

# West Antarctic Peninsula ROMS model output

**Website:** <https://www.bco-dmo.org/dataset/831045>

**Data Type:** model results

**Version:** 1

**Version Date:** 2020-11-20

## Project

» [Collaborative Research: Particulate Organic Carbon Export off the Antarctic Peninsula by Nonlinear Mesoscale Eddies and Wind Forcing](#) (POC Export off WAP)

Contributors	Affiliation	Role
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## Abstract

NetCDF model output of the simulated sea surface height, surface passive tracer concentration, and model grid data from a West Antarctic Peninsula ROMS model.

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## Coverage

**Spatial Extent:** N:-56.89838797 E:-44.39157487 S:-76.04643337 W:-97.51808264

**Temporal Extent:** 2006 - 2012

## Methods & Sampling

**Location:** Coastal West Antarctic Peninsula

### Methodology summary:

Model results are from a 1.5 km horizontal resolution Regional Ocean Modeling System (v3.6) circulation model, including dynamic sea-ice and static ice shelves (including mechanical and thermodynamic interactions between the floating ice shelves and the water underneath), for the West Antarctic Peninsula (WAP) coastal ocean. The model simulation covers the period 2006-2012 and is forced by atmospheric output from the Antarctic Mesoscale Prediction System. The results here are model sea surface height (for the entire simulation) and a surface passive tracer concentration for a temporal subset of the model run (1/25/2009-5/24/2009). At a given time step during the model integration, a conservative tracer with a default value of 1.0 was placed throughout the entire vertical water column in any grid point shoreward of the model 0.08 m sea surface elevation anomaly (with respect to the long term mean over the model domain) contour along the WAP. This tracer was then allowed to freely advect and diffuse within the model domain based on the modeled circulation.

More details on these data are in Castelao et al. (2021), but the simulation is essentially the same (other than the new passive tracer) as in Graham et al. (2016).

ROMS version used: ROMSv3.6. Information on how to visualize ROMS model output is available at: <https://www.myroms.org/wiki/Tools>

This dataset includes three sets of data files:

- 1) NetCDF model output of the simulated sea surface height for the entire model simulation (2006 through 2012) of the West Antarctic Peninsula circulation model. Each file (WAP\_1k\_zeta\_00\*.nc) contains 10 five-day temporal averages of the model SSH (m). See Data File WAP\_1k\_zeta\_00\_nc.tar.gz for file access.
- 2) NetCDF model output of the simulated sea surface height and surface passive tracer concentration for a temporal subset of the model run (1/25/2009 - 5/24/2009). Each file (WAP\_1k\_avg\_02\*.ssh.dye.nc) contains 5 one-day averages of the model SSH (m) and surface passive tracer (dimensionless: 0-1). See Data File WAP\_1k\_avg\_02\_ssh\_dye\_nc.tar.gz for file access.
- 3) One file (WAP\_1k\_grid\_r36\_smooth\_v5.nc) that contains the model grid data. See Data File WAP\_1k\_grid\_r36\_smooth\_v5.nc for file access.

## Data Processing Description

BCO-DMO Data Manager Processed notes:

- \* Original files submitted through Dropbox had the submitter's name prepended to the files. Removed the added file name prefix from .nc files.
- \* Bundled and compressed the the WAP\_1k\_zeta\_00\*.nc files into file Data File WAP\_1k\_zeta\_00\_nc.tar.gz and added to Data Files section.
- \* Bundled and compressed the WAP\_1k\_avg\_02\*.ssh.dye.nc files into WAP\_1k\_avg\_02\_ssh\_dye\_nc.tar.gz and added to the Data Files section.
- \* Added WAP\_1k\_grid\_r36\_smooth\_v5.nc to Data Files section.

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## Data Files

File
<b>Model output: simulated sea surface height and surface passive tracer concentration</b> filename: WAP_1k_avg_02_ssh_dye_nc.tar.gz (GZIP (.gz), 618.26 MB) MD5:bef1dcd9bb9ab8805b137f16732e184e  NetCDF model output of the simulated sea surface height and surface passive tracer concentration for a temporal subset of the model run (1/25/2009 - 5/24/2009). Each file (WAP_1k_avg_02*.ssh.dye.nc) contains 5 one-day averages of the model SSH (m) and surface passive tracer (dimensionless: 0-1).  Parameters in the .nc files:  dye_04,"time-averaged dye concentration, type 04","dye units" ocean_time,"averaged time since initialization","seconds since 0001-01-01 00:00:00" s_rho,"S-coordinate at RHO-points","" zeta,"time-averaged free-surface","meter"

## File

### Model grid data

filename: WAP\_1k\_grid\_r36\_smooth\_v5.nc

(NetCDF, 263.25 MB)  
MD5:abfe9de9ce44da97a1561d2929c73744

Model grid data.

