



Are global models worse than regional ones in the Arctic?

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## AOMIP Atmospheric Forcing

- NCEP/NCAR daily surface air temperatures, and sea level pressure
- monthly climatological surface relative humidities, cloud fractions, and precipitation rates

## AOMIP Bulk formulas

Surface fluxes of heat, freshwater and momentum

Relaxation towards PHC SSSs during the first 11 years

**ORCA2-LIM** (global domain, roughly  $2^\circ \times 2^\circ$  resolution)

$dt = 15/d$

### LIM sea ice model

- 3-layer snow-ice model
- 2 level ice-thickness distribution
- Viscous-plastic rheology
- global set of parameters



### ORCA2 ocean model

- OPA 8.2 in a global configuration
- Primitive equations, free surface
- z-coordinate; 30 vertical levels
- level 1.5 turbulence closure



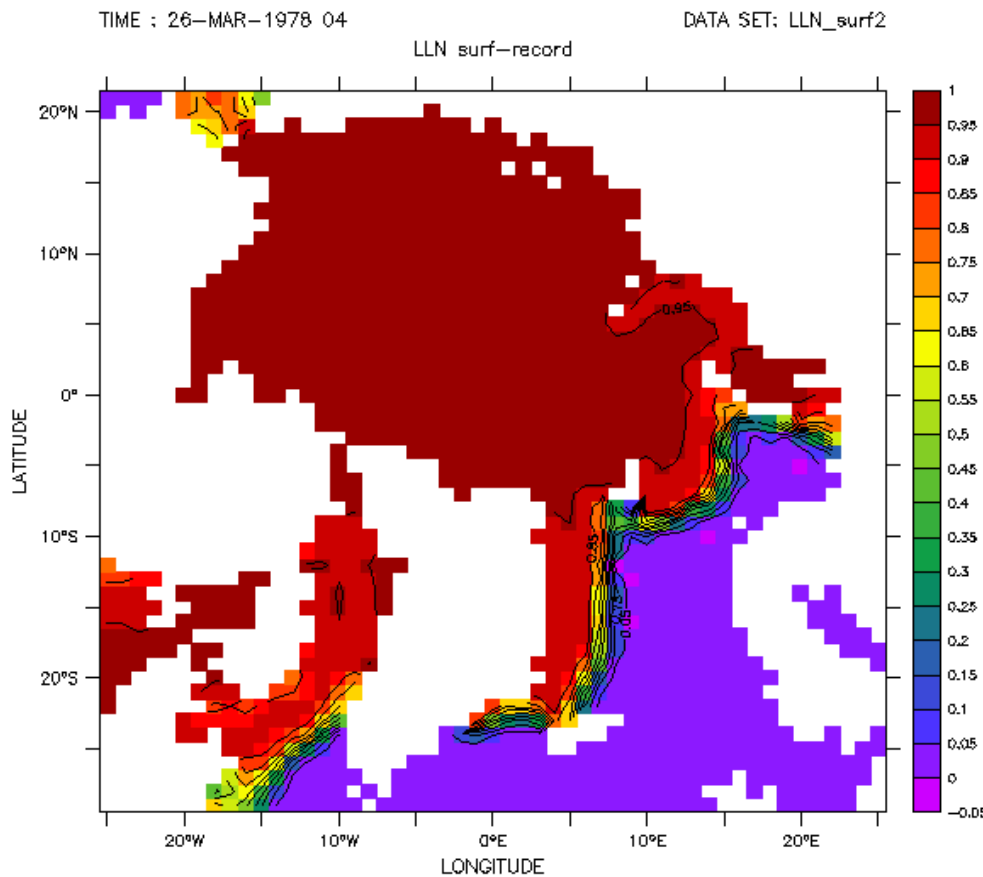
Non-AOMIP setup: different river input

# Simulated Ice extent in march 1978

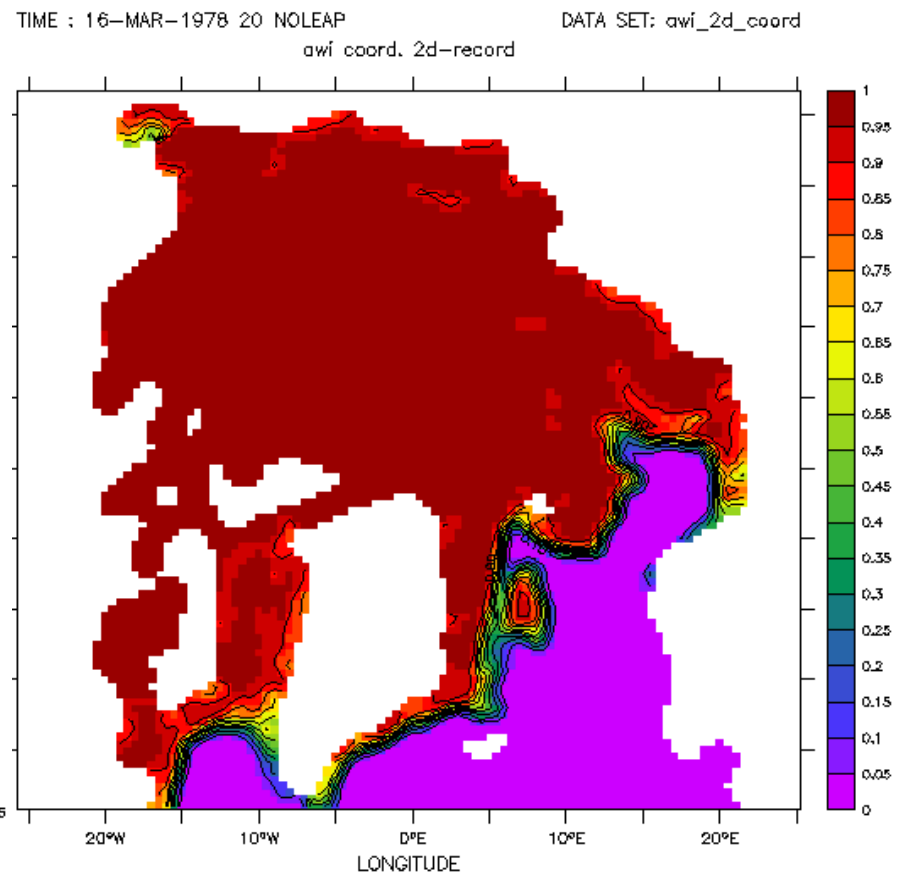


ORCA-LIM

AWI



Ice concentration (%)



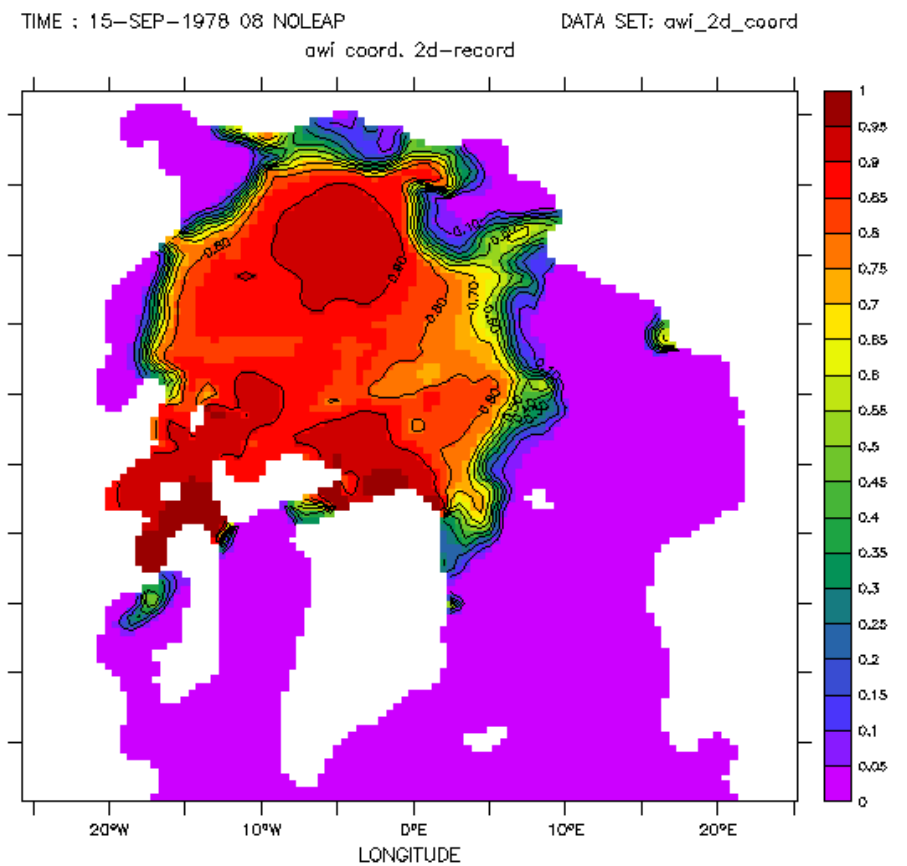
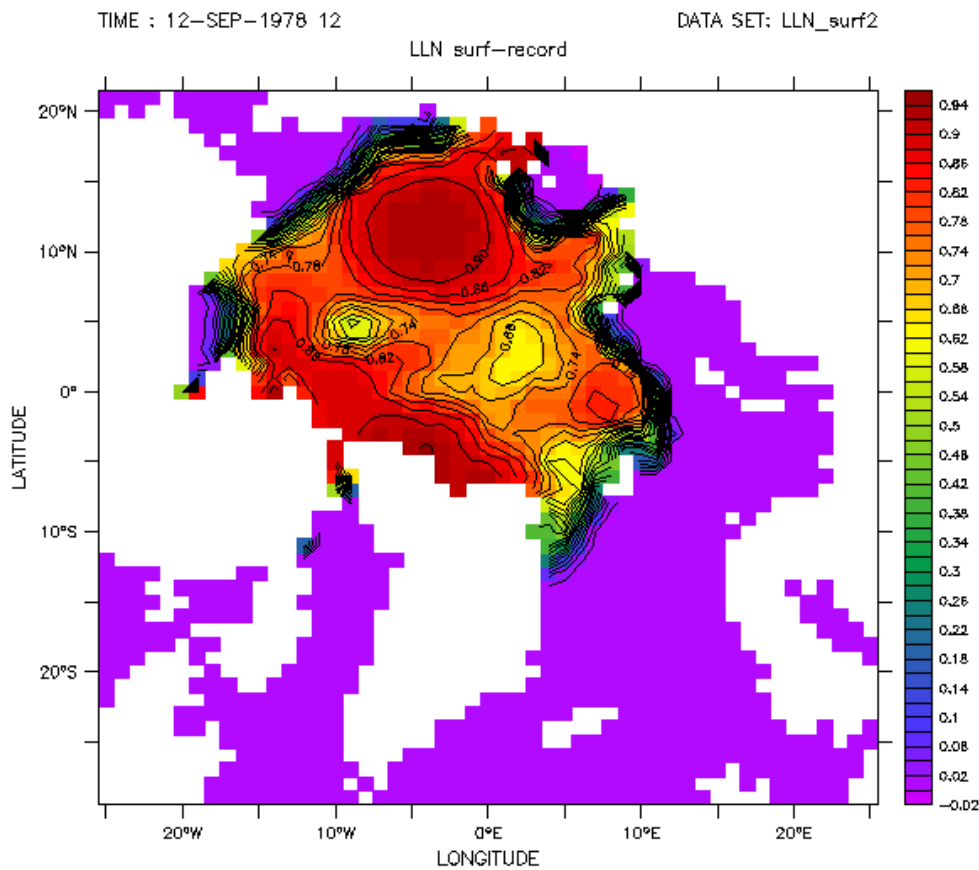
ice concentration

