

Supporting Information for "Influence of the Southern Hemisphere Supergyre on Antarctic Intermediate Water Properties in CMIP6 Models"

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Table S1

Table S1: Description of the CMIP6 models used in the study

| Models | Ocean | Atmosphere | Sea Ice | SSP585 | References |
|----------------|---|---------------------|-----------|--------|---------------------------|
| ACCESS-CM2 | ACCESS-OM2 (GFDL-MOM5, tripolar primarily 1°; 360 x 300 lon/lat; 50 levels) | MetUM-HadGEM3-GA7.1 | CICE5.1.2 | | Bi et al. (2020) |
| ACCESS-ESM1-5 | ACCESS-OM2 (MOM5, tripolar primarily 1°; 360 x 300 lon/lat; 50 levels) | HadGAM2 | CICE4.1 | | Ziehn et al. (2020) |
| AWI-CM-1-1-MR | FESOM 1.4 (unstructured grid in the horizontal with 830305 wet nodes; 46 levels) | ECHAM6.3.04 p1 | FESOM 1.4 | X | Semmler et al. (2020) |
| AWI-ESM-1-1-LR | FESOM 1.4 (unstructured grid in the horizontal with 126859 wet nodes; 46 levels) | ECHAM6.3.04 p1 | FESOM 1.4 | | Danek et al. (2020) |
| BCC-CSM2-MR | MOM4 (1/3° 10S-10N, 1/3-1° 10-30 N/S, and 1° in high latitudes; 360 x 232 lon/lat; 40 levels) | BCC_AGCM3_MR | SIS2 | X | Wu et al. (2019) |
| BCC-ESM1 | MOM4 (1/3° 10S-10N, 1/3-1° 10-30 N/S, and 1° in high latitudes; 360 x 232 lon/lat; 40 levels) | BCC_AGCM3_LR | SIS2 | | Wu et al. (2020) |
| CAMS-CSM1-0 | MOM4 (tripolar; 360 x 200 lon/lat, primarily 1° latitude/longitude, down to 1/3° within 30° of the equatorial tropics; 50 levels) | ECHAM5_CAMS | SIS 1.0 | X | Xin-Yao et al. (2019) |
| CAS-ESM2-0 | LICOM2.0 (LICOM2.0, primarily 1°; 362 x 196 lon/lat; 30 levels) | IAP AGCM 5.0 | CICE4 | X | Chai (2020) |
| CESM2 | POP2 (320x384 lon/lat; 60 levels) | CAM6 | CICE5.1 | | Danabasoglu et al. (2020) |

