Seasonal mean heat budget of the NwAC branches

Is it possible to see where lateral heat loss occur?

Vigdis Tverberg

Norwegian Polar Institute

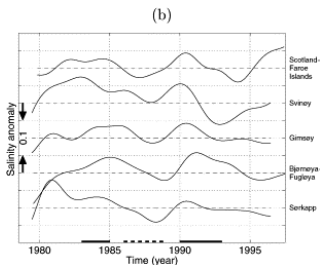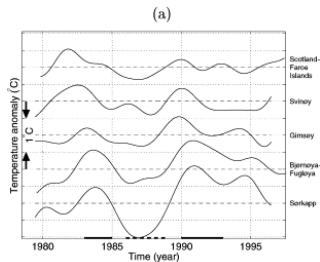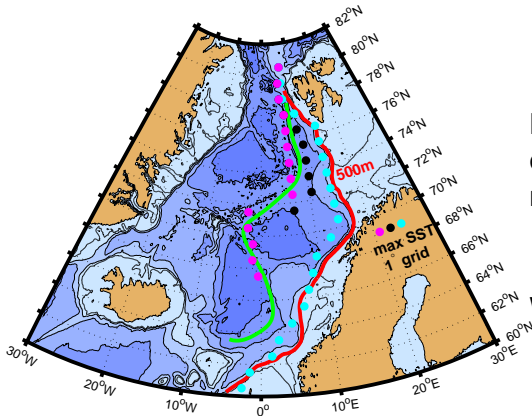31. August 2009

Outline

Bear Island Opening

(Furevik, 2001)

Time series of low passes filtered temperature and salinity anomalies along NwAC Propagation of anomalies e.g. 3.6cm/s
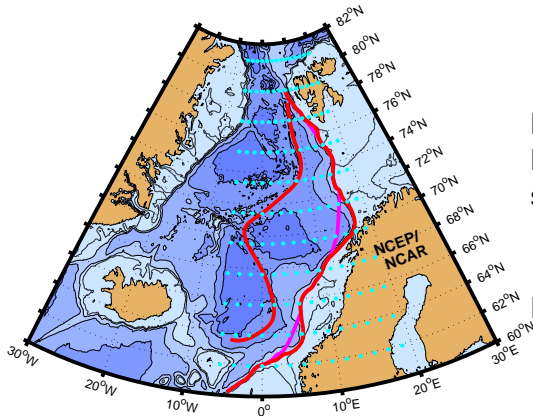
Heat budget along NwAC branches

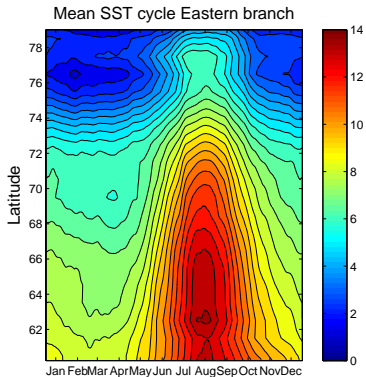NwAC branches and observed positions of max SST
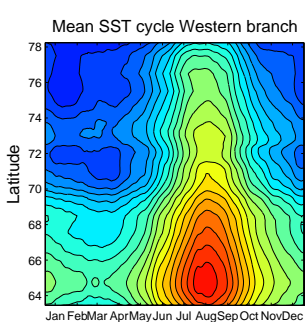
Weekly SST data
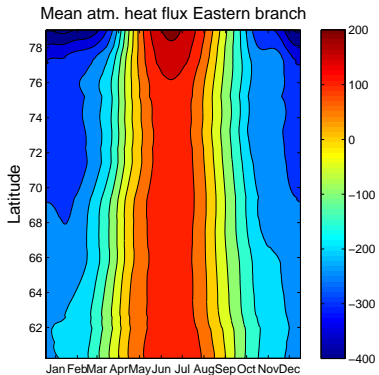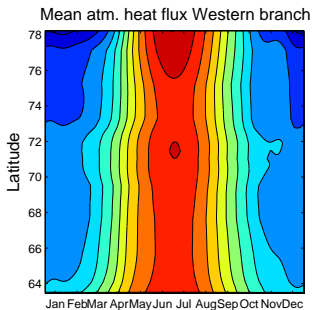
Heat budget along NwAC branches

