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Data List of Hindcast Simulation Covering the Period 1950-2003

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1. Memorandum for The Analysis for Hindcast Outputs

(a) We apply the same regulations of the memorandum concluded on July 28, 2003. The 2-year priority period for the OFES hindcast data is from August 2004 to August 2006.

(b) Please include the introductory paper (Masumoto et al., 2004) of the OFES climatological integration published in the Journal of the Earth Simulator as a reference in your paper, until an introductory paper of hindcast outputs is accepted.

Reference

Masumoto, Y., H. Sasaki, T. Kagimoto, N. Komori, A. Ishida, Y. Sasai, T. Miyama, T. Motoi, H. Mitsudera, K. Takahashi, H. Sakuma and T. Yamagata (2004): A fifty-year eddy-resolving simulation of the world ocean: Preliminary outcomes of OFES (OGCM for the Earth Simulator). J. Earth Simulator, 1, 35-56.

(c) The contents of this memorandum may be changed depending on future situations.

(d) Contact persons:

OFES hindcast outputs:

ESC : Sasaki

FRCGC : Masumoto/Nonaka

IPRC : Xie

2. Simulation Setting

# OGCM code	: OFES (MOM3-based optimized code for ES)
# Computational domain	: 75S – 75N
# Resolution	: Horizontal (0.1X0.1), Vertical (54 levels with variable grid width)
# Integration period	: 50 year
# Bathymetry	: 1/30 deg. OCCAM data set with the use of partial cell
# Initial condition	: 50 years spin-up field driven by monthly climatological NCEP/NCAR reanalysis
# Forcing	: Daily mean NCEP/NCAR reanalysis data sets are used for momentum, heat and salinity fluxes. Surface salinity field is relaxed to monthly mean climatology (WOA98). Restoring time-scale is 60 day for the mixed layer of the 50 m thickness. (6 day for the first level of 5m thickness)
# Artificial boundary condition	: Temperature and salinity fields are relaxed to monthly mean climatology (WOA98).
# Parameterizations	: Bi-harmonic smoother and KPP ($\nu_h = -27 \times 10^9 \text{ m}^4 \text{ s}^{-1}$, $\kappa_h = -9 \times 10^9 \text{ m}^4 \text{ s}^{-1}$) Coefficients are proportional to the cube of the longitudinal grid spacing (Smith et al., 2000).

3. Data Sampling and Storage

- Annual mean, monthly mean, and snapshot data per 3 days are saved. Data format is direct access format. Data of one sampling for one variable is saved to one file.
- In order to save on storage volume, 3-D data is compressed by removing land data. The data format of the 3-D compressed data is proprietary.
- Total volume of the hindcast simulation output is more than 30TB. This huge data is saved in MDPS (Mass Data Processing System, <http://www.es.jamstec.go.jp/esc/eng/Hardware/mdps.html>), which is the new data storage system of the Earth Simulator.
- A data handling system, called ODHS (OFES Data Handling System), has been developed. Data reduction by re-gridding and data extraction is easily handled by using ODHS.
* For more information about the format of 3-D compressed data and ODHS, please contact H. Sasaki (ESC).

4. Data

4.1. File Name

4.1.1 File Name of 2-D Data

File name:

Annual mean data : ~OFES_HIND/DATA_2D/annual/'directory'/'variable'.yyyy.dta

Monthly mean data : ~OFES_HIND/DATA_2D/monthly/'directory'/'variable'.mm.yyyy.dta

Snapshot per 3 days : ~OFES_HIND/DATA_2D/snap_3day/'year'/'directory'/'variable'.mm.dd.yyyy.dta

- 'directory'= directory name , 'variable'= variable name, yyyy=year(four digit: 1950-2004), mm=month(two digit: 01-12), dd=day(two digit: 01-31)
- Data of one sampling for one variable is saved to one file.
- The volume of one 2-D data is 21.6MB.

4.1.2 File Name of 3-D Data

File name:

Annual mean data : ~OFES_HIND/DATA_3D/annual/'directory'/'variable'.yyyy.dta

Monthly mean data : ~OFES_HIND/DATA_3D/monthly/'directory'/'variable'.mm.yyyy.dta

Snapshot per 3 days : ~OFES_HIND/DATA_3D/snap_3day/'year'/'directory'/'variable'.mm.dd.yyyy.dta.DL

- 'directory'= directory name , 'variable'= variable name, yyyy=year(four digit), mm=month(two digit), dd=day(two digit)
- Data of one sampling for one variable is saved to one file.
- The volume of one 3-D compressed data is about 659~668MB. File extension 'DL' means compressed data.

4.2. Variable list

4.2.1. Variable list of 2-D Data

	Directory name	Variable name	Unit
Horizontal convergence	convU	convU	cm/s
Sea surface height	eta	eta	cm
Depth of mixed layer	hmxl	hmxl	Cm
Depth of boundary layer	hb1t	hb1t	Cm
Heat flux	hflx	hflx	cal/cm ² /sec
Salinity flux	sflx	sflx	g/cm ² /sec
Wind stress (Eastward)	taux	taux	dyn/cm ²
Wind stress (Northward)	tauy	tauy	dyn/cm ²

* Annual mean data:

Total number of files for one variable covering the period 1950-2004 is 55.

Total volume of the 55 files is about 1190MB.

* Monthly mean data:

Total number of files for one variable covering the period 1950-2004 is 660.

Total volume of the 660 files is about 14GB.

* Snapshot per 3 days

Total number of files for one variable per year is 121~122.

Total volume of the 121~122 files is about 2614~2635MB.

4.2.2. Variable list of 3-D Data

	Directory name	Variable name	Unit
Temperature	temp	Temp	°C
Salinity	salinity	Salinity	× 1000+35 psu
Eastward velocity	u_vel	U	cm/s
Northward velocity	v_vel	V	cm/s
Vertical velocity	w_vel	W	cm/s

* Annual mean data:

Total number of files for one variable covering the period 1950-2004 is 55.

Total volume of the 55 files is 37GB.

* Monthly mean data:

Total number of files for one variable covering the period 1950-2004 is 660.

Total volume of the 660 files is about 440GB.

(We also made reduced grid data. The horizontal resolution is 0.5 degree)

* Snapshot per 3 days

Total number of files for one variable per year is 121~122.

Total volume of the 121~122 files per year is about 80~82GB.

5. Other Data Sets

In order to check overall performance of OFES hindcast, you can get reduced data for 3-dimensional monthly mean data. Horizontal resolution of the data is 0.5 degree.

6. Release Notes for hindcast run (Mar. 01, 2005)

*Heat flux & Salinity flux setting problem:

The program could not read NCEP reanalysis data with regular grid at first reading. The problem happened at only first reading of daily data. Air temperature, relative humidity and total cloud cover data with regular grid are used to calculate heat flux using bulk formula. The salinity flux is also affected by evaporation calculated using bulk formula. Each OFES job submitted to the ES performs a 2-month integration.

The monthly data could still be used to study seasonal, interannual, and decadal variations, because the misreading happens once per every two months. Please be aware of the problem when you use snapshots per 3 days.

*Hindcast run for 2004.

The hindcast run for 2004 following the 1950-2003 run finished in Feb/2005. The simulation was executed by using a newer version of OFES in which the above problems of heat and salinity flux settings were fixed.

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