High Resolution Simulations of the Mediterranean

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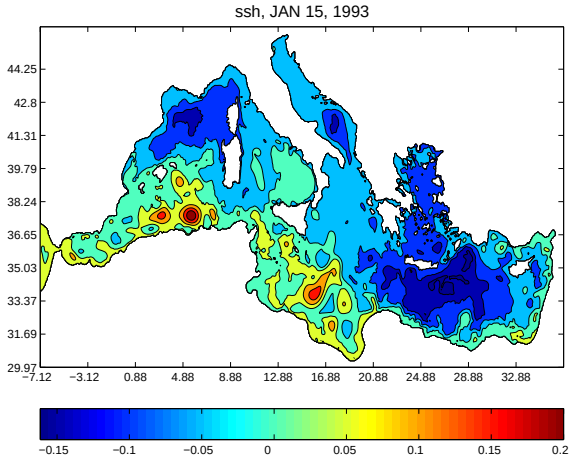
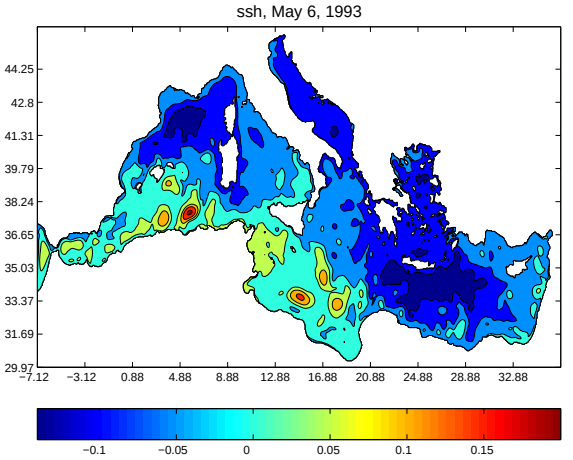
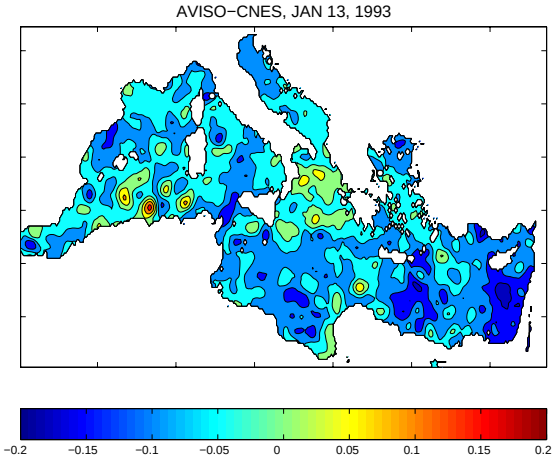
Med Sea HYCOM Configuration

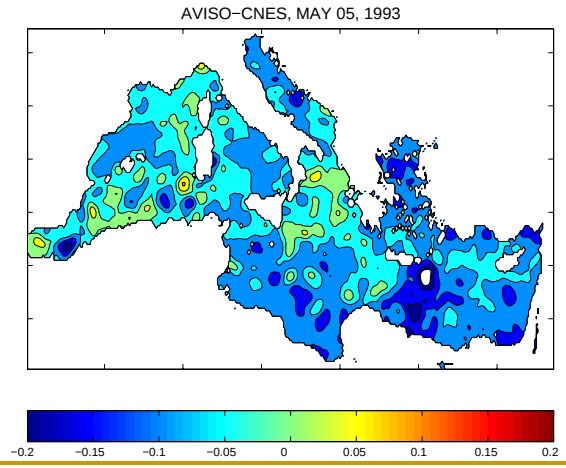
- Horizontal grid: 1/25° equatorial resolution
- 1235 x 549 grid points, ~3.4 km spacing on average
- Vertical coordinate surfaces: 20 sigma_0
- KPP mixed layer model
- Surface forcing: ERA-40 wind stress, wind speed, thermal forcing, and precipitation
- Monthly river runoff (60 rivers)
- Initialized from January climatology (GDEM3) T and S
- Relax to GDEM3 in Atlantic, and everywhere for SSS
- No other subsurface relaxation to climatology

