

Readme

Sea ice concentration data produced from a simulation with the sea ice model CICE-CPOM-2019, including a prognostic floe size distribution model to study the MIZ. University of Reading.

Monthly mean sea ice concentration output from CICE-CPOM-2019, a stand-alone (fully forced) dynamic-thermodynamic sea ice model, based on CICE model version 5.1.2, but with an added prognostic floe-size distribution (Roach et al., 2018), prognostic melt pond model (Flocco et al, 2010, 2012), and elastic anisotropic plastic rheology (Heorton et al., 2018; Tsamados et al., 2014; Wilchinsky and Feltham, 2006). Also, a prognostic mixed layer allows the ocean below the mixed layer to be relaxed toward observations so that the mixed layer can calculate its salinity, temperature, and depth based on the fluxes from the deeper ocean (Petty et al., 2014). Temperature and salinity below the ocean mixed layer are restored every 20 days to climatological monthly means from MYO-WP4-PUM-GLOBAL-REANALYSIS-PHYS-001-004 (Ferry et al, 2011). Atmospheric forcing used was NCEP Reanalysis-2 (Kanamitsu et al., 2002, updated 2017).

Further information and model description can be found in **Rolph, R. J., Feltham, D. L., and Schroeder, D.: Changes of the Arctic marginal ice zone during the satellite era, The Cryosphere, 2020.**

References:

Ferry, N., Masina, S., Storto, A., Haines, K., Valdivieso, M., Barnier, B., and Molines, J.-M.: Product User Manual GLOBALREANALYSISPHYS-001-004-a and b, *MyOcean*, 2011.

Heorton, H. D. B. S., Feltham, D. L., & Tsamados, M. (2018). Stress and deformation characteristics of sea ice in a high-resolution, anisotropic sea ice model. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 376(2129), 20170349.

Kanamitsu, M., Ebisuzaki, W., Woollen, J., Yang, S.-K., Hnilo, J. J., Fiorino, M., and Potter, G. L.: NCEP-DOE AMIP-II Reanalysis (R-2), *B. Am. Meteorol. Soc.*, 83, 1631–1643, 2017

Petty, A. A., Holland, P. R., & Feltham, D. L. (2014). Sea ice and the ocean mixed layer over the Antarctic shelf seas. *The Cryosphere*, 8(2), 761-783.

Roach, L. A., Horvat, C., Dean, S. M., & Bitz, C. M. (2018). An emergent sea ice floe size distribution in a global coupled ocean-sea ice model. *Journal of Geophysical Research: Oceans*, 123(6), 4322-4337.

Tsamados, M., Feltham, D. L., Schroeder, D., Flocco, D., Farrell, S. L., Kurtz, N., ... & Bacon, S. (2014). Impact of variable atmospheric and oceanic form drag on simulations of Arctic sea ice. *Journal of Physical Oceanography*, 44(5), 1329-1353.

Wilchinsky, A. V., & Feltham, D. L. (2006). Modelling the rheology of sea ice as a collection of diamond-shaped floes. *Journal of non-newtonian fluid mechanics*, 138(1), 22-32.