# Simulated Ice extent in September 1978



ORCA-LIM

AWI

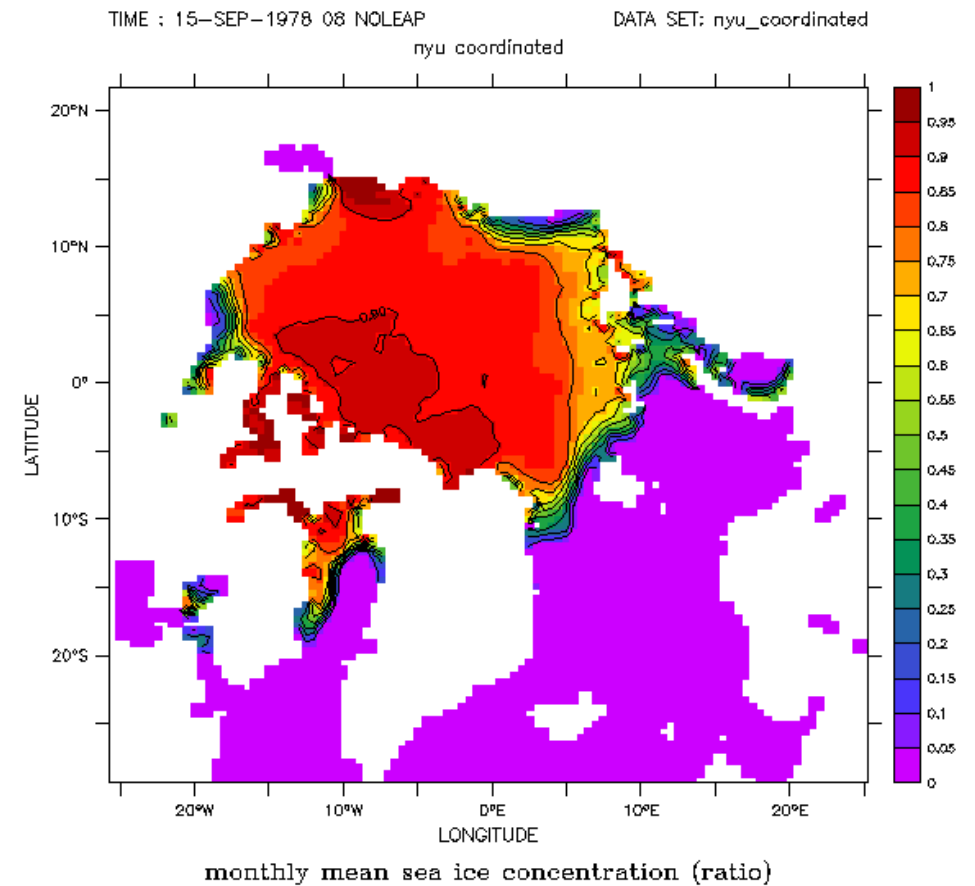
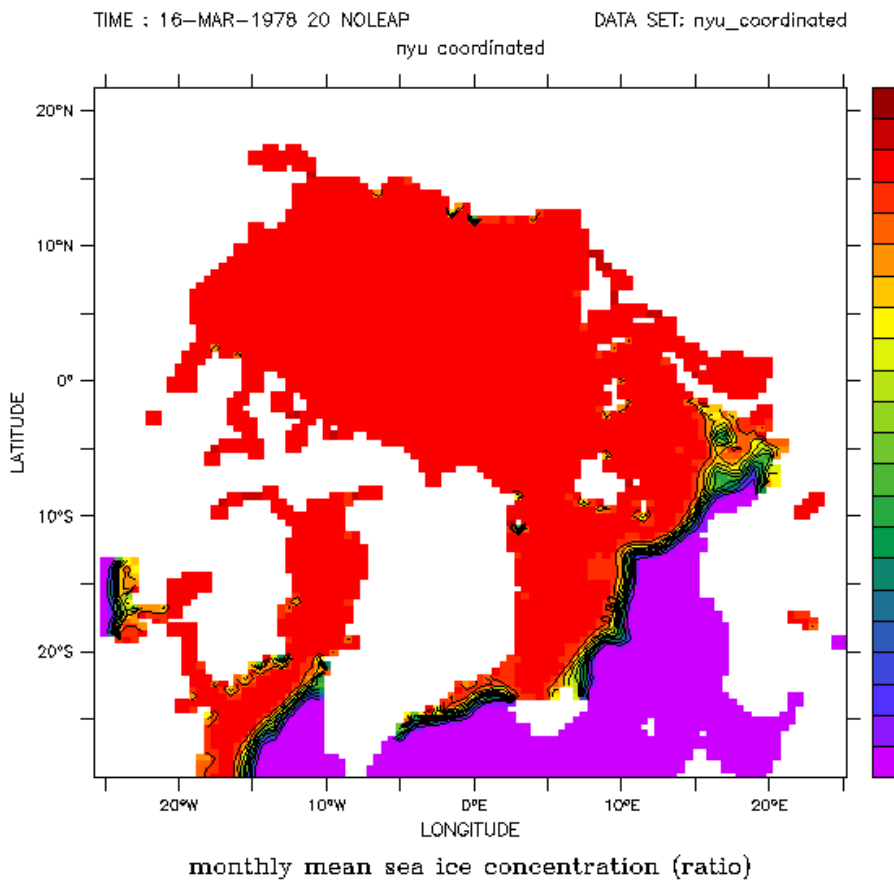


# Simulated Ice extent in 1978 : NYU



March

September

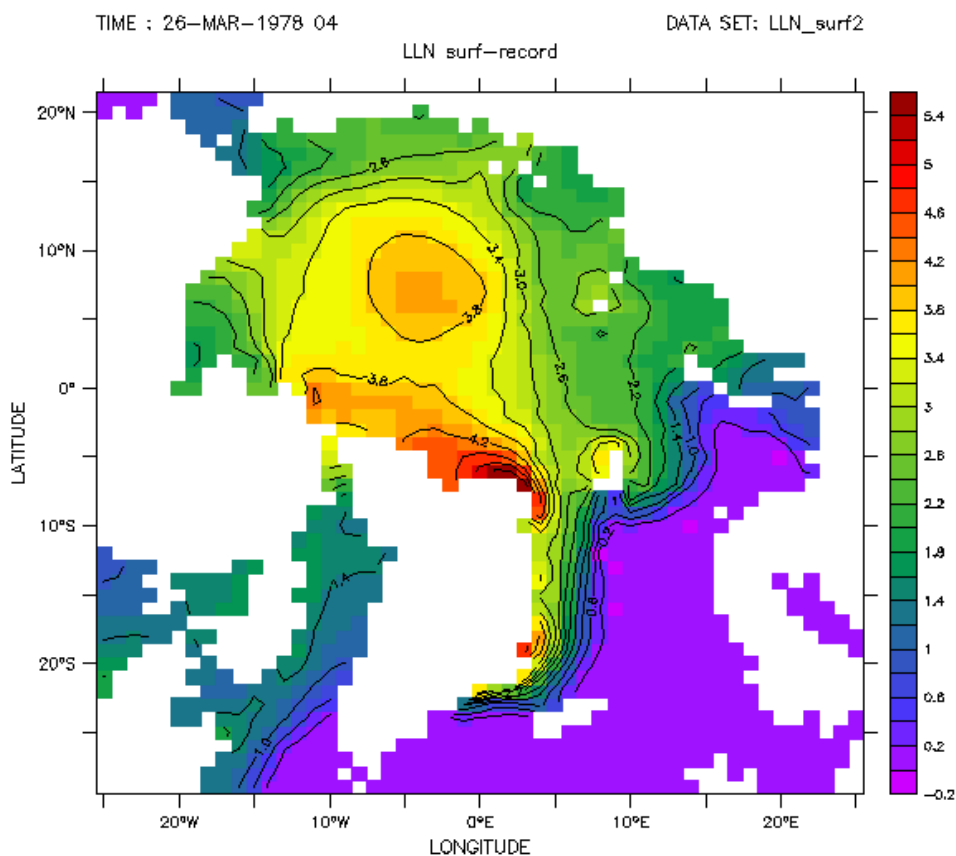


# Ice thickness in March 1978

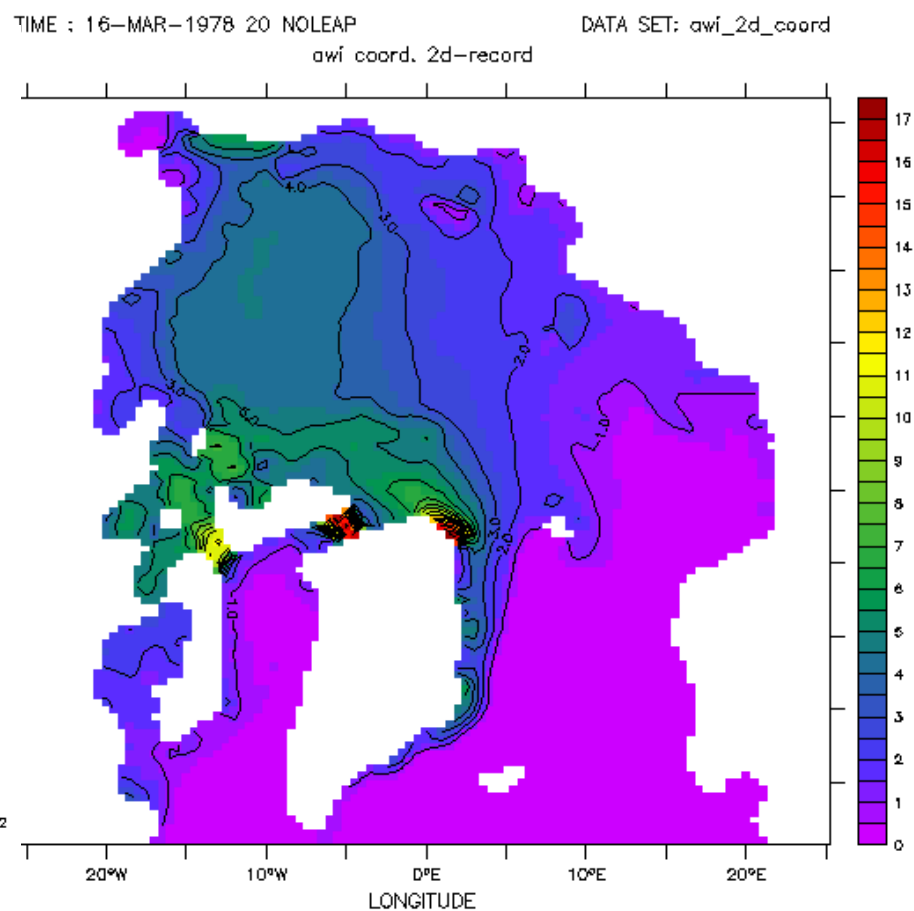


ORCA-LIM

AWI



Ice thickness (m)

