雷達資料同化策略之探討

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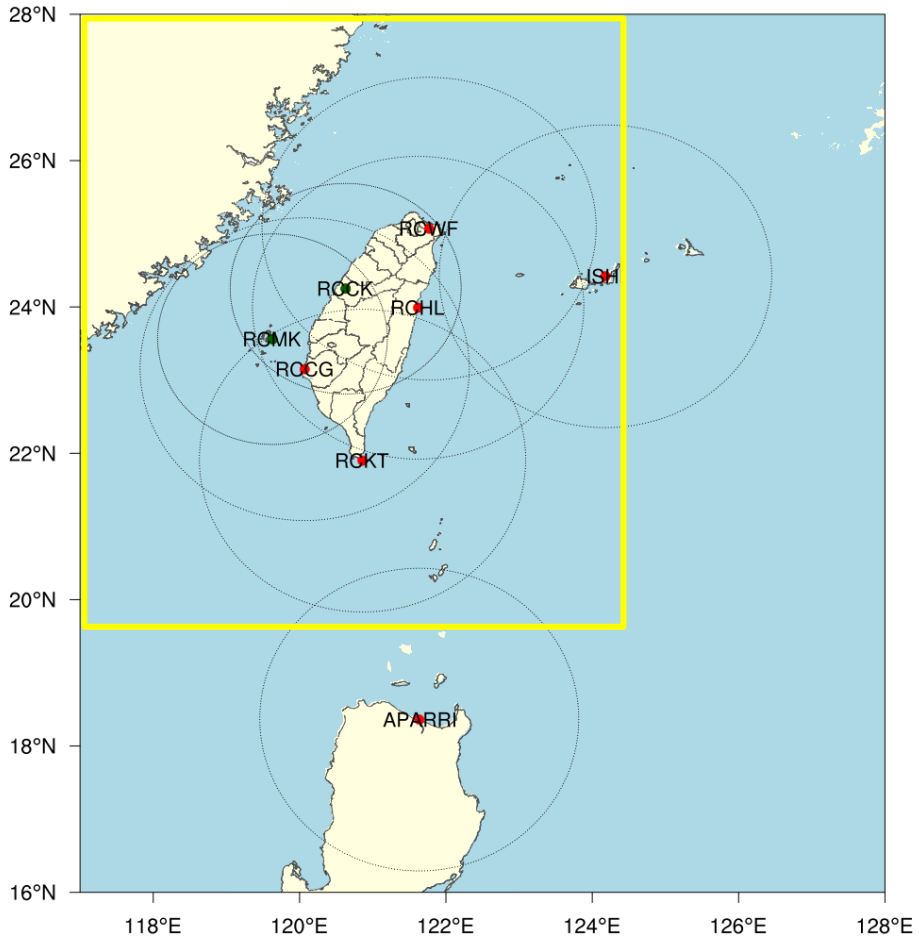
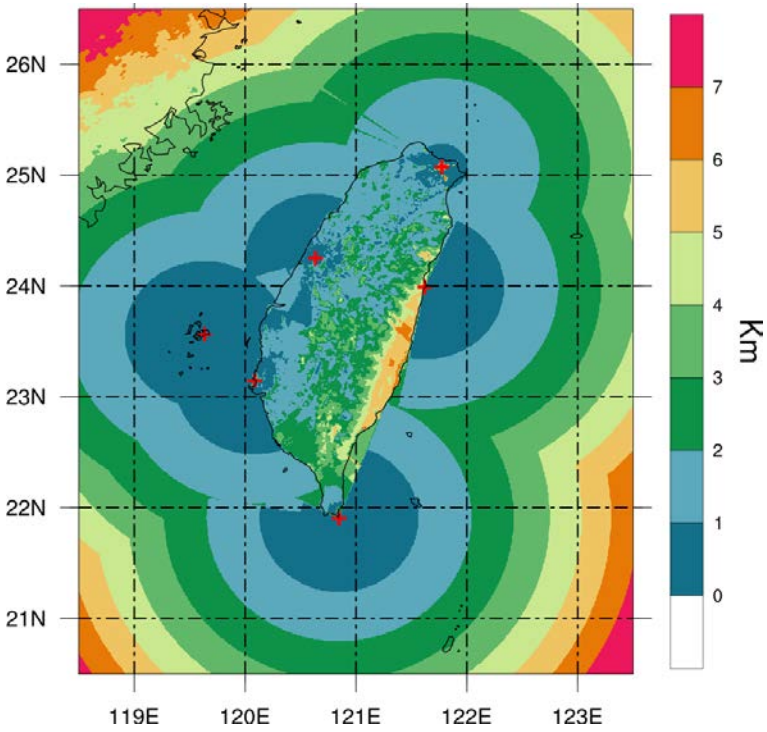
2016 / 10 / 06

