DC1: Emulation of Global Ocean Reanalyses

Task description

Creating neural emulators of global ocean dynamics, which reproduce the time evolution of the global 3D state vector, given perfectly known initial conditions and time-varying forcings.

Training dataset

- **GLORYS12 reanalysis data:** from 1993 to 2019, at 1/12° (50 levels) and 0.5° (30 levels) resolution – the latter used for prototyping.
- **Initial conditions and time-varying forcings used in operational contexts:** from CMEMS global prediction system and from ECMWF analyses.

Evaluation metrics / data

Three categories of metrics will be computed:

- **Short-term accuracy in 3D space:** forecasting ability on short (<30 days) time horizons (also used for training).
- **Accuracy in observation space**: from interpolated emulator predictions.
- **Physical consistency:** assessing the potential of emulators to be used for longer timescales, consisting of physical diagnostics computed from multi-year simulations.

Evaluation Data: the last 5 years of GLORYS12 (2020-2024) reanalysis dataset

Baseline solutions

Two state-of-the-art neural emulators will be available as baselines: GloNet, XiHe.

References

- Bora et al. (2023)
- El Aouni et al., (2024)
- Griffies et al. (2016)
- Lellouche et al. (2021)
- Ryan et al. (2015)
- Wang et al. (2024)