

雷達資料同化
之
初始化問題探討

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前言

- 以統計為基礎之資料同化
 - 1) 模式分析場容易導致不平衡的動量場與質量場
 - Model spin-up issue
 - 2) 分析場沒有水相粒子，導致降水spin-up issue
- WRF模式提供了**模式初始化方法(DFI)**，可有效改善不平衡的模式分析場，得到平衡的模式初始場
 - 改善model spin-up和降水spin-up的問題

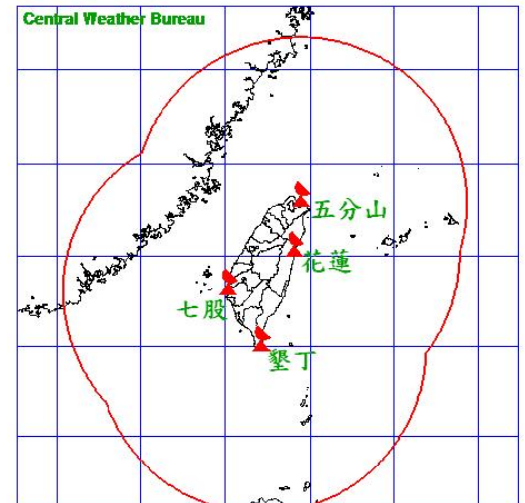
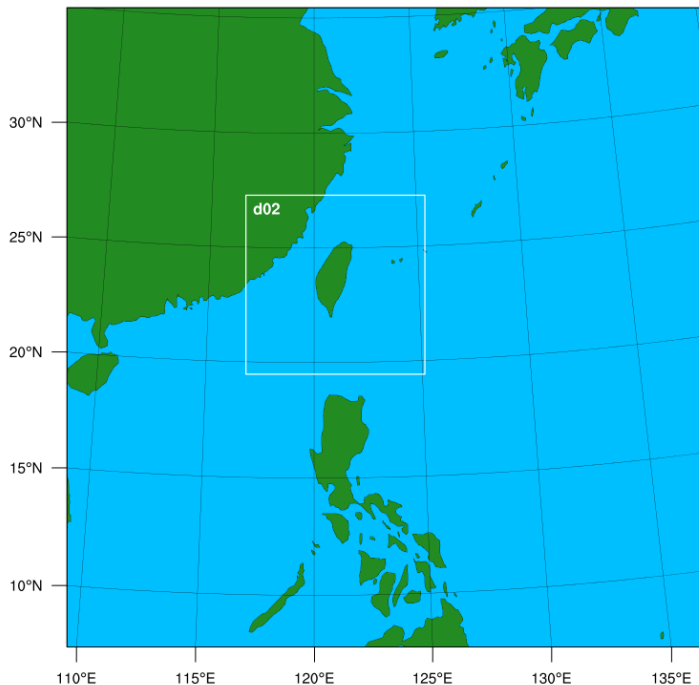
Outline

- 雷達資料同化系統介紹
- DFI 方法介紹
- DFI 敏感度測試
 - 不同濾波窗區
 - 不同資料同化策略
- 結論

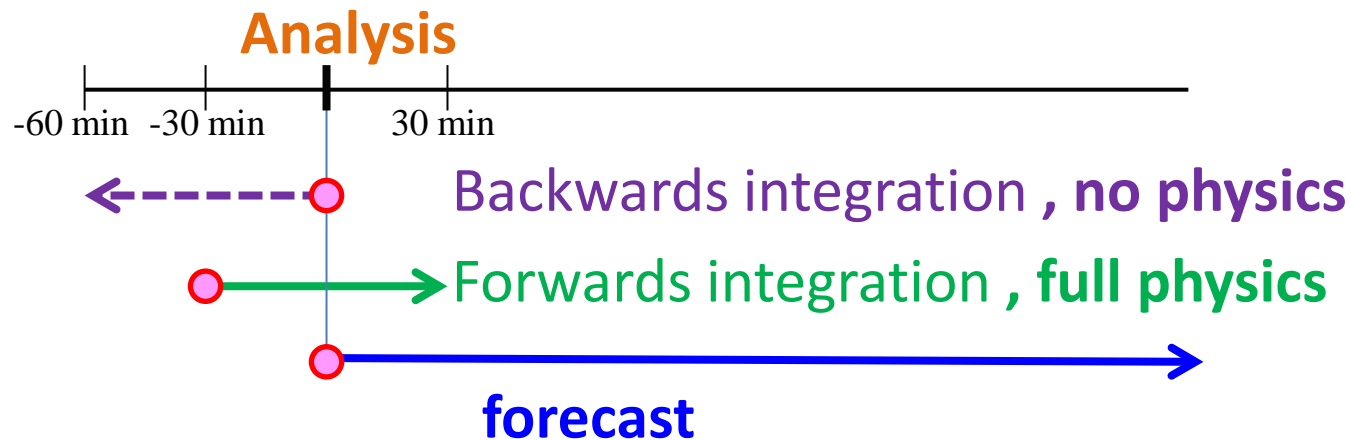
雷達資料同化系統介紹

- 資料同化方法
 - WRF 3DVAR
- 網域設定
 - 10 km
 - 301*301 / For BC
 - 2 km
 - 421*421 / For Forecast
- 雷達資料

WPS Domain Configuration



Twice Digital Filter Initialization



1) Filter window:

