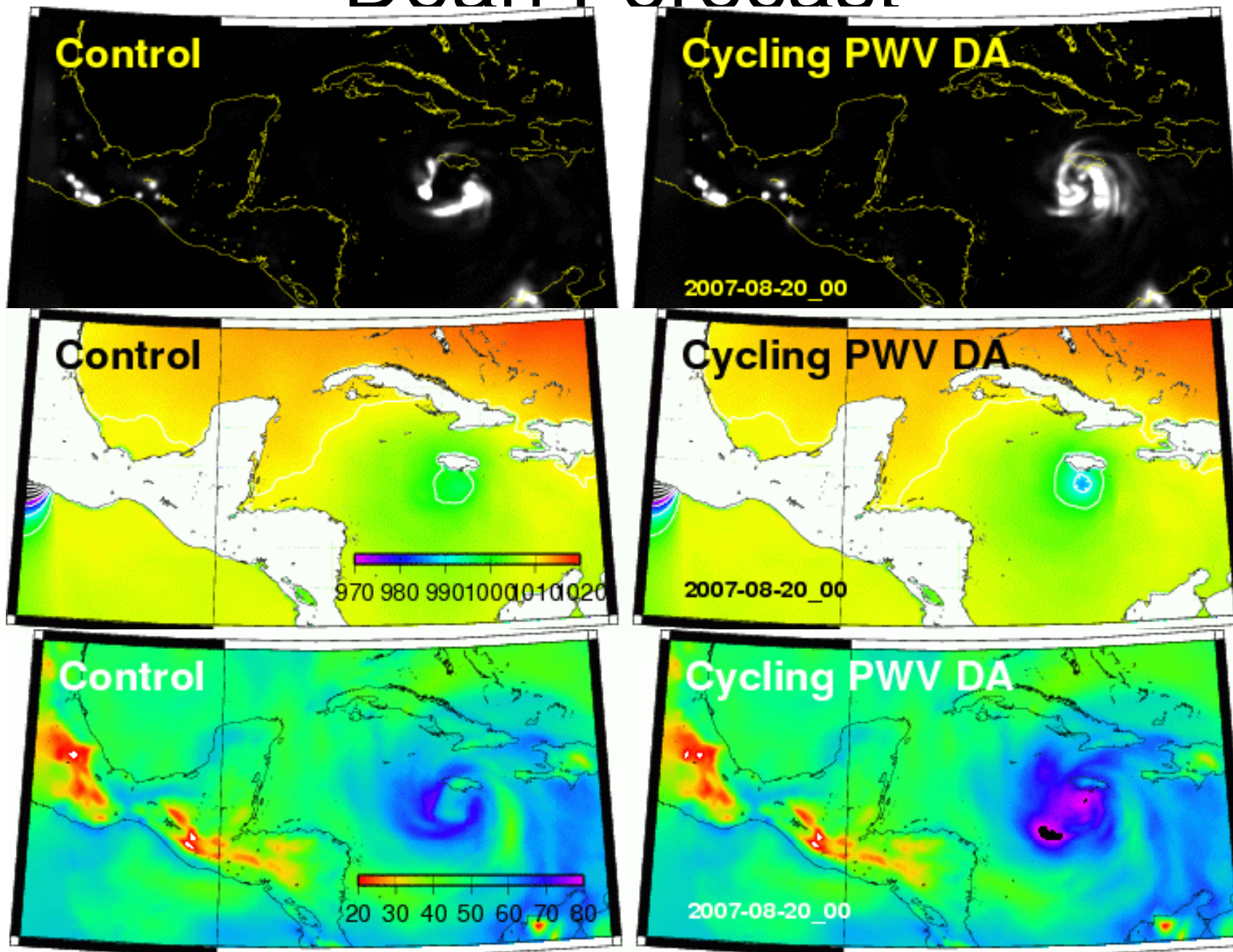


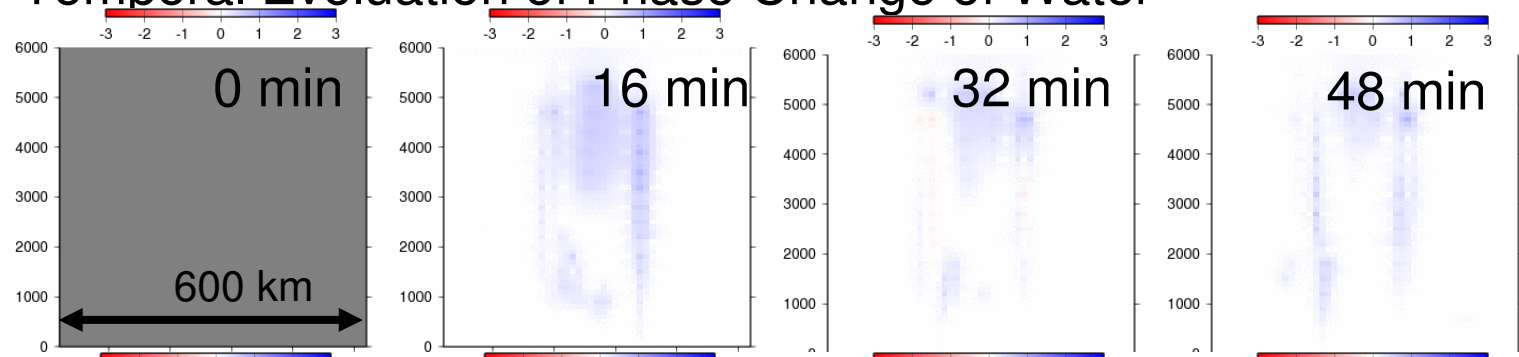
GNSS Meteorology

Dean Forecast

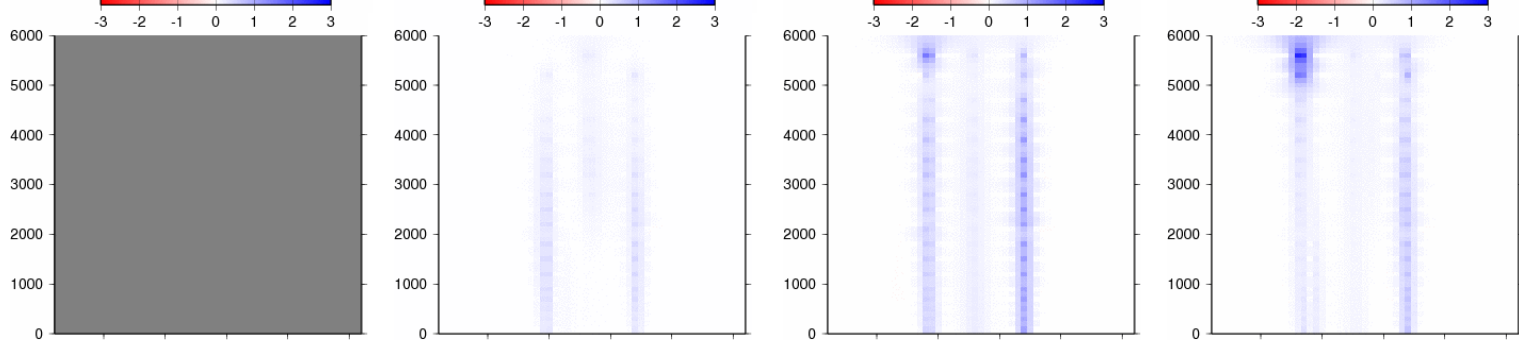


Temporal Evolution of Phase Change of Water