OUTLINE

- **Radar preprocess system for DA**
- **3 DVAR Radar DA**
- **DA strategy**
- **Conclusion and future work**

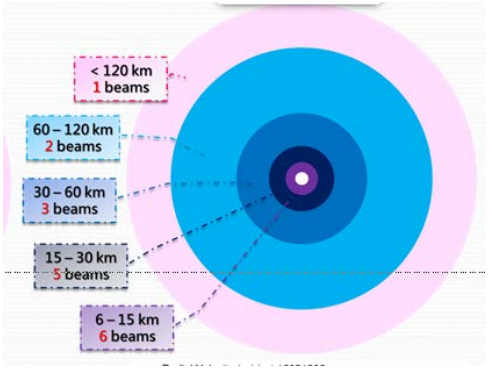
Radar coverage



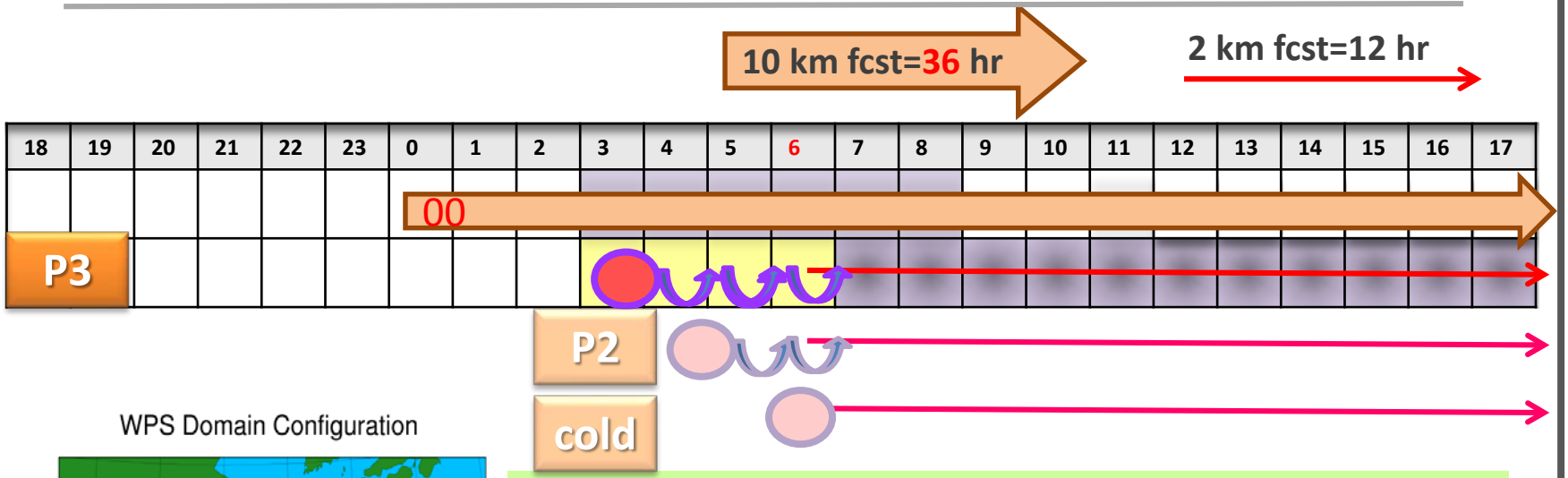


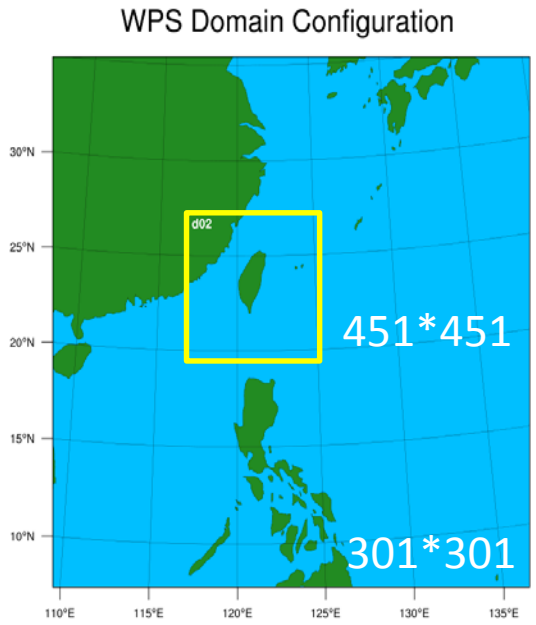
Radar Preprocess

- **Mosaic Reflectivity**
  - Thinning to the MOSAIC at the model grid
    - Adaptive Barnes interpolation scheme
- **Radial Velocity at PPI**
  - Thinning at the model grid
  - Thinning along the bin and azimuthal
- Use of the **no-rain observation**
- Cloud analysis using the reflectivity to modify the analysis on the **relative humidity**
- QC
  - Clutter filtering
  - Remove AP and noise
  - Data filling
  - Velocity dealiasing (undergoing)