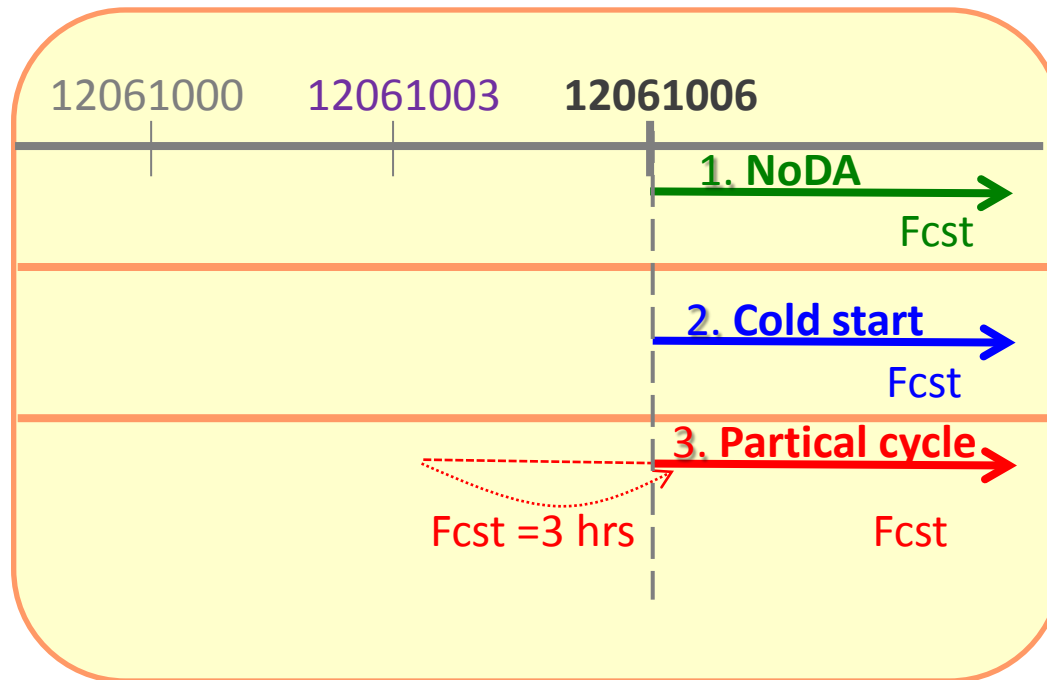
ex: filter window = 1-hr

2) Dfi_cutoff_seconds :

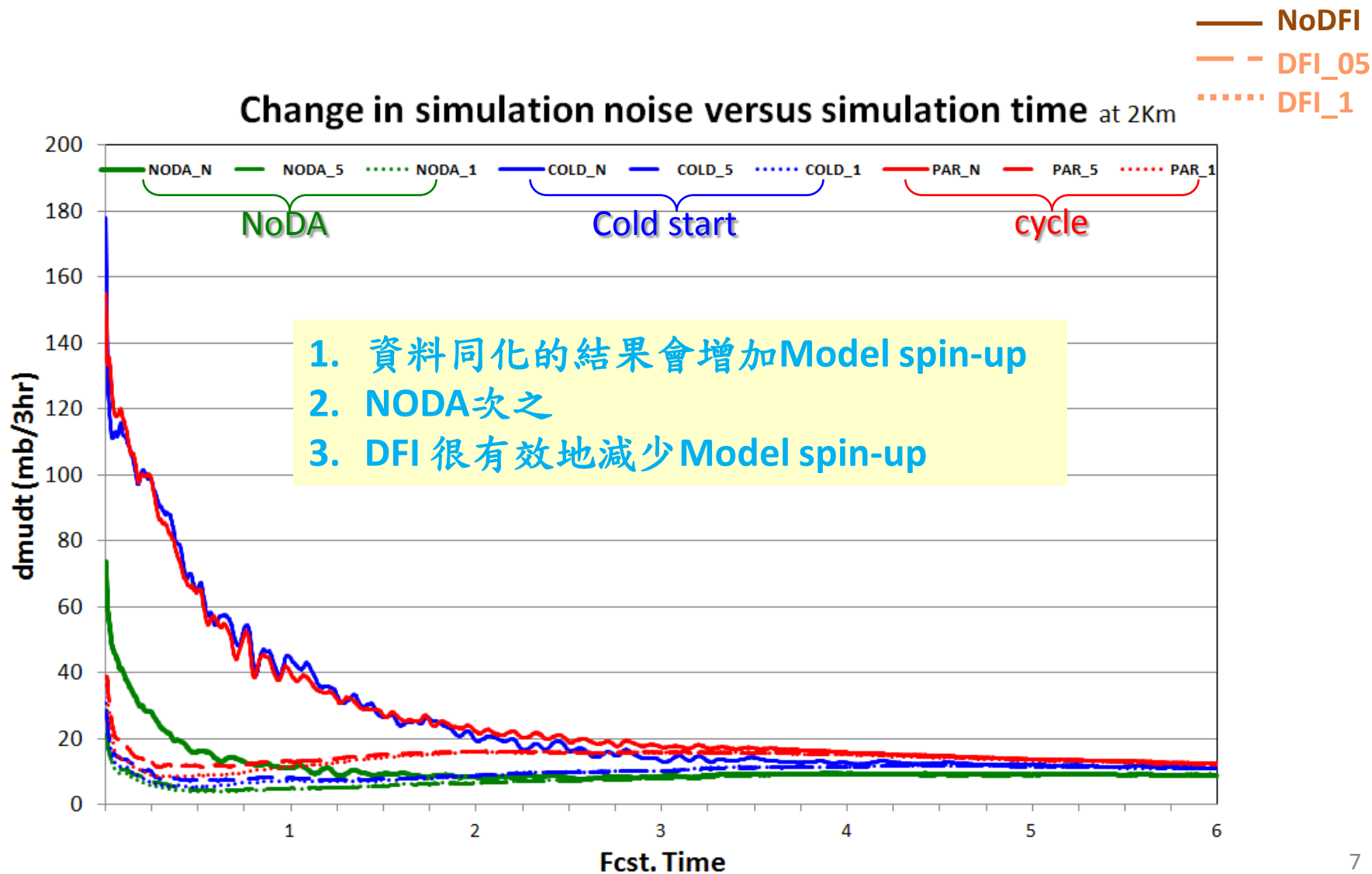
cutoff period for the filter; should not longer than the filter window

