Abstract View

Volume 11, Issue 8 (August 1981)

Journal of Physical Oceanography
Article: pp. 1059–1077 | Abstract | PDF (1001K)

Frequency-Wavenumber Spectra of Sea Surface Temperature and Wind-Stress Curl in the Eastern North Pacific

Artemio Gallegos-Garcia

Centro de Ciencias del Mar y Limnologia, Universidad Nacional Autónoma de México, México 20

William J. Emery

Department of Oceanography, University of British Columbia, Vancouver, B.C., Canada V6T 1W5

Robert O. Reid

Department of Oceanography, Texas A & M University, College Station 77843

Lorenz Magaard

Department of Oceanography, University of Hawaii, Honolulu 96832

(Manuscript received January 6, 1981, in final form April 20, 1981)

DOI: 10.1175/1520-0485(1981)011<1059:FWSOSS>2.0.CO;2

ABSTRACT

Frequency-wavenumber spectra of sea surface temperature and wind-stress curl are computed from 11 years of surface marine observations taken in the eastern North Pacific. These data were averaged by month and 2° quadrangles to yield spectra with periods from 2 to 48 months and zonal wavelengths from 400 to 4000 km. Spectra were computed for all 2° zonal bands between 16 and 40°N using data from the area between 120 and 160°W. Missing monthly values led to the computation of these spectra using a least-squares Fourier expansion which eliminated the need for temporal interpolation. Frequency spectra computed with this technique compare well with spectra using standard Fourier methods.

The resulting spectra were found to separate naturally into two regions; one between 29 and 40°N and the second between 15 and 29°N. Even within these zonal bands there were some important north–south changes. The annual signal was found to dominate the spectra of sea surface temperature at almost all wavelengths. The semiannual and 2-year periods were often also significant in sea surface temperature spectra. The annual peak dominated many of the wind-

stress curl spectra at the longest wavelengths (~ 2000–4000 km). Most of the energetic peaks in all spectra were symmetric with respect to east–west wavenumber. There were, however, some asymmetries suggesting both east and westward phase propagation. Generally, wind-stress curl spectra were white in frequency and red in wavenumber while sea surface temperature spectra were red in wavenumber but dominated by the 2-year, annual and semiannual periods in frequency.

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