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Development of tropical cyclone initialization scheme for DFS global barotropic model

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Tropical-cyclone initialization scheme for the global, barotropic, DFS-spectral model was developed. The 8th-order harmonic spectral filter (HSF) was employed in this new scheme in order to get a sharper cutoff of high wave number as well as improved computational efficiency compared to commonly used Kurihara filter. To separate the disturbance field (i.e., typhoon-scale perturbation) from the analysis field objectively, a new algorithm is presented: The typhoon scale is tentatively defined in terms of two-dimensional wave number n. Then, from the analysis field the circulation of scale n is separated, and the center of that perturbation is searched. By monitoring the center of the perturbations with different n, the disturbance field is finally determined as the scale for which the positions of the centers are not sensitive to the change of n. The area of typhoon was identified using the streamfunction. The axisymmetric bogus typhoon was generated following the Holland's formula and modified to eliminate the discontinuity at boundary of typhoon area. The new scheme was applied to the 3-days track forecast of the typhoons that passed near or over the Korean peninsula in 2002 summer. Compared to forecast without the bogusing, the new scheme yielded an improvement in the forecasts of tropical cyclone track.

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