DFI 敏感度測試

- Case : 2012061006
 - NoDFI / DFI_05 / DFI_1 ; NoDA / Cold start / Partical cycle



DFI 敏感度測試



Case :
2012061006 CV

NoDA

Cold start

Partical cycle

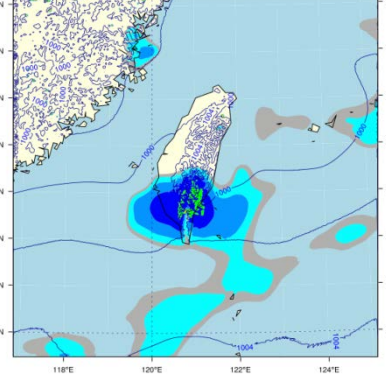
DFI_05

DFI_1

NoDFI

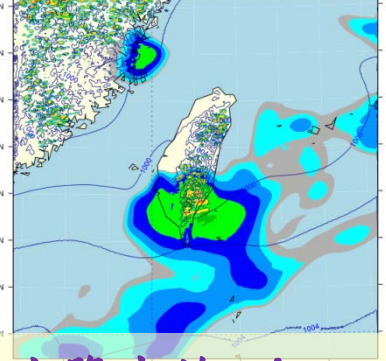
Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC DFI_05_NODA



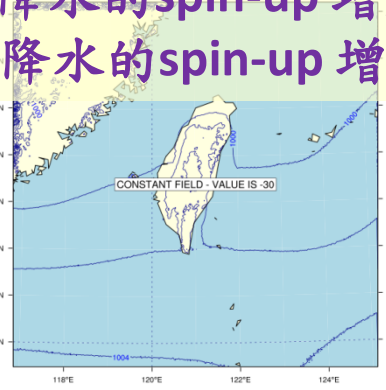
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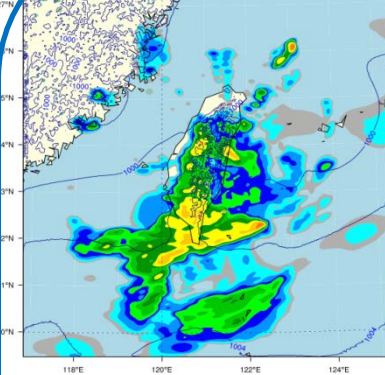
Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC NODFI



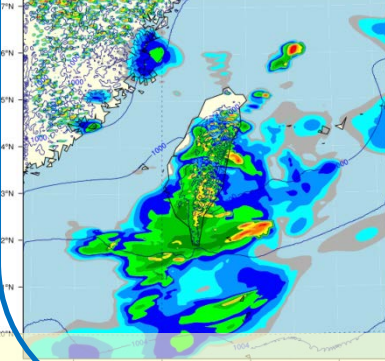
Maximum reflectivity(dbz) / SLP(hpa)

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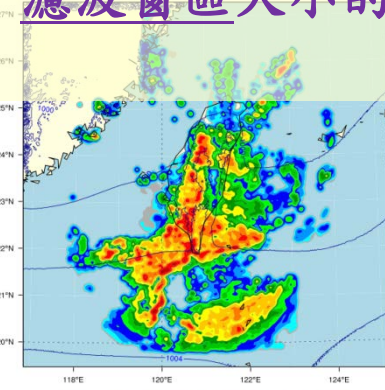
Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC DFI_1_COLD



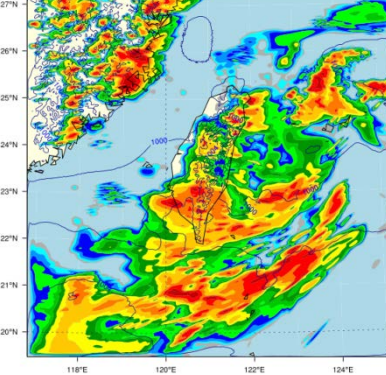
Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC NODFI_COLD



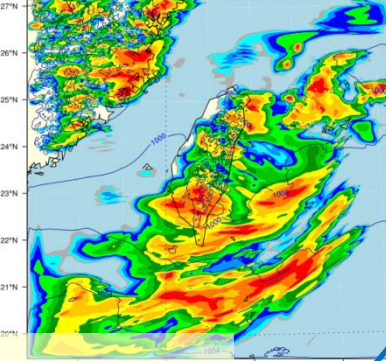
Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC DFI_05_PAR