DA strategy





Vertical Levels: 52

- 10 km：Downscale run from the NCEP GFS
- 2 km：Radar DA，初始猜測場及邊界條件來自10 km模式之預報場， Hourly Update ，提供未來12小時預報。

➢Reduce the 2-km model spin-up, both on the meteorological variables, and the hydrometeor.

➢Extend the hydrometeor fields in the observations void area

Evaluation on

① Radar pre-process method

② 3DVAR

- Vertical length scale （qr -> 0）
- Benefit of assimilate *humidity* estimated from radar reflectivity

③ DA strategy

- cold start：w/o Qv , w/o Qrsg
- cycle ：cycle frequency

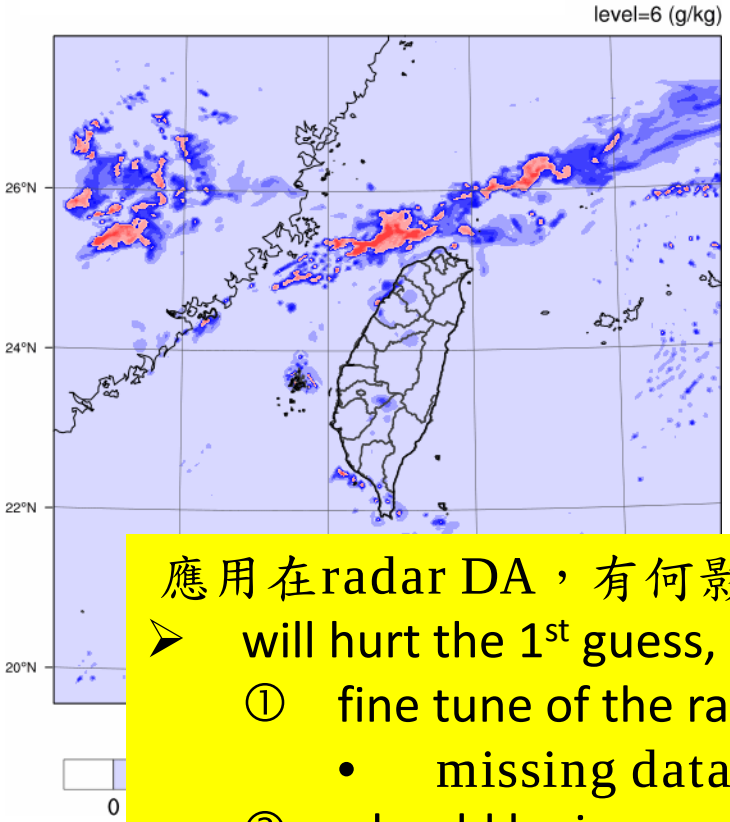
Radar pre-process system for DA

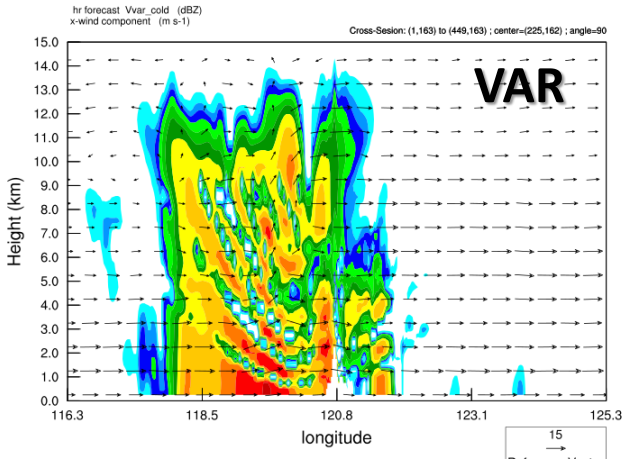
observational gap / vertical scale of qr