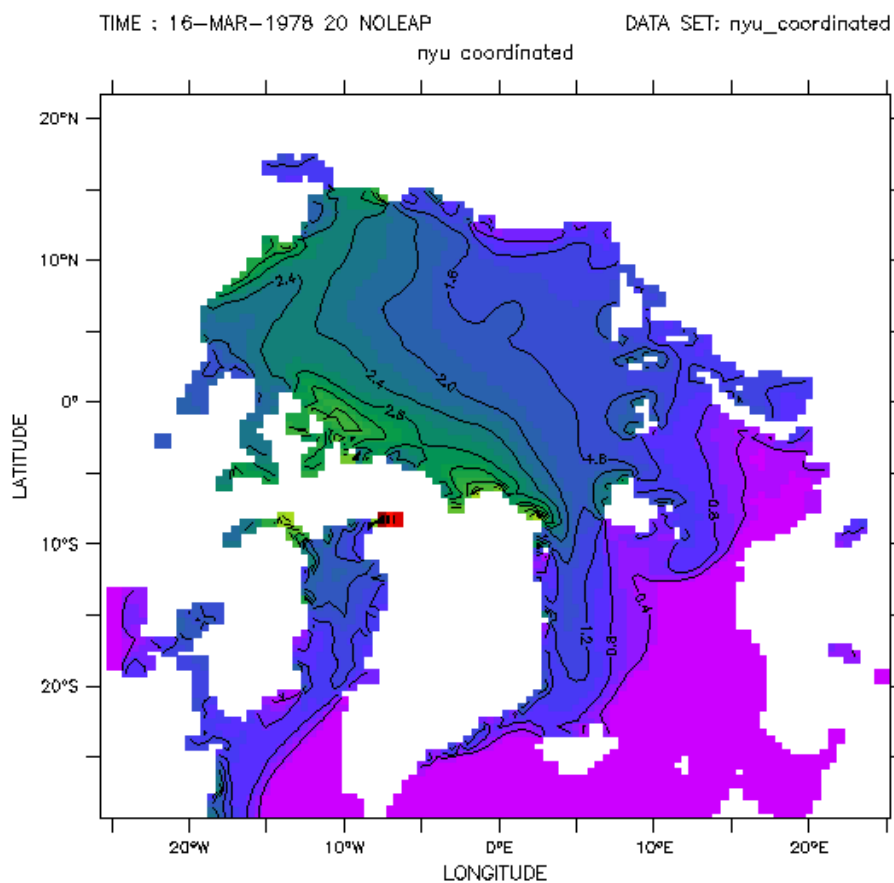


ice thickness (m)

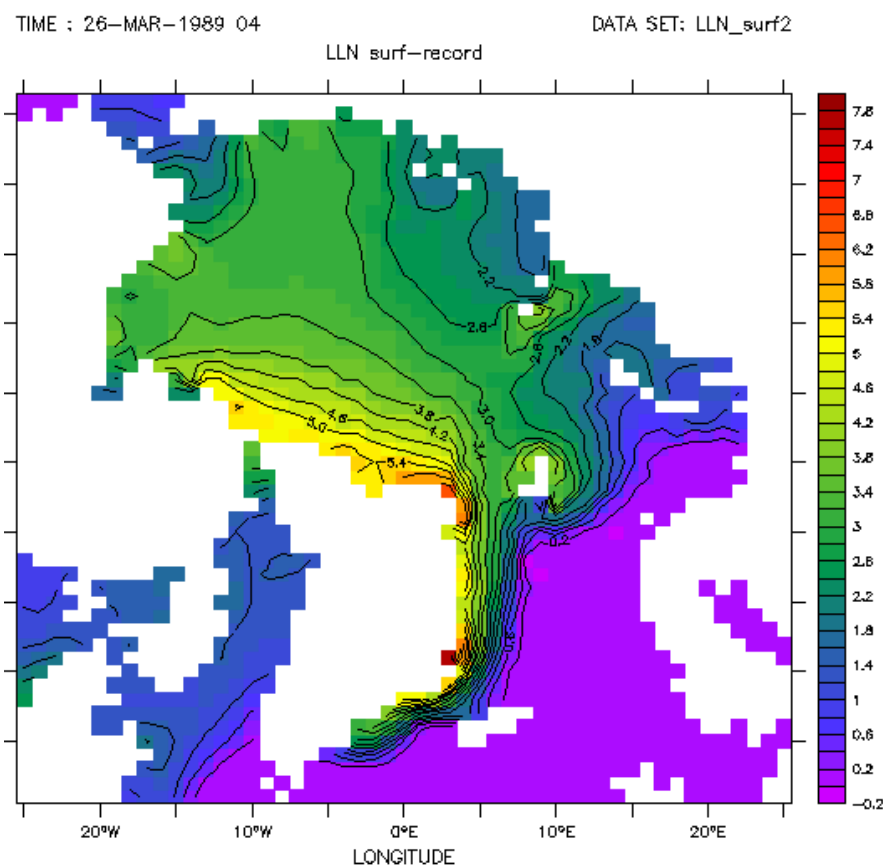
# Ice thickness in March

1978 NYU

ORCA-LIM 1989



monthly mean sea ice thickness (m)



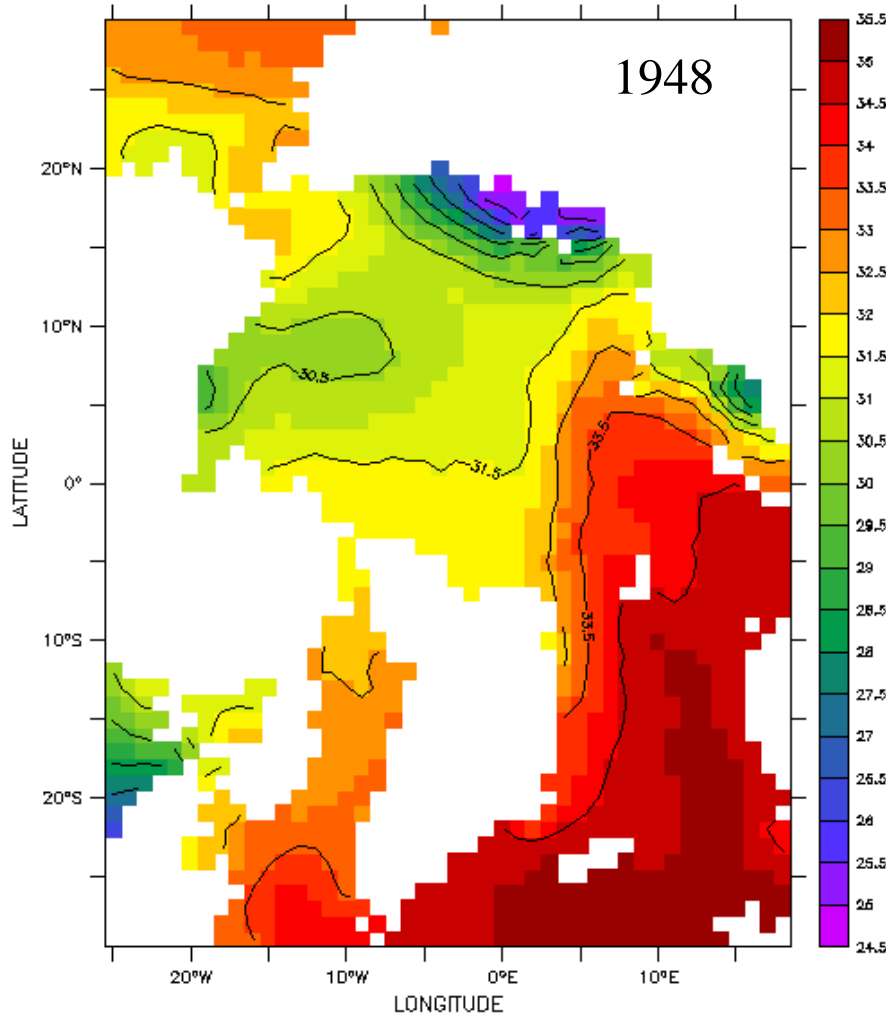
Ice thickness (m)

