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A Numerical Study of Inland Water Effects on the Reinforcement of Rainfall Associated with Typhoon Rananim(2004)

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Typhoon Rananim made landfall in China on 12 August, 2004. It caused severe damages not only in the coastal area but in the inland region also due to its rainfall reinforcement. High-resolution simulations and sensitivity experiments were employed to study the impacts of land surface water on the rainfall reinforcement associated with Typhoon Rananim using mesoscale model WRF-ARW and NOAH land surface scheme. Results show that the status of underlying surface, which has plentiful water bodies including large lakes and rivers, contributes to the rainfall reinforcement. It is found that typhoon rainfall and cloud coverage may lead to land surface cooling, however, expand the underlying water area in the same time. The expanded water surface can provide plenty of moisture for latent heat release, which is favorable for typhoon warm core and rainfall increase in turn. Sensitivity experiments indicate that the rainfall amount could be reduced if without the water bodies and the reinforcement would not be occurred. On the contrary, the cumulus convection would be enhanced if the area of water bodies was expanded and the reinforcement of rainfall would be more remarkable.