Mosaic Reflectivity：

- CAPPI based on model grid / 0.5 km – 15 km interval=0.5km

Qrain analysis increment



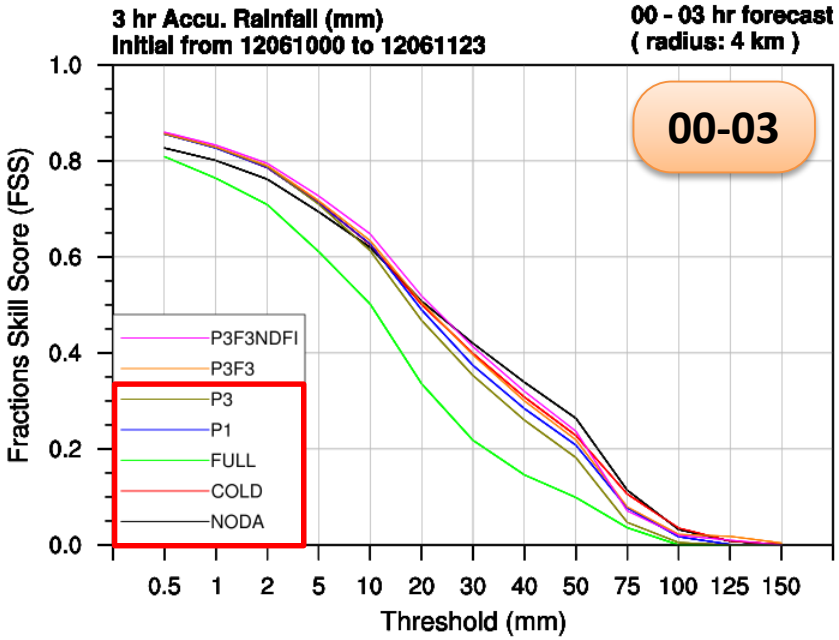


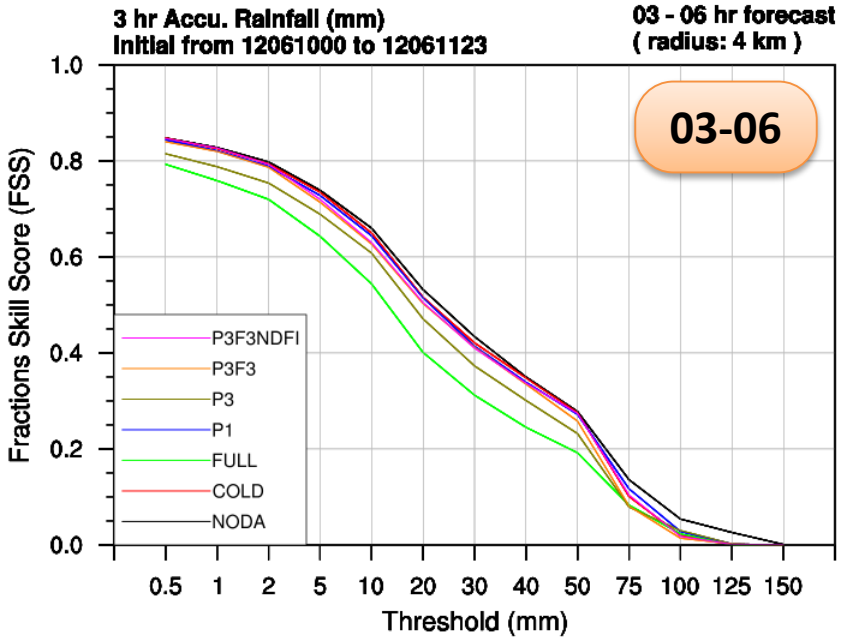
應用在radar DA，有何影響？

- will hurt the 1st guess, especially from the cycle strategy
  - ① fine tune of the radar preprocess (MOSAIC)。
    - missing data
  - ② should be improved in LETKF and **Hybrid**

