# JRA-55 based surface data set for driving ocean-sea ice models (JRA55-do). Part II: Assessment on the results of global ocean-sea ice models forced by the data set

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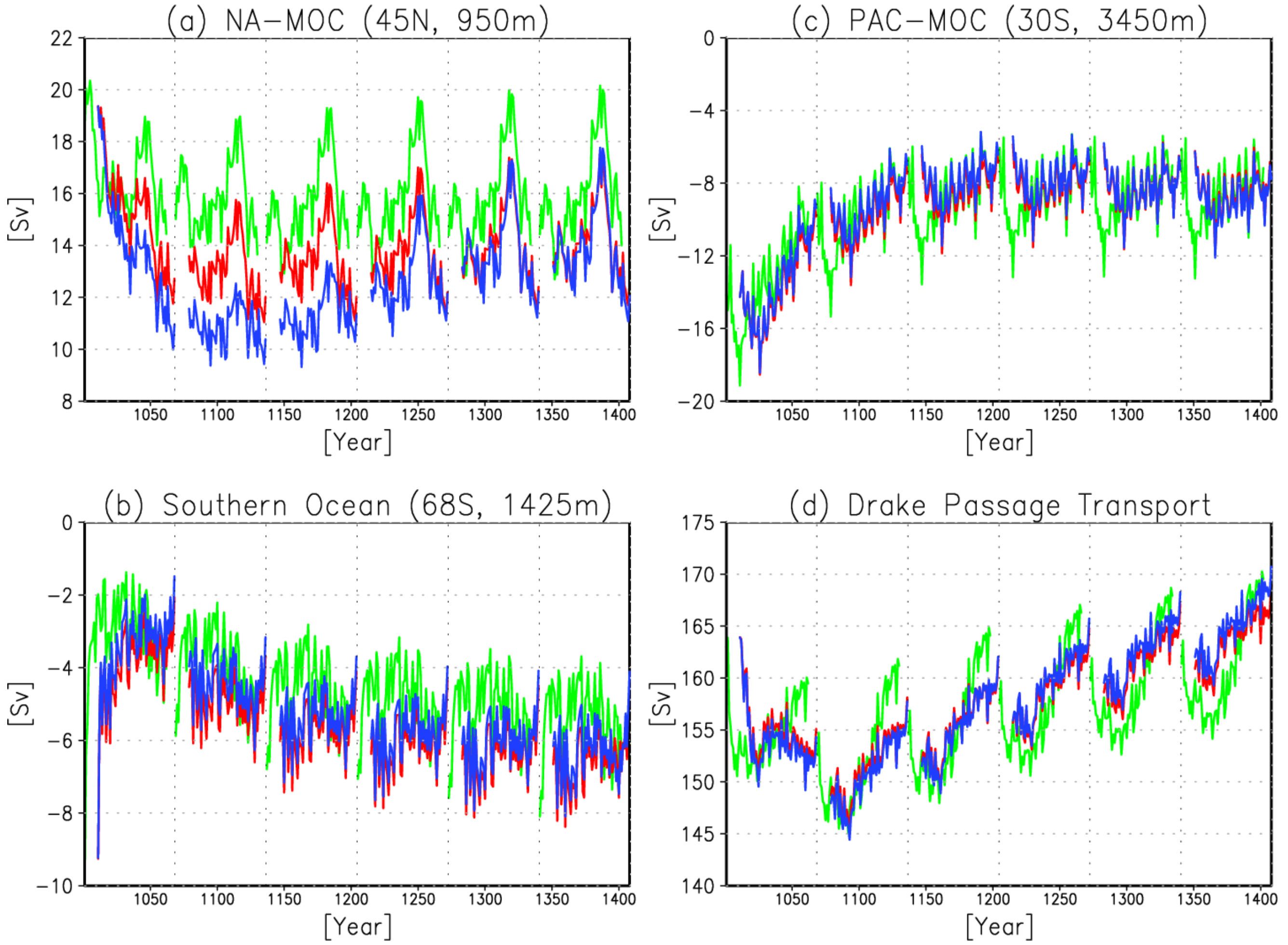
The surface data set for driving ocean-sea ice models based on JRA-55 (JRA55-do) presented in the companion paper (Part I) was used to force global ocean-ice models. The result was compared with the one forced by the CORE-II data set used in the current CORE / OMIP framework. The experiments followed the CORE / OMIP protocol: Integration starts from the state of rest with climatological temperature and salinity and lasts for about 300 years by repeatedly using the 58-year (1958-2015) forcing data set for five times. Sea surface salinity is weakly restored to climatology. Water volume and salt content in the ocean - sea ice system are kept fixed by adjusting surface fluxes every time step.
The two simulations by a JMA/MRI’s global ocean model, differing only in the surface forcing, largely showed similar features in the last (5th) forcing cycle in terms of mean state, biases, and interannual variability. However, there were two non-trivial differences in relation to the meridional overturning circulation (MOC). First, in the JRA55-do forced run, the Atlantic MOC (A-MOC) declined in the early stage, touching the minimum of about 11 Sverdrups (Sv) in the 2nd cycle. However, it gradually recovered to reach about 16 Sv in the last (5th) cycle. The mean A-MOC strength in the last cycle (16 Sv) was weaker than that of the CORE-II forced run by about 2 Sv, which would warrant a dedicated investigation in the future. The second noticeable difference was the formation of open water Polynyas in the Weddell Sea in the last cycle of the JRA55-do forced run. To understand these differences in the simulation results, we performed sensitivity experiments with the runoff from Greenland and Antarctica of JRA55-do being replaced by that of CORE-II. This is because the run-off from Greenland of JRA55-do has been increased by an order of magnitude relative to CORE-II and the run-off from Antarctica in JRA55-do has spatial distribution as opposed to the uniform distribution in CORE-II. In the sensitivity run, the initial decline of the A-MOC diminished (the minimum is about 14 Sv in the 2nd cycle), but the A-MOC in the last cycle was almost identical with the original run. This may imply that, in the presence of weak surface salinity restoring, an anomalous fresh water forcing from Greenland will certainly have impacts on the strength of A-MOC in a short term, but that the A-MOC is resilient in a longer term. The formation of open water Polynyas in the Weddell Sea did not occur with the CORE-II run-off around Antarctica. The less (more) run-off east (west) of the Antarctic Peninsula than CORE-II may have caused this difference in the model behaviors. This would warrant some improvements in the representation of cryosphere-ocean interactions in models.
In the poster, results from other ocean modeling groups will be included to investigate whether the above results depend on a particular model or not.


(a) NA−MOC (45N, 950m)
[Sv]
22
20
18
16
14
12
10
8
1050 1100 1150 1200 1250 1300 1350 1400
[Year]
(c) PAC−MOC (30S, 3450m)
[Sv]
0
−4
−8
−12
−16
−20
1050 1100 1150 1200 1250 1300 1350 1400
[Year]
(b) Southern Ocean (68S, 1425m)
[Sv]
0
−2
−4
−6
−8
−10
1050 1100 1150 1200 1250 1300 1350 1400
[Year]
(d) Drake Passage Transport
[Sv]
175
170
165
160
155
150
145
140
1050 1100 1150 1200 1250 1300 1350 1400
[Year]