Abstract View

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Wintertime Interactions of the Atmosphere with the Mediterranean Sea

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ABSTRACT

The net loss of heat by the Mediterranean Sea was determined for February 1969 while oceanographers observed the cooling and sinking of the water south of France. The heat loss during the four preceding months was found to be sufficient to produce the unstable stratification necessary for the sinking of the water. The mistral wind removed most of the heat through evaporation and sensible heat flux. On days when the mistral was blowing 1200 cal cm^{-2} day^{-1} of heat and 1.5 cm day^{-1} of water were removed from the sea. Throughout the winter season an average of 400 cal cm^{-2} day^{-1} was lost by the sea through sensible and latent heat fluxes. About half of the solar radiation absorbed by the water in the winter was lost through infrared radiation. Monthly heat exchanges are computed for an area south of France which show the dominant roles of latent heat exchange and solar radiation absorption in determining the temperature cycle and circulation of Mediterranean water.

The flow patterns, turbulence and energy exchange of the mistral wind have been studied through use of aircraft, ship, buoy and radiosonde observations. The maximum observed rms turbulent vertical velocities of the mistral wind was 204 cm sec^{-1}. The average shearing stress was 5 dyn cm^{-2}. The evaporation from the sea was measured by an aircraft turbulence technique, accumulation along a trajectory, flux through the sides of a volume, and by an empirical formula. The formula gave an average evaporation rate which was closer to the overall average of all techniques than any other technique.

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