7.16 JAPANESE OCEAN FLUX DATA SETS WITH USE OF REMOTE SENSING OBSERVATIONS(J-OFURO)

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1. Introduction

Ocean actively changes heat, water and momentum with atmosphere through the ocean surface. The exchanged heat, water and momentum are transported by general ocean and atmospheric circulation on the globe. Since the exchanging and transporting processes are essential components for global climate, estimates of those fluxes between atmosphere and ocean is quite important for understanding a mechanism of global climate. However, it is difficult to globally estimate those fluxes by using in situ observation data such as ship and buoy data because in situ data are extremely sparse in time and space. However, we can globally obtain homogeneous data with high resolution using analysis and satellite data. Therefore, it is concluded that analysis and satellite data are suitable for obtaining global distribution of fluxes between ocean and atmosphere.

Recently we constructed ocean surface flux data sets by mainly using satellite data. The name of the data set is Japanese Ocean Flux data sets with Use of Remote sensing Observations (J-OFURO). The data sets includes shortwave radiation flux, longwave radiation flux, latent heat flux, sensible heat flux, momentum flux, surface air temperature, sea surface dynamic topography and surface geostrophic currents. Here, we introduce heat and momentum flux data sets included in J-OFURO (http://dtsv.scc.u-tokai.ac.jp). The radiation data sets cover the region of the eastern Indian Ocean and the Western and Central Pacific Ocean between 60°N and 60°S, 80°E and 160°W depending on the coverage of Japanese Geostationary Meteorological Satellite(GMS). However, other data sets basically cover the whole globe. The spatial and temporal resolutions are basically 1° by 1° and 1 month, respectively.

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2. Shortwave Radiation Flux

Geographical area: 60N - 60S, 80E - 160W
Time period: Mar.1987 - Sep.1998
Grid: (space/time):0.25° x 0.25 ° , monthly
Variables: solar radiation at the sea surface
Data sources: GMS/VISSR, SSM/I, NOAA/AVHRR, TOMS
Correction applied: Long-term degradation of the VISSR visible channel is corrected
Comments: Based on comparison with routine ground measurements of insolation, mostly in Japan and Australia, the statistical errors of daily and monthly mean insolation values are estimated t o be less than 20% and 10%, respectively.

3.Longwave Radiation Flux

Geographical area: 80E-160W, 60S-60N
Time period:
October 1992 through September 1993
Grid: (space/time):
1.0 ° x 1.0 ° , monthly
Variables: Upward and downward long wave radiation fluxes at sea surface
Formulae used:
The narrow band model, proposed by Goody (1964), is used to compute the emission and absorption of the atmosphere. The H_2O rotation band, the H_2O continuum, the CO_2 15 micro-meter band and the H_2O 6.3 micro-meter are included in the radiation model. The parameters in the model are given by Rogers and Walshaw (1966), Goldman and Kyle (1968) and Roberts et al. (1976). Spectral rang is 0-2200 cm^{-1}. The spectral band is divided into 23 narrow bands for the radiation computation. Upward long wave radiation is computed following the black body theory with the emissivity of sea surface of 0.984 given by Konda et al. (1994).
Data sources: GMS/VISSR,COADS,MCSST,BSRN, NCEP Reanalysis

4. Turbulent Heat Flux

Geographical area:Global
Time period:1991-1995
Grid:(space/time): 1.0 ° X 1.0 ° , Monthly
Formulae used:
(1) Specific Humidity:
Schlussel et al.(1995)
(2) Bulk formula:Kondo(1975)
(3) Sensible Heat Flux :
Kubota and Mitsumori(1997)
Data sources:DMSP/SSMI data,
NCEP SST data, COADS , ECMWF
Comments: We have compared our turbulent heat flux data with other data. The results are shown in our HP(http://dtsv.scc.u-tokai.ac.jp/).

5. Momentum Flux

Geographical area: 60°N-60°S, 30°E-70°W
Time period: Sep. 16, 1996-Jun. 29, 1997 for NSCAT
Oct., 1992-May, 1996 for ERS-1
Mar., 1996-Dec. 1999 for ERS-2
Grid and Resolution:(space/time): 1.0° x 1.0°,
daily for NSCAT
monthly and 10-day for ERS-1& 2
Variables: Zonal and meridional components of wind and wind-stress vectors
Formulae used: Bulk formula based on Large and Pond(1981), Vector-averages using weighing function depending upon time and space which were proposed by Levy and Brown(1986). (See Kutsuwada, 1998).
Data sources: PODAAC in JPL for NSCAT
IFREMER for ERS-1 & 2
Correction applied: Intercomparison with TAO buoy winds for wind and wind-stress components
Comments:
We have made validation by intercomparison of our products with measurements at TAO buoys in the tropical Pacific. Results for NSCAT and ERS-1,2 products are documented in Kutsuwada(1998) and Kutsuwada and Kazama (2000), respectively. These results reveal that our products have permissible reliability in the tropical region.

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