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Ensemble-based sensitivity analysis and predictability of an extreme rainfall event over northern Taiwan in the Mei-yu season: The 2 June 2017 case

Abstract

In the Mei-yu season, the northern coast of Taiwan has an extreme-rainfall event on 2 June 2017. The event caused the area produce severe rainfall about 635 mm in 12 hours took northern Taiwan a lot of tolls. However, before the occurrence of the event, most of numerical model had a large standard deviation, small ensemble mean and low probability in northern Taiwan. Therefore, the study takes this case to conduct an ensemble-based sensitivity analysis (ESA) in hope of improving the forecast to reduce the damage.

In the study, the ensemble model has 45 members and chooses areal-mean accumulated rainfall in northern Taiwan (25.0° - 25.5° N, 120.9° - 122.1° E) over the most-rainy 6h which is from 1900 UTC 1 to 0100 UTC 2 June 2017 to response function (R). Through an ensemble-based sensitivity analysis (ESA), we can learn the change in response function when the factor increases by per sigma in the ensemble model. The factors which the study chooses include (a) the frontal speed and position (b) the intensity of the front (c) the moisture in the environment (d) the frontal low-pressure disturbance (e) trough in order to understand which factor impact R most. The result suggests the factors are interrelated, especially the frontal speed and position can impact the northern rainfall the most.

Keyword

Ensemble forecast

Ensemble-based sensitivity analysis

Reference

Wang, C.C., Li, M. S., Chang, C. S., Chuang, P. Y., Chen, S. H., & Tsuboki, K., 2021: Ensemble-based sensitivity analysis and predictability of an extreme rainfall event over northern Taiwan in the Mei-yu season: The 2 June 2017 case. *Atmospheric Research*, **259**, 105684. <https://doi.org/10.1016/j.atmosres.2021.105684>.