

Figure 1. (Left) Latitude-longitude cross sections of the diabatic heating rates at 700 hPa. (Right) Altitude-latitude cross section of the diabatic heating rates zonally averaged over 120-250°E. Both are averaged over 5-day backward in time from the target day (30<sup>th</sup> December 2005) for (a) NCEP (b) MERRA (c) ECMWF dataset, respectively.

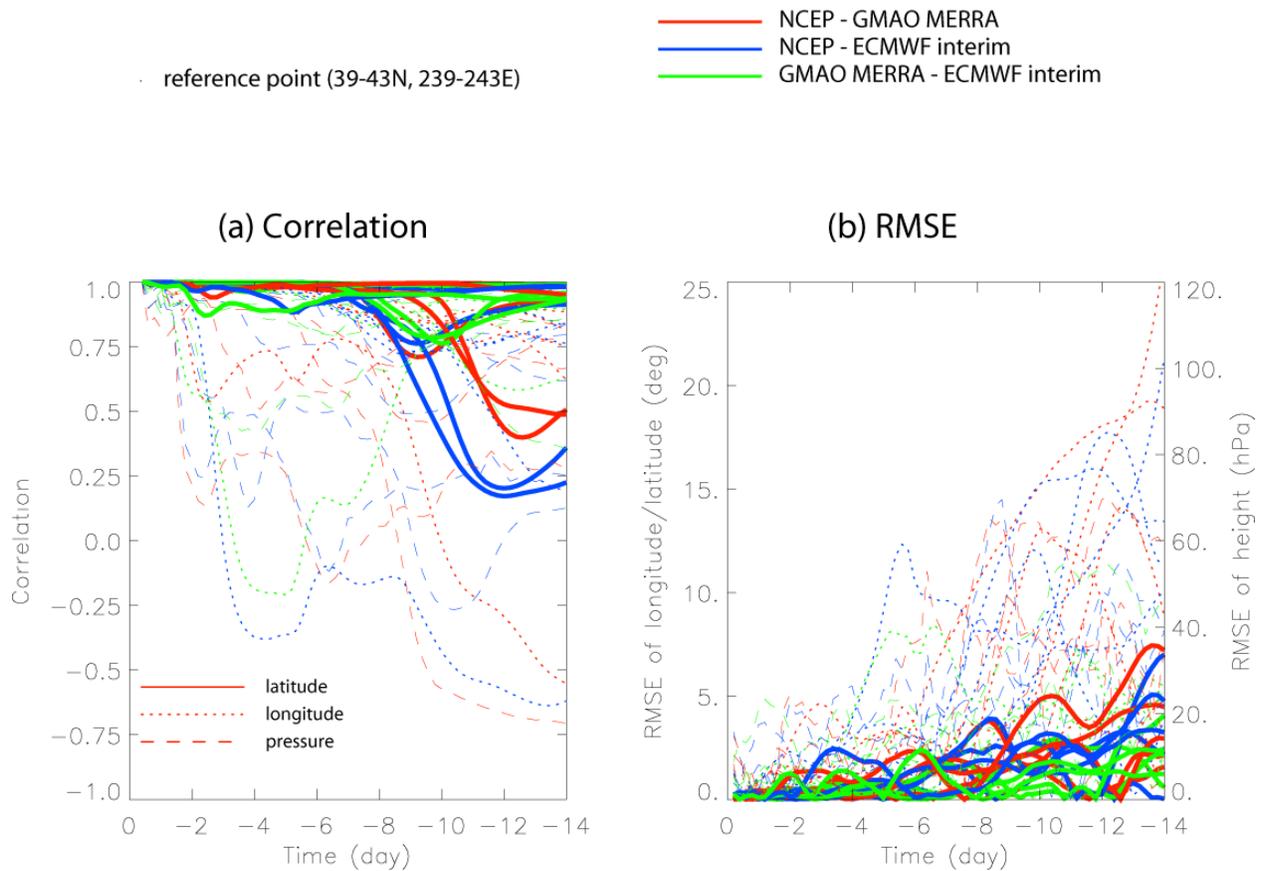
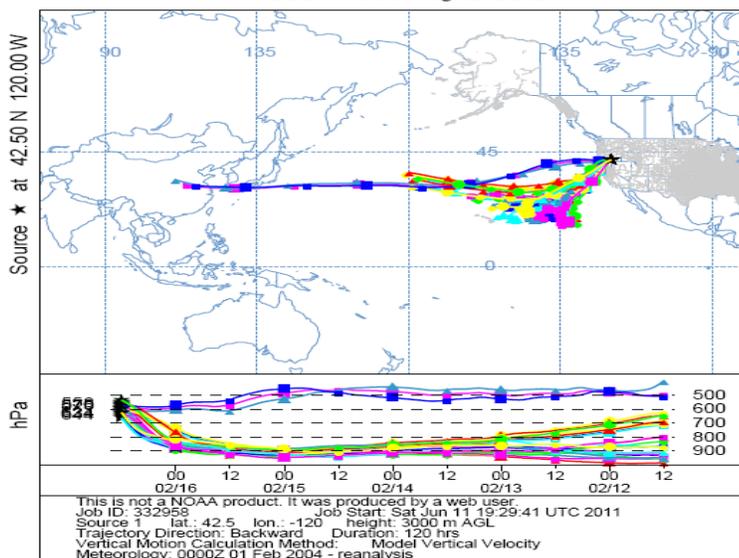


