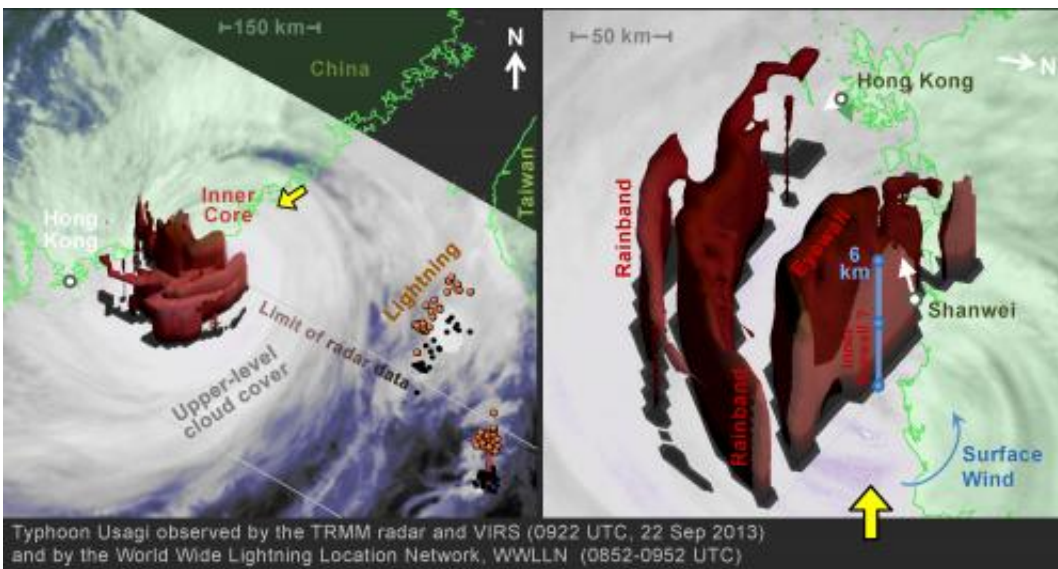


# NASA sees inner-core structure of Typhoon Usagi persisted at landfall

September 24 2013



TRMM satellite data provided a look at Typhoon Usagi's inner-core structure an hour before landfall on Sept. 22, 2013. Heavy precipitation (in deep red) was found near the storm's center. Credit: NASA Goddard Space Flight Center/Owen Kelley

The radar on NASA and JAXA's Tropical Rainfall Measuring Mission (TRMM) satellite saw Typhoon Usagi maintaining some of its inner-core structure an hour before landfall on Sept. 22, 2013. The data was used to create an image that showed the 3-D regions of heavy precipitation hiding under the circular cloud cover near Usagi's center of rotation.

While the light precipitation regions had lost the appearance of organization, the heavy precipitation regions showed what appeared to be a ~50 km/31.0 mile-radius eye wall, with multiple rain bands further away from the center. There is even some evidence that the compact inner eye wall, seen in previous overflights, had not completely disappeared one hour before landfall. The yellow arrow on the left side of the image shows the orientation of the viewpoint in the zoom view on the right side of the image.

The heavy precipitation was indicated there using the 40 dBZ radar reflectivity signal, and that signal barely reached a 6 km/3.7 miles altitude, indicating updrafts fell somewhat short of what would be required for lightning to form in the inner core. (dBZ means "decibels relative to Z" and is a meteorological measure of "Z," the equivalent reflectivity of a radar signal reflected off a remote object- which is the principle of Doppler Radar).

Consistent with this picture, the World Wide Lightning Location Network (WWLLN) saw no lightning in the inner core during an hour-long period centered on the time of the TRMM overflight. WWLLN did observe thunderstorm cells in the wake of the typhoon, several hundred kilometers/miles to the southeast over the South China Sea.

The counter-clockwise circling surface winds reached a peak of 94 knots/108.2 mph/174.1 kph at the city of Shanwei, China, approximately one hour after the TRMM satellite passed overhead in space. Early reports suggest Shanwei may have experienced the worst winds at landfall. This made Typhoon Usagi easily a category 2 on the Saffir-Simpson [hurricane intensity](#) scale. At the time of landfall in Shanwei, Hong Kong was only experiencing 25-30 knot/28.7 to 34.5 mph/46.3 to 55.5 kph winds, about 150 km/93.2 miles to the west of Shanwei. After making a surprise right turn during the final day before landfall, Typhon Usagi's center passed to the north of Hong Kong after [landfall](#), bringing

a maximum wind of 50 knots/57.5 mph/92.6 kph to various locations in Hong Kong between 2 to 6 hours after this TRMM overflight.

Provided by NASA's Goddard Space Flight Center

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