DA strategy

FSS ***3-hr Accu.rainfall***

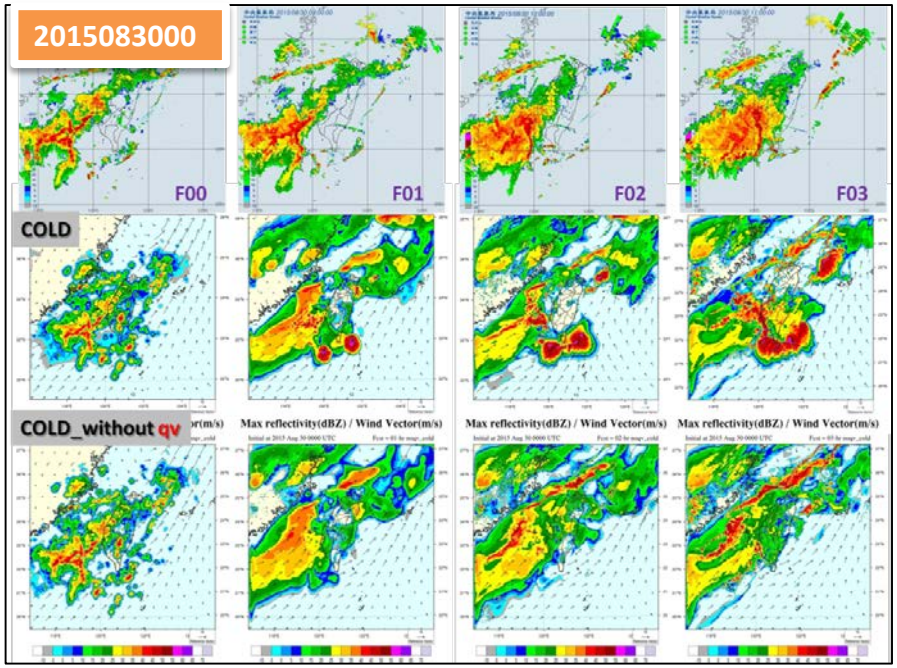


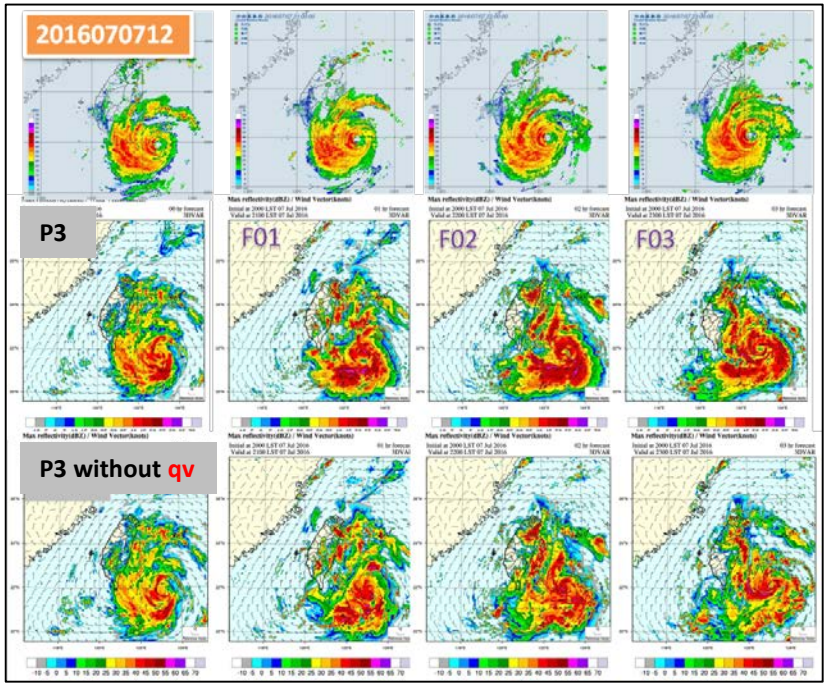


cold start ~ P1 > P3 >> full cycle

Assimilate radar Reflectivity

assimilate humidity estimated from radar reflectivity



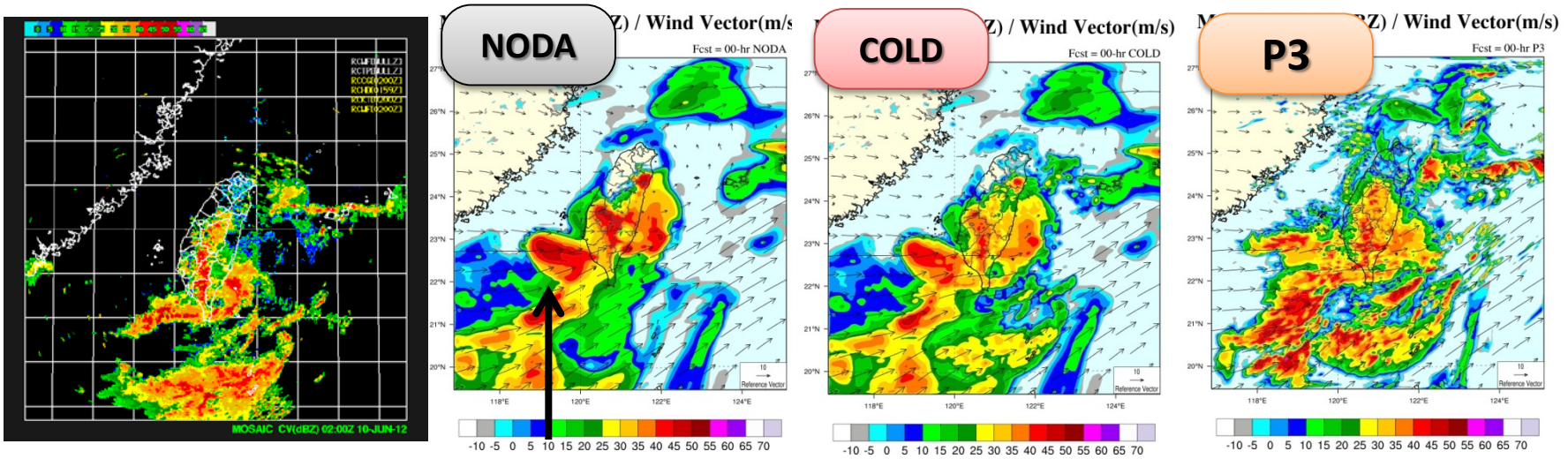


Apply the reflectivity based clod analysis produce too much rainfall

DA strategy

