

4D-VAR Ocean Data Assimilation products

November 1, 2010

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November 17, 2010

A Contribution to Data Integration Analysis System (DIAS)
in Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

■ Name of data set and the abbreviated name

Name: 4D-VAR ocean data assimilation products

Abbreviation: ODAP4D (K7ODAP3.1)

■ Introduction

Synthesis/Analysis: Ocean Data Assimilation System

Our 4D-VAR data assimilation system is developed by the MEXT K-7 project. The Ocean General Circulation Model is version 3 of the GFDL Modular Ocean Model (MOM3), which is equipped with several sophisticated schemes; e.g., the nonlocal K Profile Parameterization (KPP) for mixed layer physics, the Gent and McWilliams (GM) scheme for isopycnal mixing, and quicker advection scheme. The horizontal resolution is 1° in both latitude and longitude, with 36 vertical levels spaced from 10 m near the sea surface to 400 m at the bottom. This model is better able to reproduce ocean circulation processes and is expected to form a platform suitable for the use of the 4D-VAR adjoint model.

The assimilated elements in this study are temperature and salinity from the World Ocean Database 2001 (WOD01), Fleet Numerical Meteorology and Oceanography Center (FNMOC) dataset, Reynolds SST, OISST values, and Argo float data from the Coriolis Data Center, and sea-surface dynamic-height anomaly data derived from TOPEX/Poseidon altimetry. In addition, the climatologies of the World Ocean Database 1998 (WOD98) were used as background data for regions without observational coverage. All observational data were averaged onto 1° by 1° bins and then compiled as series of 10-day means for the surface data and monthly means for the subsurface data. The assimilation window is 16 years during 1991-2006.

■ Dataset creator

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■ **Dataset release date**

November 1, 2010

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■ **Recommended Form for Citation of Dataset**

Please cite as: Masuda, S., T. Awaji, T. Toyoda, Y. Shikama, and Y. Ishikawa (2009), Temporal evolution of the equatorial thermocline associated with the 1991–2006 ENSO, *J. Geophys. Res.*, 114, C03015, doi:10.1029/2008JC004953.

■ Products

Variables: potential temperature [$^{\circ}\text{C}$], salinity [PSU], horizontal velocity ($u[\text{cm/s}]$, $v[\text{cm/s}]$)

Region: quasi-global (75°S - 80°N)

Resolution: horizontal $1^{\circ}\times 1^{\circ}$, vertical 27 levels

Period: 1991-2006 (ver.3.1)

File format: Monthly data in GrADS format: “DIASoda[YYYY][MM].dta” Where, “[YYYY]” and “[MM]” is year and month, respectively. “DIASoda9106.ctf” is also provided for whole period.

■ Reference paper

Masuda, S., T. Awaji, N. Sugiura, Y. Ishikawa, K. Baba, K. Horiuchi, and N. Komori (2003): Improved estimates of the dynamical state of the North Pacific Ocean from a 4 dimensional variational data assimilation, *Geophys. Res. Lett.*, 30, 16, 1868.

Masuda, S., T. Awaji, T. Toyoda, Y. Shikama, and Y. Ishikawa (2009), Temporal evolution of the equatorial thermocline associated with the 1991–2006 ENSO, *J. Geophys. Res.*, 114, C03015, doi:10.1029/2008JC004953.

■ Reference URL

K7 Database:

<http://www.jamstec.go.jp/frcgc/k7-dbase2/eng/index.html>

K7 Ocean State Estimate based on 4D-VAR Ocean Data Assimilation:

http://www.jamstec.go.jp/frcgc/k7-dbase2/eng/datadoc/k7ra_ocean.html