DC3: Arctic Sea Ice Forecasting

Task description

Forecasting the Arctic sea ice's response to external forcings on an hourly to seasonal time frame, by predicting key sea ice parameters such as extent, thickness, concentration and drift over short (i.e. hours) and long (i.e. seasonal) time horizons. The proposed solution should produce outputs that can be compared against gridded observations (at 1, 10 or 60 km resolution) and drifter trajectories.

Training datasets

- **Satellite data:** sea ice concentration, thickness and drift from missions such as Sentinel-1 and 2, CryoSat-2, SMOS and AMSR2 (except 2016-2020).
- **Reanalysis data:** information on oceanographic and atmospheric variables.
- **Hi-res sea ice simulations:** e.g. NextSIM-F archives.

Evaluation metrics / data

Forecast accuracy: comparison of predicted vs observed variables.

Sea Ice Physics: realism of several predicted statistics

User-oriented metrics: relating to activities like shipping, pollutant tracking, etc.

Computational efficiency: runtime and computational resource requirements

Data: the following from 2016 to 2020

- sea ice concentration and drift from AMSR2 at 10 to 60 km resolution
- sea ice lead fraction from MODIS gridded at 1km resolution
- ice embedded drifter data from IABP

Baseline solutions

NextSIM-F, IceCastNet, and a sea ice thickness emulator for short-term forecasting. For seasonal forecasts, TOPAZ and the aforementioned sea ice emulator.

References

- Williams et al. (2021)
- Sakov et al. (2012)
- Durand et al. (2024)
- Boutin et al. (2023)
- Du et al. (2017)
- Reiser et al. (2020)