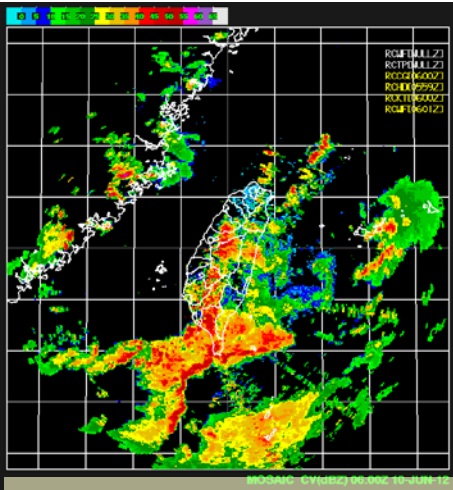
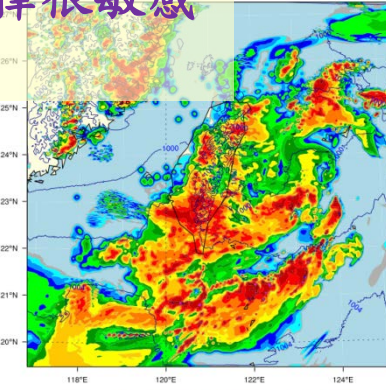
Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC DFI_1_PAR



Maximum reflectivity(dbz) / SLP(hpa)

Initial at 2012 Jun 10 0600 UTC NODFI_PAR

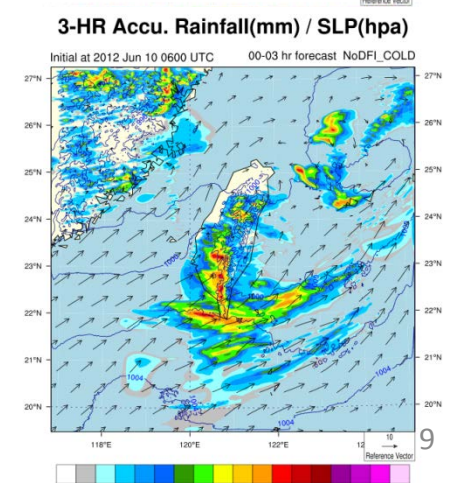
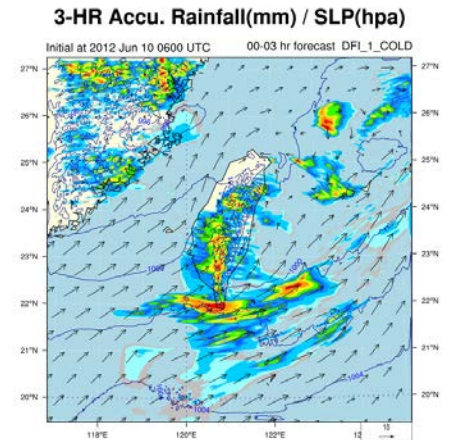
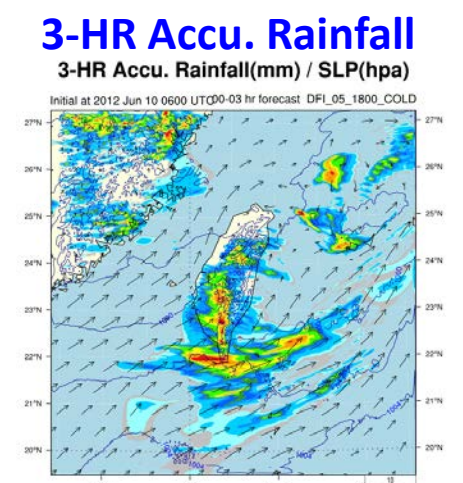
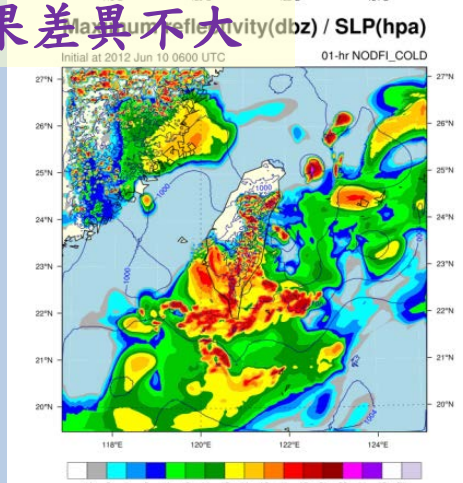
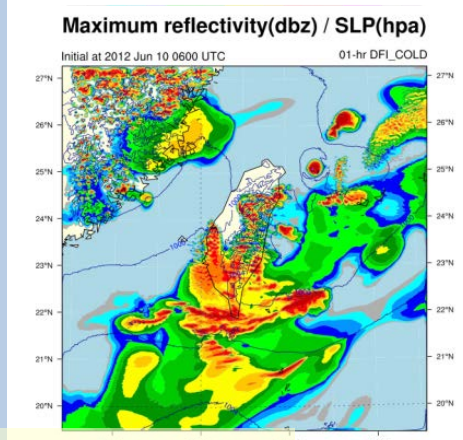
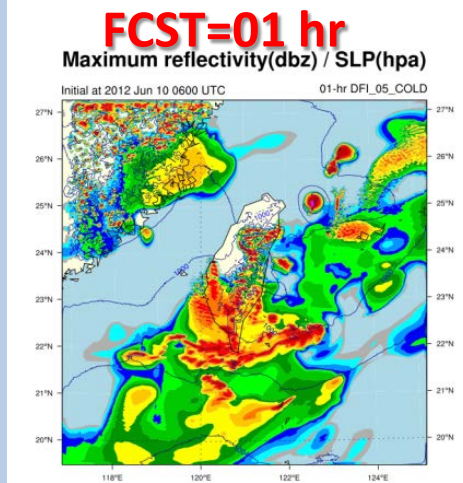
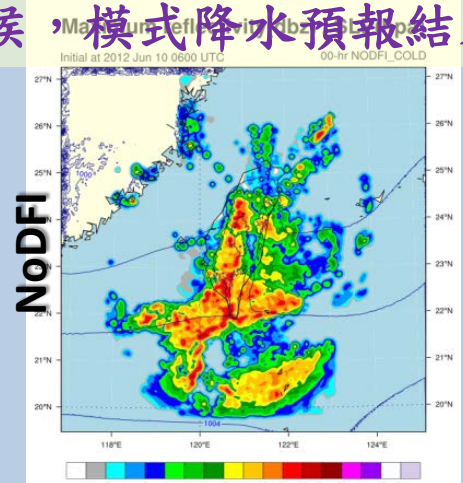
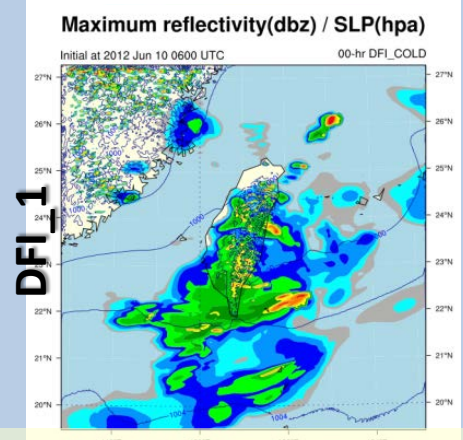
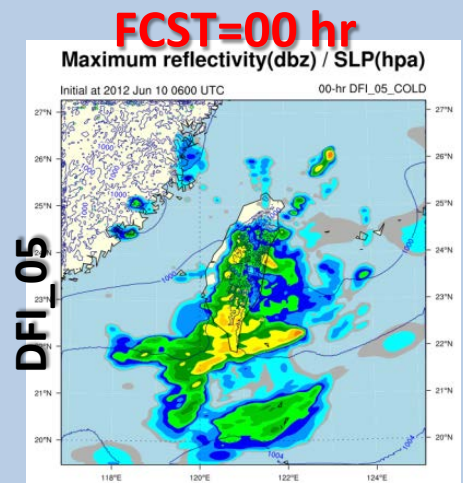
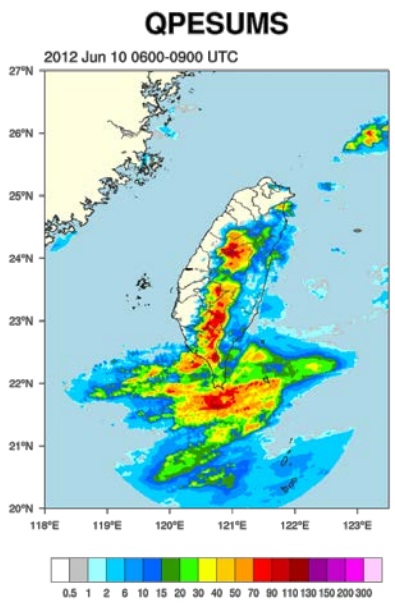