Sea Surface Height

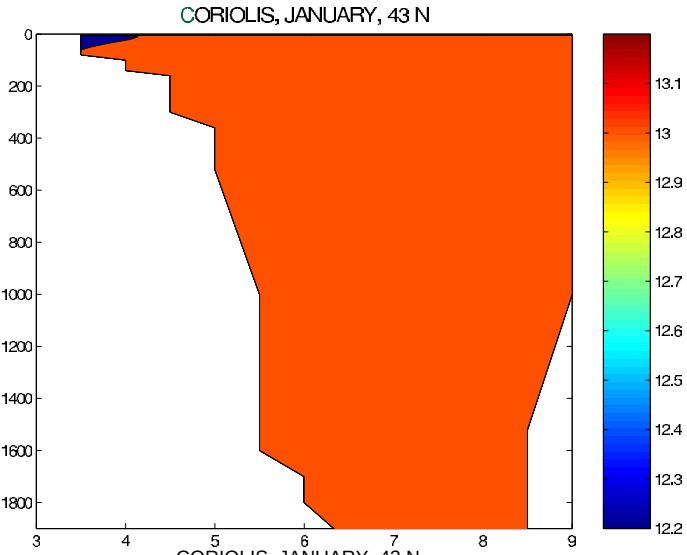


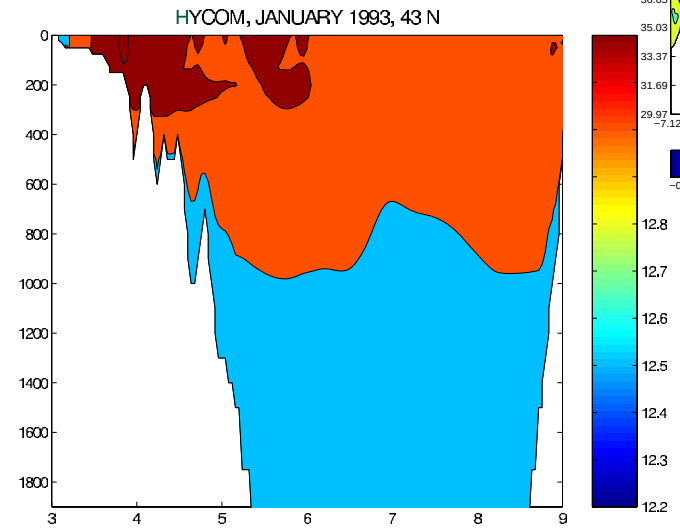


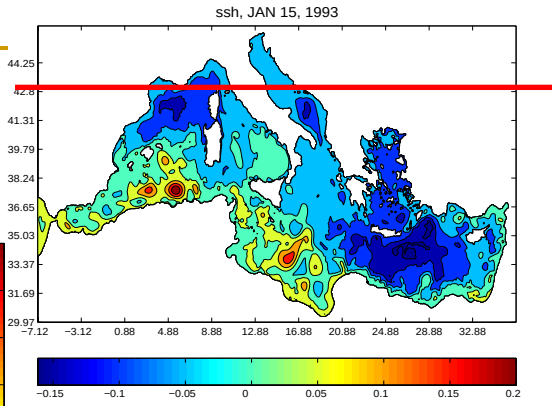


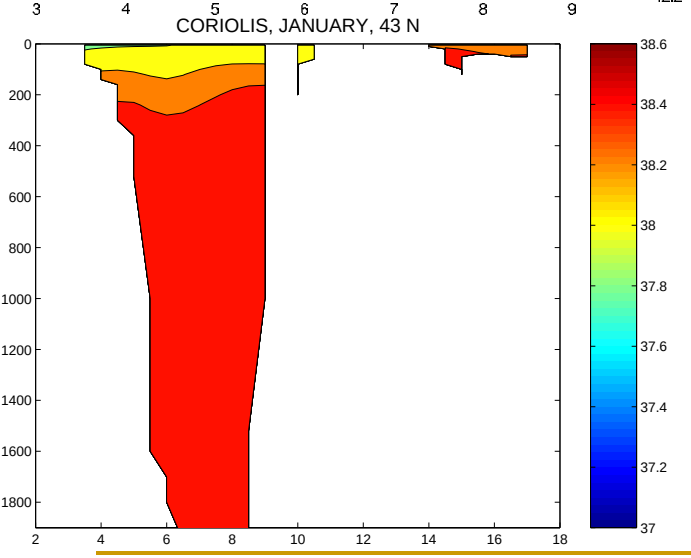


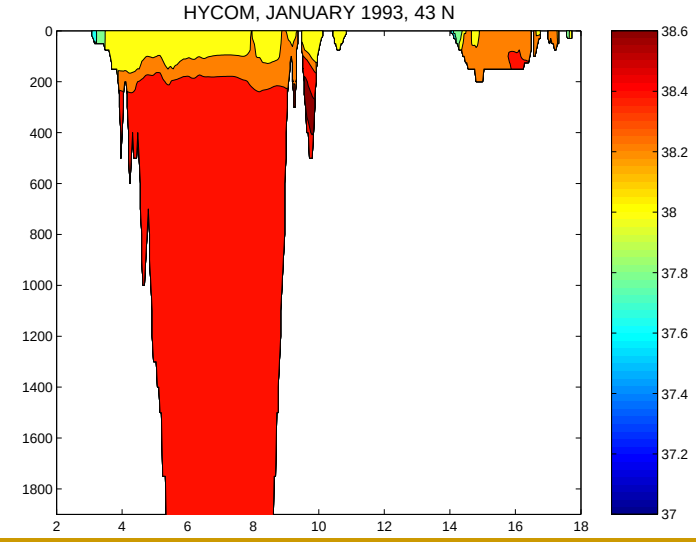
43N





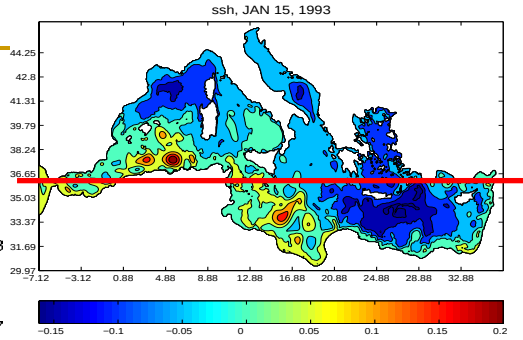


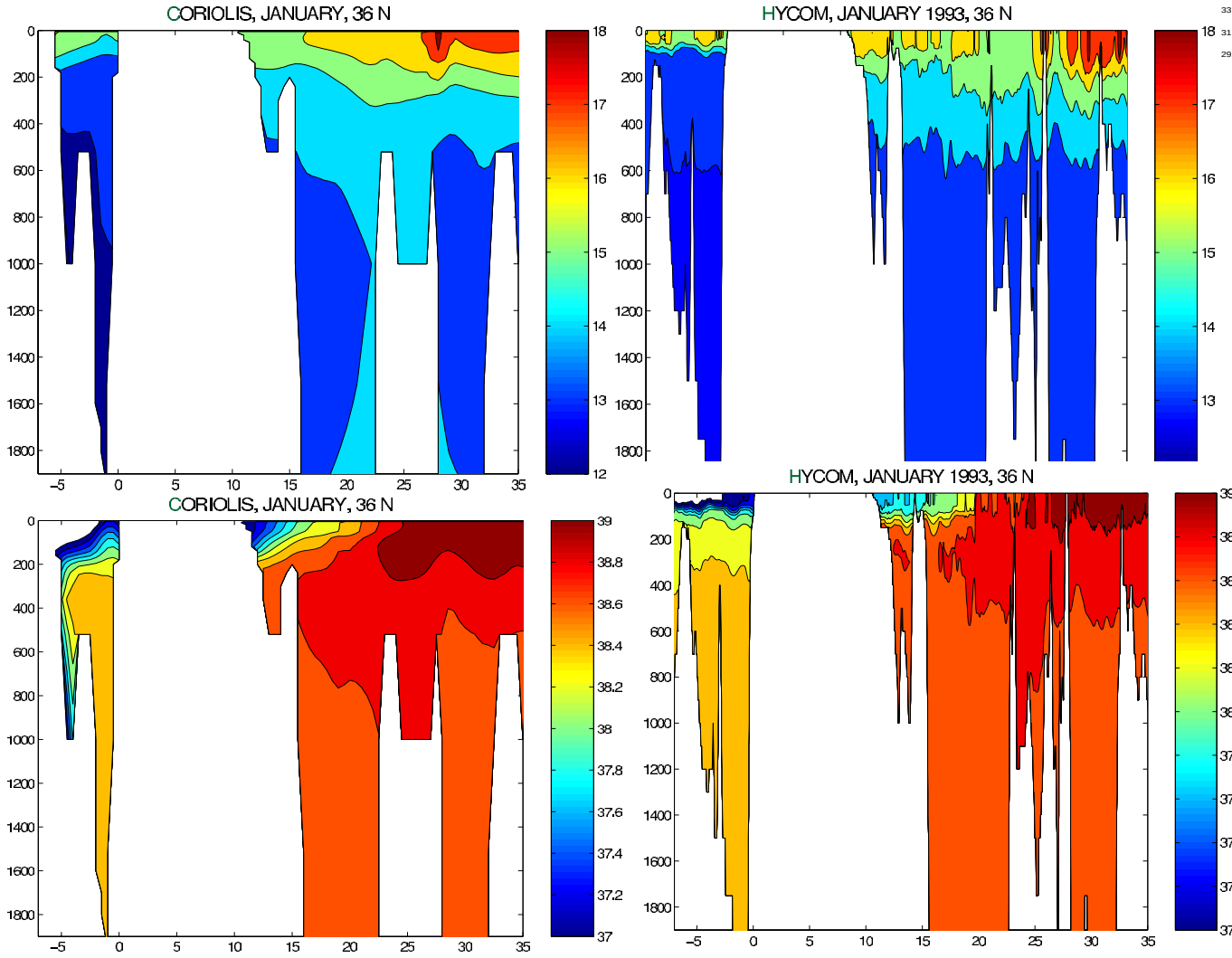




Model is too cold at depths below 800m (maybe deep convection related)