Role of the 10-km

- Provide the high-resolution BC for 2-km grid
- Improve the 1st guess of the cold start

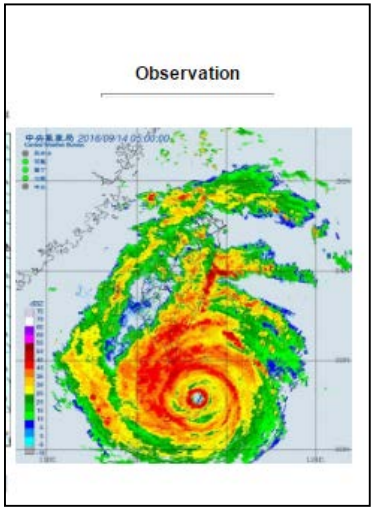


Reflectivity from the 10-km forecast

DA strategy

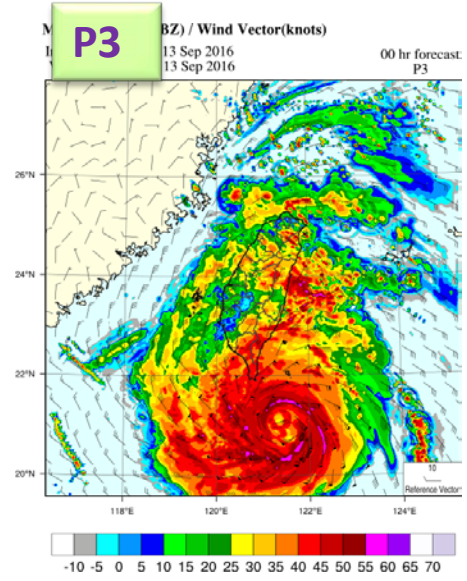
cycle ： frequency　　**cold start**：w/o Qrsg

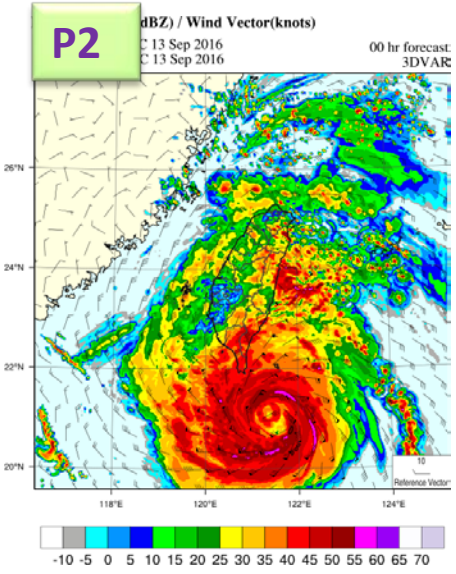
Initial at *2016091321 UTC (TY* MERANTI)