# Surface salinity: ORCA-LIM

DEPTH (m) : 5  
TIME : 13-JAN-1948 04

DATA SET: LLN\_vol3

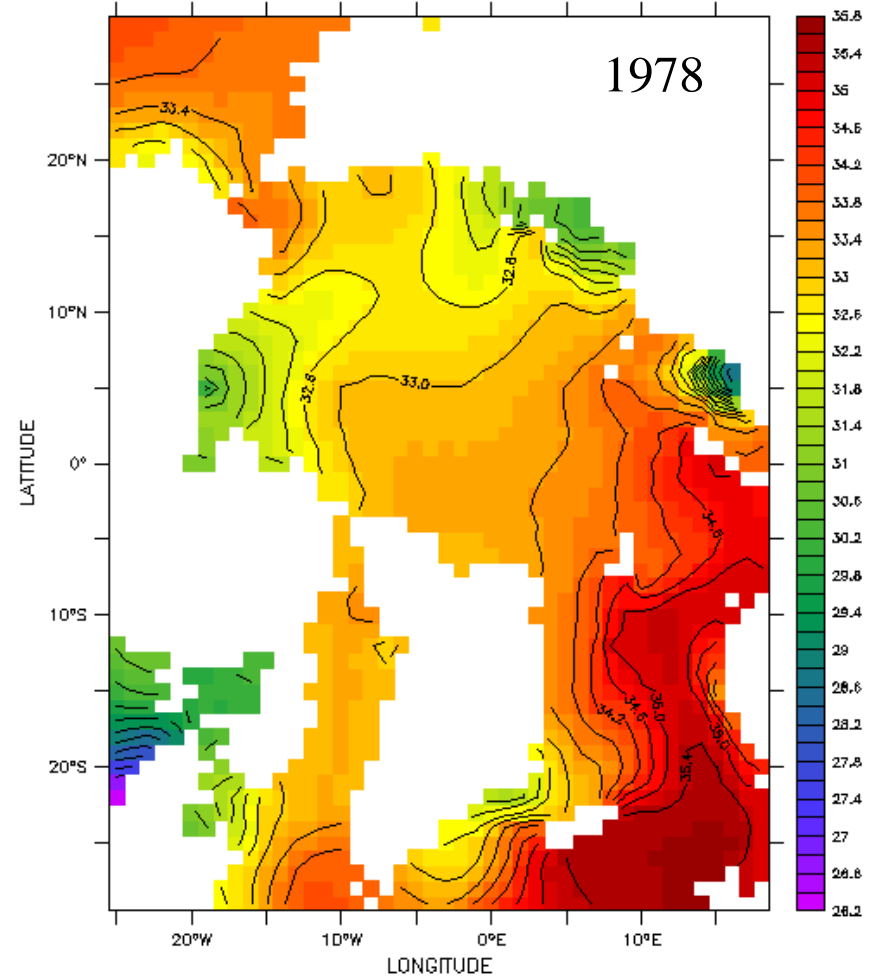
LLN vol-record



DEPTH (m) : 5  
TIME : 12-JAN-1978 04

DATA SET: LLN\_vol3

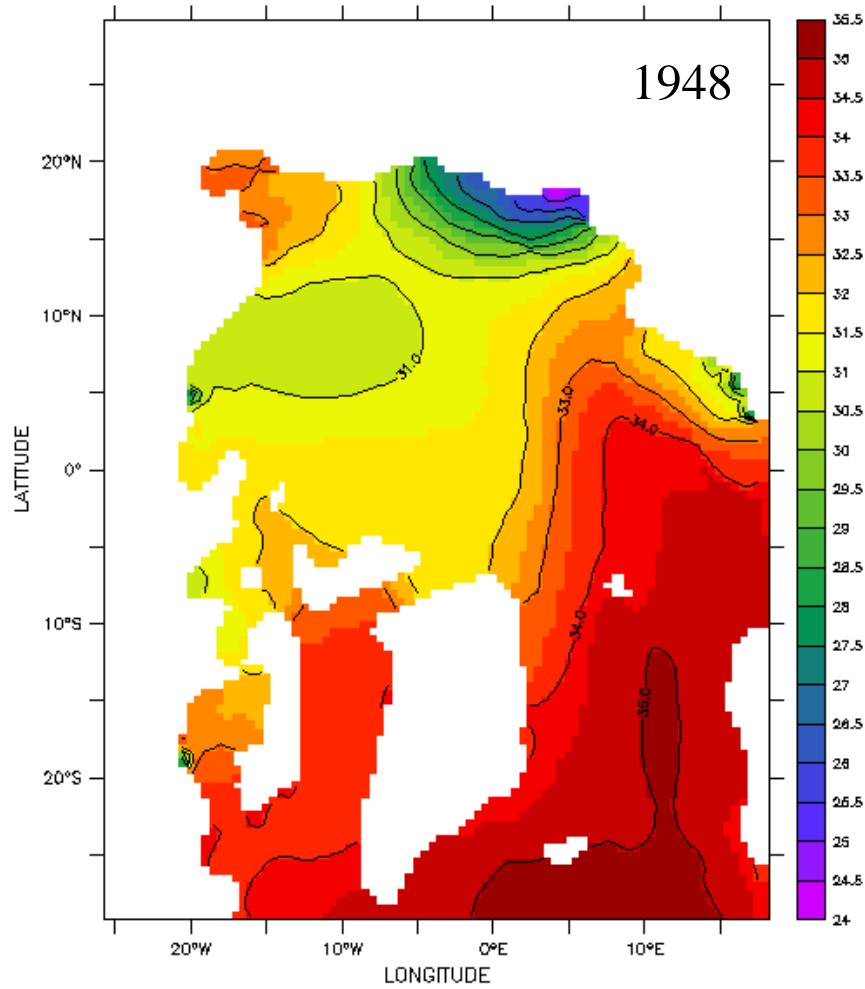
LLN vol-record



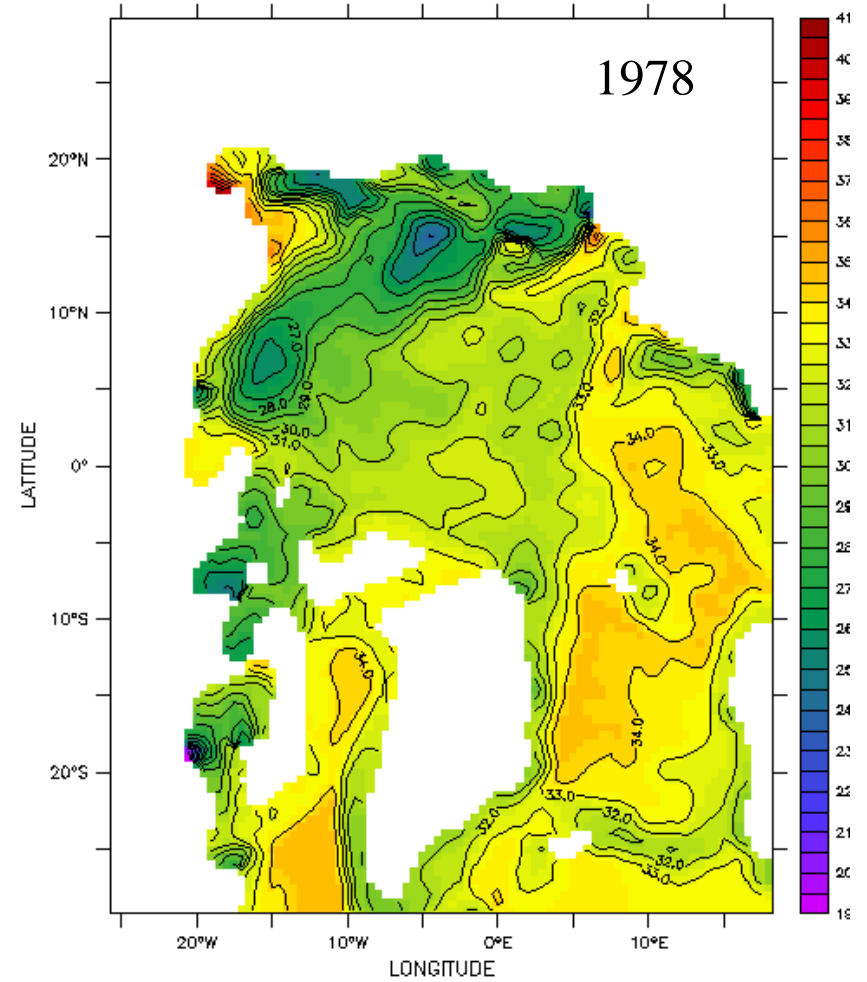


# Surface salinity: AWI

Z (meter) : -5  
TIME : 15-JAN-1948 00 NOLEAP DATA SET: awi\_3d\_coord  
awi coord. 2d-record

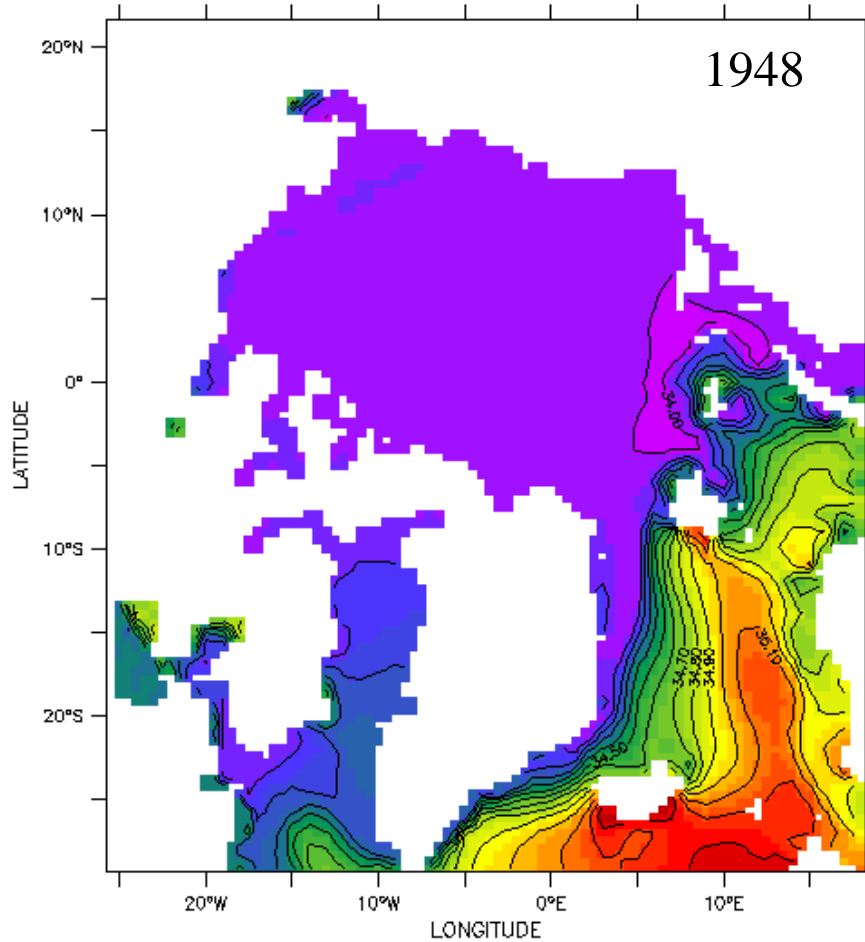


Z (meter) : -5  
TIME : 15-JAN-1978 00 NOLEAP DATA SET: awi\_3d\_coord  
awi coord. 2d-record



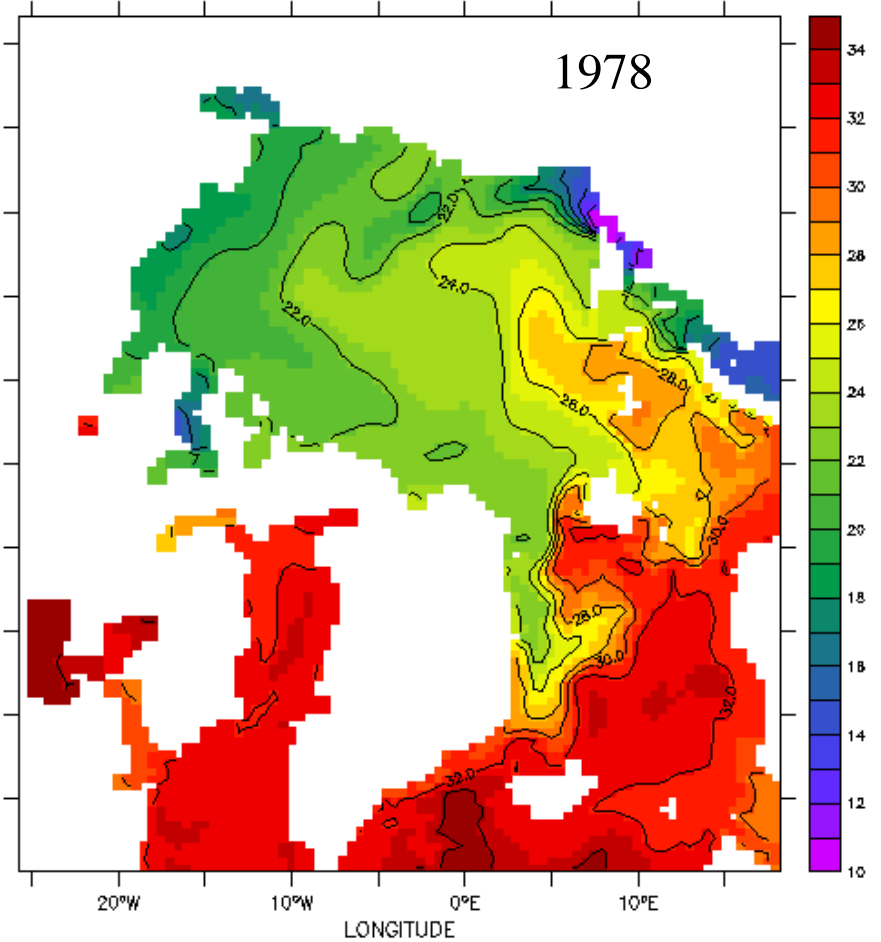
# Surface salinity: NYU

Z (meters) : -10  
TIME : 15-JAN-1948 00 NOLEAP  
DATA SET: nyu\_coordinated  
nyu coordinated



monthly mean ocean salinity (ppt)

Z (meters) : -10  
TIME : 15-JAN-1978 00 NOLEAP  
DATA SET: nyu\_coordinated  
nyu coordinated