36N

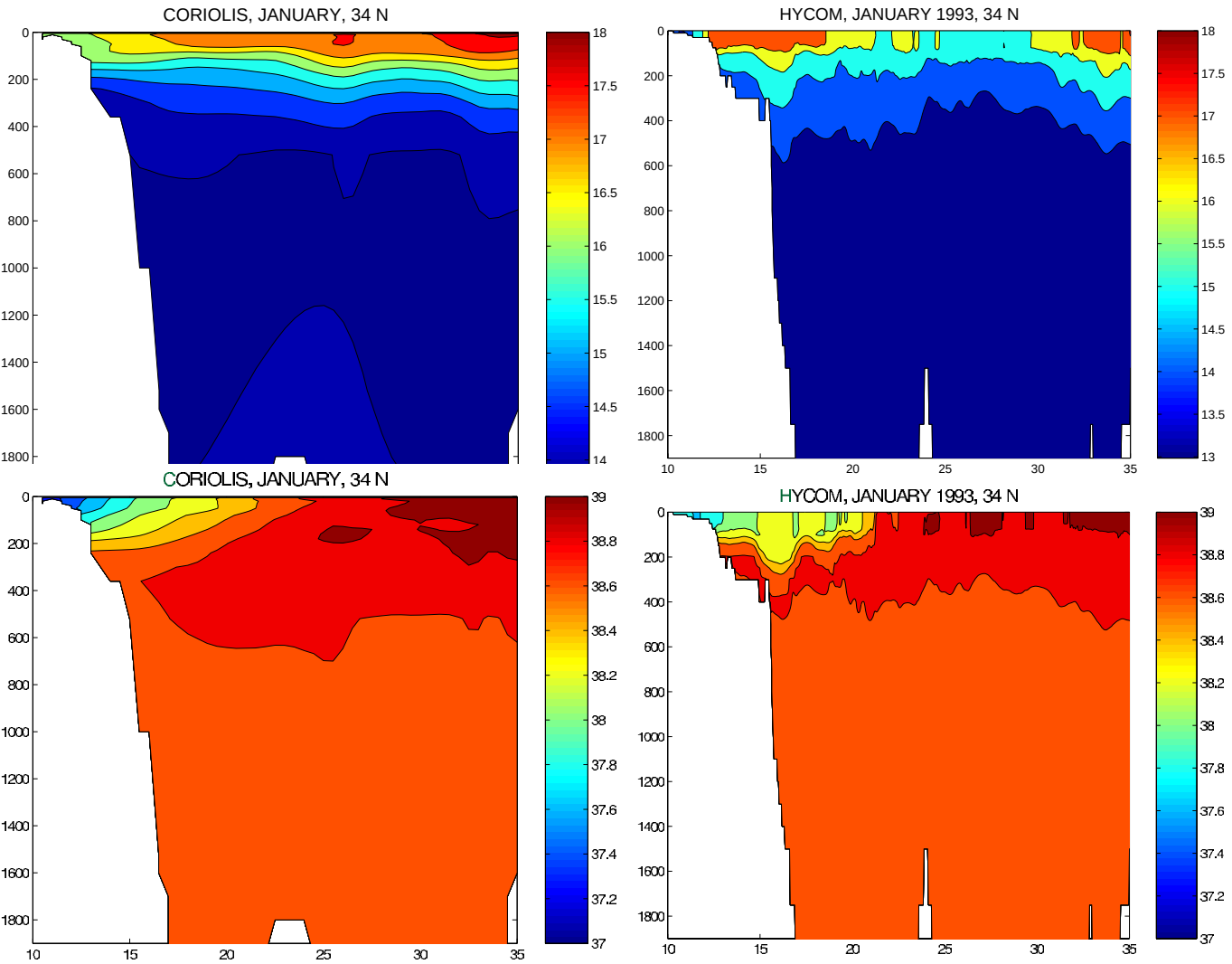


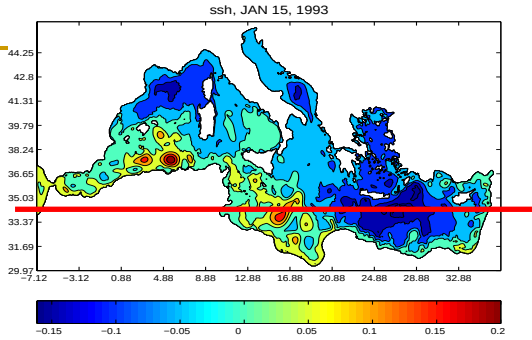


Waters just outside and inside the Straits are too warm and too salty (below sill depth)

Sea of Crete waters are a little colder and saltier than what reanalysis shows.

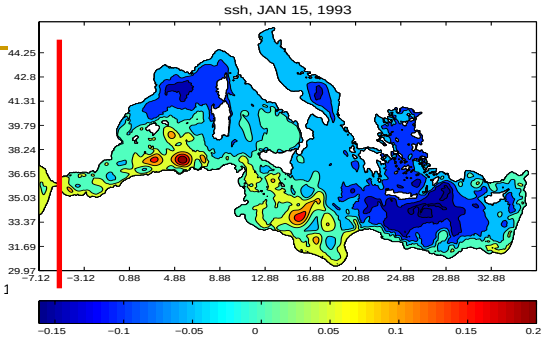
34N; Levantine

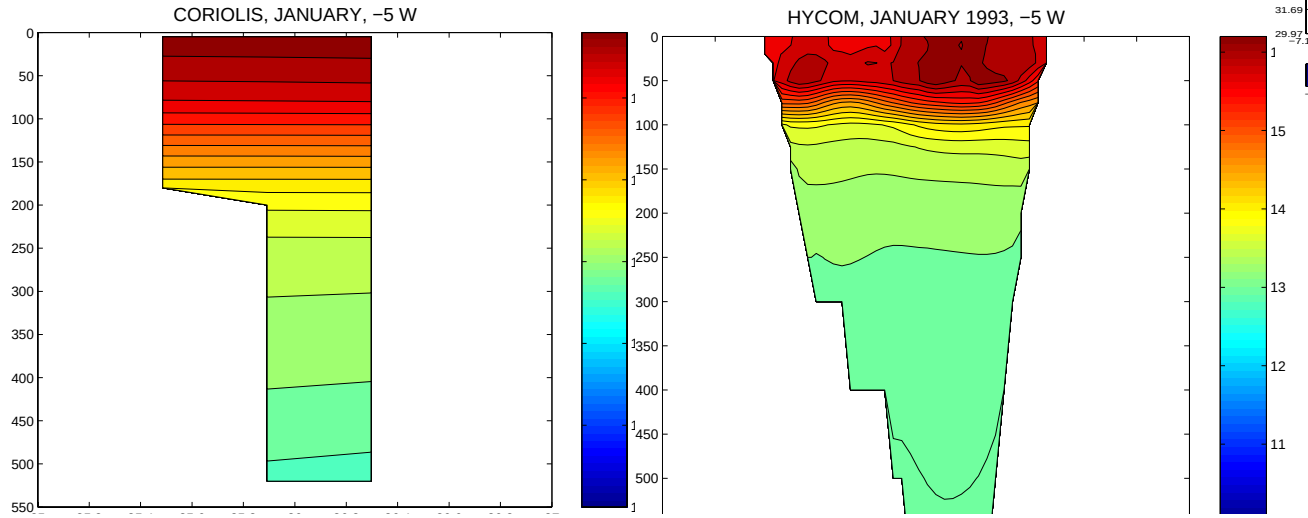


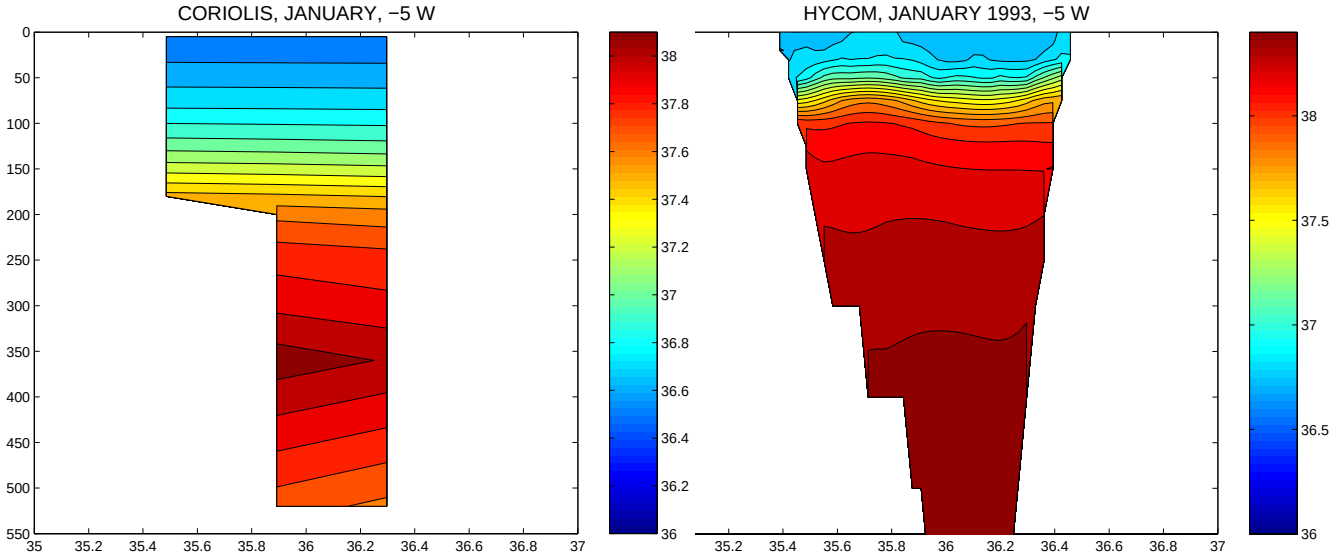


Over the Levantine basin waters are a little saltier at the surface.