For Noda , DFI 減小降水的spin-up
 For Cold start , DFI使降水的spin-up 增加
 For cycle , DFI使降水的spin-up 增加

濾波窗區大小的選擇很敏感

Cold start

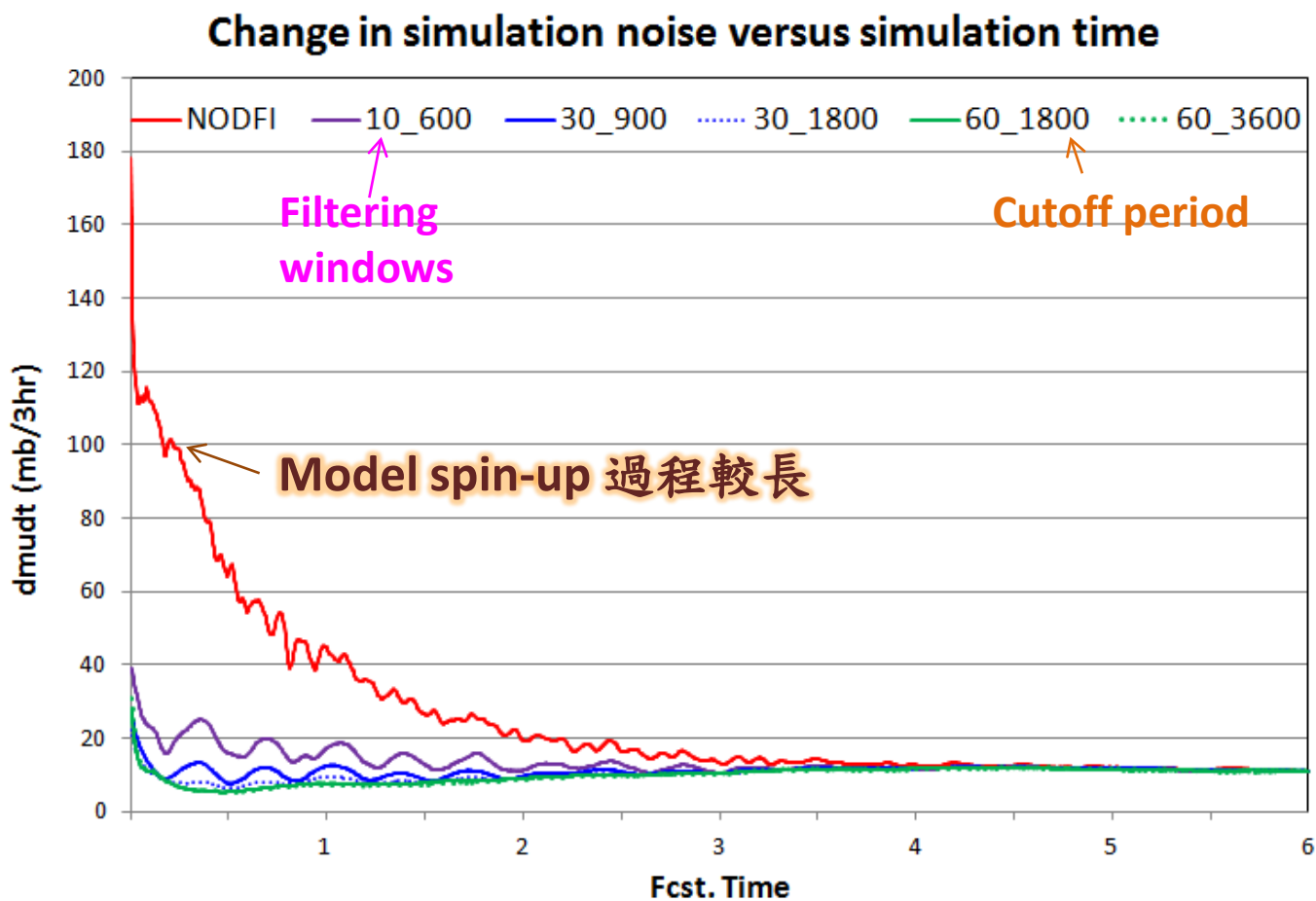
Case :
2012061006 CV



預報1小時 模式降水預報結果差異不大



模式預報降水差異不大，是否不用 DFI 會比較好？



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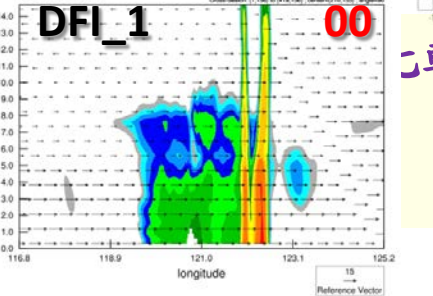
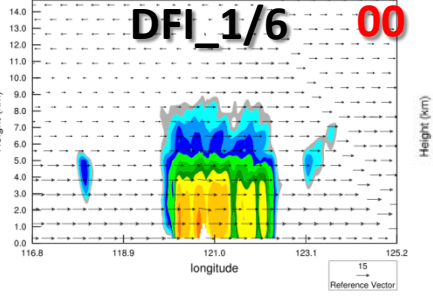
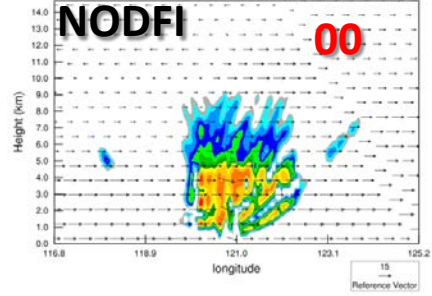
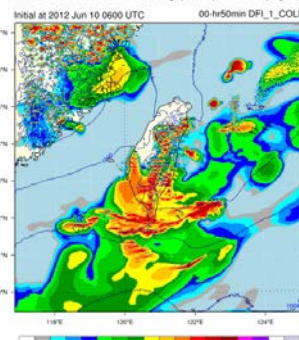
