Vertical Typhoon: A Database on the Vertical Structure of Typhoons Based on GPV Data

Asanobu Kitamoto[1]

[1] NII

http://agora.ex.nii.ac.jp/~kitamoto/

The horizontal structure and vertical structure is an important tool for the analysis of meteorological phenomena. In particular, vertical structure plays an important role in the understanding of the mechanism of severe weather such as typhoons and heavy rains. Hence, we suggest that the collection of data on the vertical structure of meteorological phenomena is important, and propose Vertical Typhoon which is the database of the vertical structure of typhoons.

Vertical Typhoon is a database created on GPV (Grid Point Value) data, and will be an information infrastructure to study the representation of the structure of typhoons on GPVs. Several types of physical values are calculated for each vertical layer (pressure plane), and this makes possible to study the vertical structure of typhoons through the creation of cross-sectional diagrams. GPV has a problem of its coarse grid scale, but the resolution is steadily increasing. Moreover, it is also possible to compare the representation of typhoons on multiple numerical prediction models (or other simulations) by comparing cross-sectional diagrams obtained from multiple GPVs. We therefore claim that the database of typhoon's vertical structure is useful for various areas of research.

As a preparation for this database, our portal site, Vertical Earth [1], opened GPV Navigator [2] that enables users to easily navigate GPV data for vertical directions and temporal directions. This database deals with GSM (Global Scale Model) and MSM (Meso Scale Model) GPV data (objective analysis) obtained from Japan Meteorological Agency. This interface now provides planar diagrams of GPV, so users can reconstruct the vertical structure in their mind from several diagrams along vertical directions. It is apparent, however, that cross-sectional diagrams are much easier for the understanding of the vertical structure.

Vertical Typhoon is a database that provides cross-sectional and planar diagrams specialized in typhoons. This database is based on best track data provided from Japan Meteorological Agency as well as GPV data, and extracts GPV data around the center of each typhoon. Users can browse the GPV data of past typhoons, and in the future it may be possible to search for similar typhoons in terms of the similarity of vertical structures.

Vertical Typhoon proposed in this paper is a complementary database to Digital Typhoon [3], a database created by the same author. The former focuses on the vertical structure, while the latter focuses on the horizontal structure, and both databases can be integrated by the typhoon number and the observation time. Future work includes the realization of 3-D database through the integration of these vertical and horizontal databases.

[1] Vertical Earth, http://earth.nii.ac.jp/
[2] GPV Navigator, http://earth.nii.ac.jp/atmosphere/GPV/
[3] Digital Typhoon, http://www.digital-typhoon.org/