

EVOLUTION OF TYPHOON HERB NEAR TAIWAN DETERMINED FROM SATELLITE MICROWAVE OBSERVATIONS

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The purpose of this research is to consider evolution of fields of atmospheric and oceanic parameters for typhoon Herb area during 29 July - 1 August 1996. Herb crossed Taiwan in its mature stage on 31 July - 1 August. Wind speed reached 60 m/s in the northeast part of Taiwan; precipitation exceeded 1000 mm over the Central Mountain Ridge. Strong winds and heavy rains caused the greatest damage of any typhoon in the past 30 years.

Atmospheric and oceanic parameters were retrieved from DMSP SSM/I and Okean-7 Real Aperture Radar data. Total water vapor content of the atmosphere and total cloud liquid water content were determined with a physical-based algorithm from measured brightness temperatures (TBs) at 22.2 and 37.0 GHz (vertical polarization). The simulated TBs were used to develop the algorithm. Coefficients and approximation functions used in calculations were found by numerical integration of the radiative transfer equation. Rainfall rate was estimated with Adler's (1994) algorithm. Wind speed was determined with Goodberlet and Swift's (1992) and Wentz's (1992) algorithms.

The use of both passive and active microwave observations carried out from different satellites allowed us to consider the transformation of the typhoon structure with higher temporal resolution than with either source used alone. In particular, the location, shape and size of the eye and the areas of deeper convection in the eyewall region and spiral rainbands of Herb were determined. We estimated variations of heavy clouds and precipitation areas and size of individual rain bands and rain cells were. The fast cyclonic movement of a band of dry air around the center of typhoon was traced. The values of satellite-derived water vapor content and spatial structure of retrieved fields were in agreement with radiosonde data, ship reports, weather maps and maps of radar reflectivity of coastal weather radar. It was demonstrated that the active and passive data generally complement each other, as the sensors were sensitive to different physical properties of the ocean and the atmosphere.

Key words: typhoon, SSM/I, satellite real aperture radar, water vapor, precipitation.