5W

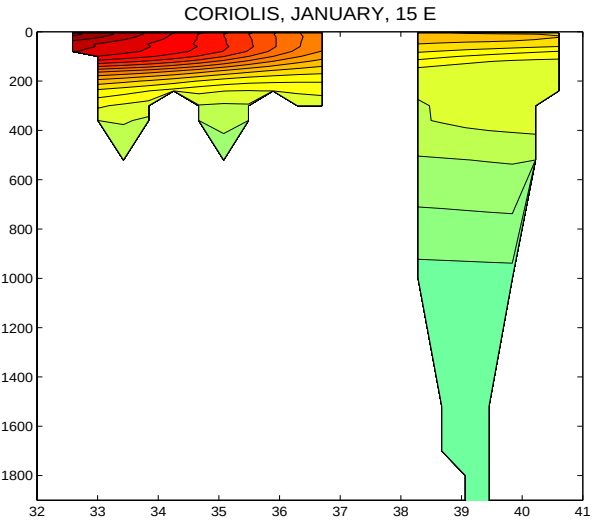


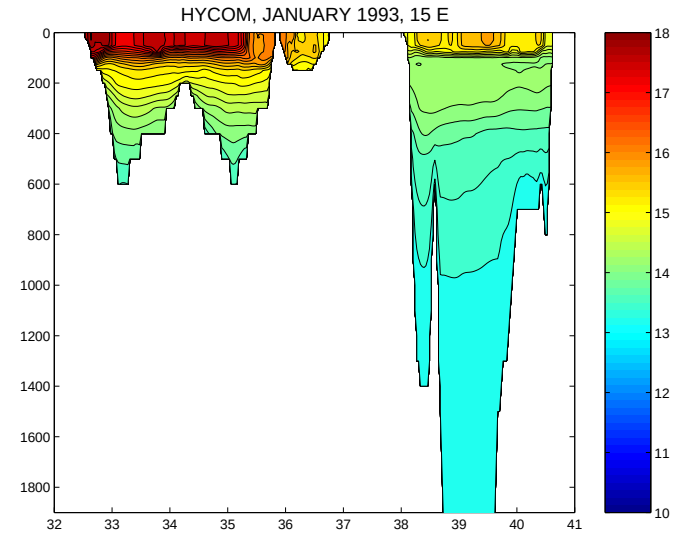


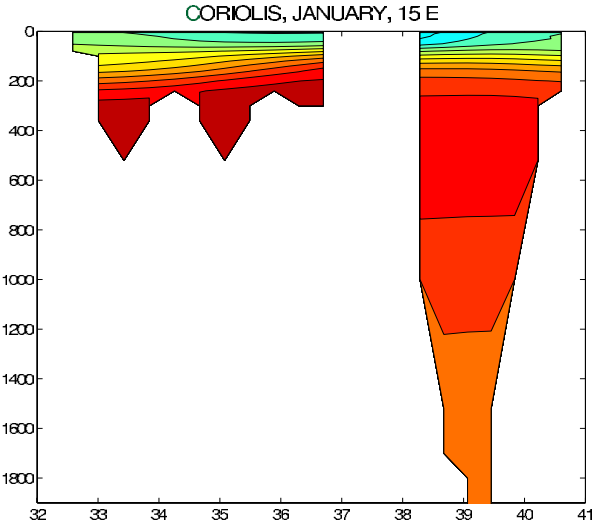


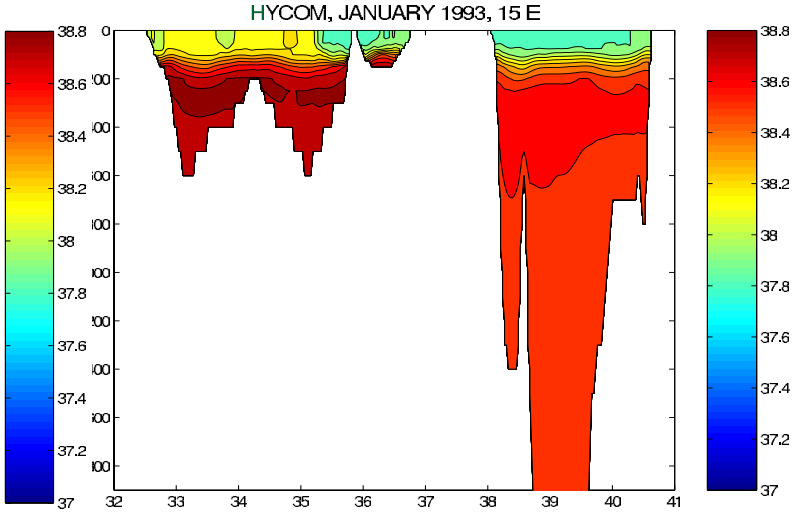
Below 400m model is warmer and misses the subsurface salinity maximum. Problem with target density resolution? Or the Intermediate Water formation in the Levantine Basin?

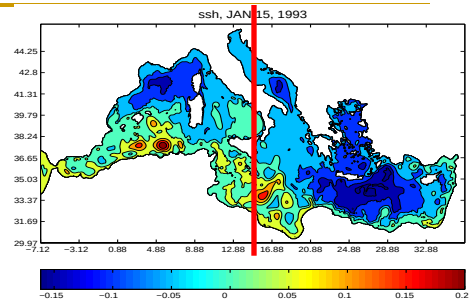
15E





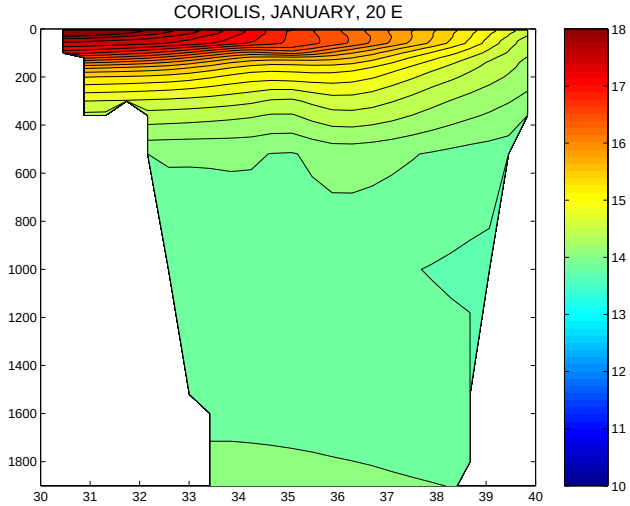


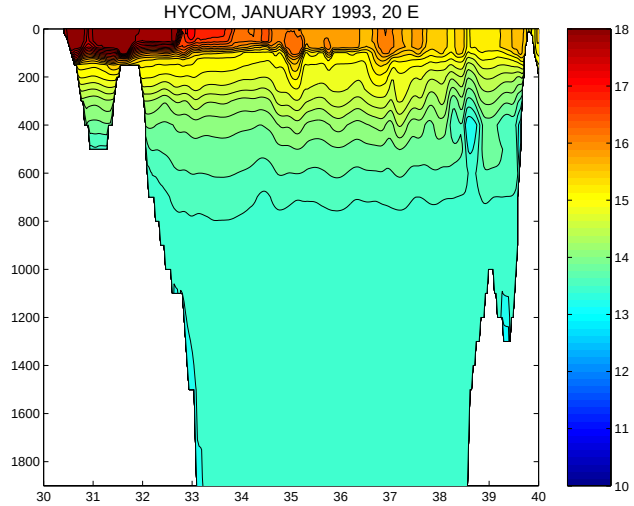


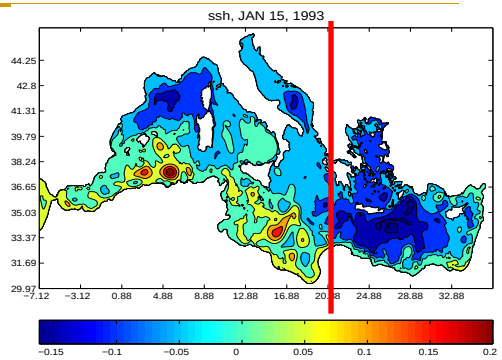


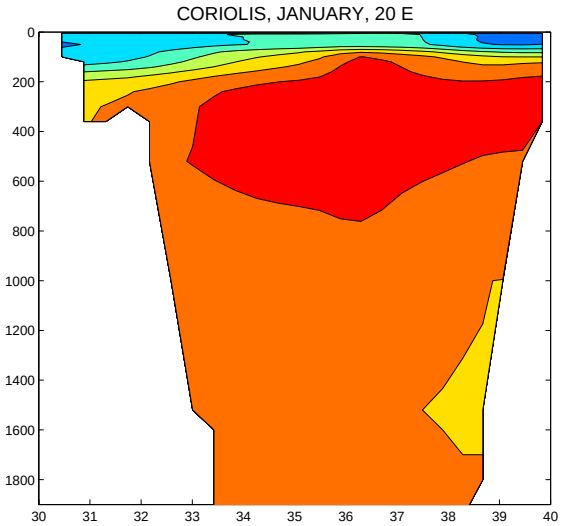
Adriatic Sea is colder and fresher at depth. They Tyrrhenian Sea is colder and saltier at depths below 400m.