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| CESM2-FV2 | POP2 (320x384 lon/lat; 60 levels) | CAM6 | CICE5.1 | | Danabasoglu et al. (2020) |
| CESM2-WACCM | POP2 (320 x 384 lon/lat; 60 levels) | WACCM6 | CICE5.1 | X | Danabasoglu et al. (2020) |
| CESM2-WACCM-FV2 | POP2 (320x384 lon/lat; 60 levels) | WACCM6 | CICE5.1 | | Danabasoglu et al. (2020) |
| CIesm | CIesm-OM (FD, SCCGrid Displaced Pole; 720 x 560 lon/lat; 46 levels) | CIesm-AM | CICE4 | X | Lin et al. (2020) |
| CMCC-CM2-HR4 | NEMO3.6 (ORCA0.25 1/4° from the Equator degrading at the poles; 1442 x 1051 lon/lat; 50 vertical levels) | CAM4 | CICE4.0 | | Cherchi et al. (2019) |
| CMCC-CM2-SR5 | NEMO3.6 (ORCA1 tripolar primarily 1° lat/lon with meridional refinement down to 1/3° in the tropics; 362 x 292 lon/lat; 50 vertical levels) | CAM5.3 | CICE4.0 | X | Cherchi et al. (2019) |
| CMCC-ESM2 | NEMO3.6 (ORCA1 tripolar primarily 1° lat/lon with meridional refinement down to 1/3° in the tropics; 362 x 292 lon/lat; 50 vertical levels) | CAM5.3 | CICE4.0 | X | Lovato et al. (2022) |
| CNRM-CM6-1 | Nemo 3.6 (eORCA1, tripolar primarily 1°; 362 x 294 lon/lat; 75 levels) | Arpege 6.3 | Gelato 6.1 | X | Voltaire et al. (2019) |
| CanESM5 | NEMO3.4.1 (ORCA1 tripolar grid, 1° with refinement to 1/3° within 20°s of the equator; 361 x 290 lon/lat; 45 vertical levels) | CanAM5 | LIM2 | X | Swart et al. (2019) |
| EC-Earth3 | NEMO3.6 (ORCA1 tripolar primarily 1° with meridional refinement down to 1/3° in the tropics; 362 x 292 lon/lat; 75 levels) | IFS cy36r4 | LIM3 | X | Döscher et al. (2021) |
| EC-Earth3-AerChem | NEMO3.6 (ORCA1 tripolar primarily 1° with meridional refinement down to 1/3° in the tropics; 362 x 292 lon/lat; 75 levels) | IFS cy36r4 | LIM3 | | Van Noije et al. (2020) |
| EC-Earth3-CC | NEMO3.6 (ORCA1 tripolar primarily 1° with meridional refinement down to 1/3° in the tropics; 362 x 292 lon/lat; 75 levels) | IFS cy36r4 | LIM3 | X | Döscher et al. (2021) |
| EC-Earth3-Veg-LR | NEMO3.6 (ORCA1 tripolar primarily 1° with meridional refinement down to 1/3° in the tropics; 362 x 292 lon/lat; 75 levels) | IFS cy36r4 | LIM3 | X | Döscher et al. (2021) |
| FGOALS-f3-L | LICOM3.0 (LICOM3.0, tripolar primarily 1°; 360 x 218 lon/lat; 30 levels) | FAMIL2.2 | CICE4.0 | X | Guo et al. (2020) |
| FGOALS-g3 | LICOM3.0 (LICOM3.0, tripolar primarily 1°; 360 x 218 lon/lat; 30 levels) | GAMIL3 | CICE4.0 | X | Li et al. (2020) |

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| FIO-ESM-2-0 | POP2-W (POP2 coupled with MASNUM surface wave model, Displaced Pole; 320 x 384 lon/lat; 60 levels) | CAM4 | CICE4.0 | X | Bao, Song, and Qiao (2020) |
| GFDL-CM4 | GFDL-OM4p25 (GFDL-MOM6, tripolar - nominal 0.25°; 1440 x 1080 lon/lat; 75 levels) | GFDL-AM4.0.1 | GFDL-SIM4p25 | X | Held et al. (2019) |
| GISS-E2-1-G | GISS Ocean (GO1, 1°; 360 x 180 lon/lat; 40 levels) | GISS-E2.1 | GISS SI | | Kelley et al. (2020) |
| GISS-E2-1-G-CC | GISS Ocean (1°; 360 x 180 lon/lat; 40 levels) | GISS-E2.1 | GISS SI | | NASA Goddard Institute for Space Studies Kelley et al. (2020) |
| HadGEM3-GC31-LL | NEMO-HadGEM3-GO6.0 (eORCA1 tripolar primarily 1° with meridional refinement down to 1/3° in the tropics; 360 x 330 lon/lat; 75 levels) | MetUM-HadGEM3-GA7.1 | CICE-HadGEM3-GSI8 | X | Andrews et al. (2020) |
| HadGEM3-GC31-MM | NEMO-HadGEM3-GO6.0 (eORCA025 tripolar primarily 0.25°; 1440 x 1205 lon/lat; 75 levels) | MetUM-HadGEM3-GA7.1 | CICE-HadGEM3-GSI8 | X | Andrews et al. (2020) |
| ICON-ESM-LR | ICON-O (icosahedral/triangles; 40 km; 40 levels) | ICON-A | Thermodynamic (Semtner zero-layer) dynamic (Hibler 79) | | Jungclaus et al. (2022) |
| IPSL-CM6A-LR | NEMO-OPA (eORCA1.3, tripolar primarily 1°; 362 x 332 lon/lat; 75 levels) | LMDZ | NEMO-LIM3 | | Boucher et al. (2020) |
| MCM-UA-1-0 | MOM1.0 (MOM1, 1.875 X 2.5°; 192 x 80 lon/lat; 18 levels) | R30L14 | Thermodynamic ice model (free drift dynamics) | | Stouffer (2019) |
| MPI-ESM-1-2-HAM | MPIOM1.63 (bipolar GR1.5, approximately 1.5°; 256 x 220 lon/lat; 40 levels) | ECHAM6.3 | Thermodynamic (Semtner zero-layer) dynamic (Hibler 79) | | Mauritsen et al. (2019) |
| MPI-ESM1-2-HR | MPIOM1.63 (tripolar TP04, approximately 0.4°; 802 x 404 lon/lat; 40 levels) | ECHAM6.3 | Thermodynamic (Semtner zero-layer) dynamic (Hibler 79) | | Mauritsen et al. (2019) |
| MPI-ESM1-2-LR | MPIOM1.63 (bipolar GR1.5, approximately 1.5°; 256 x 220 lon/lat; 40 levels) | ECHAM6.3 | Thermodynamic (Semtner zero-layer) dynamic (Hibler 79) | X | Mauritsen et al. (2019) |