NwAC branches and
NCEP/NCAR grid for
surface fluxes

Daily surface fluxes

SST, mean seasonal cycle

Mean SST cycle Western branch

Mean SST cycle Eastern branch

Sea surface heat flux, mean seasonal cycle

Mean atm. heat flux Western branch

Mean atm. heat flux Eastern branch

SST - 78.5N

SST at 78.5°N and CTD avg 0–50mm, 500m bottom depth
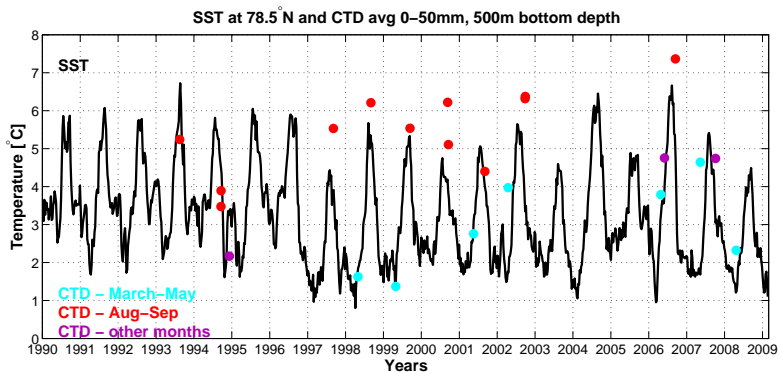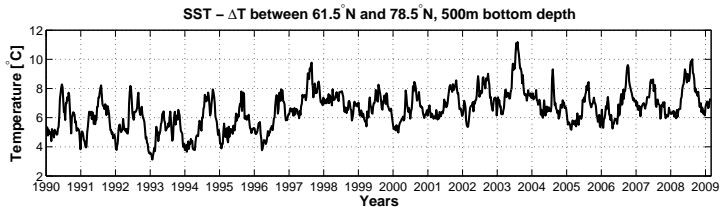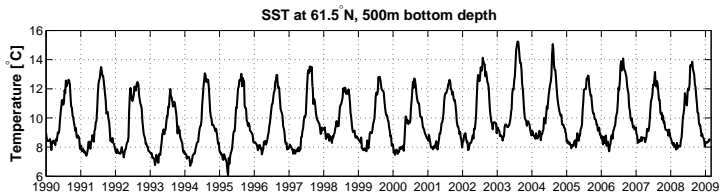
NwAC northern edge
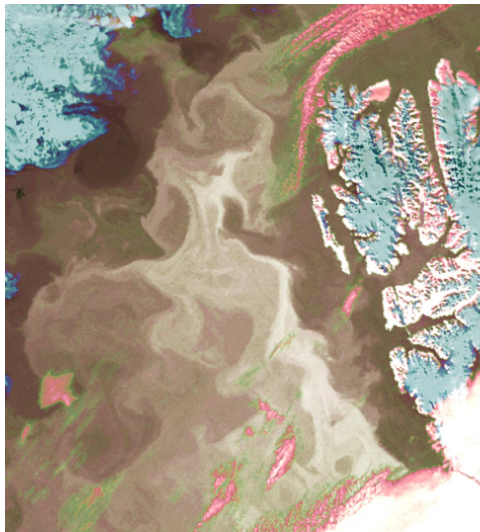
West Spitsbergen Current

SST image

courtesy: V. Pavlov

SST - 61.5N and difference

Heat equation

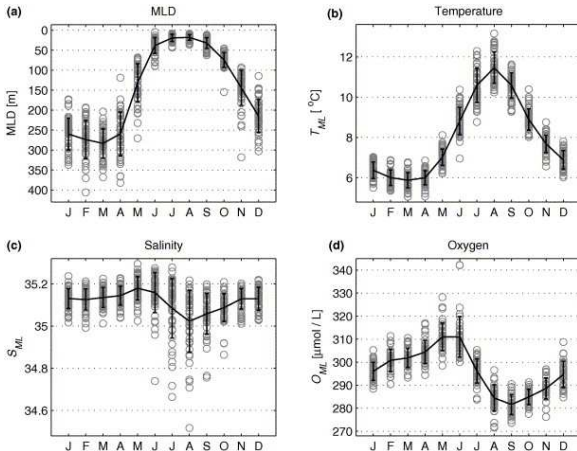Heat pr m^3:

$$q = \rho_w c_p \left(T - T_f \right)$$

Heat propagating along the NwAC branches:

$$\frac{\partial \bar{q}}{\partial t} + \overline{v} \frac{\partial \bar{q}}{\partial y} + \frac{\partial}{\partial x} \left(\overline{u'q'} \right) = \frac{Q}{H} - \frac{dH}{dt} \frac{\triangle q}{H}$$

