Climate projections of temperature variability in the Black Sea in the 21st century

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Introduction

- The Black Sea temperature has been rising since the 20th century due the climate change.
- Intense changes in physical and biogeochemical parameters increase the vulnerability of the marine ecosystem.
- This research aims to comprehensively assess the impact of global climate change on the Black Sea in the 21st century.

Model configuration

- **NEMOv4.2+BAMHBIv1.1:**

  Vertical resolution:

  59 lvls with ~1 m step in the upper 15 m

  Horizontal resolution:

  44x81 points, ~ 15x15km

- **NEMO+TURSEM:**

  Vertical resolution:

  75 lvls

  Horizontal resolution:

  43x82 points, ~ 15x15km

- **POM+ERSEM:**

  Vertical resolution:

  25 lvls

  Horizontal resolution:

  72x130 points ~ 10x10km

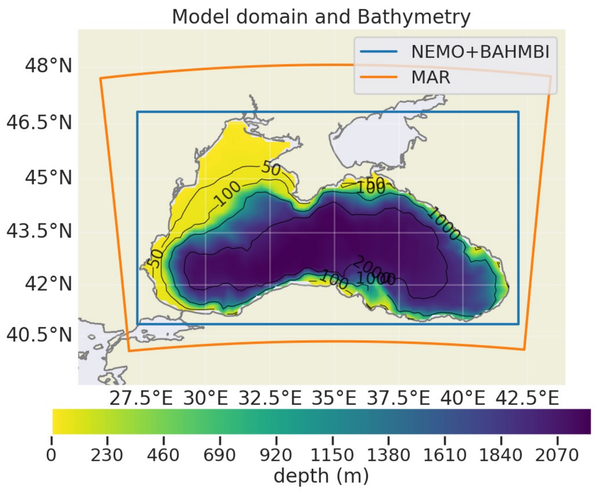
- **MARv3.14:**

  Vertical resolution:

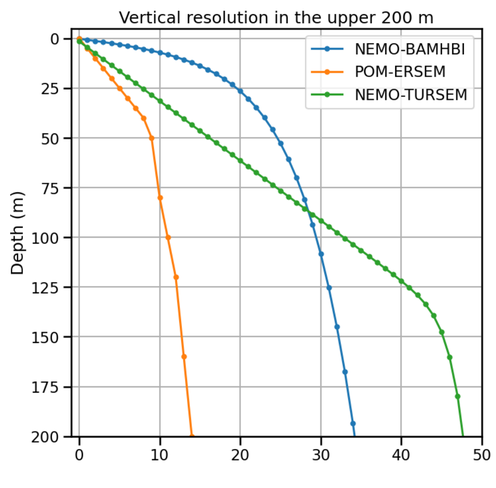
  24 sigma levels, 0-70 hPa

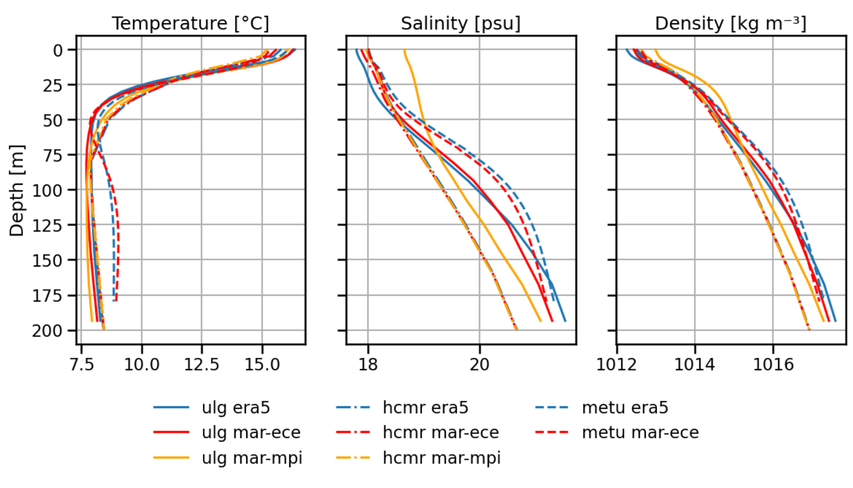
  Horizontal resolution:

