SYMPOSIUM OP'24 ADVANCING OCEAN PREDICTION SCIENCE FOR SOCIETAL BENEFITS

Projecting climate changes effects on the Black Sea's physical and biogeochemical environment

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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

- **MARv3.14:**

  Vertical resolution:

  24 sigma levels, 0-70 hPa

  Horizontal resolution:

  87x132 points ~ 10x10km

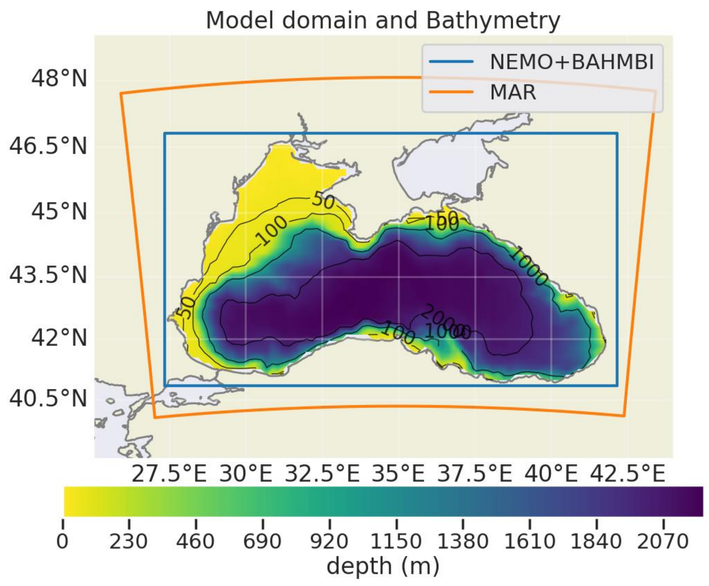
- **NEMOv4.2+BAHMBIv1.1:**

  Vertical resolution:

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

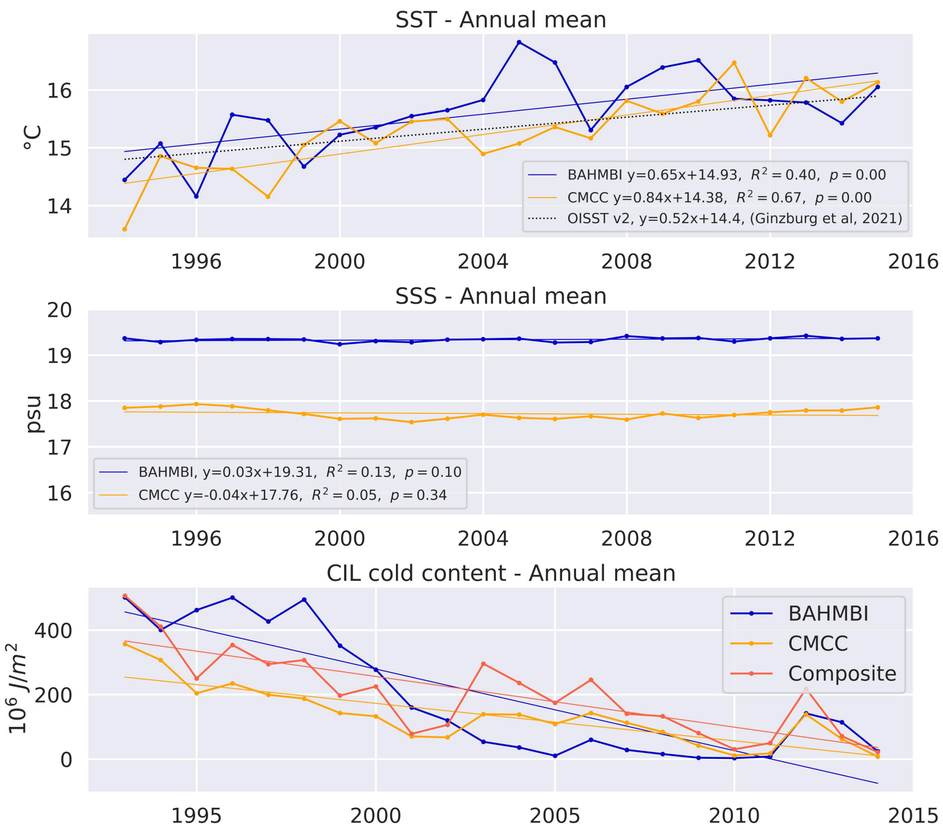
  Horizontal resolution:

