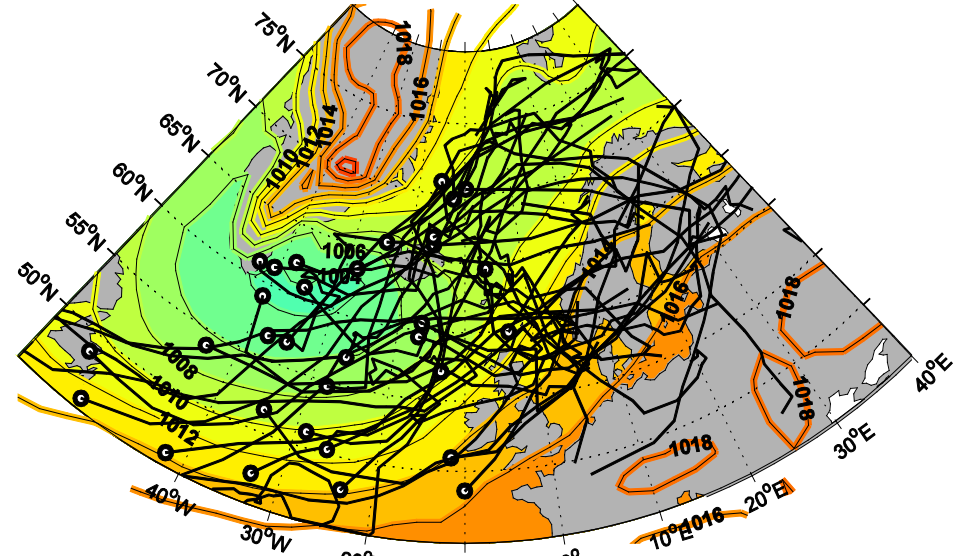
# Stormtracks and mslp



Composite Year 2000 and 2001



Composite Year 2003 and 2006



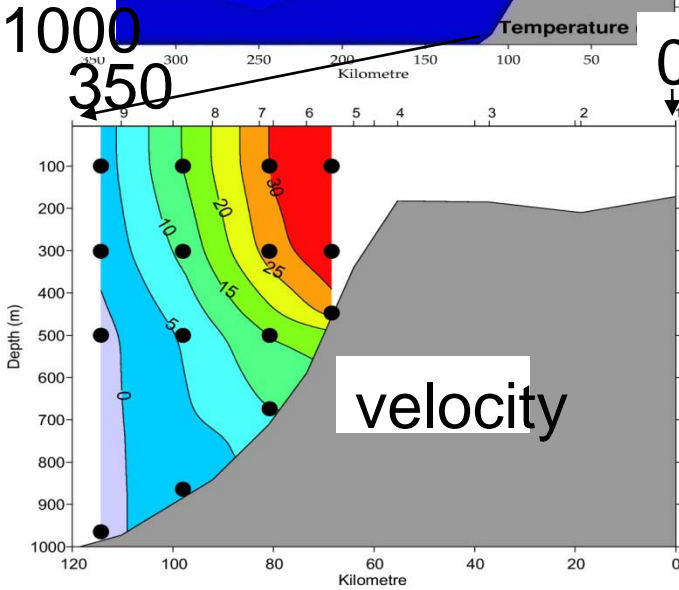
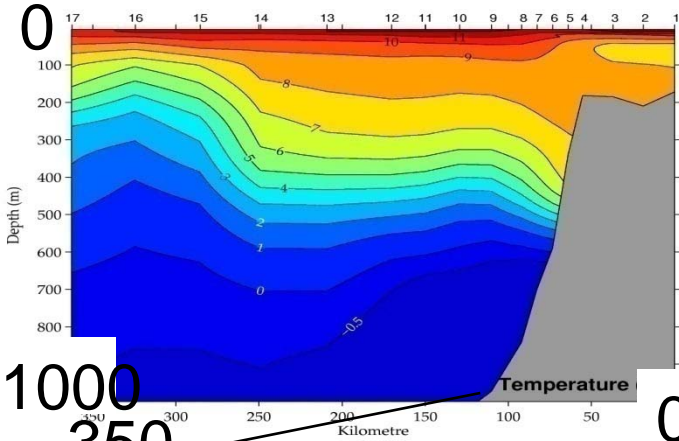
*Hypothesis: The wind forcing determines the Barents inflow, the residual flux go to Fram Str.*





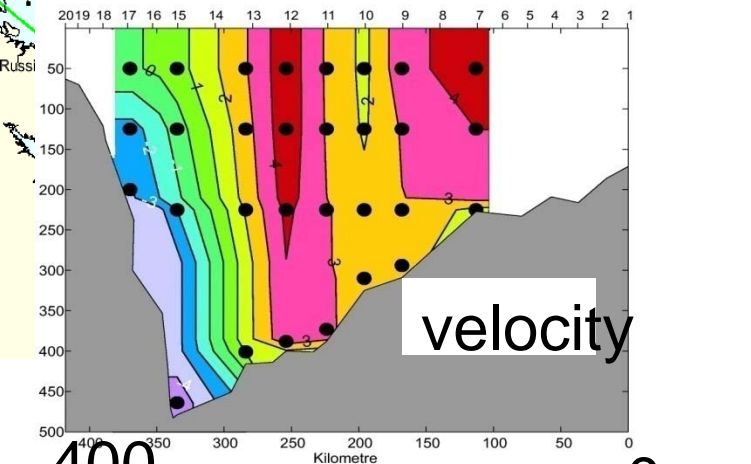
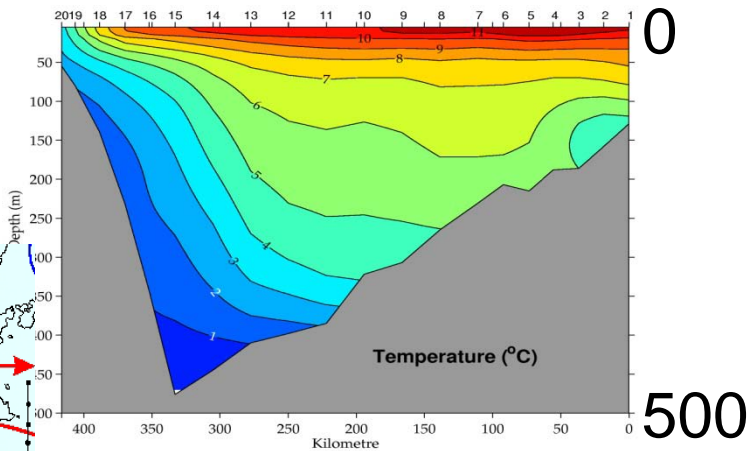
# Structure of Atlantic water

## Svinøy section



Width~40km  
Velocity~30cm/s

## Barents Sea Opening



Width~200km  
Velocity~5cm/s

Skagseth et al.  
2007