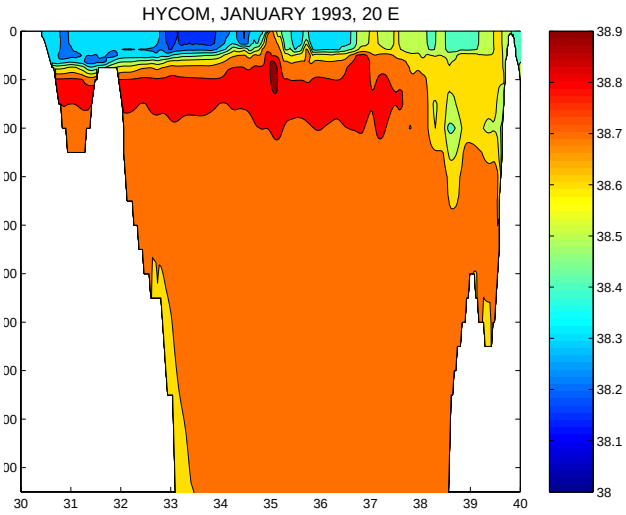
20E







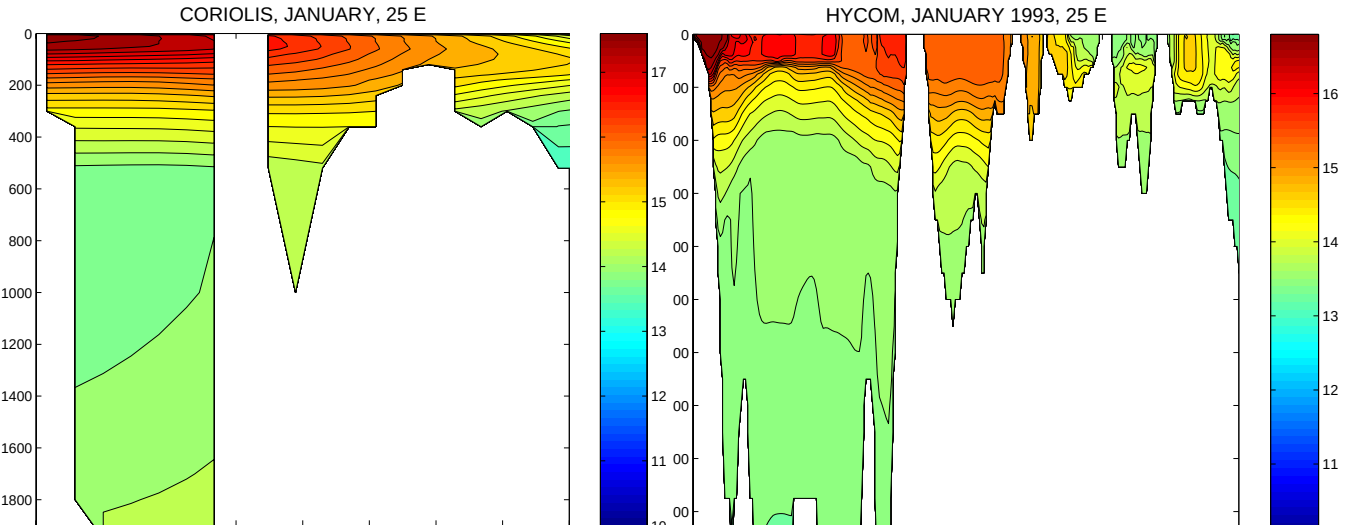


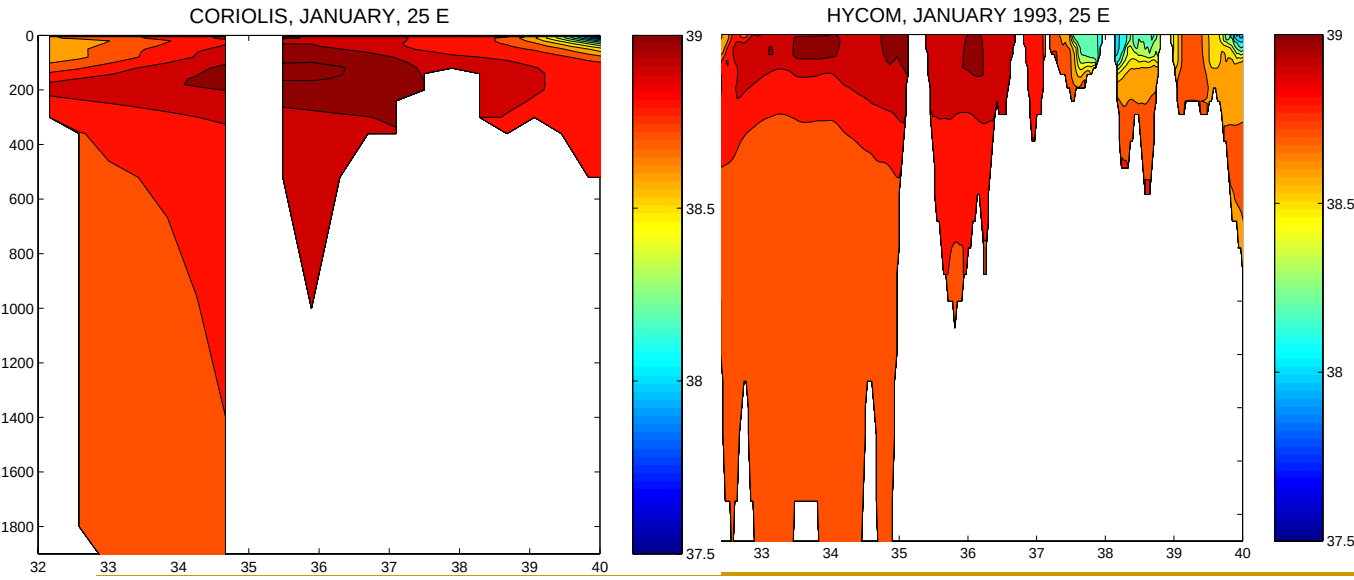


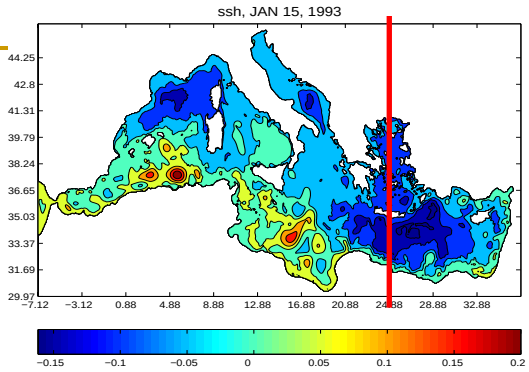
Surface in the model is off with regards to salinity (problem with relaxation climatology?)

Fresh and warmer feature off Ionian shelf at 1400m. Indication of a boundary current?

