Northern Seas observations and mechanisms

1. chain of events
2. timing
3. magnitudes

model evaluation

Arctic Sept sea ice cover (Stroeve et al. 2012)

...simulated trends from the models contributing to CMIP5 are more consistent with observations over the satellite era (1979–2011). Trends from most ensemble members and individual models nevertheless remain smaller than the observed value.
The Arctic/Atlantic THC

Observed GSR hydrography 1950–2005

$$U_1 = \ldots$$
$$U_2 = \ldots$$
$$U_3 = \ldots$$

Eldevik and Nilsen, J. Clim., 2013

Explaining climate model Arctic/Atlantic THC

Bergen Climate Model

BCM time series courtesy of Iselin Medhaug and Helene R. Langehaug
1. chain of events
2. timing
3. magnitudes

Observed ocean climate
Holliday et al. 2007

Observed sources and variability... 1950–2005

Atlantic inflow
Arctic int water
Dense overflow

salinity
pot temp

Eldevik et al., Nature Geosci., 2009

Olsen et al. 2008, Nature

Overflow

obs vs GCM

Eldevik et al., Nature Geosci., 2009

Atlantic inflow anomalies of ±0.1 psu; ±1°C travel the basin in ≤5 yrs
Arctic int water
Dense overflow

Net: ±0.02 Sv; ±30 TW
Mechanisms for variable exchanges

1. chain of events
2. timing
3. magnitudes

- well-covered by qualitative and quantitative observations
- key mechanisms have been identified
- models can be confronted with observations/mechanisms
- constituting benchmarks, or at least hindcast evaluation

the Nordic and Barents seas are...