Geophysical Research Abstracts
Vol. 14, EGU2012-1537, 2012
EGU General Assembly 2012

The application of Conditional Nonlinear Optimal Perturbation to the binary typhoons interaction over the western Pacific

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Abstract: The interaction between the typhoons Fengshen and Fung-wong over the Western Pacific in the year of 2002 was studied by the Conditional Nonlinear Optimal Perturbation (CNOP) method. Via the study, we found that, the CNOP method could reveals the process of one-way interaction between Fengshen and Fung-wong, since the region of Fung-wong was selected verification area, the sensitivity area were mainly located in the region of Fengshen, and present the half ring structure. However, if the region of Fengshen was selected verification areas, most of the sensitivity areas were located in the region between the Fengshen and subtropical high, far away from the position of Fung-wong. This indicates that the subtropical high was the lead of the Fengshen. The sensitivity experiment showed that the initial errors in the CNOP-identified sensitive areas had larger impact on the verification-area prediction than did those near the typhoon center, and that their developments took a large proportion in the whole domain. This suggests that matters in the CNOP-identified sensitive areas do have large influence on the verification-area prediction.
Key words: Conditional Nonlinear Optimal Perturbation, binary typhoons, interaction, sensitivity area, prediction