  87x132 points ~ 10x10km

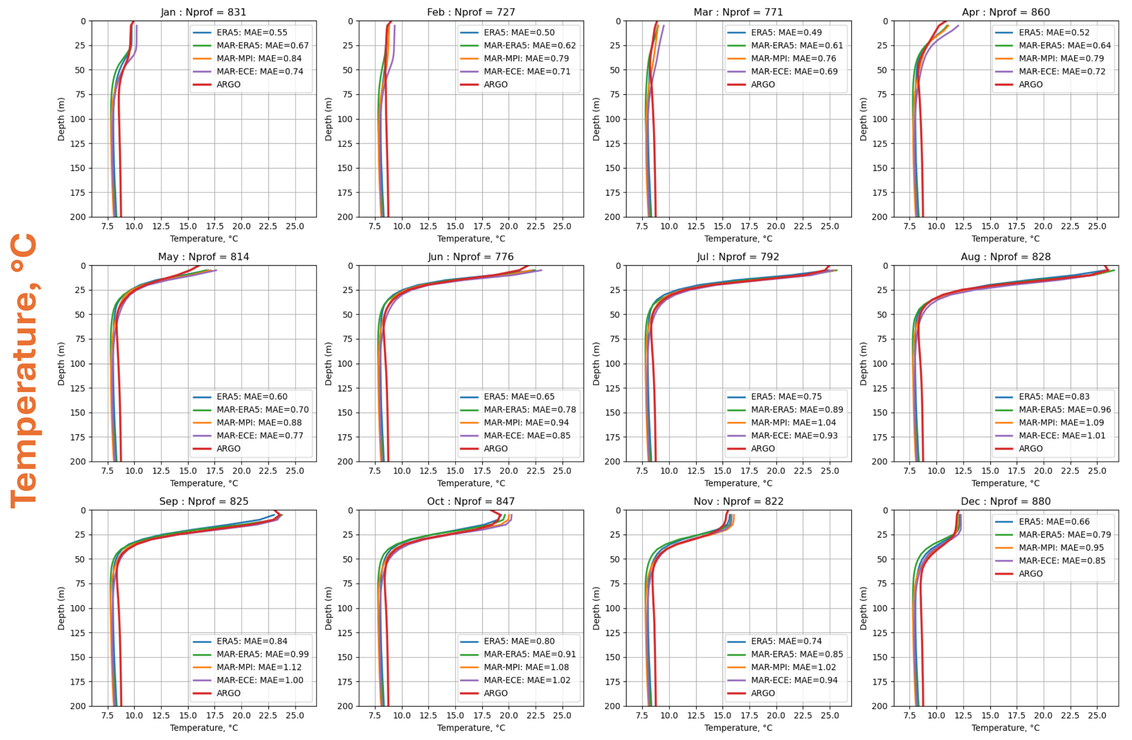


2005-01-01 to 2015-01-01

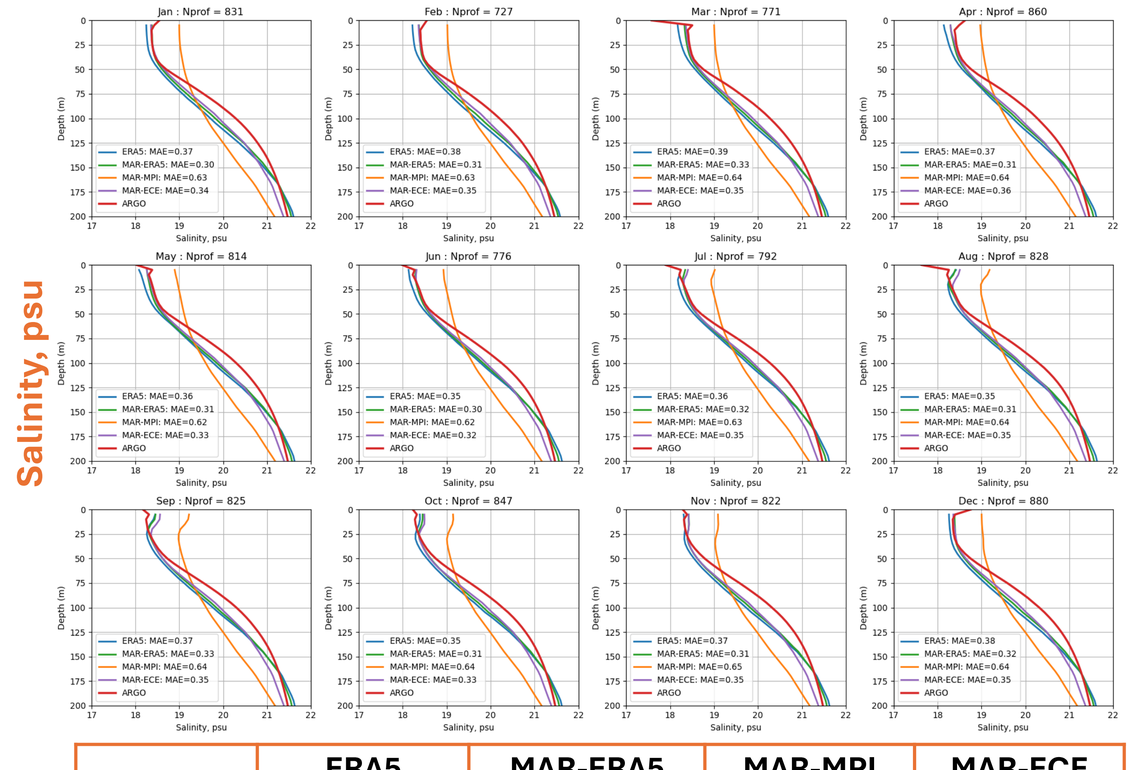




