A Comparison Study of the Impacts of the Three Adaptive Observation Methods

Xiaohao Qin[1,3], Mu Mu[1,2]

[1]LASG, Institute of Atmospheric Physics,Chinese Academy of Sciences, Beijing 100029, China

[2]Key Laboratory of Ocean Circulation and Wave,Institute of Oceanology, Chinese Academy of Sciences, Qingdao 266071, China

[3]Graduate University of Chinese Academy of Sciences, Beijing 100049, China

The impacts of three adaptive observation methods that have been used for tropical cyclone (TC) adaptive observations, the conditional nonlinear optimal perturbation (CNOP), the first singular vector (FSV) and the ensemble transform Kalman filter (ET KF) methods, are compared for 36-hour forecasts of two northwest Pacific TC cases named Matsa (2005) and Nock-Ten (2004), by investigating the reduction of forecast-error variance of hypothetical test probes. The sensitive regions corresponding to each method are obtained. And lots of the test probes are designed both inside and outside the above sensitive regions to identify the proper sites for adaptive observations. The best test probe is picked out based on each method. The results show that, the sensitive regions identified by the above methods are more proper for adaptive deployment than the other regions. Comparing to the other two methods, the optimal deployment sites identified by the CNOP have the most improvement to the forecast in the verification region at the verification time for the two cases studied in this research. The optimal deployment sites identified by the FSV have more impacts than that of the ET KF for one case, but the reverse is in the other case.