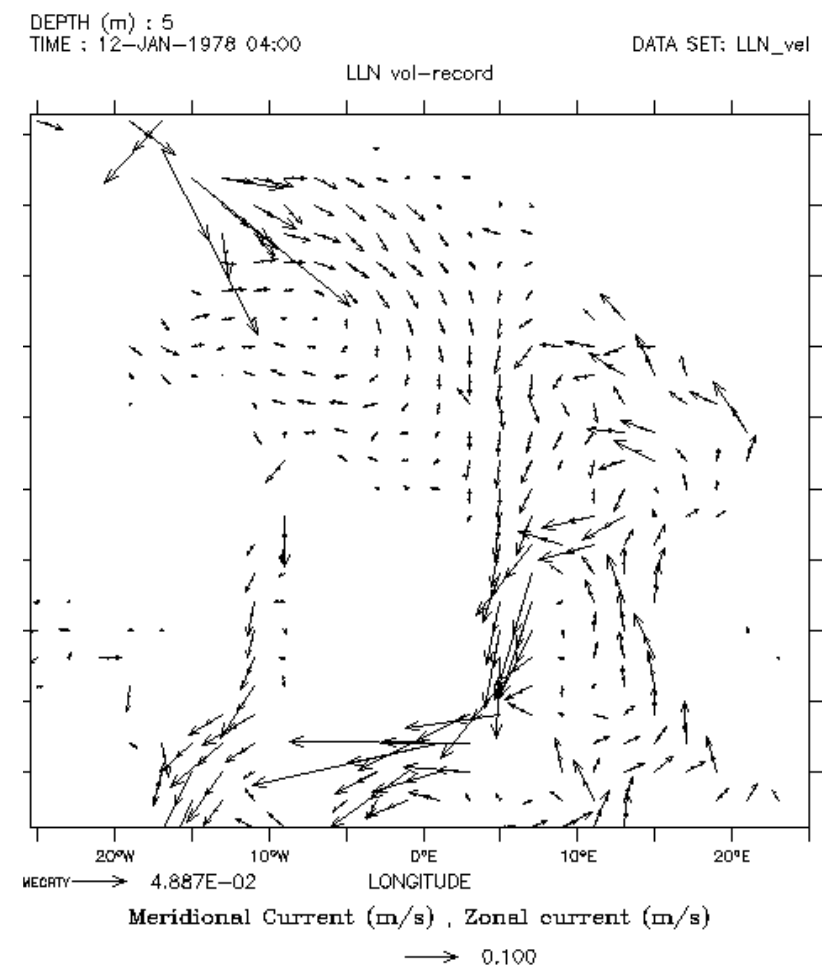
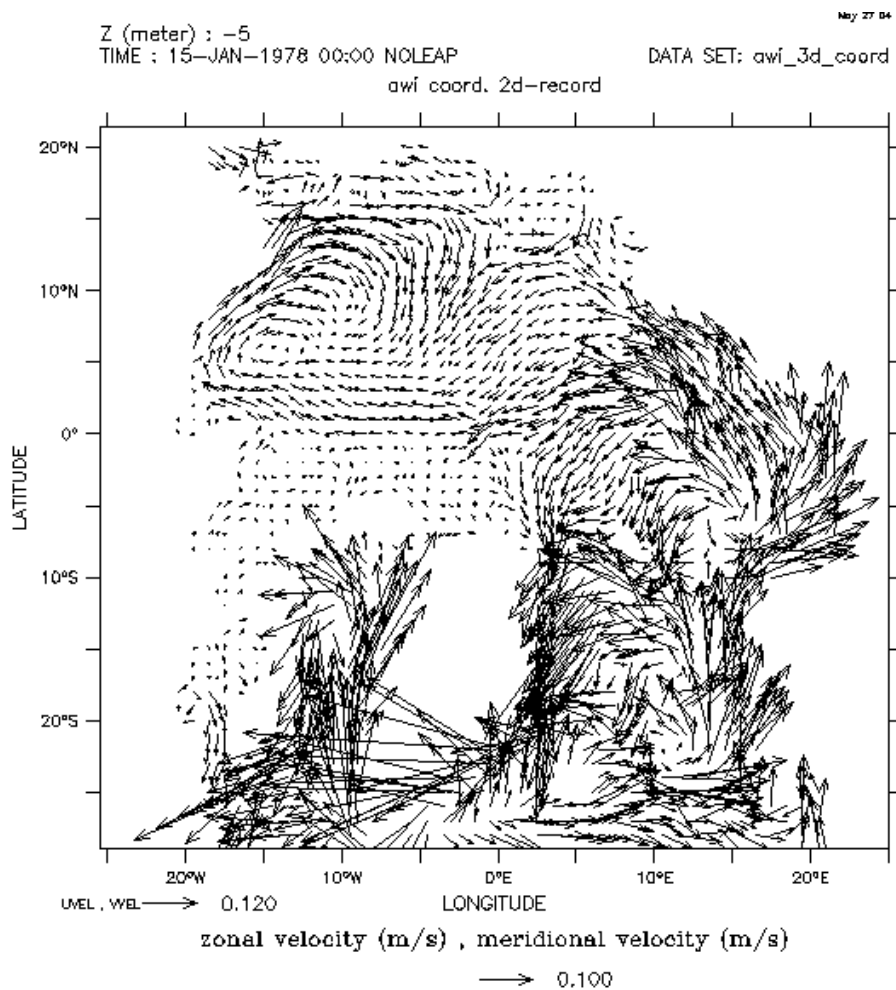
monthly mean ocean salinity (ppt)

# Oceanic surface currents in January 1978



AWI

LLN

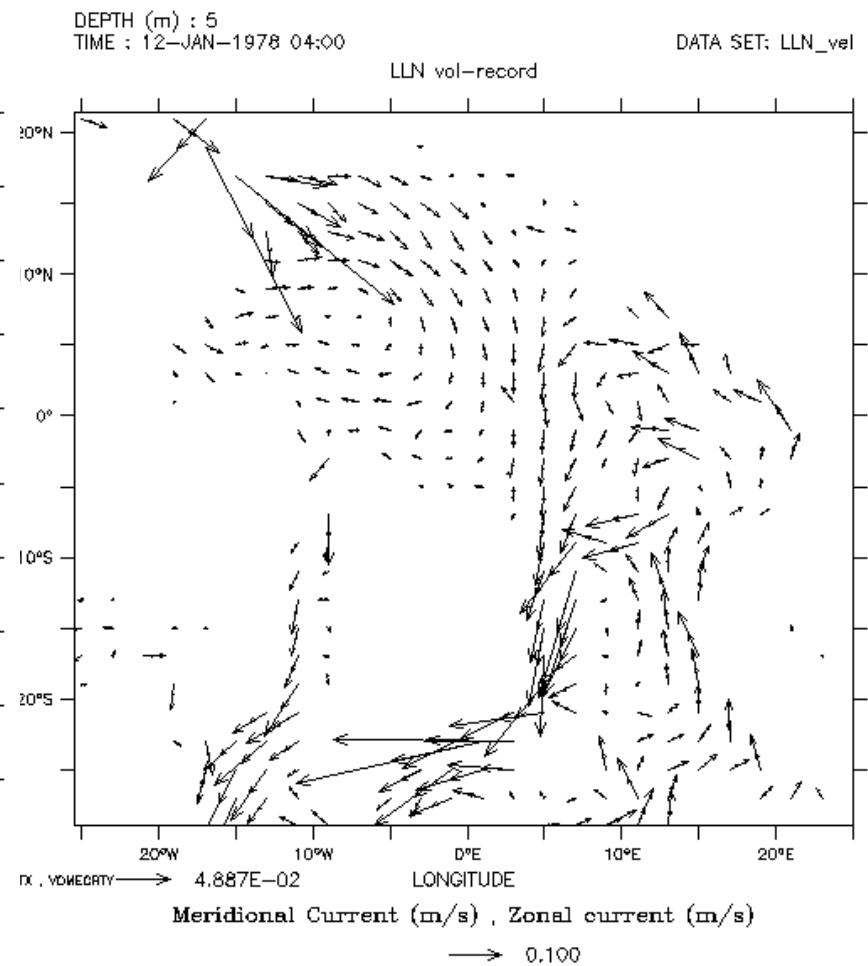
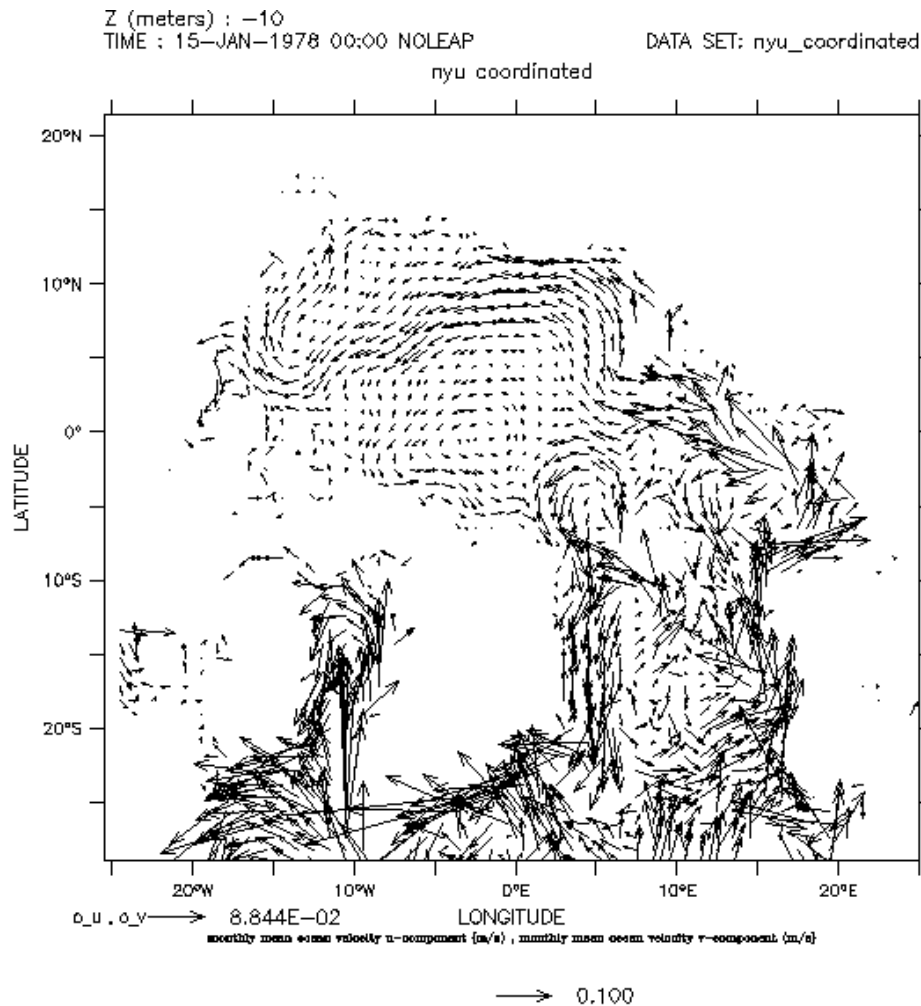


