Rain friction can reduce typhoon's destructive force by up to 30 percent

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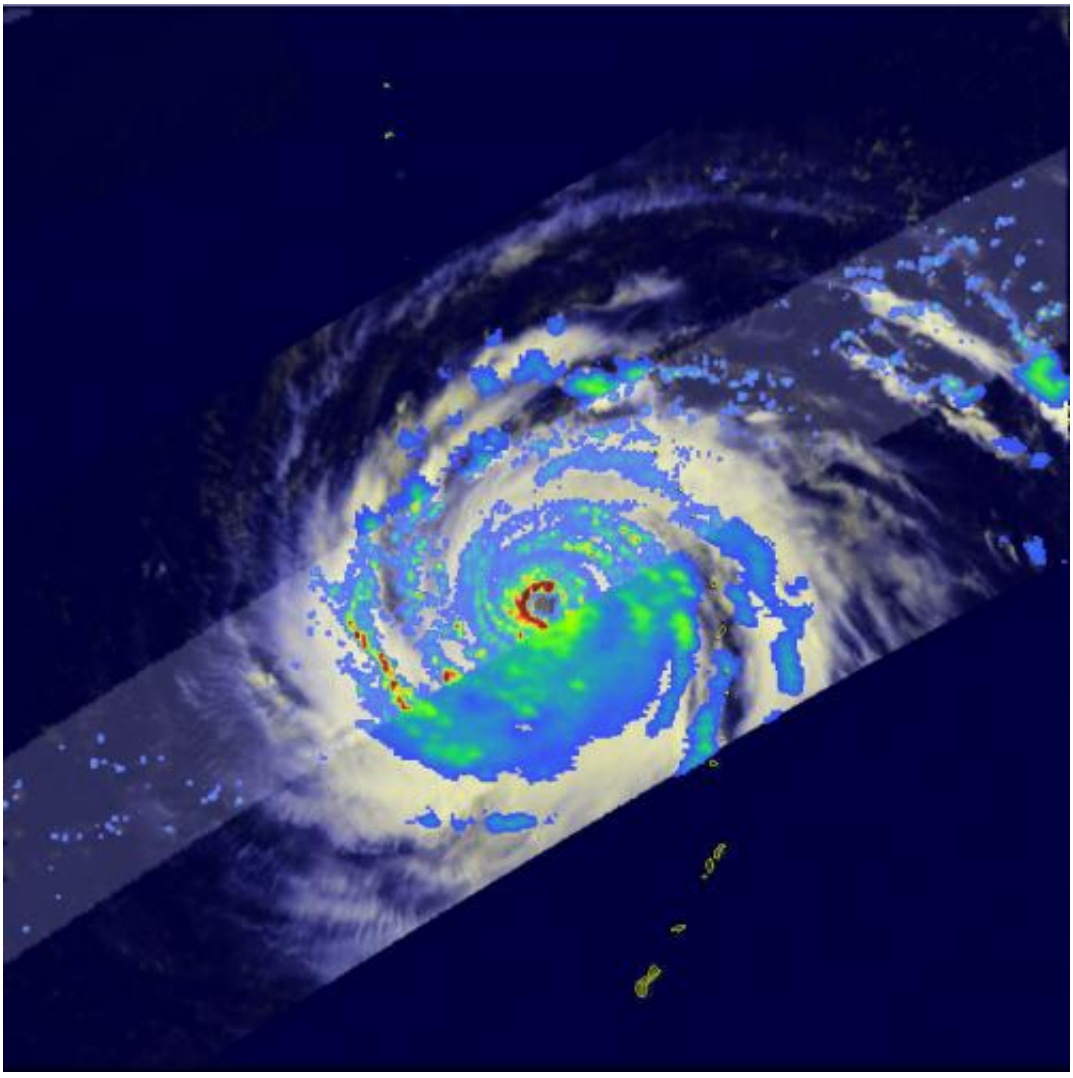

Heaviness of rainfall around the typhoon’s center is marked by red, green and blue in that order. Areas with the heaviest rainfall, in red and green are around the central column.

Accurately anticipating an approaching typhoon's destructive force makes all the difference in advance preparations and as a consequence, the cost in lives. But over the decades, climate scientists have not made the same headway in this regard as they have in predicting a typhoon's trajectory.

Researchers at the Okinawa Institute of Science and Technology Graduate University (OIST) have found that an aspect of a typhoon being ignored by current forecasting models plays a significant role in determining the level of havoc it will wreak upon landfall.

Typhoons dump a lot of water in the form of rain. The researchers have demonstrated that the energy lost to friction between this falling rain and the whipping winds of a typhoon can lessen the typhoon's destructive force, or intensity, by as much as 30 percent.

The paper, authored by researchers from OIST's Fluid Mechanics Unit andContinuum Physics Unit, appeared online in *Geophysical Research Letters*.

The intensity of a typhoon is set by the wind speed at the base of the typhoon's central column. To predict this speed, scientists currently model typhoons as engines fueled by heat from the ocean water.

Heat is carried away from the ocean surface by hot water vapor. This vapor is collected by the spiraling winds of the typhoon and tossed up along the typhoon's central column. As it moves away from the warmth of the ocean, it cools back to water and falls as rain. In the typhoon's central column itself this rainfall amounts to some 2 trillion liters of water per day, which is comparable to a large river falling out of the sky.

"The pace at which energy is lost to friction between rain and winds in a single typhoon would be sufficient to keep the Japanese economy

running," said Tapan Sabuwala from OIST's Continuum Physics Unit, the first author of the paper.

The OIST researchers compared their predictions of typhoon intensity to satellite data compiled over the past thirty years and found that the margins of error between prediction and observation reduced significantly when the friction between rain and winds was factored in.

"For this study we used a simple mathematical model. We are now looking into state-of-the-art models that people use for actual forecasting," said Pinaki Chakraborty, head of OIST's Fluid Mechanics Unit.

Climate change is increasing ocean temperatures worldwide. This is expected to lead to stronger typhoons. Predicting their intensities accurately will be crucial to anticipating damages and minimizing loss of lives. The OIST research is a major step in this direction.

More information: "Effect of rainpower on hurricane intensity." *Geophysical Research Letters* DOI: 10.1002/2015GL063785

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