Abstract View

Volume 27, Issue 3 (March 1997)

Journal of Physical Oceanography
Article: pp. 457–467 | Full Text | PDF (906K)

Oceanic Freshwater Budget and Transport as Derived from Satellite Radiometric Data

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(Manuscript received April 20, 1995, in final form January 1, 1996)

DOI: 10.1175/1520-0485(1997)027<0457:OFBATA>2.0.CO;2

ABSTRACT

Blended satellite–ship evaporation and SSM/I retrieved precipitation fields are used to compute oceanic freshwater budget (FWB) and transport (FWT) over a 3-year period (1988–90). In order to validate the results, comparisons on monthly, seasonal, and multiyear average bases are performed with ECMWF analyzed field and climatology respectively. For May 1988, differences between ECMWF output and the present monthly estimate are within 2 mm day^{-1} (73 cm yr^{-1}). Comparison with climatology shows that global discrepancies for long-term average drop down to 36 cm yr^{-1} rms with a tendency for satellite-derived results to enhance climatological features. Differences are found to correlate with FWB patterns: large positive differences are observed in strong evaporative regions (eastern tropical Pacific), whereas negative differences are observed over the eastern part of the intertropical convergence zone and the northwestern part of the subtropical basins. Over the latter, precipitation is strongly dominant in our results, whereas climatology features rather slightly negative or positive contribution to the FWB (i.e., evaporation). Over the Gulf Stream, for example, climatology indicates that ocean is losing about 100 cm yr^{-1} freshwater while FWB is balanced in our computation. FWT is then computed and compared with climatological and in situ estimates. Differences with climatology are found to be 0.2 Sv rms (Sv $\equiv 10^6$ m^3 s^{-1}) in the Atlantic, Indian, and Northern Pacific Oceans, and results generally match estimates derived from oceanographic data within the same error level, except in the Indian Ocean. The major disagreement is observed in the southern Pacific Ocean where results, although confirming the direction of the FWT, suggest that 2.48 Sv is entering the Pacific Ocean, whereas climatologies only give a northward transport equal to 0.26 Sv.

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