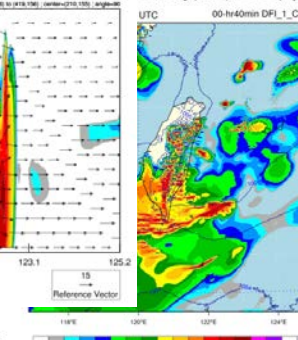
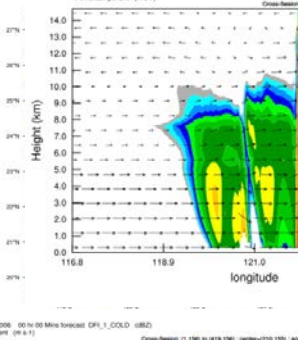
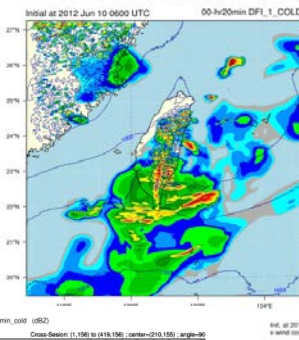
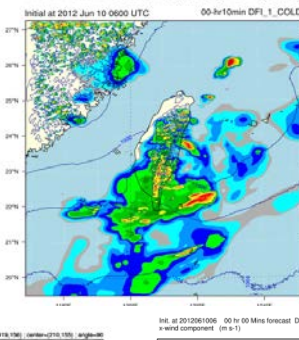
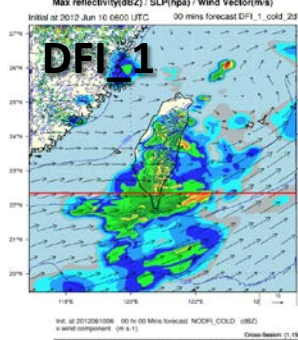
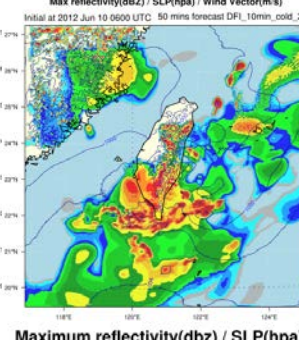
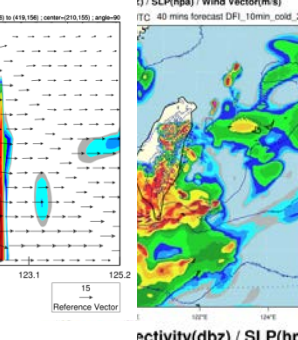
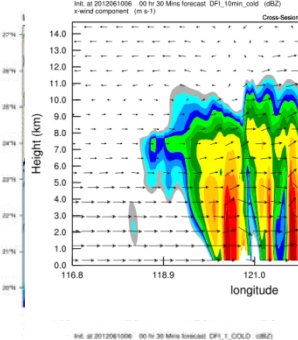
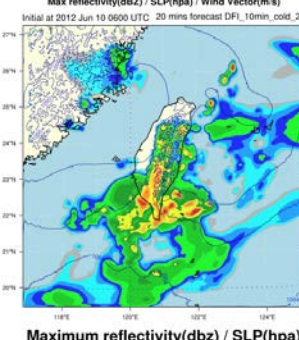
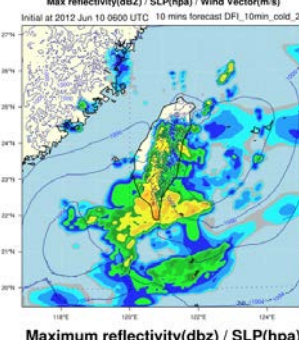
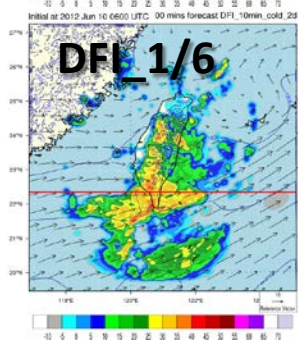