Mean seasonal cycle, (T=1 year):

$$0 = \oint_0^T \frac{\partial q}{\partial t} dt + \overline{v} \frac{\partial \overline{q}}{\partial y} \oint_0^T dt = \oint_0^T \frac{Q}{H} dt$$
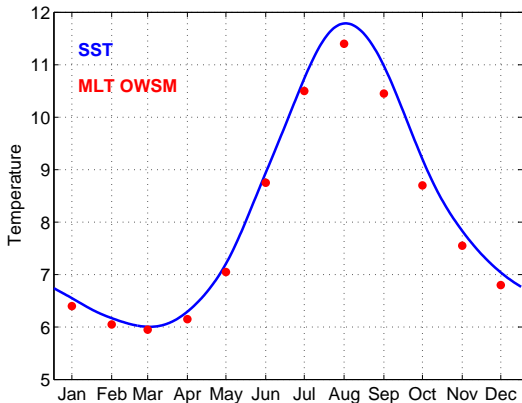
Ocean weather station MIKE
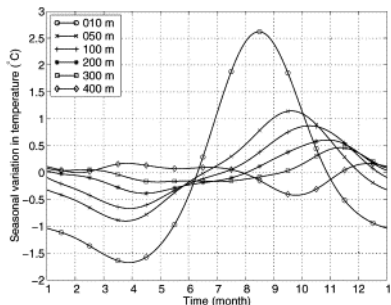

Monthly mean values at station M

(Nilsen and Falck, 2006)
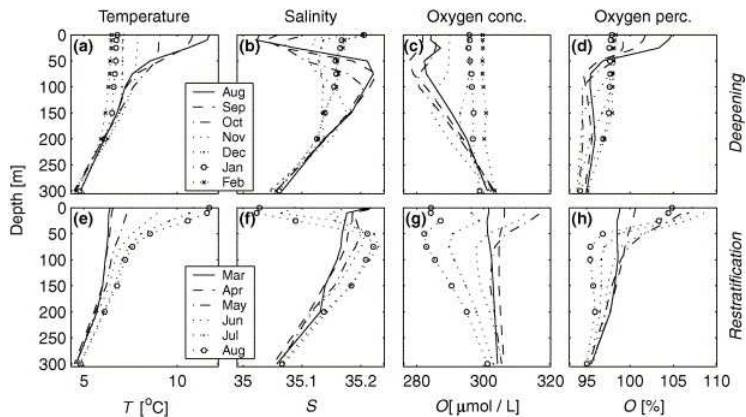
SST at Ocean weather station MIKE

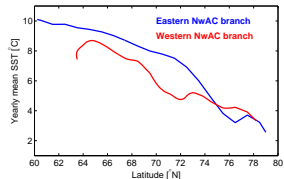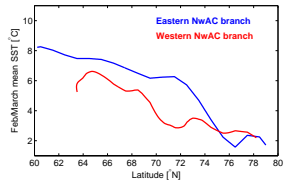Comparing SST and ml temperature at MIKE
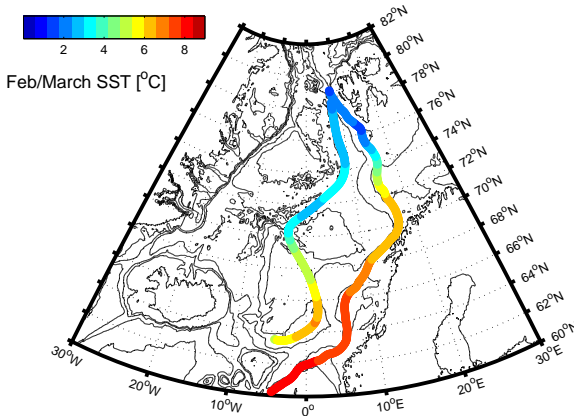
Bear Island Opening

Seasonal cycle of mean temperature at the Bjørnøya-Fugløya section (Furevik, 2001)

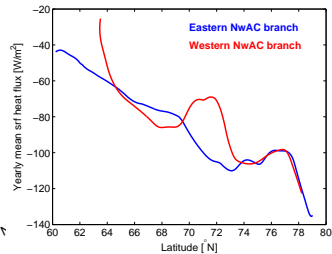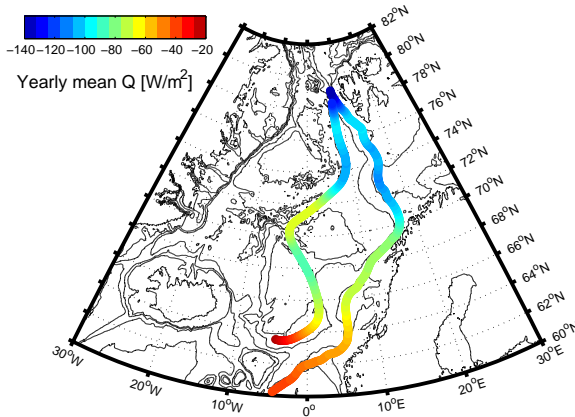# Ocean weather station MIKE

(Nilsen and Falck, 2006)

Mean SST, Feb/March and yearly mean

NCEP/NCAR yearly mean surface heat flux

Yearly mean propagation speed