Parameters in the .nc file:

angle,"angle between XI-axis and EAST","radians"  
dmde,"ETA-derivative of inverse metric factor pm","meter"  
dndx,"XI-derivative of inverse metric factor pn","meter"  
el,"basin length in the ETA-direction","meter"  
f,"Coriolis parameter at RHO-points","second-1"  
h,"model bathymetry at RHO-points","meter"  
hraw,"Working bathymetry at RHO-points","meter"  
lat\_psi,"latitude of PSI-points","degree\_north"  
lat\_rho,"latitude of RHO-points","degree\_north"  
lat\_u,"latitude of U-points","degree\_north"  
lat\_v,"latitude of V-points","degree\_north"  
lon\_psi,"longitude of PSI-points","degree\_east"  
lon\_rho,"longitude of RHO-points","degree\_east"  
lon\_u,"longitude of U-points","degree\_east"  
lon\_v,"longitude of V-points","degree\_east"  
mask\_psi,"mask on PSI-points","nondimensional"  
mask\_rho,"mask on RHO-points","nondimensional"  
mask\_u,"mask on U-points","nondimensional"  
mask\_v,"mask on V-points","nondimensional"  
pm,"curvilinear coordinate metric in XI","meter-1"  
pn,"curvilinear coordinate metric in ETA","meter-1"  
raw\_mask,"\*unsmoothed\* mask on rho-points","nondimensional"  
spherical,"grid type logical switch",""  
xl,"basin length in the XI-direction","meter"  
x\_psi,"X-location of PSI-points","meter"  
x\_rho,"X-location of RHO-points","meter"  
x\_u,"X-location of U-points","meter"  
x\_v,"X-location of V-points","meter"  
y\_psi,"Y-location of PSI-points","meter"  
y\_rho,"Y-location of RHO-points","meter"  
y\_u,"Y-location of U-points","meter"  
y\_v,"Y-location of V-points","meter"  
zice\_raw,"\*unsmoothed\* zice on rho-points","meters, relative to sea level"  
zice,"zice on rho-points","meters, relative to sea level"

## File

### Model output: simulated sea surface height for the entire model simulation

filename: WAP\_1k\_zeta\_00\_nc.tar.gz

(GZIP (.gz), 2.37 GB)  
MD5:643d5aa39f5e8aea99aab9f4025e0fca

NetCDF model output of the simulated sea surface height for the entire model simulation (2006 through 2012) of the West Antarctic Peninsula circulation model. Each file (WAP\_1k\_zeta\_00\*.nc) contains 10 five-day temporal averages of the model SSH (m).

Parameters in the .nc files:

lat\_rho, "latitude of RHO-points", "degree\_north"

lon\_rho, "longitude of RHO-points", "degree\_east"

ocean\_time, "averaged time since initialization", "seconds since 0001-01-01 00:00:00"

zeta, "time-averaged free-surface", "meter"

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## Related Publications

Castelao, R. M., Dinniman, M. S., Amos, C. M., Klinck, J. M., & Medeiros, P. M. (2021). Eddy-Driven Transport of Particulate Organic Carbon-Rich Coastal Water Off the West Antarctic Peninsula. *Journal of Geophysical Research: Oceans*, 126(3). doi:10.1029/2020jc016791 <https://doi.org/10.1029/2020JC016791>  
*Results*

Graham, J. A., Dinniman, M. S., & Klinck, J. M. (2016). Impact of model resolution for on-shelf heat transport along the West Antarctic Peninsula. *Journal of Geophysical Research: Oceans*, 121(10), 7880–7897. doi:10.1002/2016jc011875 <https://doi.org/10.1002/2016JC011875>  
*Methods*

WikiROMS (2016,Dec) Wiki ROMS: Tools. Accessed November 20th, 2020. Available from <https://www.myroms.org/wiki/Tools>  
*Methods*

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## Parameters

*Parameters for this dataset have not yet been identified*

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## Project Information

**Collaborative Research: Particulate Organic Carbon Export off the Antarctic Peninsula by Nonlinear Mesoscale Eddies and Wind Forcing (POC Export off WAP)**

**Coverage:** West Antarctic Peninsula waters

NSF Award Abstract:

The Southern Ocean accounts for a large fraction of the global ocean CO<sub>2</sub> uptake. The Southern Ocean is also unique because it encircles the globe, providing pathways for deep, inter-basin exchange. Previous studies

have shown that particulate organic carbon (POC; fixed organic matter) seasonally builds up around the productive Antarctic seas before moving off-shore. The project will serve as a step toward better quantifying the export of POC from around the Antarctic Peninsula and better understanding the larger Southern Ocean carbon cycle. The project will promote education by supporting graduate and undergraduate students. New data sets on offshore transport pathways and POC variability will be generated in a consistent and systematic manner, and will be available to the scientific community.

This proposal will examine the offshore export of particulate organic carbon (POC) off the Antarctic Peninsula, from areas of high accumulation near the coast to areas offshore. We hypothesize that both wind-driven surface Ekman transport and transport by nonlinear mesoscale eddies can make significant contributions to the offshore export of POC. Specifically, the project will (1) identify areas of enhanced accumulation of POC off the Antarctic Peninsula; (2) quantify spatial and temporal variability in offshore transport by nonlinear mesoscale eddies and by winds in a surface Ekman layer; and (3) compare the estimates of offshore transport to the POC distribution away from the coast to identify preferred transport pathways or hotspots for offshore export of coastal water and POC off the Peninsula. This study will utilize decade-long satellite observations of POC based on algorithms validated against in situ data, ocean vector winds, eddy kinematic and propagation characteristics based on altimeter data, and results from a high resolution eddy resolving ocean model coupled to a sea ice model. The study will focus on the Antarctic Peninsula during summer, when reduced cloud/sea ice cover when satellite data availability is high.

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## Funding

Funding Source	Award
<a href="#">NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)</a>	<a href="#">OPP-1643468</a>
<a href="#">NSF Office of Polar Programs (formerly NSF PLR) (NSF OPP)</a>	<a href="#">OPP-1643386</a>

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