# Oceanic surface currents in January 1978



NYU

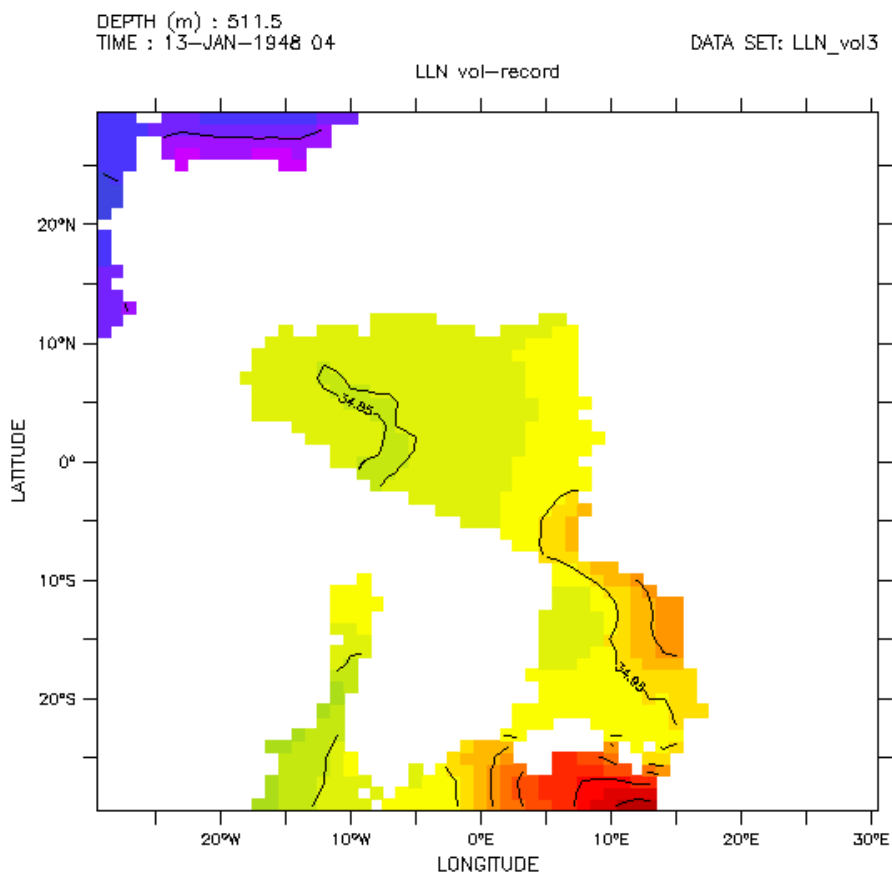
LLN



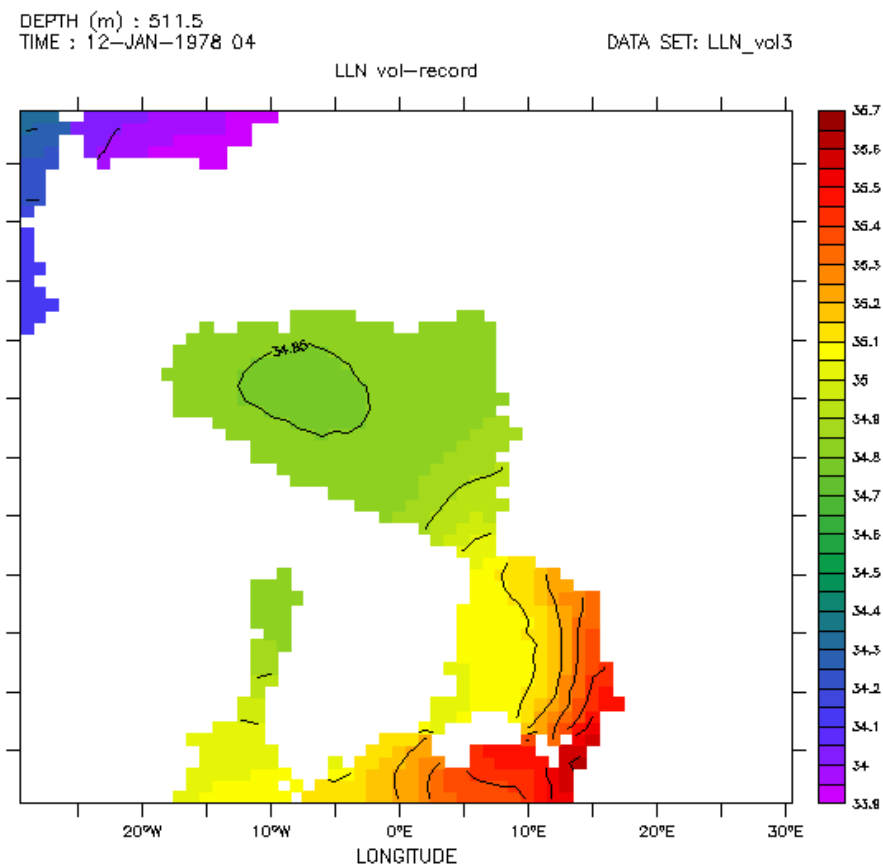
# Salinity at 500 m: ORCA-LIM

1948

1978



Salinity (psu)

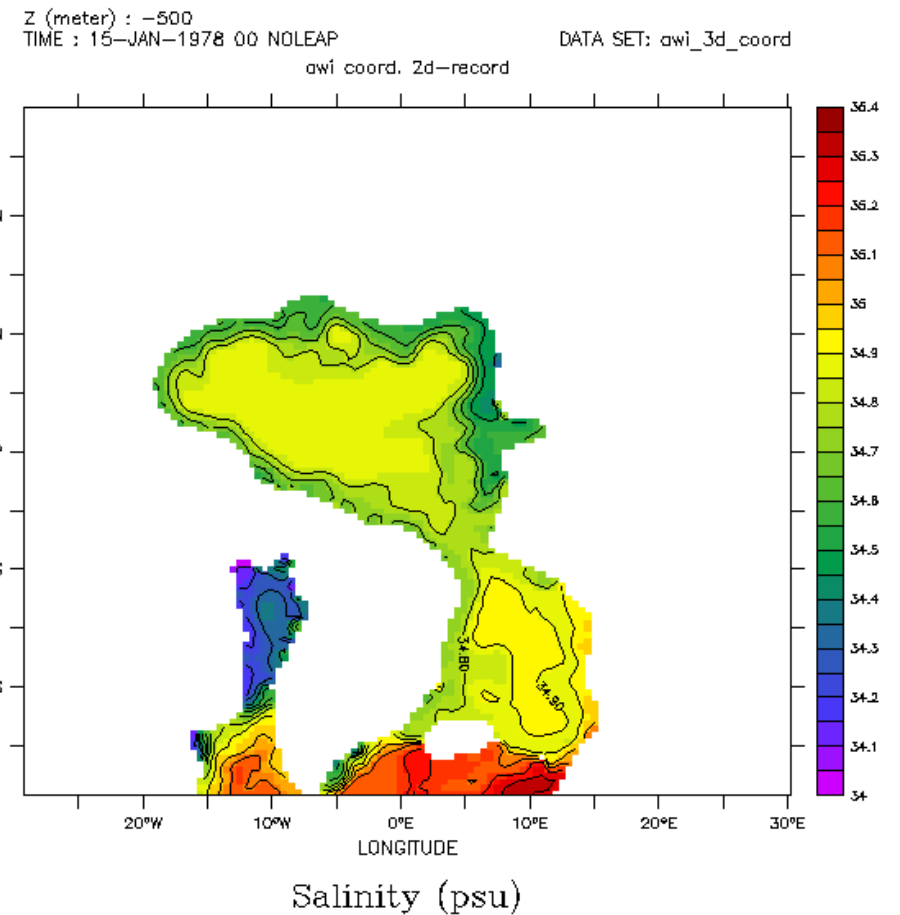
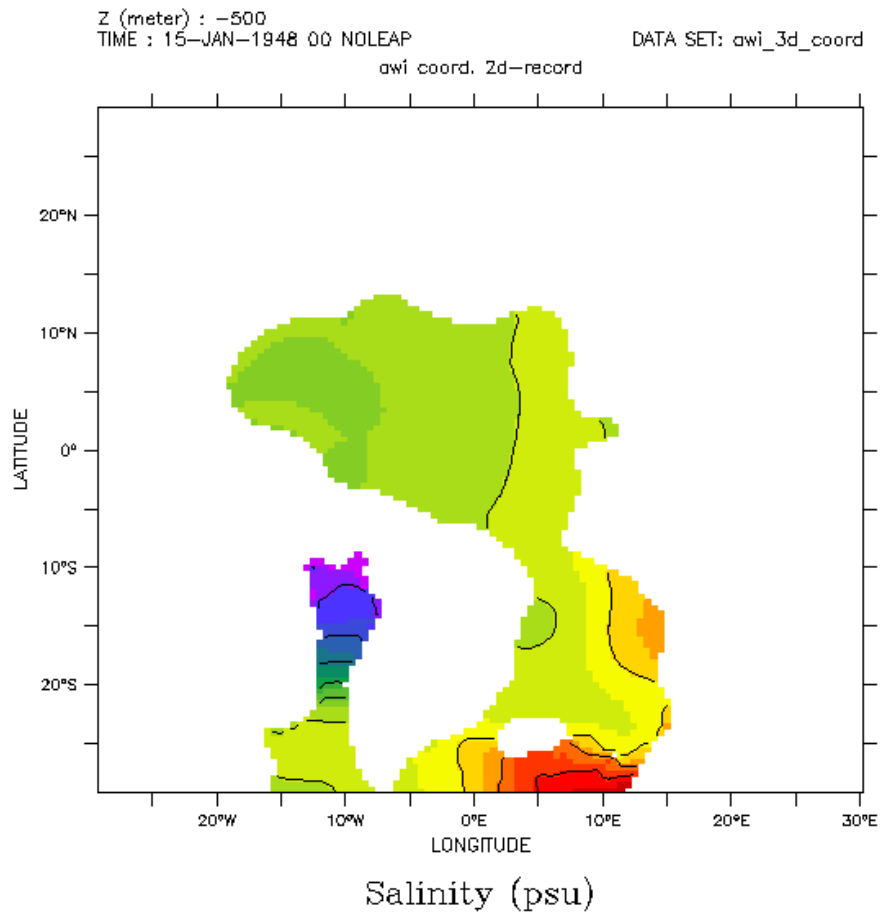


Salinity (psu)

