

Estimation and Control of Air-Sea Momentum and Heat Fluxes of Typhoons

Project manager

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leader's institution

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R&D institutions

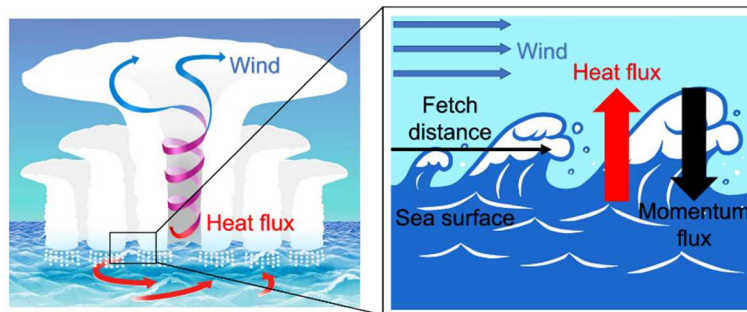
University of Hyogo, Kindai University, Okayama University, Science, Japan Agency for Marine-Earth Science and Technology

Summary of the project

To realize weather control, highly accurate weather forecasting is essential. In particular, for controlling typhoons, there are two bottlenecks: (1) low accuracy of typhoon intensity predictions; (2) difficulty of distinguishing natural and control effects. This project aims to solve these bottlenecks by investigating the mechanism of momentum and heat transfer across the sea surface under typhoons, and formulating the momentum and heat fluxes using parameters associated with wave-breaking and wind waves through a large laboratory experiment for simulating typhoons.

Milestone by the end of project (year 2024)

The momentum and heat fluxes will be measured with a margin of error of 20%, considering wind speeds ≤ 40 m/s and fetch distances ≤ 30 m. Based on these measurements, an empirical equation will be proposed for the fluxes. Subsequently, using a numerical model and the empirical equation, typhoon intensity under artificially varied sea-surface conditions will be predicted, which will aid in investigating the probability of altering typhoon intensity (maximum wind speed of a typhoon) by 5% or more.



R&D theme structure of the project

Task 1-1: Generating and controlling the air-water turbulence field with temperature gradient and surface waves at extremely high wind speeds

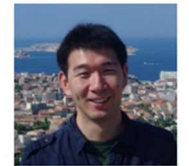
PI: Naohisa Takagaki (University of Hyogo)
 Study of typhoon control techniques using a typhoon simulation water tank



Naohisa Takagaki
 (University of Hyogo)

Task 1-2: Typhoon simulations using a novel flux models and suggestions for typhoon control

PI: Keigo Matsuda (JAMSTEC)
 Study of typhoon intensity precision and typhoon control techniques



Keigo Matsuda
 (JAMSTEC)

Task 2-1: Air-sea momentum transfer mechanism at extremely high wind speeds

PI: Naoya Suzuki (Kindai University)
 Measuring air-sea momentum flux



Naoya Suzuki
 (Kindai University)

Task 2-2: Air-sea heat transfer mechanisms at extremely high wind speeds

PI: Koji Iwano (Okayama University of Science)
 Measuring air-sea heat flux



Koji Iwano
 (Okayama University of Science)