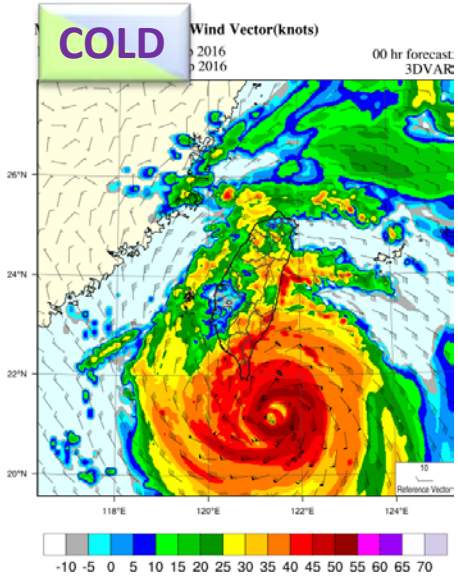


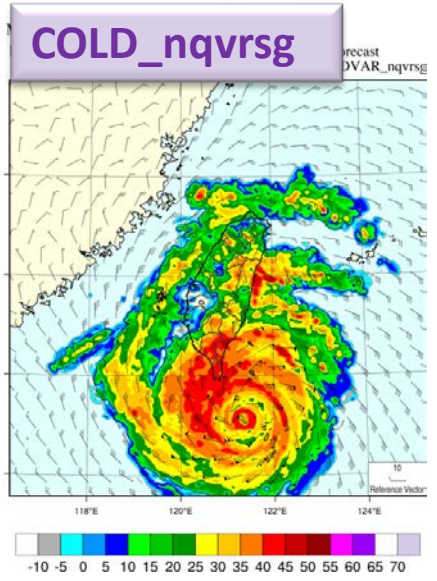
cycle越多次(P3>P2)分析場弱雨帶範圍分佈越寬
cold帶進太多水象資訊