# Salinity at 500 m : AWI

1948

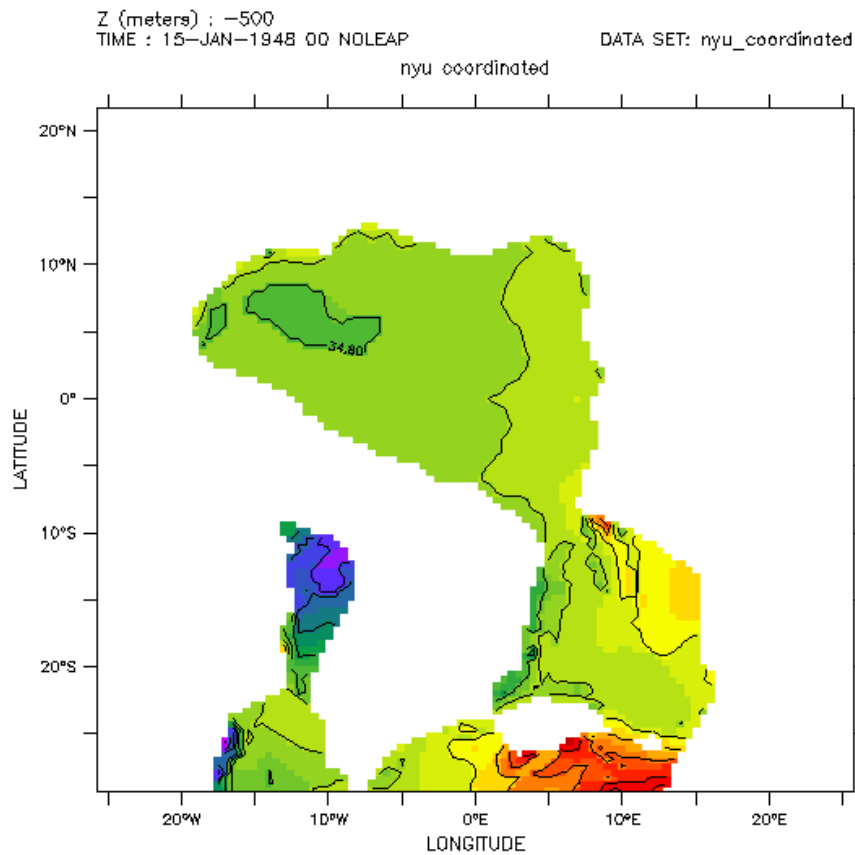
1978



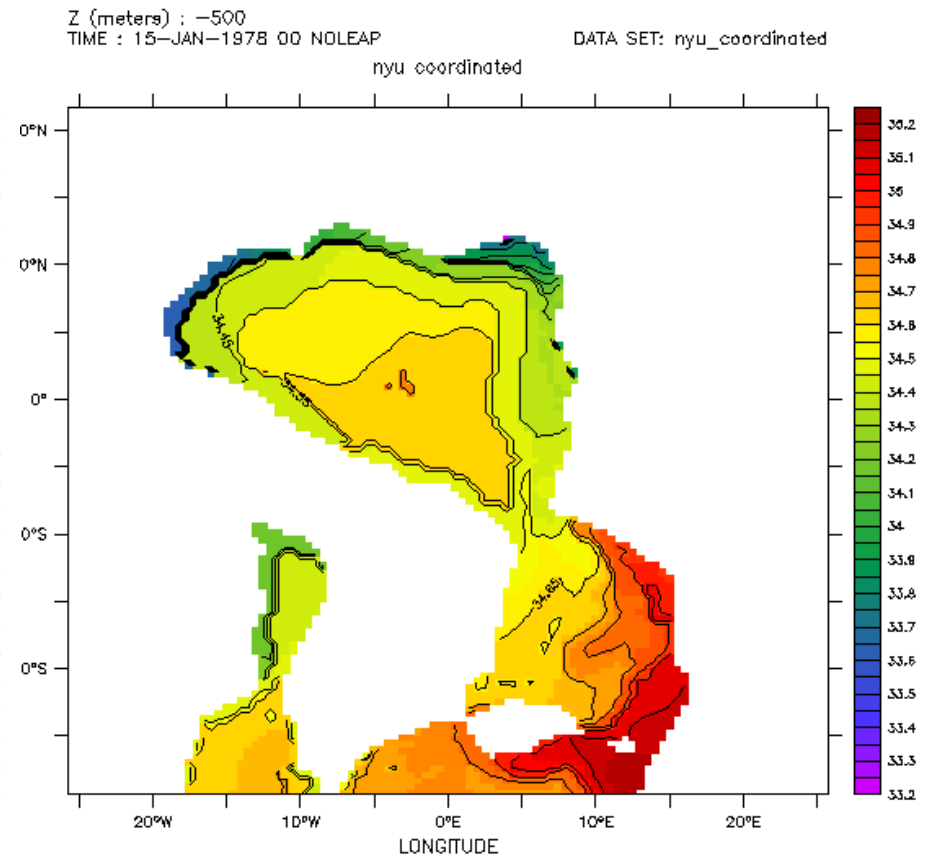
# Salinity at 500 m: NYU

1948

1978



monthly mean ocean salinity (ppt)



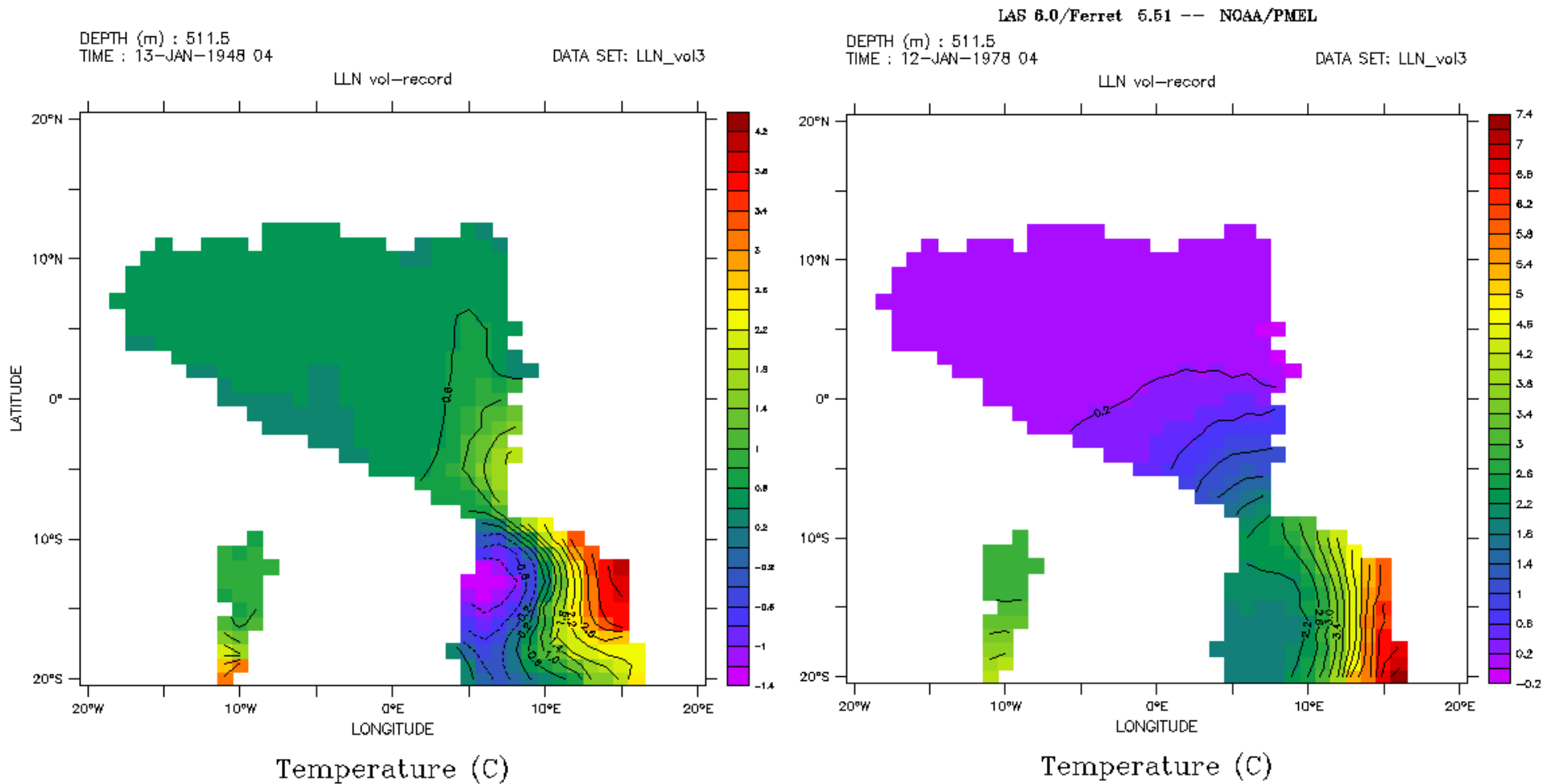
monthly mean ocean salinity (ppt)

# Temperature at 500 m : ORCA-LIM



1948

1978



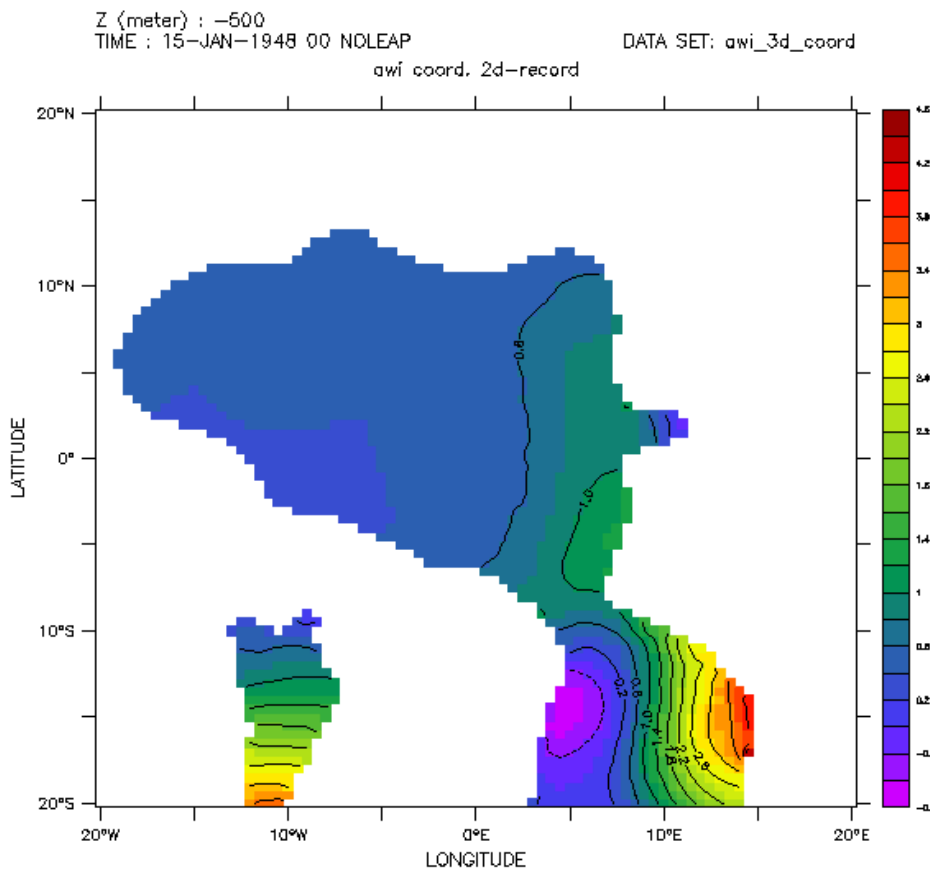


# Temperature at 500 m : AWI

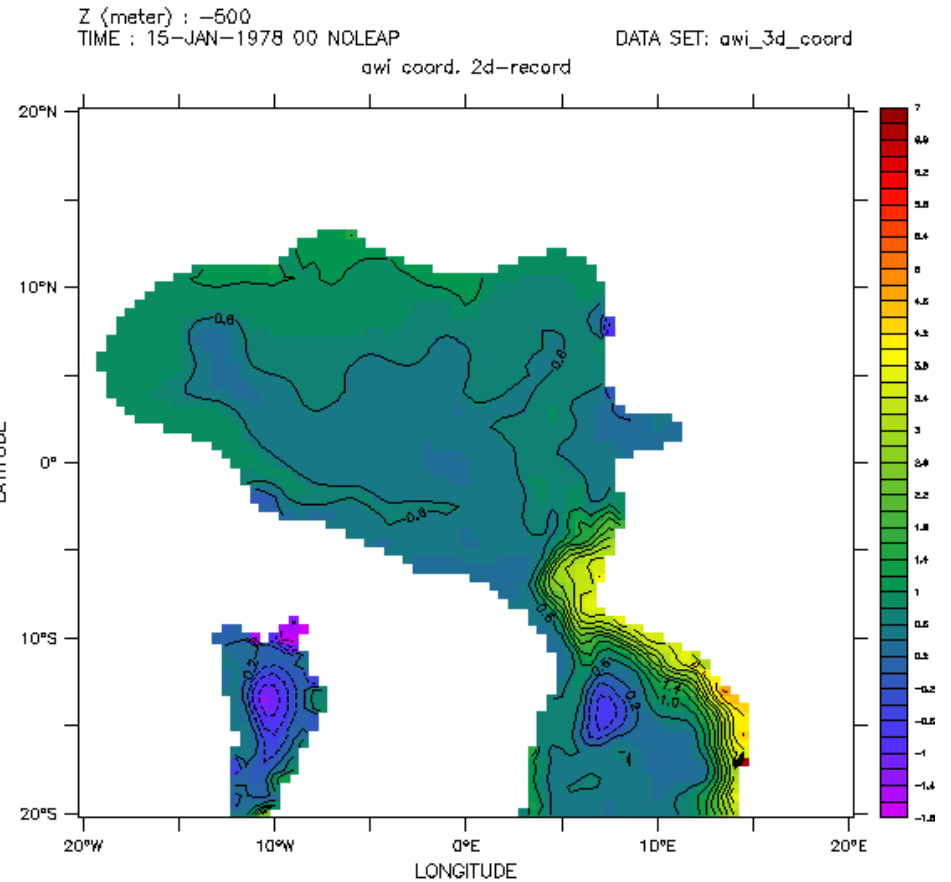


1948

1978



potential Temperature (C)



