Abstract View

Volume 8, Issue 5 (September 1978)

Journal of Physical Oceanography
Article: pp. 881–887 | Abstract | PDF (567K)

Sea Surface Temperature Response to Variations in Atmospheric Wind Forcing

Russell L. Elsberry and Sharon D. Raney

Naval Postgraduate School, Monterey, CA 93940

(Manuscript received February 27, 1978, in final form May 23, 1978)

DOI: 10.1175/1520-0485(1978)008<0881:SSTRTV>2.0.CO;2

ABSTRACT

Sea surface temperature changes occurring during atmospheric forcing events defined in terms of wind speed are examined with the long time series of surface data at Ocean Weather Ships P, V and N in the North Pacific Ocean. The 3 h forcing is expressed in terms of u_*^3, where u_* is the atmospheric friction velocity, and various heat flux components. It is shown that the distributions of atmospheric forcing during the warming season are rather similar to those of the cooling season, although the intensity of the forcing is much less in the warming season. The nonlinearity in the u_*^3 distribution is very similar in both seasons. That is, a few of the most intense synoptic events provide a majority of the turbulent kinetic energy input to the upper layers of the ocean. During the majority of time, the winds are light and there is inadequate turbulent kinetic energy to maintain a deep layer against the stabilizing effects of near-surface heating.

It is found that sea temperature increases during the warming season generally occur during periods of low wind speeds rather than during periods of excessive insulation. The sea surface temperature increase in March through August accumulated during the 65% of the time associated with low wind speed periods exceeds by 20–44% the net temperature increase for the period. The high wind speed events then account for the reduction to the observed temperature increases through mixing the warm surface waters to deeper levels. This study shows that the prediction of sea surface temperature changes will require a proper representation of both the high wind speed casts and the sustained periods with low wind speeds.

top

Headquarters: 45 Beacon Street Boston, MA 02108-3693
DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718
Allen Press, Inc. assists in the online publication of *AMS* journals.