25E



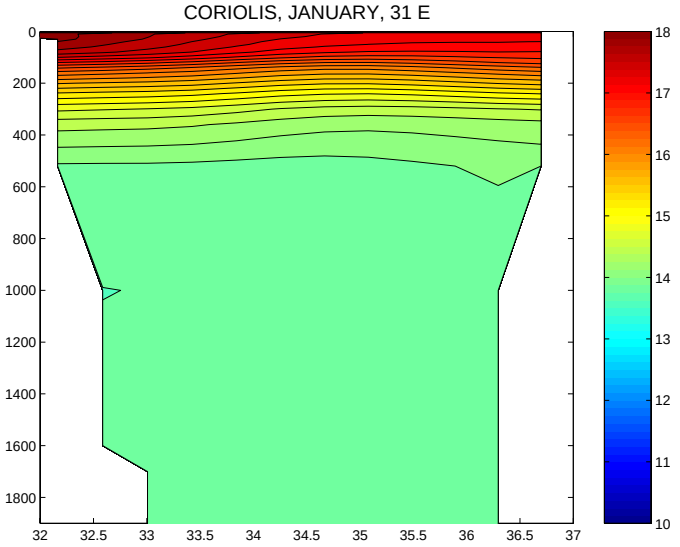


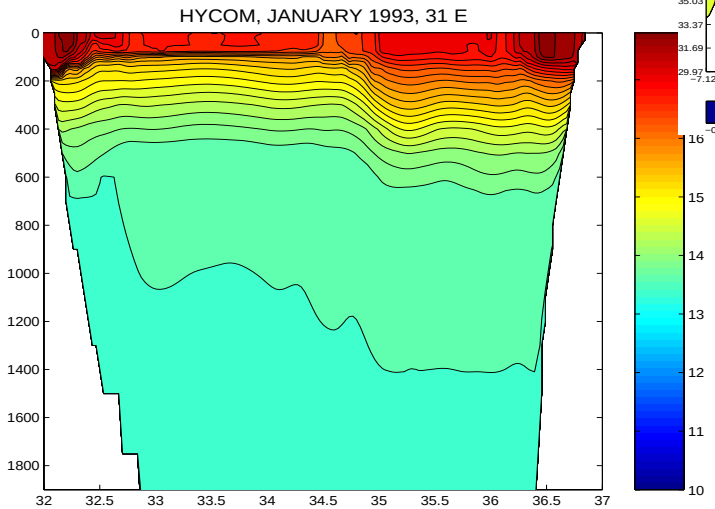


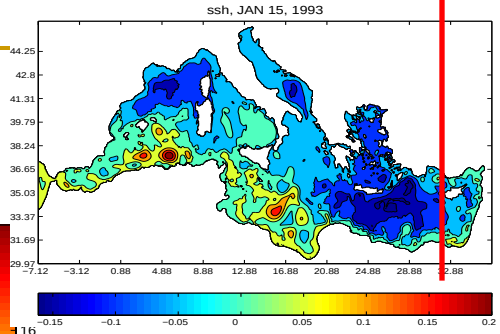
Model too salty at surface in the Sea of Crete and south of Crete. Problem with relaxation? Or mixing?

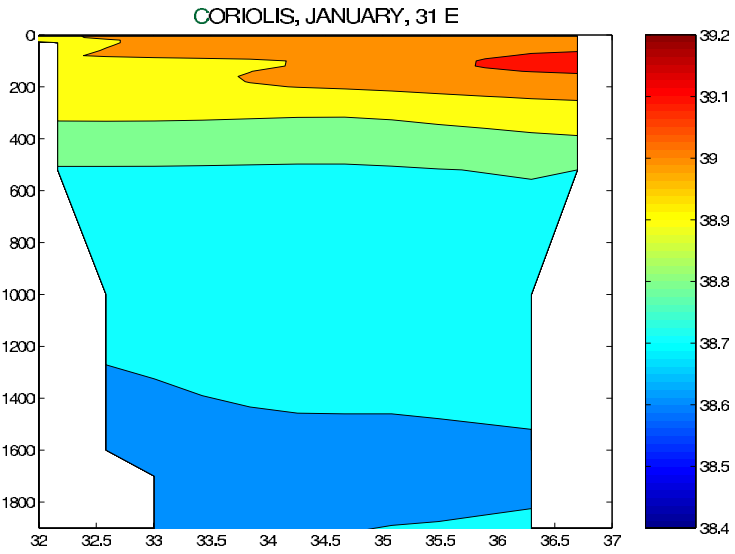
Model too cold and fresher over the Aegean Sea.

