1. INTRODUCTION

- Ocean General Circulation Models (OGCM) need Air-Sea Fluxes as surface boundary condition (Fig. 1).

2. CONTEXT

DRAKKAR collaboration

Scientific and technical coordination between modelling groups in Europe (UGGE, LPO, LOCÉAN, MERCATOR-Ocean, GEOMAR, NOCS, IO-RAS, MUSI) with objectives to:

- develop and maintain a hierarchy of state-of-the-art ocean/sea ice model configurations for operational and research applications based on the NEMO OGCM,
- design, carry out, assess, and distribute high-resolution global ocean/sea ice numerical simulations performed over long periods (five decades or more).
- develops consistent global forcing datasets based on a combination of ECMWF analyses and reanalysis and observed flux data, called "Drakkar Forcing (DFS)."

List of Relevant Surface Atmospheric Variables in DFS

- 2m air temperature (°C)
- 2m specific humidity (g/kg)
- Downward shortwave radiation (W/m²)
- Downward longwave radiation (W/m²)
- 10m zonal wind speed component u10 (ms⁻¹)
- 10m meridional wind speed component v10 (ms⁻¹)
- Precipitation (liquid, snow) (mm/day)

3. OBJECTIVE: DFS5.2

To construct a new atmospheric surface data set to drive the global ocean models used by the DRAKKAR modelling community.

The forcing set presently used in DRAKKAR is DFS3. It covers the period 1958-2010. Radiations from ISCCP, satellite estimates, Precipitation from ERA5XAS data set, and other surface variables are from ERA40 reanalysis and Operational ECMWF analyses.

The DFS5.2 forcing set presented here is based on ERA_interim and ERA40 reanalyses covering altogether the period 1958-2013.

4. ERA_interim:

Description

Recent ECMWF reanalysis (Dee et al., 2011)

Period: 1979-2013

Resolution: 0.7° x 0.7°, 3-hourly

Represents an improvement compared to former reanalyses (e.g. ERA40).

Brief assessment of ERA_interim surface variables

Short wave downward radiation (Fig. 3)

ERA_interim downward shortwave radiation shows too much isolation (when compared to ISCCP satellite products) in the regions of atmospheric subsidence in eastern side of ocean basins. This is related to a misrepresentation of low stratus in the model. Similar behaviour is seen in the longwave.

5. DRAKKAR FORCING SET DFS5.2: Summary

The comparison of ERA_interim with satellite products (Frame 4) suggests that corrections/adjustments are necessary before the surface atmospheric variables could be used as surface boundary conditions of a global OGCM.

Corrections are applied to ERA_interim fields to produce DFS5.2.

Because ERA_interim begins in 1979, ERA40 is used for the period 1958-1979 (Table 1).

6. CORRECTION OF ERA_interim SURFACE VARIABLES – PERIOD 1979-2010

The global correction of the DFS5.2 atmospheric forcing data set.

7. DFS5.2_PERIOD 1958-1978

Radiation fluxes and Precipitation

ERA40 corrected daily climatology is used

 ERA1 daily climatology (period 1979-2010) combined with the 3-hourly "synoptic scales" of ERA40, calculated as the de-trended 3-hourly anomaly to the 3-hourly value minus the daily climatology of ERA40 calculated over the period 1958-1978.

The "Climatological Mean" of DFS5.2 over the period 1958-1978 is exactly the same as the one for the period 1979-2010.

REFERENCES


Dee, D. P., et al., 2011: The ERA_interim Reanalysis. ECMWF Newsletter, No. 89, 37-49.

Dee, D. P., et al., 2011: The ERA_interim Reanalysis. ECMWF Newsletter, No. 89, 37-49.

Dee, D. P., et al., 2011: The ERA_interim Reanalysis. ECMWF Newsletter, No. 89, 37-49.

Dee, D. P., et al., 2011: The ERA_interim Reanalysis. ECMWF Newsletter, No. 89, 37-49.

Dee, D. P., et al., 2011: The ERA_interim Reanalysis. ECMWF Newsletter, No. 89, 37-49.

Dee, D. P., et al., 2011: The ERA_interim Reanalysis. ECMWF Newsletter, No. 89, 37-49.