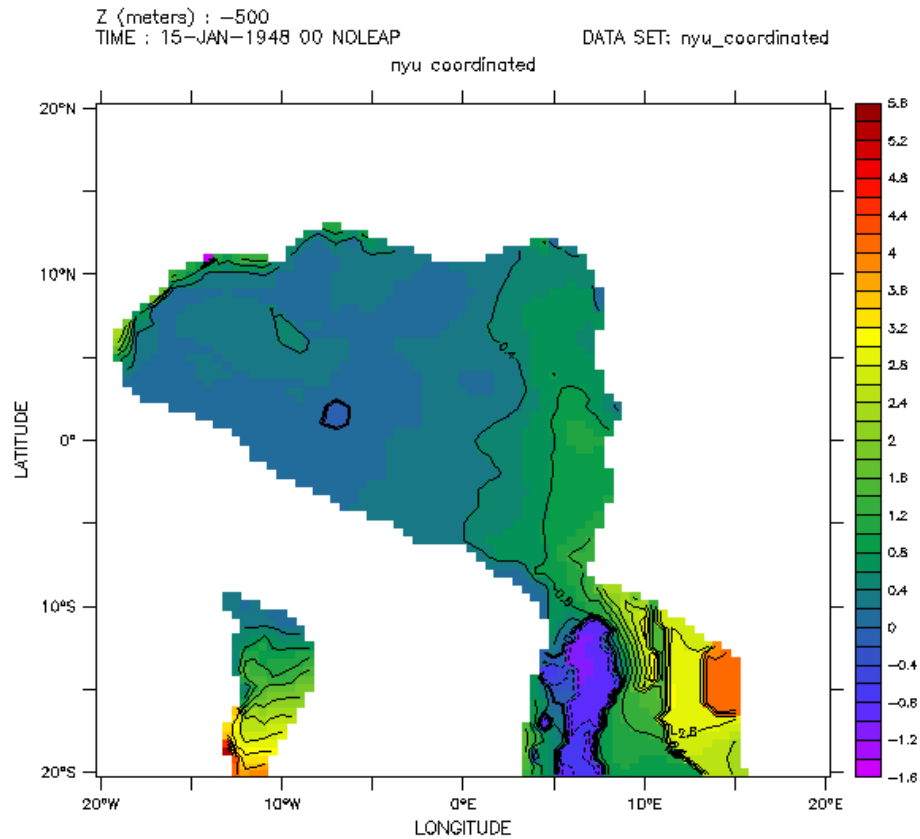
potential Temperature (C)

# Temperature at 500 m : NYU

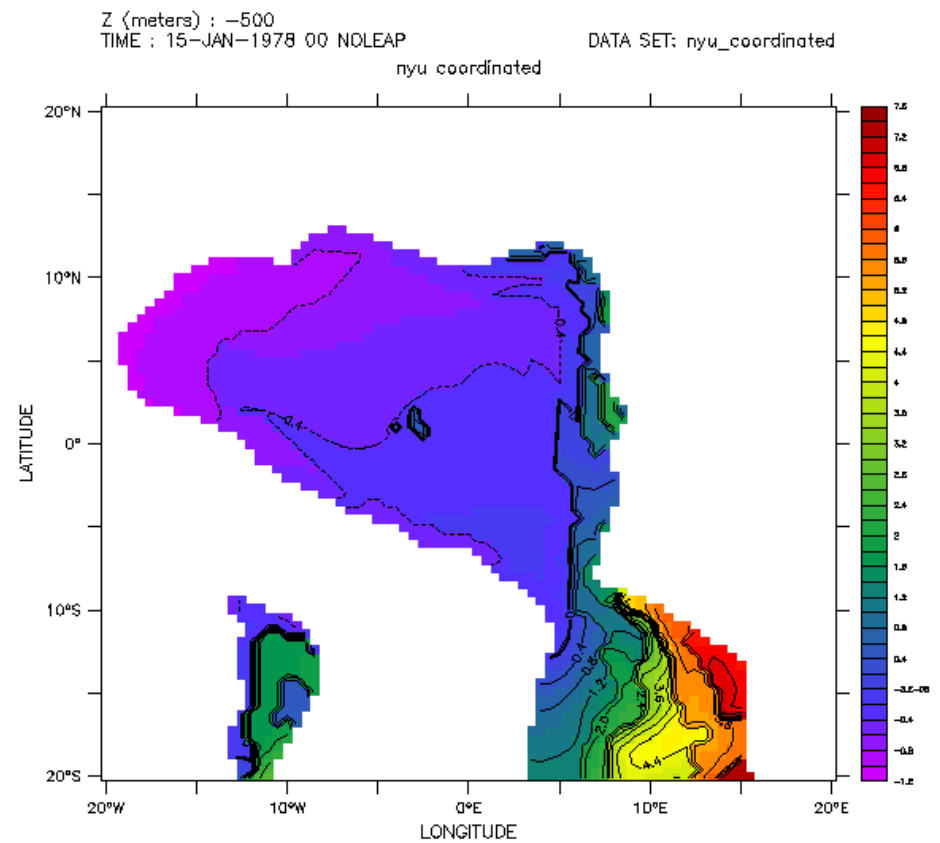


1948

1978



monthly mean ocean temperature (C)



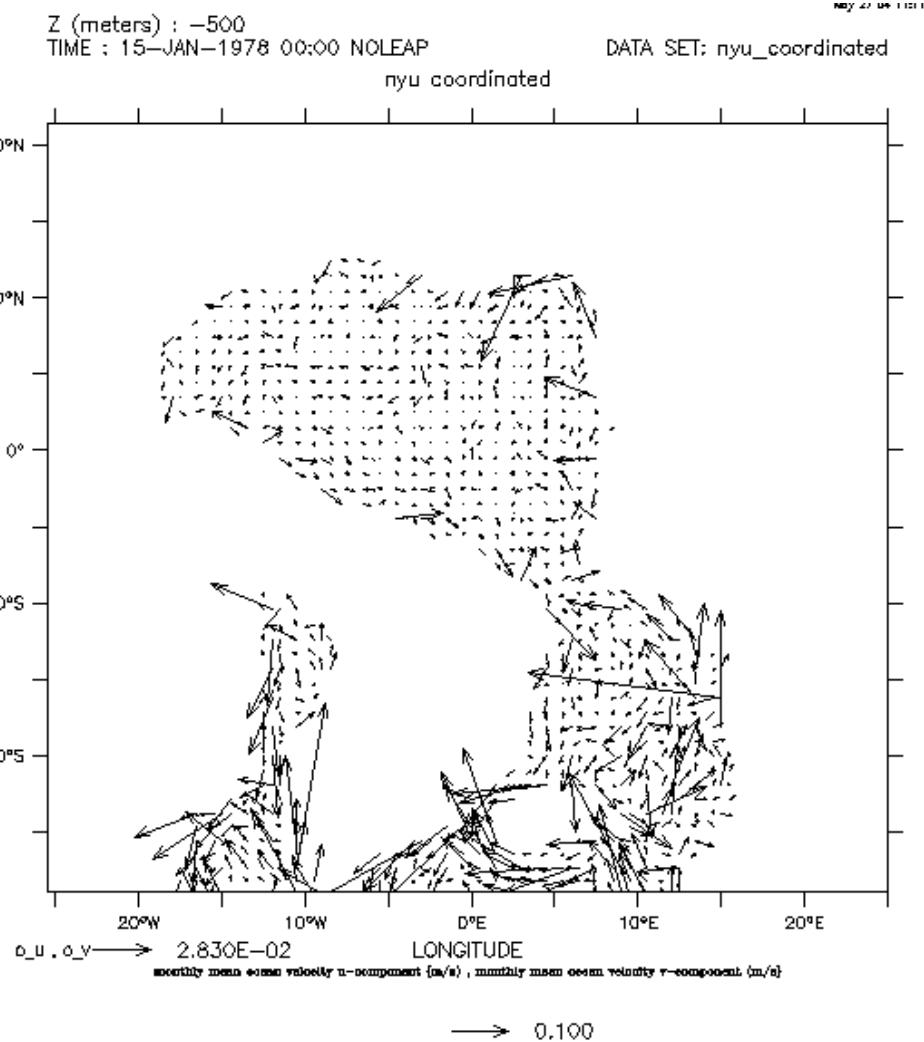
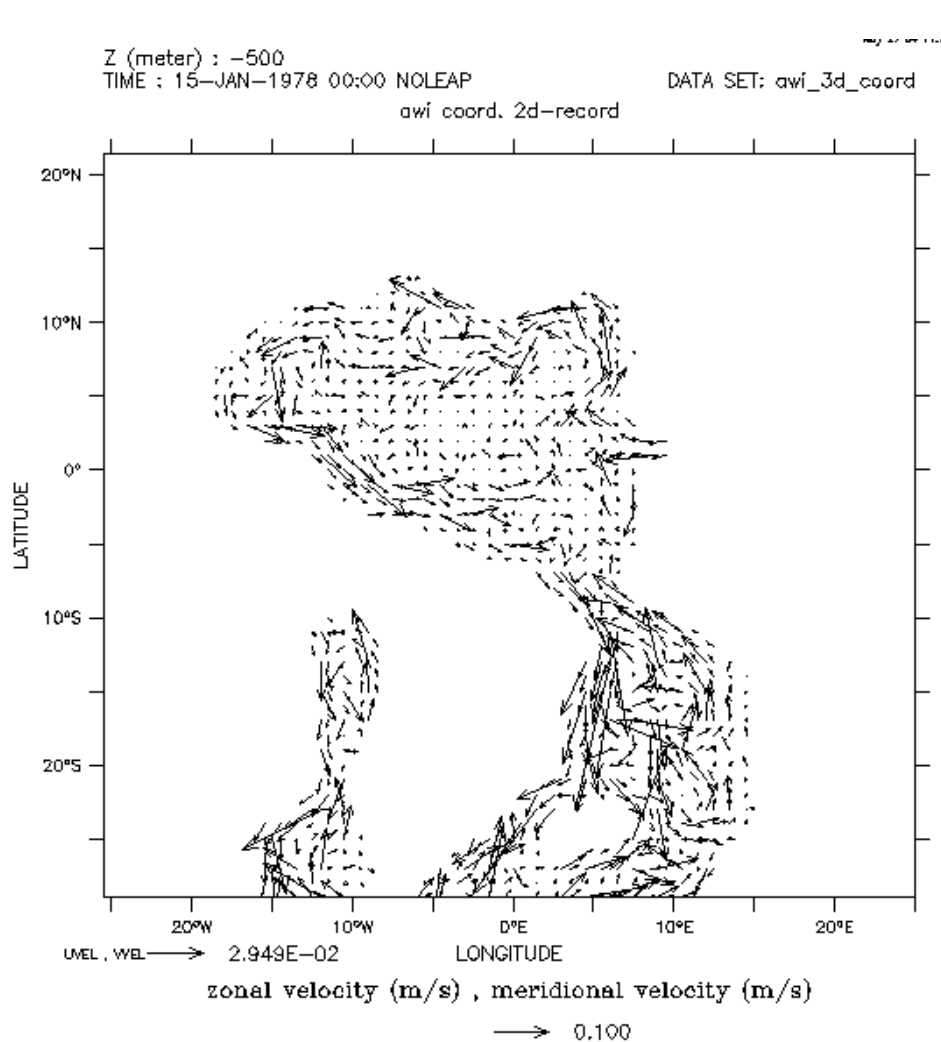
monthly mean ocean temperature (C)



# Oceanic currents at 500 m in 1978

AWI

NYU



# Oceanic currents at 500 m :ORCA-LIM



1978

1996