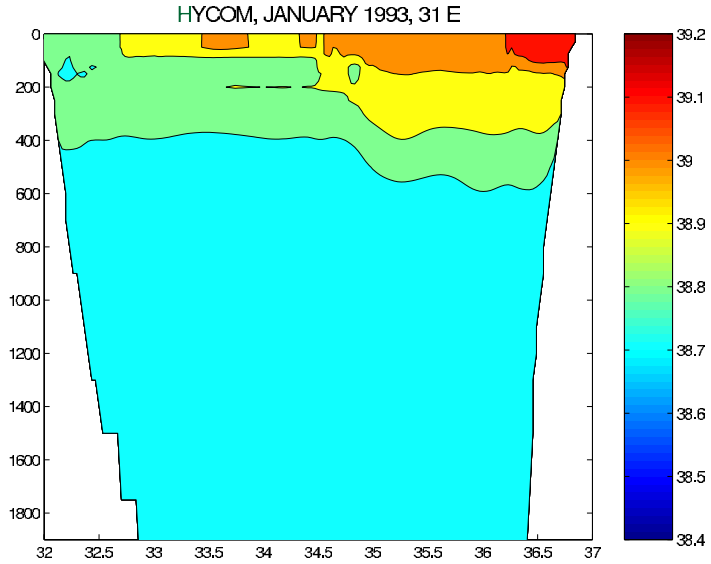
31E





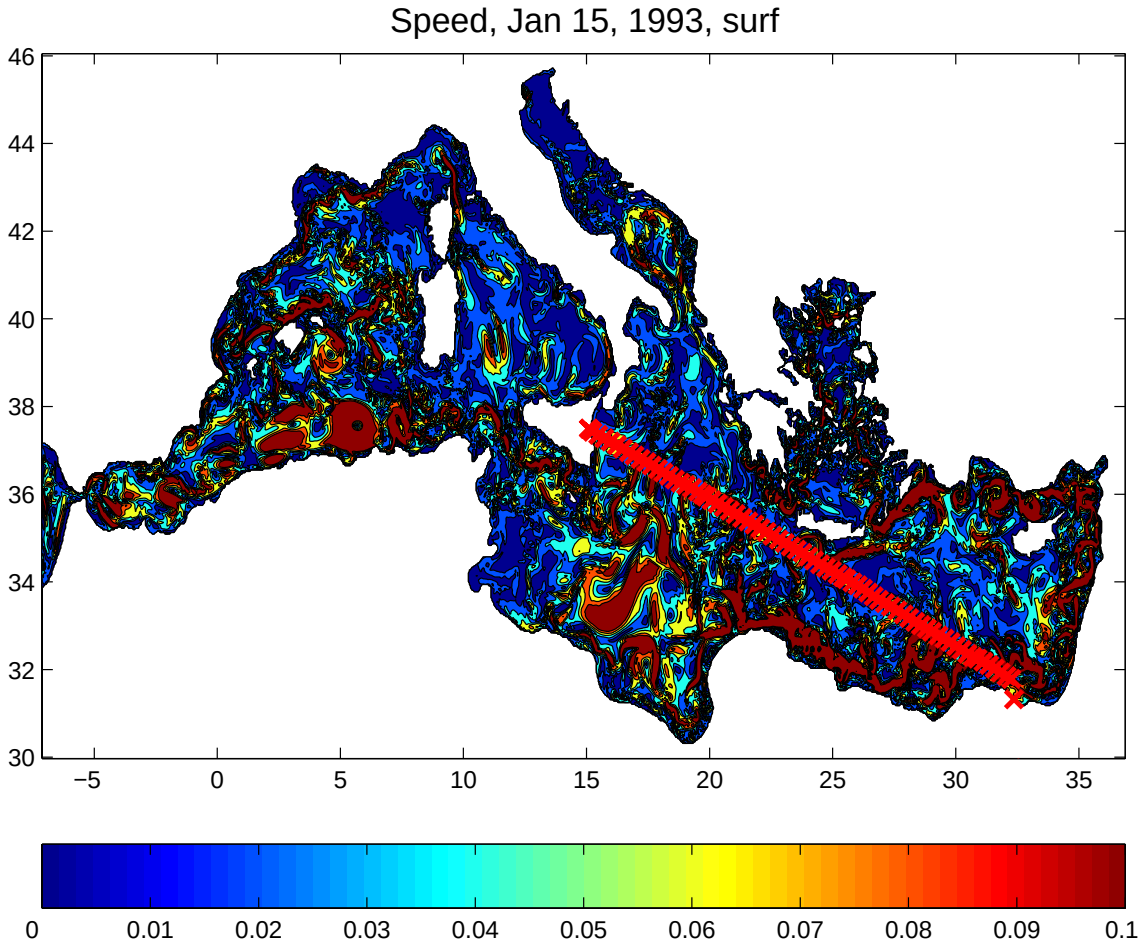




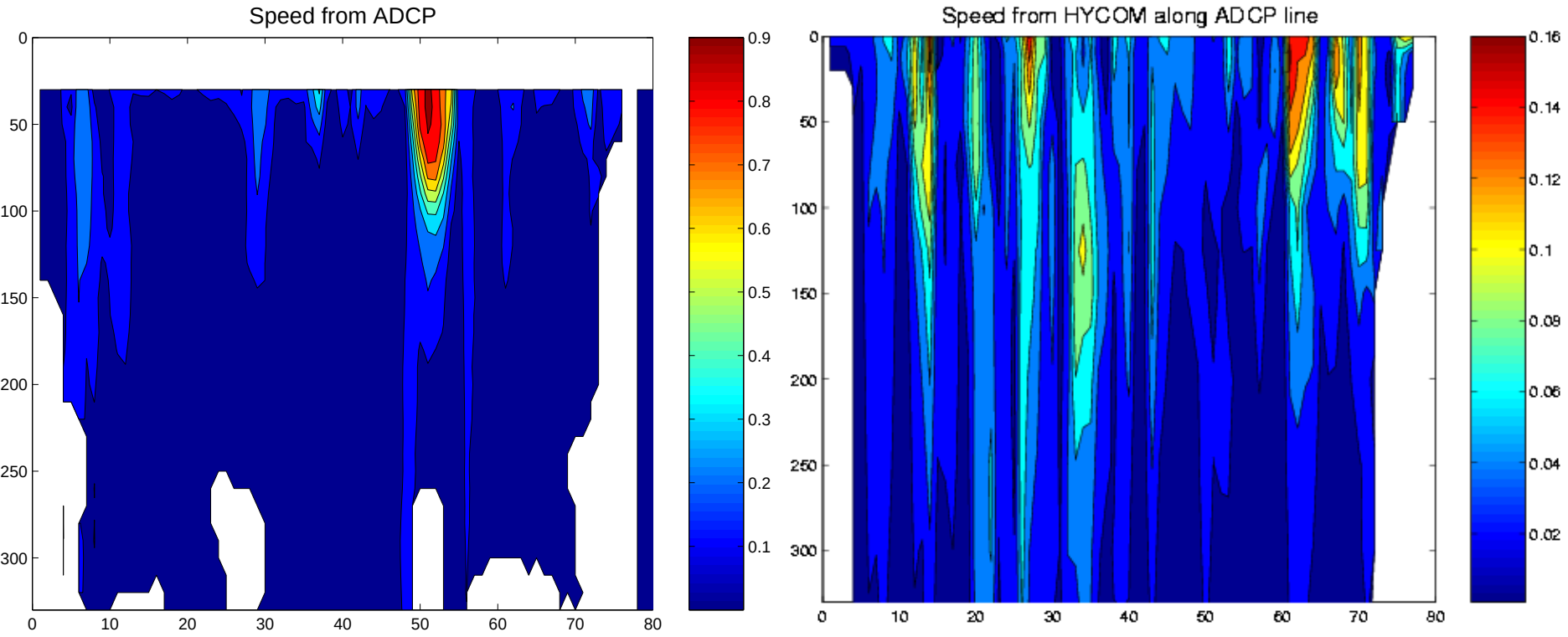


Model is colder and saltier on the north side (against Turkey) at the surface. Much colder and fresher than reanalysis at detph.