  44x81 points, ~ 15x15km

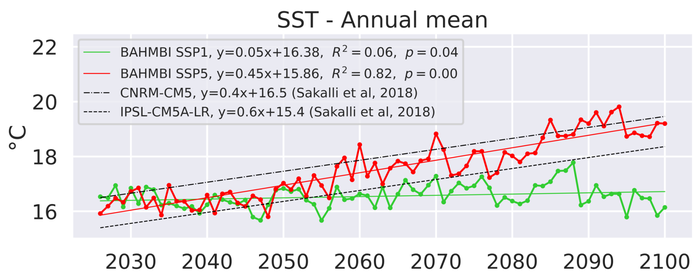


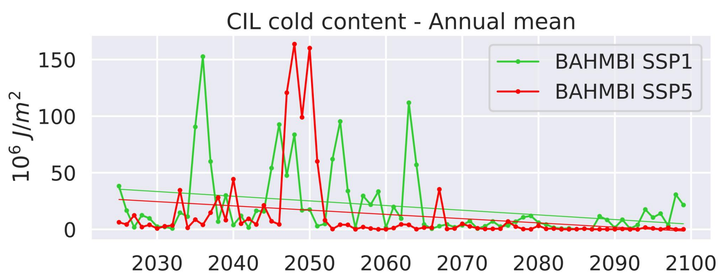
Validation (1993 - 2015)

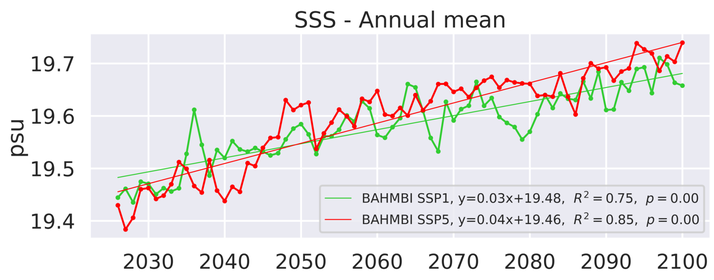
- **CMCC** - Black Sea Physics Reanalysis (Lima et al., 2020)
- **Composite** – CCC based on measurements and model data (Capet et al., 2020)
- **OISST** - high resolution SST using AVHRR



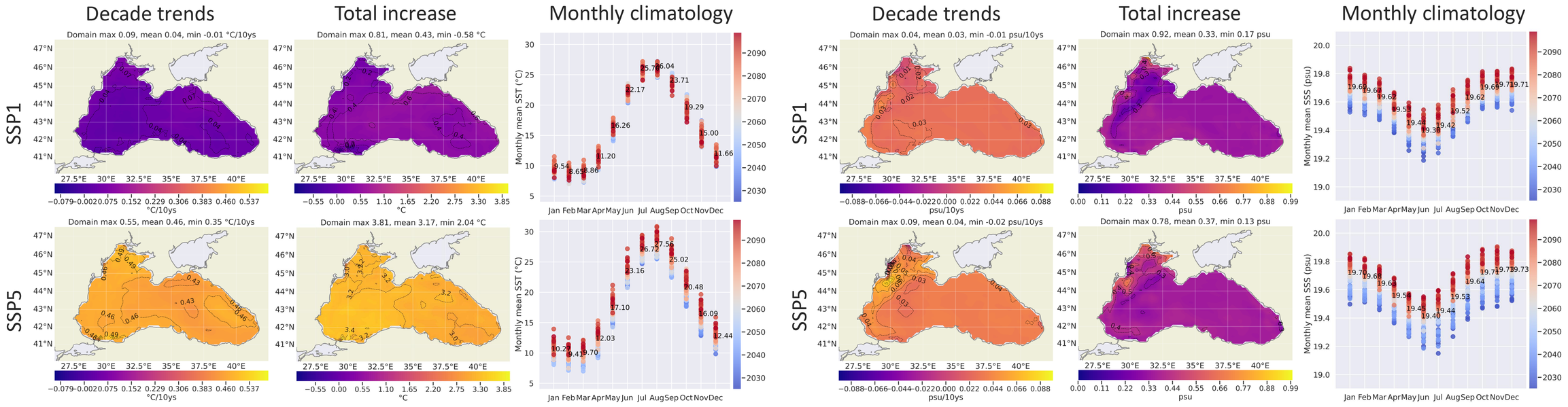
Climate projections for SSP126 and SSP585 scenarios (2025 - 2100)







Temperature



Salinity

Conclusions

- The Black Sea temperature will increase by 3.2 ˚C by 2100 at an average rate of 0.45 ˚C/10yrs under the SSP585 scenario. The temperature increase under the SSP126 scenario will not exceed 0.5 ˚C.
- Warming of the Black Sea will disrupt the formation of CIL. A decrease in CCC in the future is expected for both scenarios, but is more pronounced under SSP585.
- During the 21st century, salinity is expected to increase at a rate of 0.03 and 0.04 psu/10yrs for scenarios SSP126 and SSP585, respectively.

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