Developing A Quality Index for Cloud-Resolving Typhoon Rainfall Forecasts in Taiwan based on Machine Learning

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Taiwan located at typhoon hot spot, require highly Typhoon forecast accuracy to prepare reduce nature hazard. Based on experience, newest typhoon numerical forecast not always more accuracy, previous results are useful but hard to use. Setting up index of typhoon forecast will help forecaster correct the result easier and better, so establish quality Index is important topic.

This study using cloud-resolving model through time-lagged approach, that combines the strengths of high resolution for quantitative precipitation forecast (QPF) and longer lead time for preparation. The ensemble system using the Cloud-Resolving Storm Simulator (CReSS) has a grid size of 2.5 km, a large domain of 1860 kmx 1360 km, and an extended range of 8 days. Then take out the important parameters from the forecast results, using machine learning to establish quality Index, the quality Index contain fractions skill score (FSS), threshold score (TS), along track correction and cross track correction.

For the ten typhoons, training the model with nine typhoons and testing by the other. The FSS predict difference best result is 0.081, and average difference in ten cases is 0.141; threshold score in 100 mm predict is much harder than FSS, the average difference in the typhoons is 0.160. Those results mean predict system is useful in rainfall area and type. In the track correction case, cross track correction is better than along track, for ten typhoon case, 24 hr forecast cross track error is 23 km and along track error is 47 km, that mean track correction system is really useful.