VAROUT







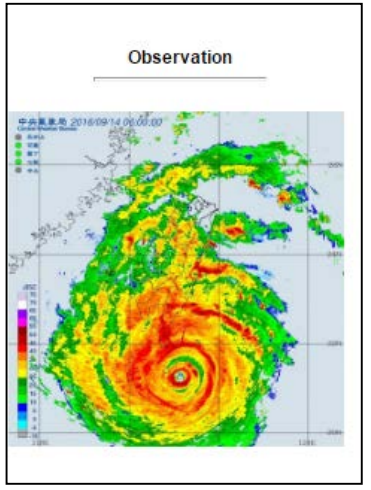


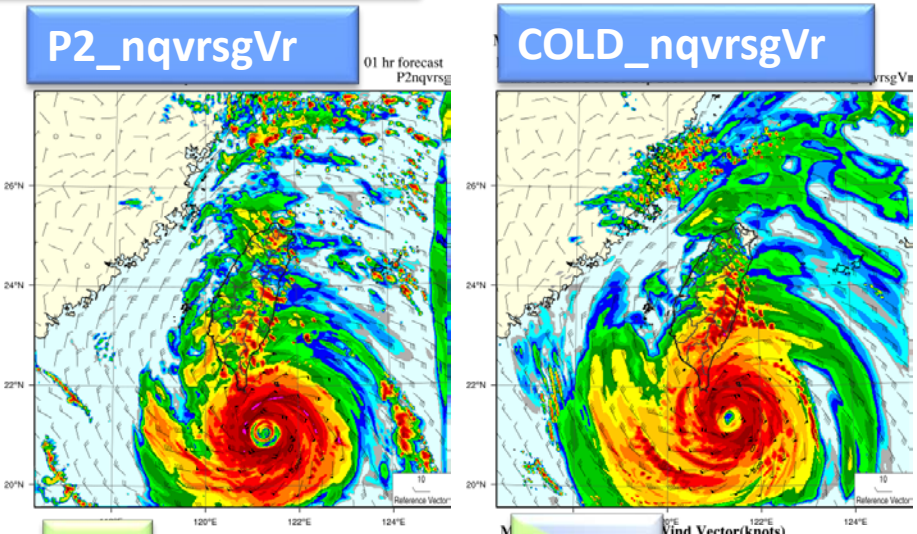
DA strategy

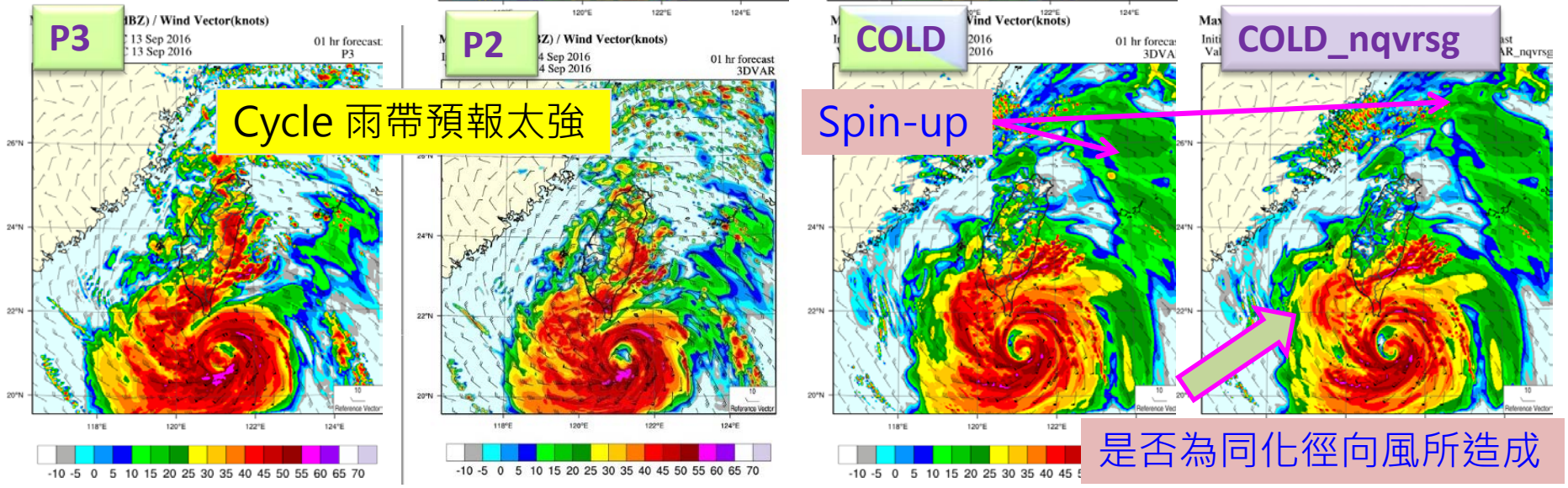
cycle ： frequency　　**cold start**：w/o Qrsg

Initial at *2016091321 UTC (TY* MERANTI)

F01







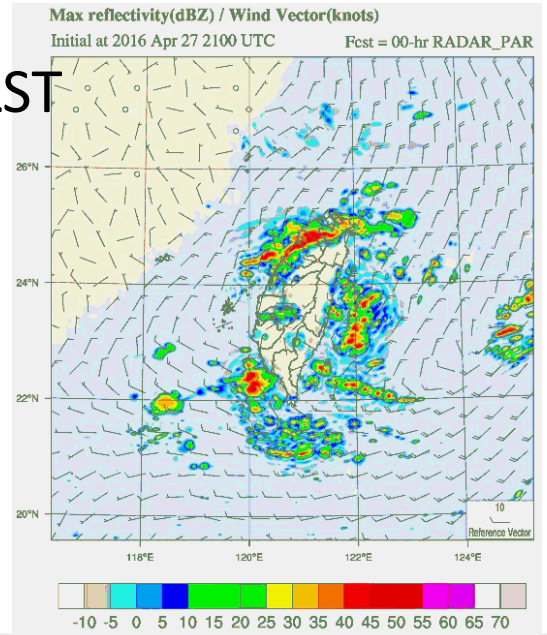
Conclusion and Future work

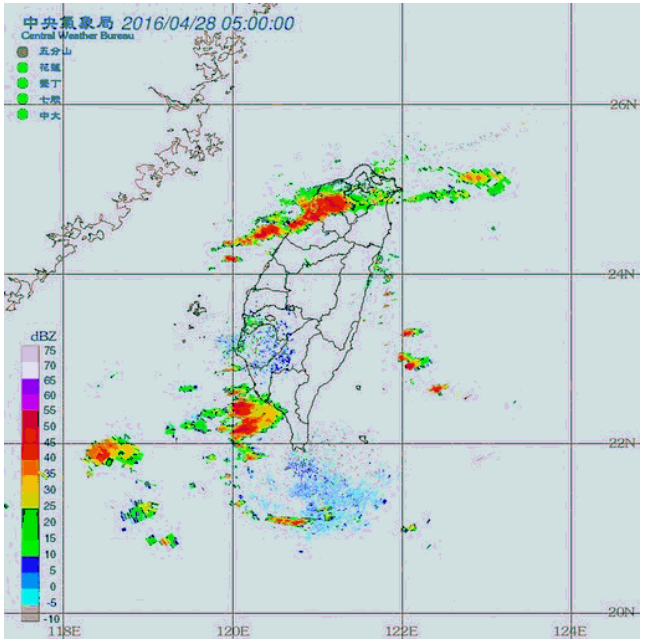
① Radar pre-process method
- fine tune of the radar preprocess （ MOSAIC Reflectivity and ***radial wind*** ）

② 3DVAR
- Vertical length scale （qr -> 0）
  - Hybrid 3DVAR
- Benefit of assimilate *humidity* estimated from radar reflectivity
  - turn off *rqv*

③ DA strategy
- cold start：w/o Qv , w/o Qrsg
  - without Qvrsg
- cycle ：cycle frequency
  - P3->P2
  - 較高頻率的資料同化頻率
- *BLENDING*

Initial：0428 0500 LST





Typhoon Meranti