Data

Virginia Institute of Marine Science

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Dataset: A numerical simulation of the ocean, sea ice and ice shelves in the Amundsen Sea (Antarctica) over the period 2006-2022 and its associated code and input files

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Spatial Information: Longitude 90-140 deg.W, Latitude 68-76 deg.S (Amundsen Sea, Antarctica)

Data Access: Download from Link

Abstract: A three-dimensional numerical model of the Amundsen Sea (Antarctica) was used to simulate the period Jan.2006-Mar.2022 under consistent atmospheric/oceanic forcings, bathymetry/ice shelf topography, and model equations/parameters. The model is an implementation of the Regional Ocean Modeling System (ROMS, https://www.myroms.org/) with extensions for sea ice (Budgell 2005) and ice shelves (Dinniman et al. 2011). It simulates the ocean hydrography and circulation, sea ice thermodynamics and dynamics, and the basal melt of the ice shelves, with a uniform horizontal mesh of 1.5km and 20 topography-following vertical levels. Forcings include the ERA5 reanalysis (3-hourly), 10 tidal constituents from CATS 2008, and ocean/sea ice conditions at the edges of the model domain taken from the 5km-resolution circumpolar model of Dinniman et al. 2020 and from daily SSM/I satellite images. The model outputs are divided into nine directories each containing two years worth of model results (run661-669) in the NetCDF format. Each directory contains: daily-averaged model fields (roms_avg_xxxx.nc), instantaneous snapshots every 3 hours for select fields (roms_qck_xxxx.nc), and instantaneous snapshots every 30 days (roms_his_xxxx.nc). All the metadata information necessary for the interpretation of the model outputs (dimensions, units, etc) is included inside the NetCDF files. The NetCDF files follow the CF conventions and can be opened with various software that are open source and freely available over the Internet. In addition to the model outputs, this archive includes the computer code as well as the input files necessary for reproducing the model outputs of this archive.

Description: See "File Description"

File Description (Table or list):

--readme.txt : Background information on the numerical simulation.
--code_v20230107.zip : The computer code used for the computer simulation.
--depths.m : A Matlab/Octave script computing the vertical position of the 3D model grid boxes at a given time.
--run601/roms_avg_xxxx.nc : Daily-averaged model fields (30 days of results per file) for years 2006-2007.
--run601/roms_qck_xxxx.nc : Instantaneous snapshots every 3 hours for select model fields (30 days of results per file) for years 2006-2007.
--run601/roms_his_xxxx.nc : Instantaneous snapshot of model fields every 30 days for years 2006-2007.
--run602/ : Same as run601, but for years 2008-2009.
--run603/ : Same as run601, but for years 2010-2011.
--run604/ : Same as run601, but for years 2012-2013.

--run605/ : Same as run601, but for years 2014-2015.
--run606/ : Same as run601, but for years 2016-2017.
--run607/ : Same as run601, but for years 2018-2019.
--run608/ : Same as run601, but for years 2020-2021.
--run609/ : Same as run601, but for Jan.-Mar. 2022.
--input_files/grd_amicus1076x516_2010_v20220703.nc : Grid file for the ROMS simulation.
--input_files/roms_ini.nc : Initial condition for the ROMS simulation.
--input_files/tides_amicus1076x516_v20211128.nc : Tidal forcing for the ROMS simulation.
--input_files/nud_amicus1076x516x20_v20220915.nc : Nudging rates for relaxation over the off-shelf region (abyssal plain).
--input_files/bry_amicus1076x516x20_ssmiyyyy_vxxxxxxxx.nc : Lateral boundary conditions for year yyyy.
--input_files/clm_amicus1076x516x20_yyyy_vxxxxxxxx.nc : Climatological fields for relaxation over the off-shelf region (abyssal plain; year yyyy).
--input_files/frc_amicus_era5_yyyy_swrad0.71_vxxxxxxxx.nc : Atmospheric forcing for year yyyy.

Keywords: Amundsen Sea, Antarctica, model, ocean, sea ice, ice shelves, continental shelf, polynyas, ROMS, polar, southern ocean

Associated Publication(s): (Not applicable)

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