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|-------------|---|---------------------|-------------------|--------|-------------------------------------|
| MRI-ESM2-0 | MRI.COM4.4 (tripolar primarily 0.5° latitude/1° longitude with meridional refinement down to 0.3° within 10°s north and south of the equator; 360 x 364 lon/lat; 61 levels) | MRI-AGCM3.5 | MRI.COM4.4 | X | Yukimoto et al. (2019) |
| SAM0-UNICON | POP2 (Displaced Pole; 320 x 384 lon/lat; 60 levels) | CAM5.3 with UNICON | CICE4.0 | | Park, Shin, Kim, Oh, and Kim (2019) |
| TaiESM1 | POP2 (320x384 lon/lat; 60 levels) | TaiAM1 | CICE4 | X | Wang et al. (2021) |
| UKESM1-0-LL | NEMO-HadGEM3-GO6.0 (eORCA1 tripolar primarily 1° with meridional refinement down to 1/3° in the tropics; 360 x 330 lon/lat; 75 levels) | MetUM-HadGEM3-GA7.1 | CICE-HadGEM3-GSIS | X | Sellar et al. (2019) |

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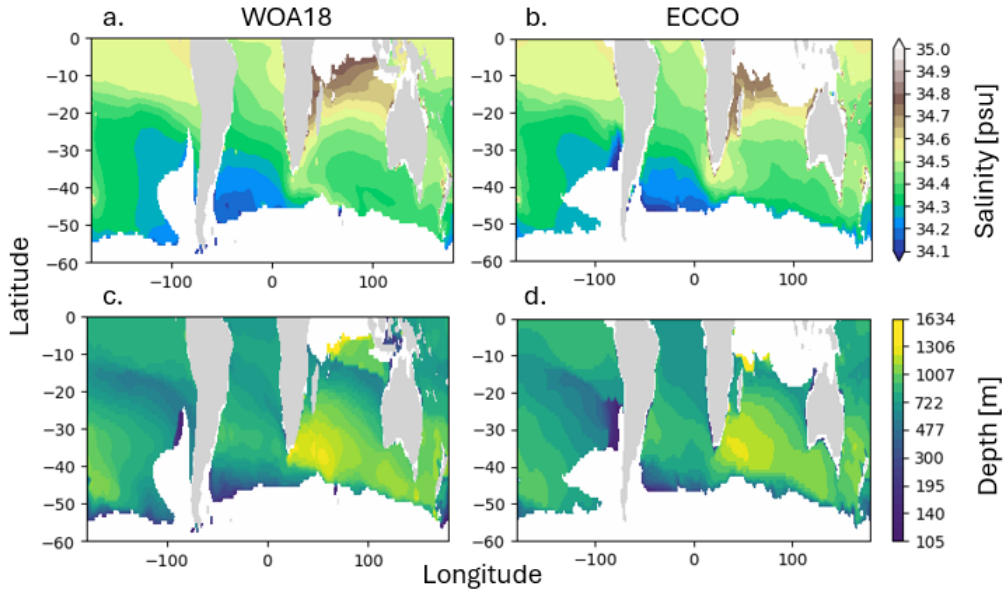


Figure S1. (a) and (b) AAIW core salinity in WOA18 and ECCO respectively. (c) and (d) AAIW core depth in WOA18 and ECCO respectively.