Wada, A., W. Yanase, and K. Okamoto, 2022: Interactions between a tropical cyclone and upper-tropospheric cold-core lows simulated by an atmosphere-wave-ocean coupled model: A case study of Typhoon Jongdari (2018). *J. Meteor. Soc. Japan*, **100**, 387-414.
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Plain Language Summary: To investigate the effects of atmosphere-ocean interactions and interactions between upper-tropospheric cold lows (UTCLs) and Typhoon Jongdari (2018) on the unusual Jongdari's track, numerical simulations were conducted with a 3-km-mesh nonhydrostatic atmosphere model and an atmosphere-wave-ocean coupled model, using different initial conditions created by adopting different initial times. This study demonstrated the effects of ocean coupling and atmospheric initial conditions on the simulation of Jongdari and discussed their mechanism.

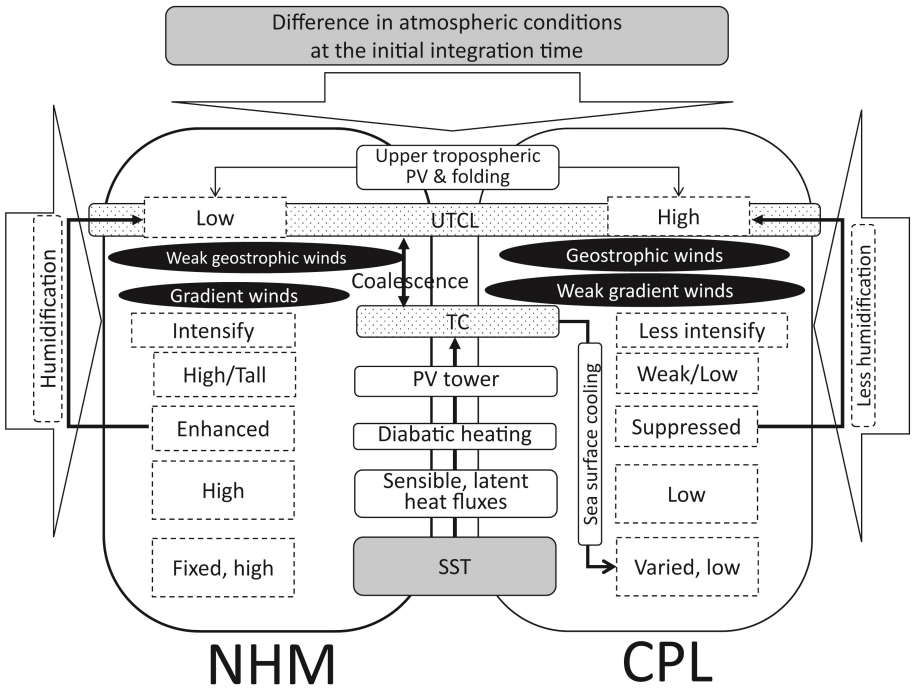

Figure 1. Schematic diagrams depicting the interactions between Typhoon Jongdari (2018) and adjacent upper-tropospheric cold low (UTCL) addressed in this study. Factors associated with uncertainty of atmospheric environments and ocean coupling are shown. Sea surface temperature (SST) and difference in atmospheric initial conditions are shaded. Solid ellipses indicate the comparison of geostrophic and gradient winds that affect simulated Jongdari's tracks between the noncoupled- (NHM) and coupled-model (CPL) simulations. Dashed boxes show the comparison regarding the factor in each solid box. "Humidification" indicated in large arrows is directly affected by diabatic heating and the effect is accumulated in the atmospheric environments, resulting in the impact on UTCL. "Difference in atmospheric environments at the initial time" indicated in another large arrow is also one of the atmospheric environment factors that affects the simulations of Jongdari and the UTCL.

- Ocean coupling helped sustain the upper-tropospheric potential vorticity associated with adjacent upper-tropospheric cold low and weakened the column of elevated potential vorticity associated with Jongdari.
- A larger difference in the atmospheric initial conditions had a stronger influence on simulated track and intensity of both Jongdari and the upper-tropospheric cold low than the effects of ocean coupling
- The steering flow of Jongdari was affected by the geostrophic-balanced cyclonic circulation created by the upper-tropospheric cold low.