Validation

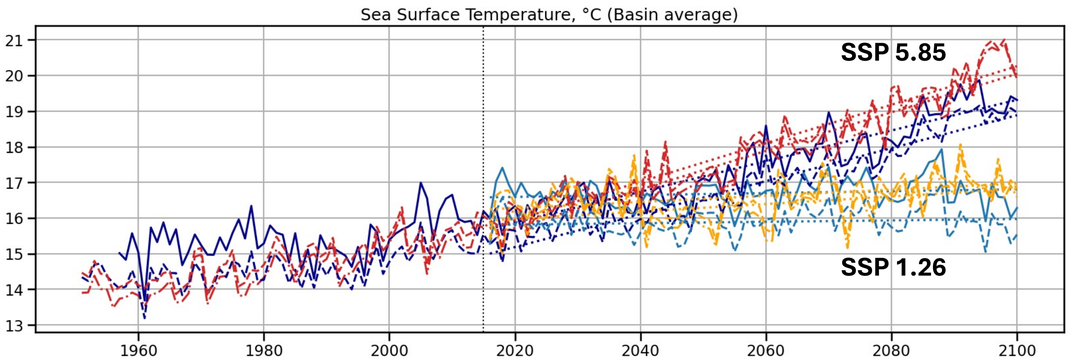


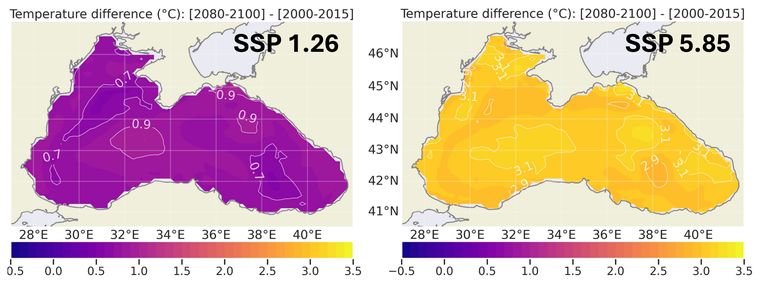
	ERA5	MAR-ERA5	MAR-MPI	MAR-ECE
MAE	0.66	0.78	0.94	0.85

