Abstract View

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Ocean Response to a Hurricane. Part I: Observations

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ABSTRACT

The response of the ocean to hurricanes was investigated using aircraft-deployable expendable current profilers (AXCP). The goals were to observe and separate the surface wave and surface mixed layer (SML) velocities under the storms and to map the across-track and along-track velocity and temperature response in the mixed layer and thermocline. Custom instrumentation was prepared, including slower failing AXCPs, and the AXCP equipment was installed on NOAA WP-3D aircraft. Research flights were made into two 1984 hurricanes: Norbert, in the eastern Pacific off Baja California (19°N, 109°W), and Josephine, off the east coast of the United States (29°N, 72°W). Thirty-one probes were deployed in each hurricane, and about half the AXCPs provided

temperature and velocity profiles. Most velocity profiles exhibited strong surface wave contributions, slablike velocities in the SML, strong shears beneath the SML, and only weak flows in the upper thermocline. Separation of the surface gravity wave velocities from the steady and inertial motions was obtained by fitting the profiles to steady flows and shears in three layers and to a single surface wave at all levels. The velocity profiles displayed large divergences to the horizontal SML velocities in the wake of the hurricanes. The observations show a strong enhancement of SML velocities to the right of the storm as expected from numerical simulations. The largest SML velocities were 1.1 m s^{-1} in Norbert and 0.73 m s^{-1}in Josephine. Numerical simulations will be compared with the observations in Part II.

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