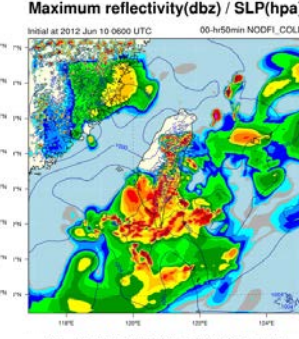
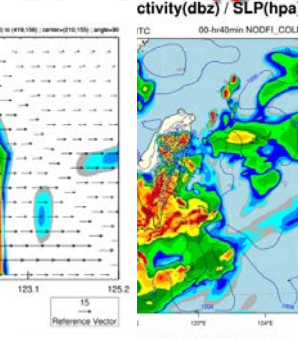
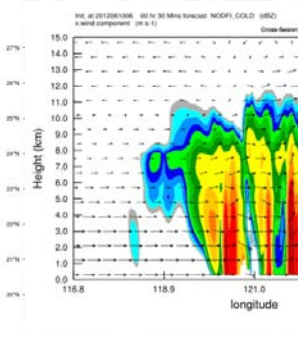
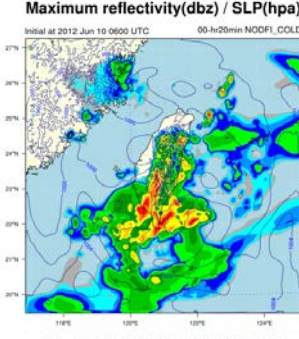
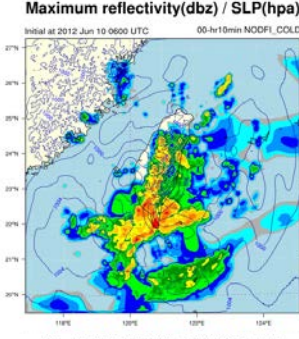
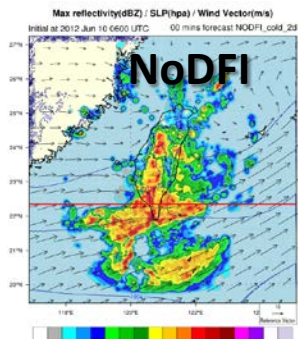
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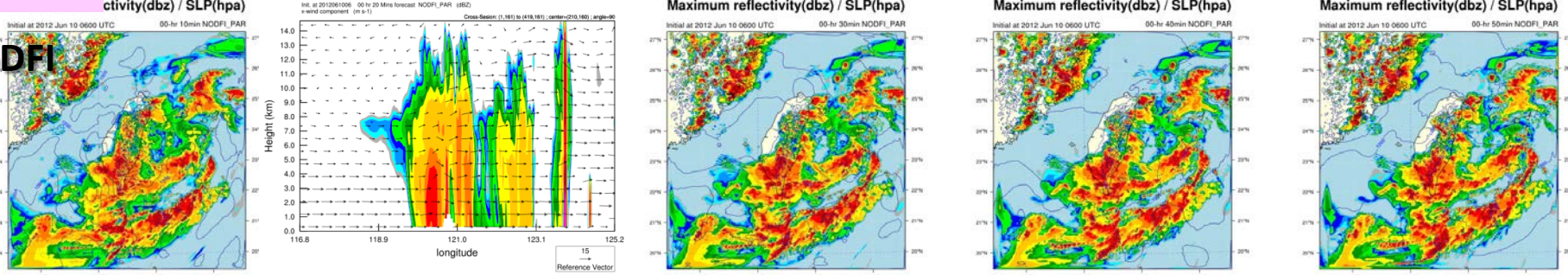
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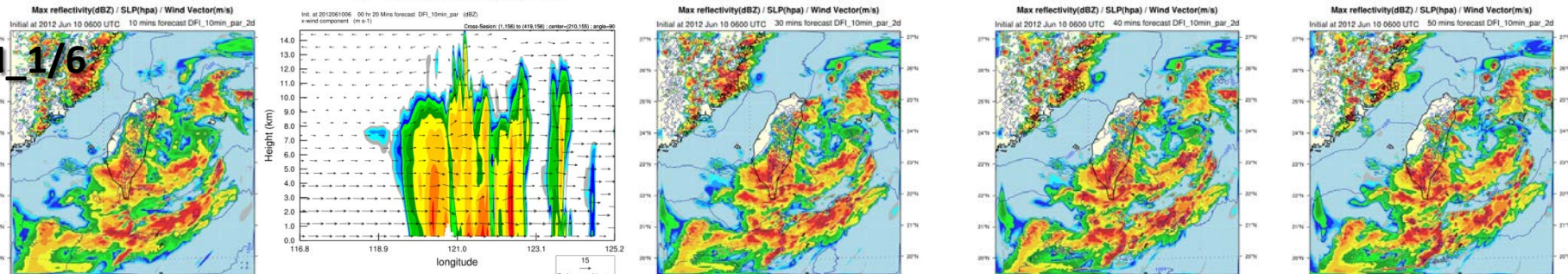


