Experimental Regional Reanalysis with the WRF-based Local Ensemble Transform Kalman Filter (LETKF) Using Two-Way-Nested Heterogeneous Grids

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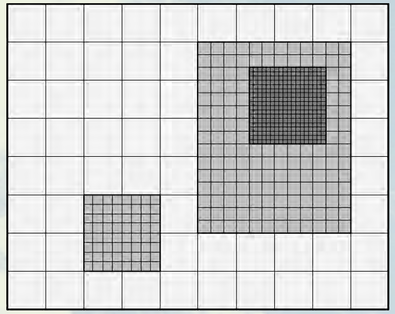
1. Goals

- An efficient approach to high-resolution reanalysis: use of nested domains

- A seamless approach to data assimilation with nested domains is explored.

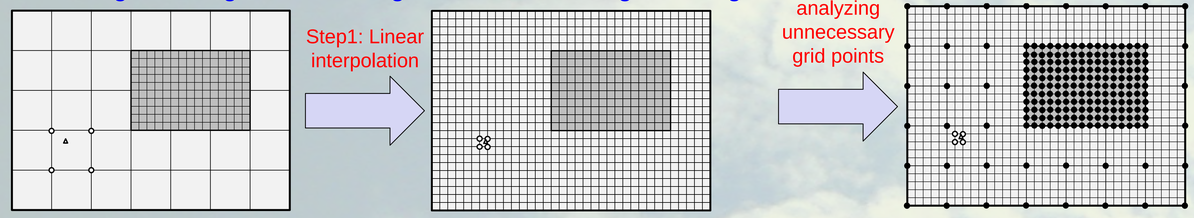


2. Methodology

- We use the existing WRF-LETKF system (Miyoshi and Kunii 2012) with minimal modifications.

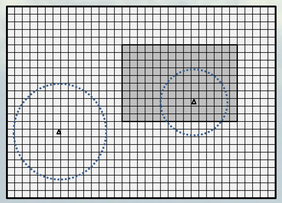
- Apply a single LETKF to nested domains efficiently.

Heterogeneous grid → Step1: Linear interpolation → High-resolution homogeneous grid → Step2: Skip analyzing unnecessary grid points



Taking advantage of grid-point independence of the LETKF

- Enhanced localization
  More localization in the higher-resolution inner domain

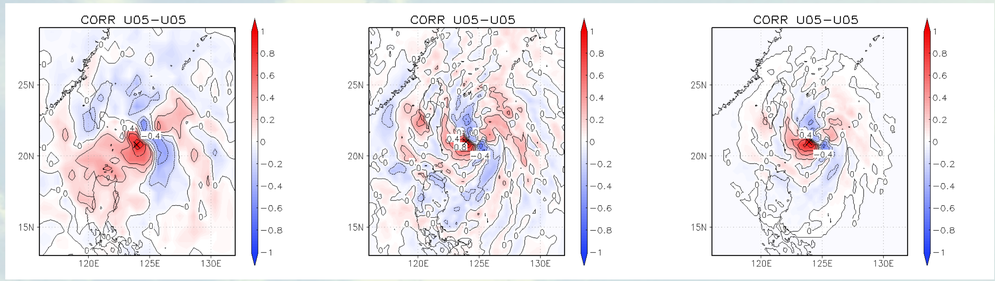


3. Results

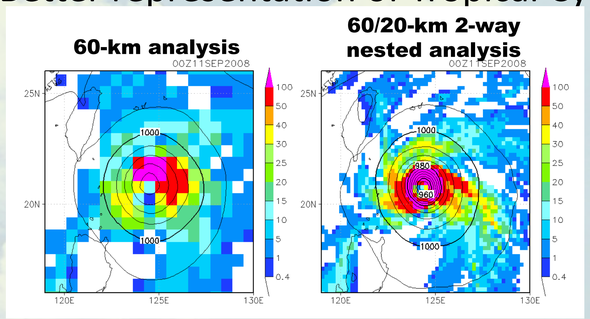
- 2-month reanalysis has been performed in the Western North Pacific in August-September, 2008.
- 60/20-km two-way nested domains are used.

- Background error correlations (U-wind in the lower troposphere)

60-km grid spacing 400-km localization | 20-km grid spacing 400-km localization | 20-km grid spacing 200-km localization



- Better representation of Tropical Cyclones



4. Conclusion

- The seamless data assimilation with two-way-nested heterogeneous grids may be useful for efficient high-resolution reanalysis.