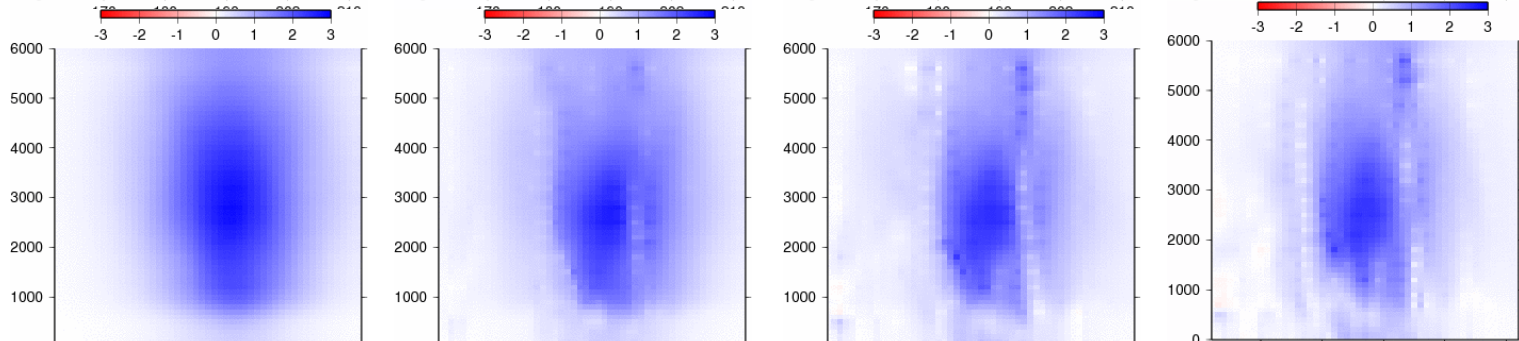
D cloud water



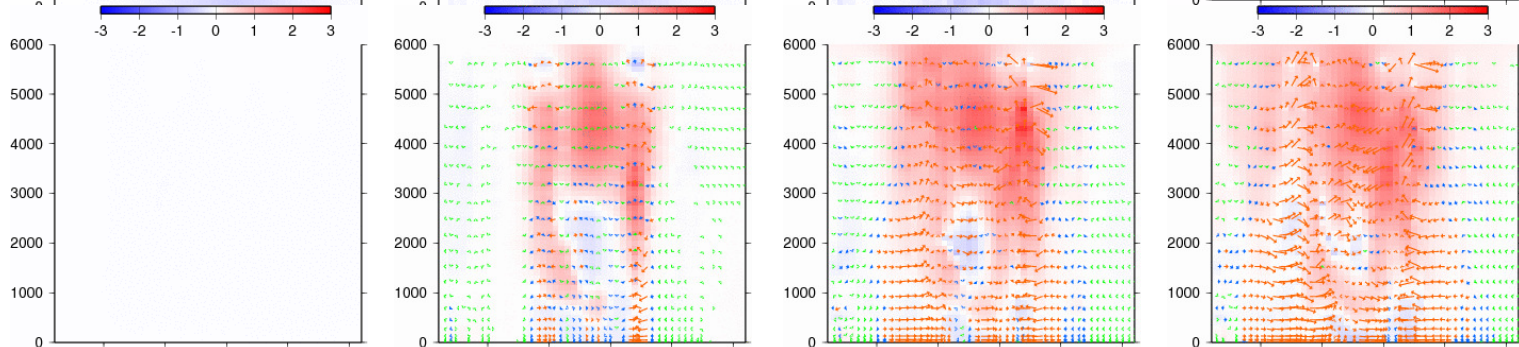
D rain water



D water vapor

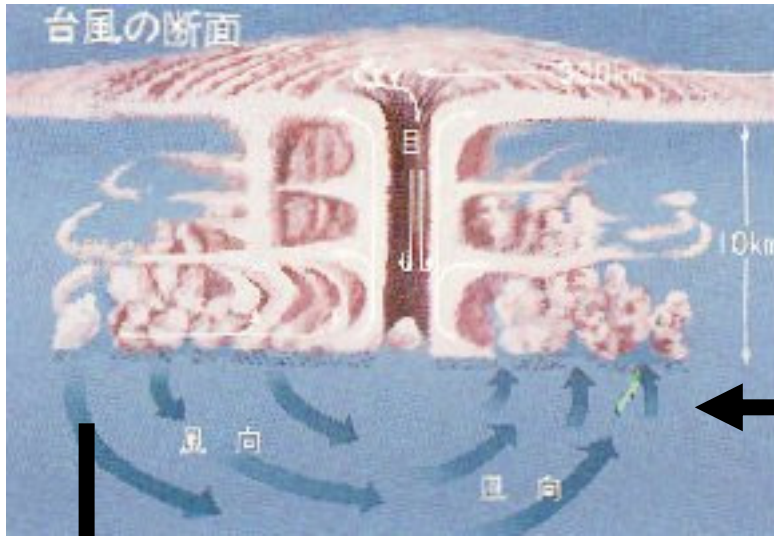


D temperature
+ D wind



Energy Balance in Hurricane