Surface speed and ADCP line



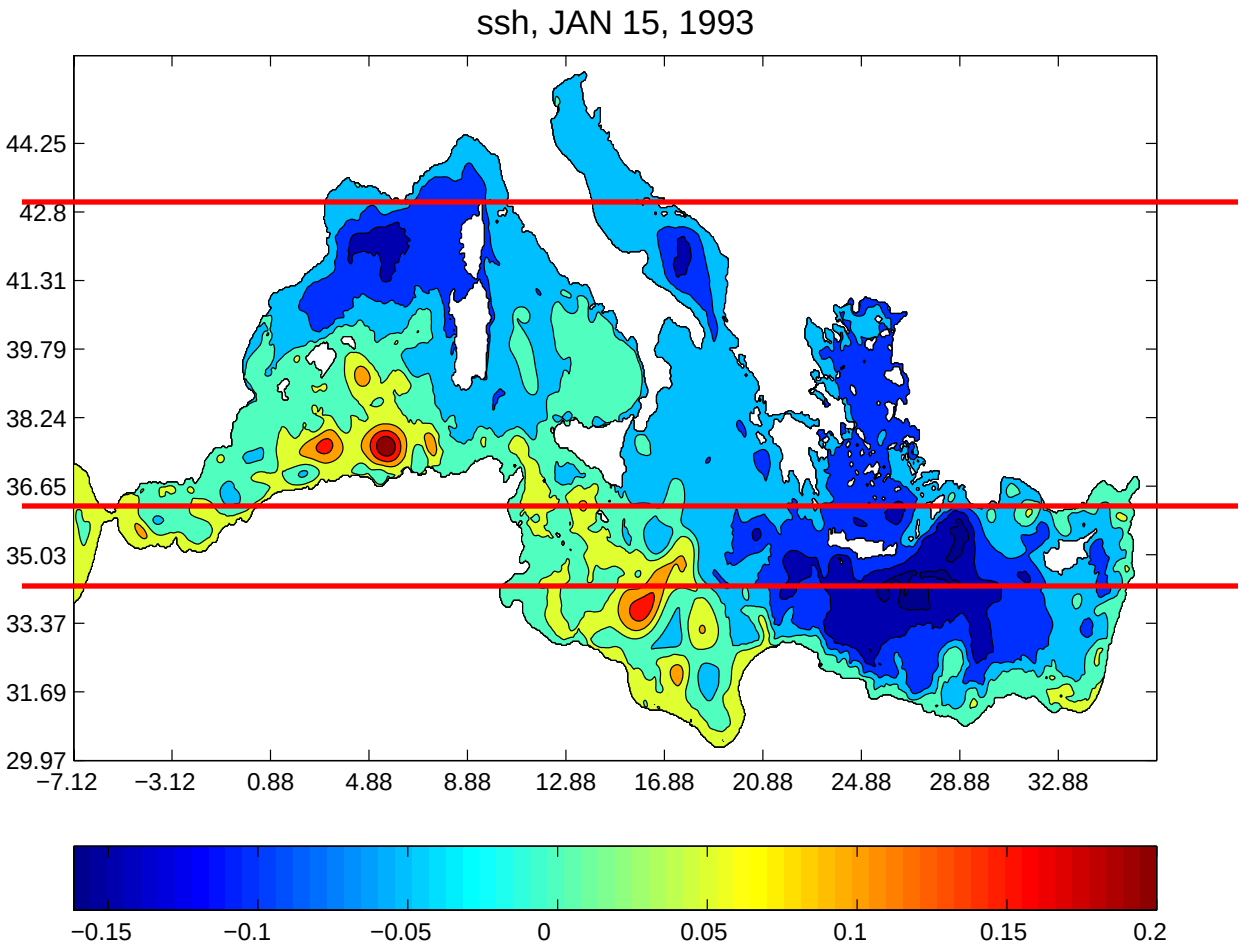
Speed section across EastMed basin



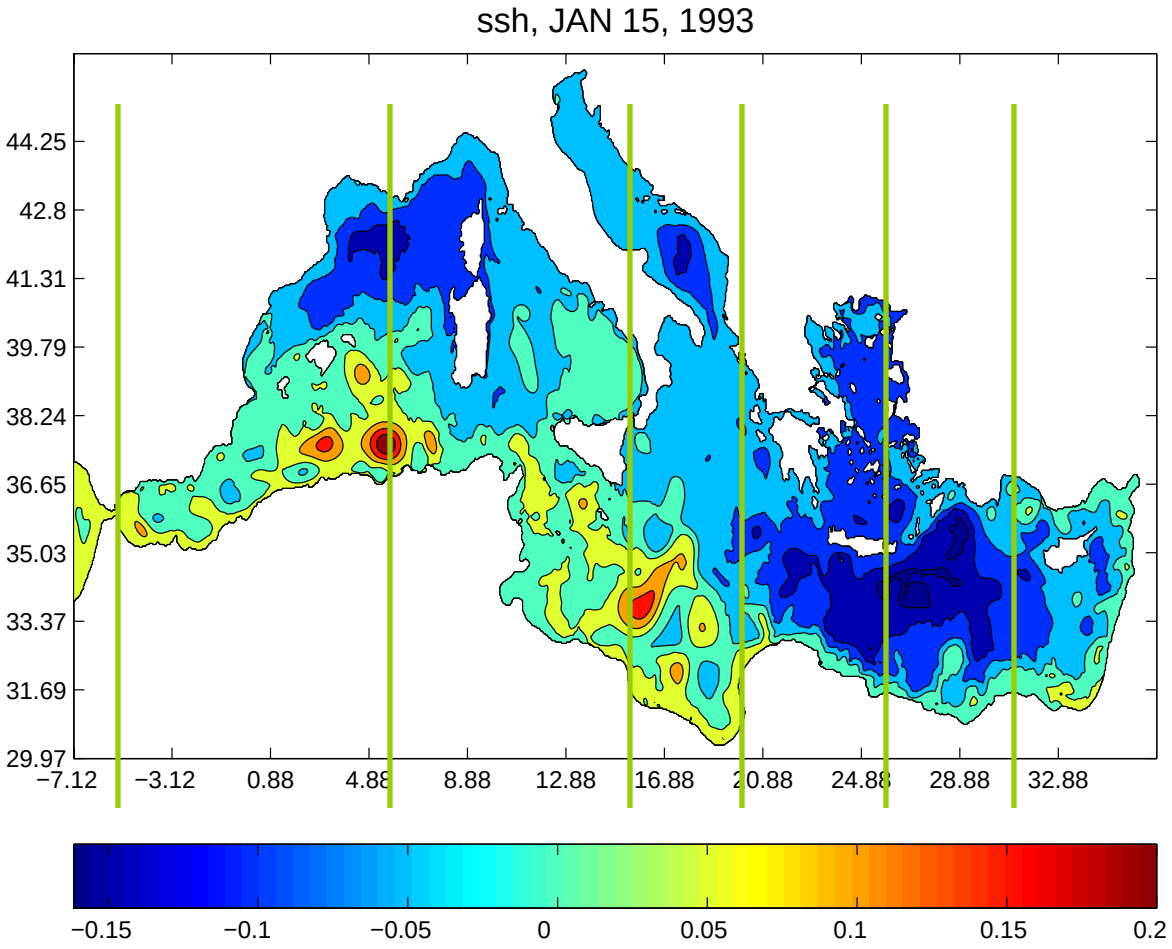
Future Work

- Compare to surface and near-surface climatologies:
  - SST monthly fields
  - SSH long term mean and variability
  - Drifter current climatology
- Investigate fidelity of climatologies we are relaxing at the Straits
- Twin run with reduced biharmonic momentum dissipation and thickness diffusion
- Optimize layer structure
- Try a σ_2 case; effects of thermobaricity

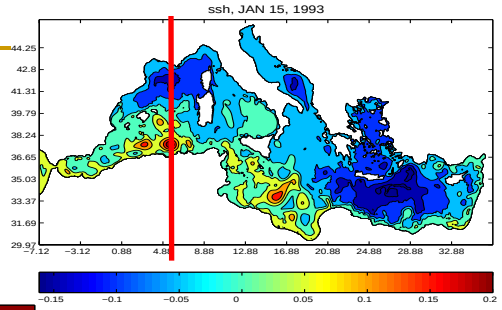
section


ssh, JAN 15, 1993
44.25
42.8
41.31
39.79
38.24
36.65
35.03
33.37
31.69
29.97
−7.12
−3.12
0.88
4.88
8.88
12.88
16.88
20.88
24.88
28.88
32.88
−0.15
−0.1
−0.05
0
0.05
0.1
0.15
0.2

Meridional Sections



5E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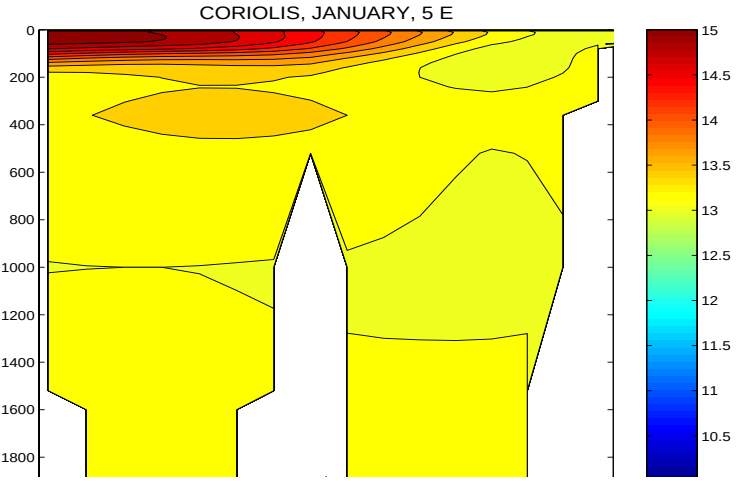
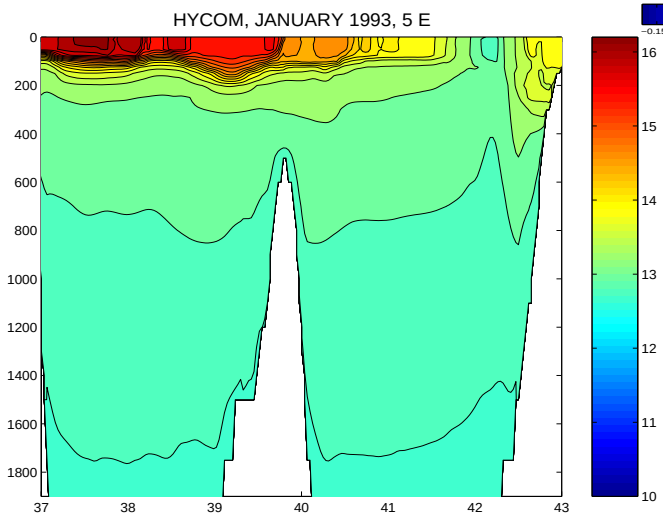

CORIOLIS, JANUARY, 5 E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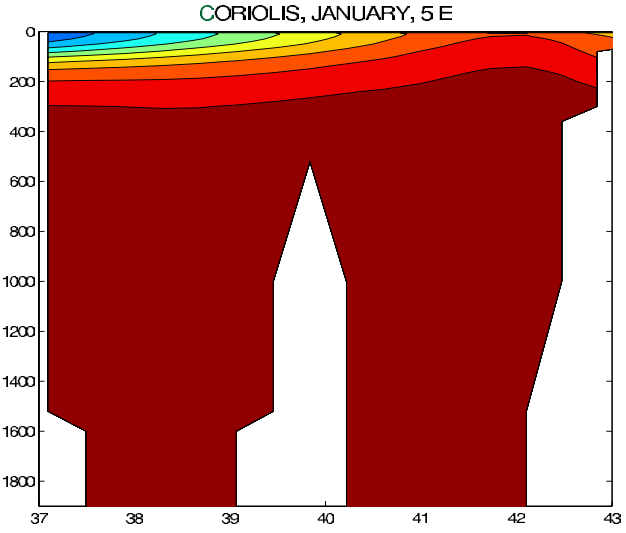
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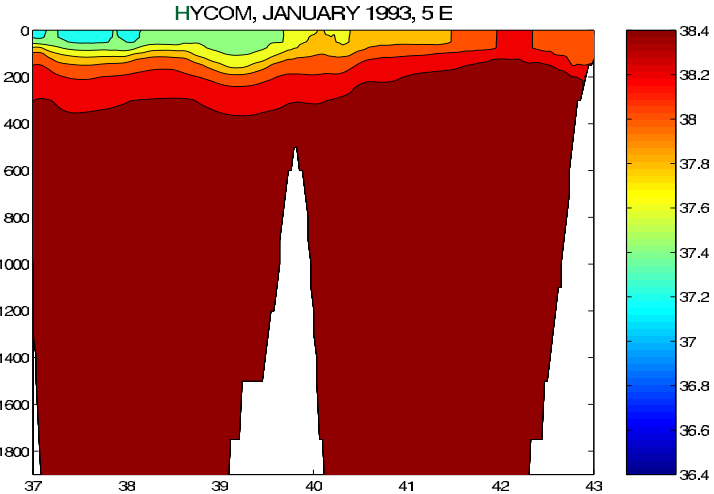
HYCOM, JANUARY 1993, 5 E