3.4 Typhoon Bogussing

For tropical cyclones over the western North Pacific, typhoon bogus data are generated to construct a realistic typhoon structure in the initial fields of the forecast models according to their resolutions. They are made up of geopotential height and wind data around a typhoon. The generated bogus structure is axially asymmetric for all the analyses.

Firstly, symmetric bogus profiles are generated automatically from the central pressure (Pc) and the 15m/s wind speed radius of the typhoon (R15) analyzed by forecasters. The surface pressure profile is defined by using the Fujita's formula (1952). The gradient wind balance is assumed to calculate the surface pressure profile meeting the requirement from the wind speed at the particular radius R15. Surface observations within the bogussing area are referred to correct the pressure profile. Upper geopotential profiles are defined by the empirical formula based on the analysis of tropical cyclone by Frank (1977). It is assumed that the temperature anomaly has its maximum at 250hPa. The wind field on each level is derived from the geopotential height profiles with the gradient wind balance. The surface wind field is also derived from the gradient wind balance but it is modified to include the effect of surface friction.

Secondly, asymmetric components are retrieved from the first guess fields and added to the symmetric bogus profile to generate the final asymmetric bogus structure. In the regional analysis, when the target area of bogussing is across the boundary, asymmetric components are extracted from corresponding global first guess field.

In the global early analysis and the regional analysis and the mesoscale analysis, observational data are generated from the resulting bogus structure. In the global cycle analysis, the structure is implanted into the first guess fields by a blending method with a linear weighting function.

References

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