10^{18} J
Kinetic Energy

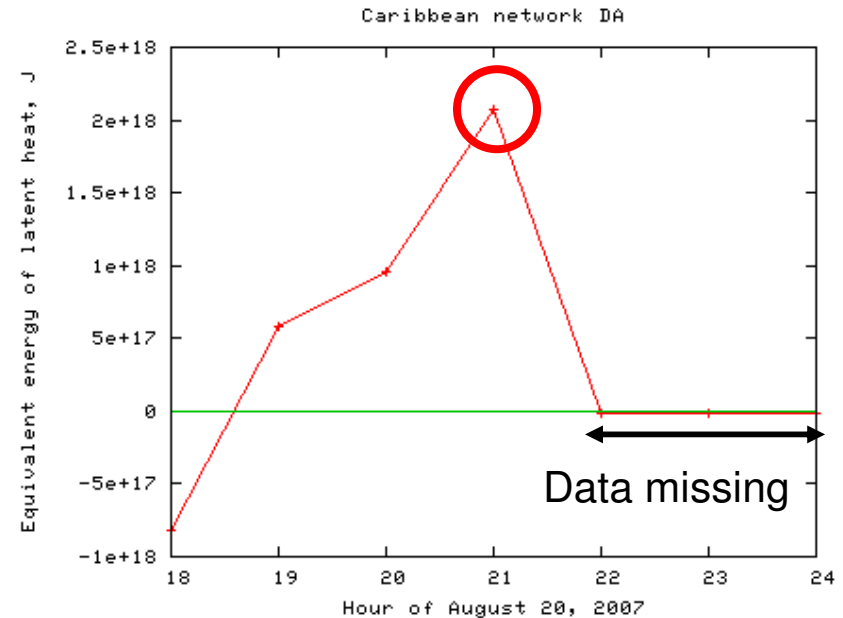


Friction

10^{13} J/sec

? J/sec

Release of latent heat from
phase change of water
(water vapor to liquid water)

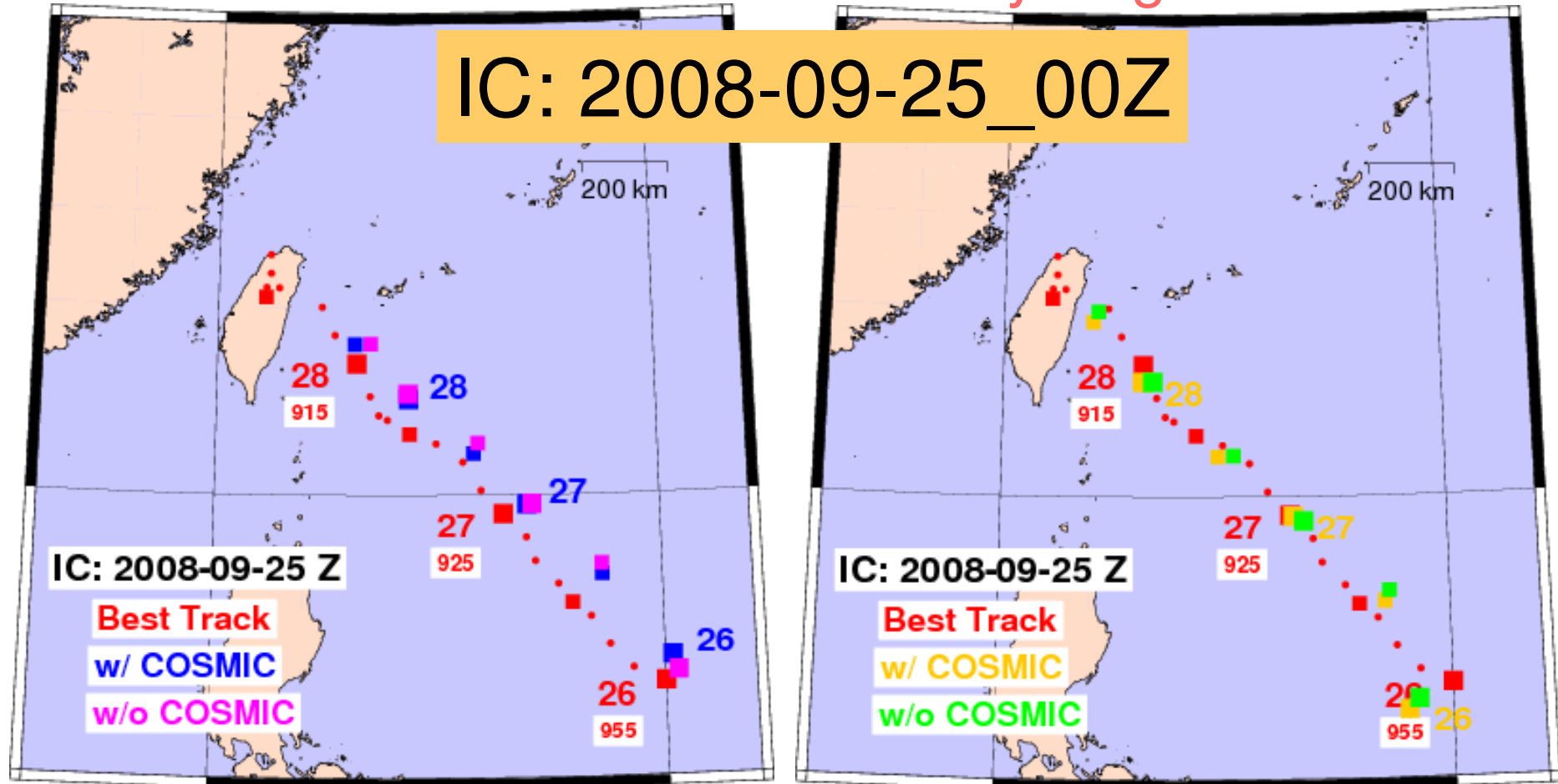


- 21:00 Jamaica station provides equivalent latent heat of 2.2×10^{18} J from positive increment of water vapor.
- M 8.5 earthquake: 3.6×10^{17} J
- Atomic bomb: 8.0×10^{13} J, Hydrogen bomb: 4.0×10^{16} J