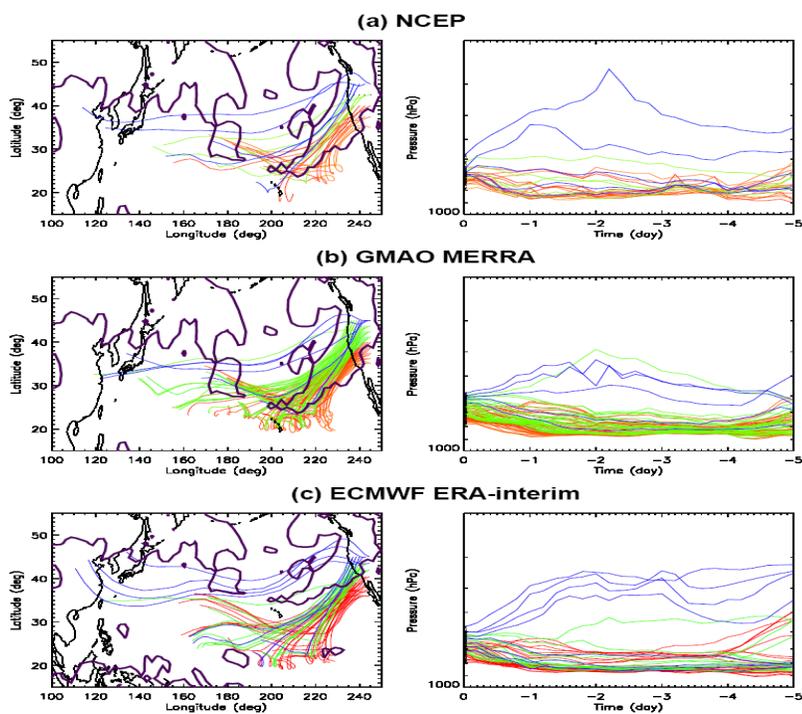
Figure 2. (a) Correlations of the longitudes (line), latitudes (dot), and pressures (dash) of the trajectories as functions of time between different reanalysis datasets (NCEP and MERRA (red), NCEP and ECMWF interim (blue), and MERRA and ECMWF interim (green)) for 5 AR cases (16<sup>th</sup> February 2004, 26<sup>th</sup> March 2005, 30<sup>th</sup> December 2005, 27<sup>th</sup> February 2006, 4<sup>th</sup> December 2007). (b) The root mean square errors (RMSE) of longitudes, latitudes, and pressures with respect to time for the different trajectories from the three different datasets. The day = 0 indicates the target day, the time when the trajectory starts. Negative day means the time in days associated with the backward trajectory.