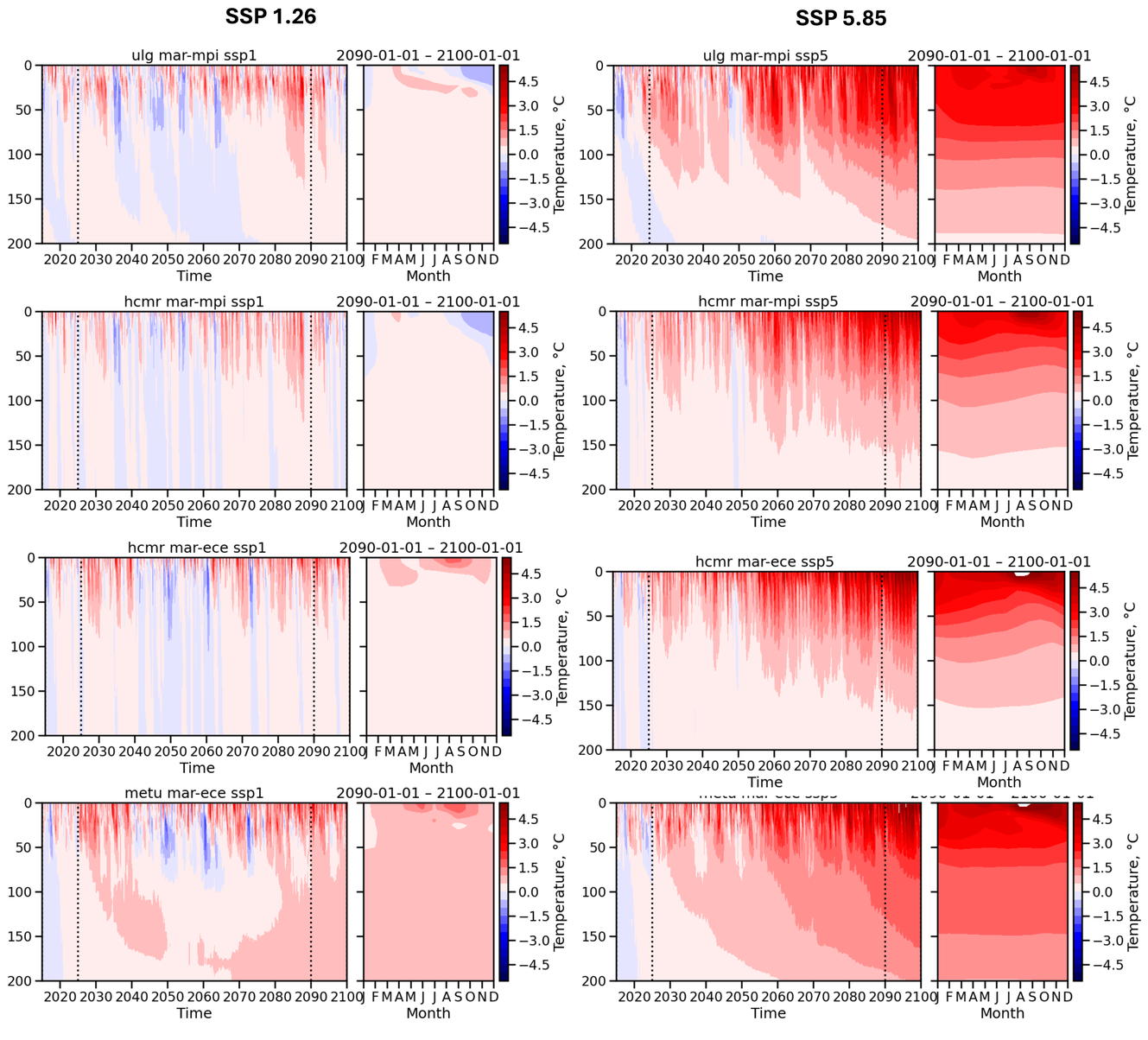


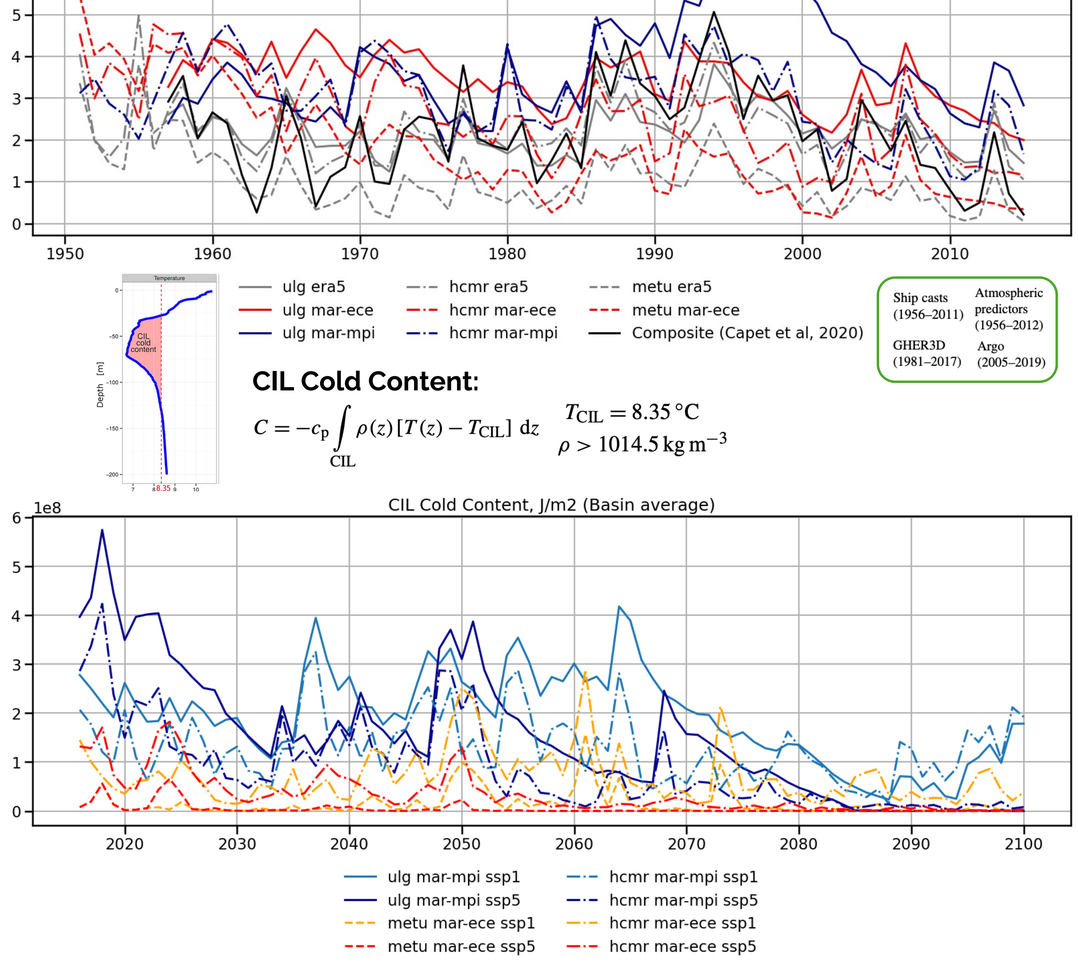
	ERA5	MAR-ERA5	MAR-MPI	MAR-ECE
MAE	0.37	0.31	0.63	0.34

Climate projections: SSP 1.26 and SSP 5.85 scenarios









CIL Cold Content:

$$C = -c_p \int_{CIL} \rho(z)\,[T(z) - T_{CIL}]\ \mathrm{d}z \qquad T_{CIL} = 8.35\,^{\circ}\mathrm{C} \qquad \rho > 1014.5\,\mathrm{kg\,m^{-3}}$$