Cold 3DVAR vs Cycling 3DVAR

Cold 3DVAR

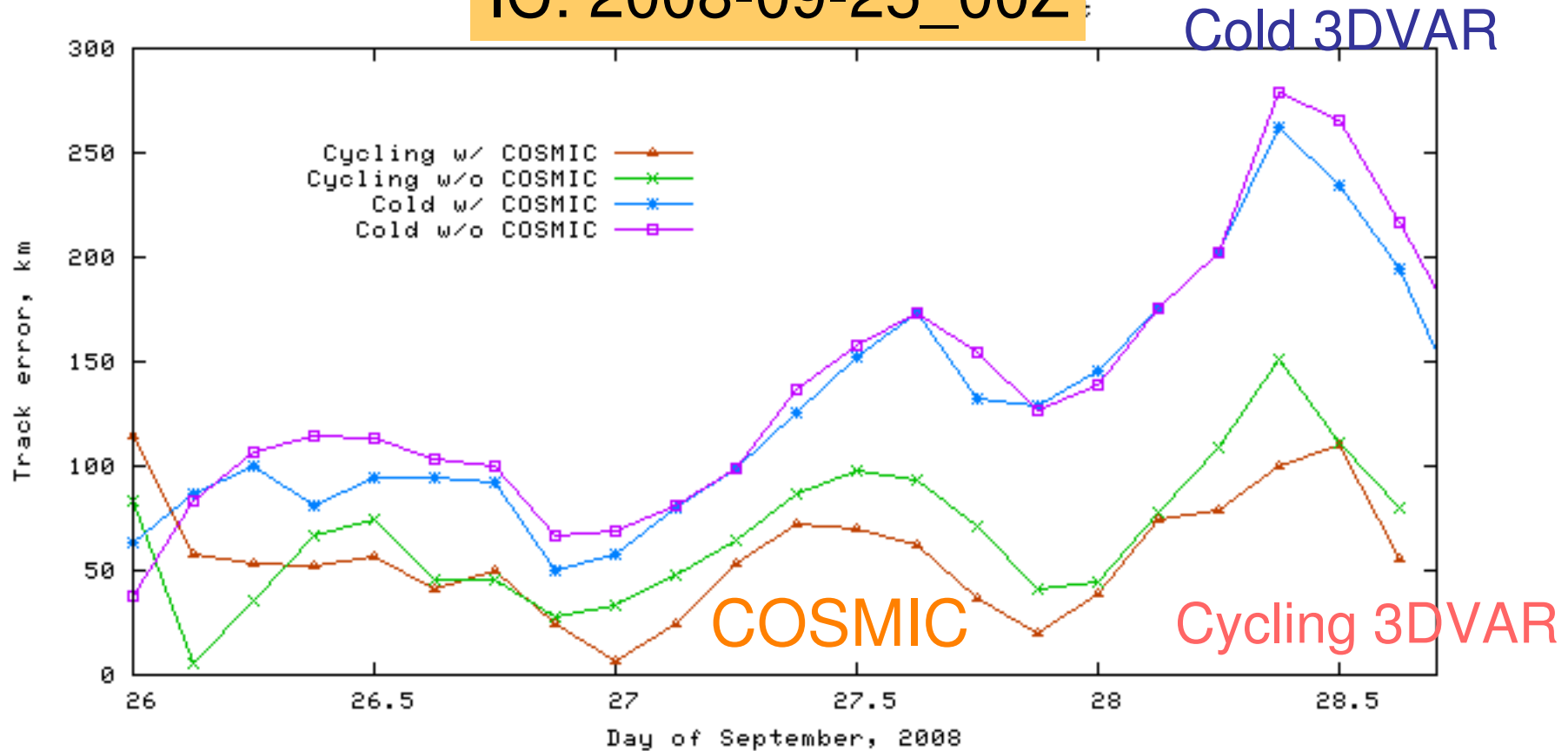
Cycling 3DVAR



- Significant improvement for track forecast in cycling 3DVAR

Track Forecast Errors

IC: 2008-09-25_00Z



- Cycling 3DVAR forecast is much better than cold 3DVAR forecast
- Forecast with COSMIC profile is better than