NOAA HYSPLIT MODEL  
 Backward trajectories ending at 1200 UTC 16 Feb 04  
 CDC1 Meteorological Data



(A)

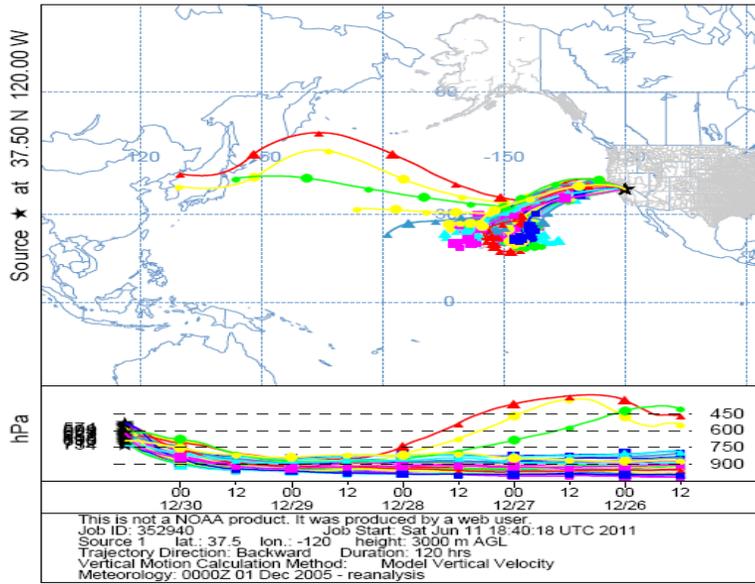
16<sup>th</sup> February, 2004



(B)

Figure 3a. Horizontal and temporal variation of vertical coordinate of 5-day back trajectories simulated from (A) the HYSPLIT model and (B) the quasi-isentropic model from 12 UTC 16<sup>th</sup>, February, 2004 (day = 0). Target region is (A) a 240°E, 37.5°N, 3km AGL and nearby locations and (B) 235-245°E, 37-43°N, 300K isentrope. Panels (a), (b), and (c) represent the trajectories using NCEP, GMAO MERRA, and ECMWF ERA-interim reanalyses, respectively. Color represents trajectories having various origins.

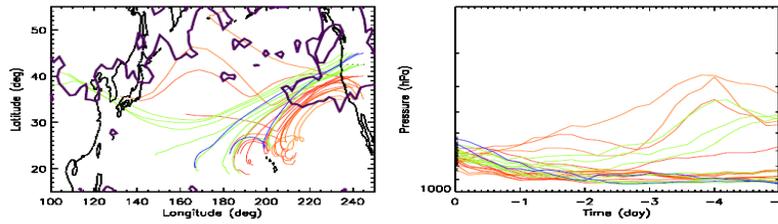
NOAA HYSPLIT MODEL  
 Backward trajectories ending at 1200 UTC 30 Dec 05  
 CDC1 Meteorological Data



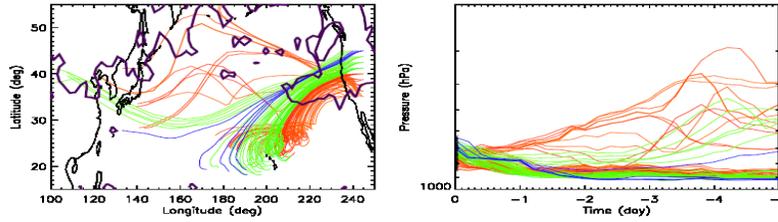
(A)