比較小

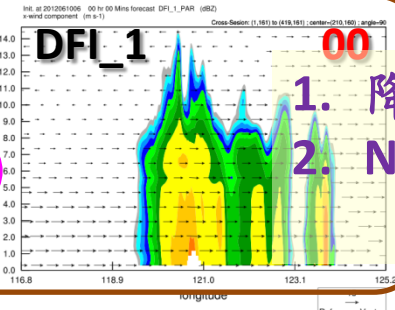
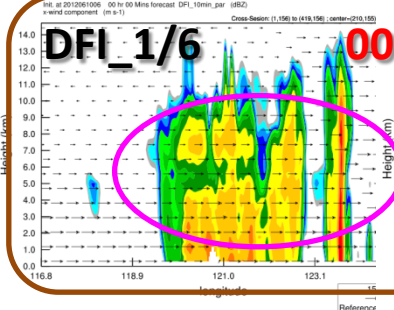
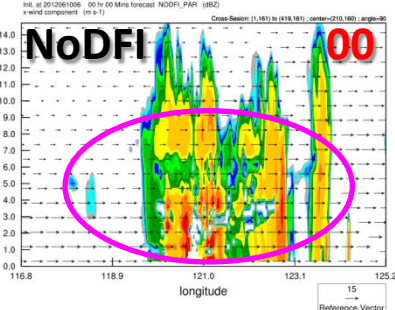
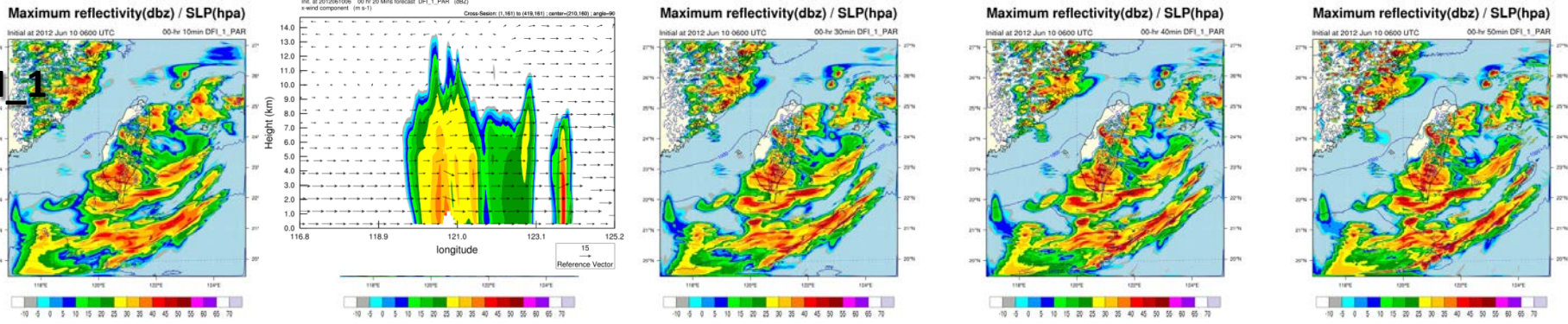
NoDFI



DFI_1/6



DFI_1



1. 降水預報結果差異不大
2. NoDFI 垂直回波結構較為破碎

DFI在Radar DA的角色

- With DFI Improve model spin-up
- **In Noda** Improve precip spin-up
- **In cold start** radar DA,
 - degrade the precip spin-up
 - small filter window , can reduce precip spin-up的負面影響
 - improve the obs gap
- **In cycle** radar DA,
 - improve the obs gap
 - DFI may play more important role for high frequency update cycle