30<sup>th</sup> December, 2005

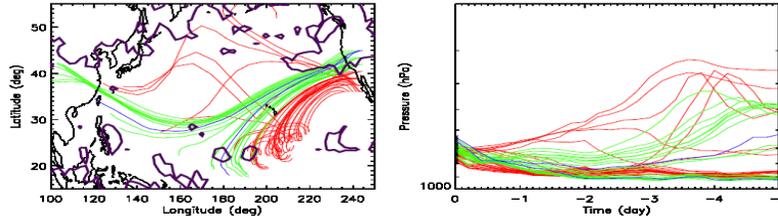
(a) NCEP



(b) GMAO MERRA



(c) ECMWF ERA-interim



(B)

Figure 3b. The same as Fig. 3a except for 30<sup>th</sup> December, 2005.

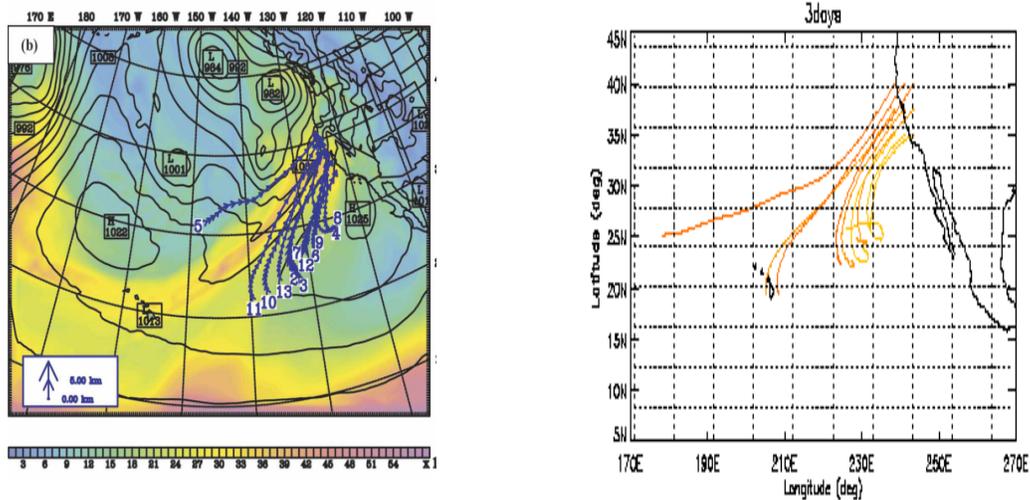


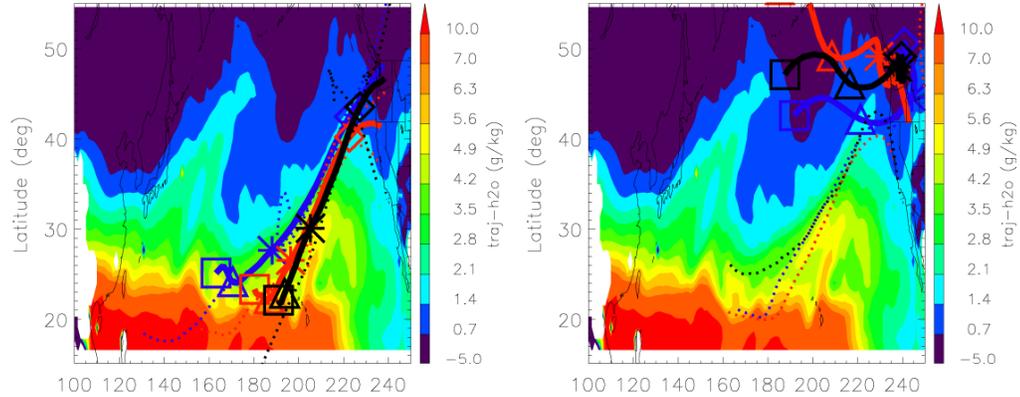
Figure 3c. (Left) Backward trajectories valid at 36 h (1200 UTC 16<sup>th</sup> February, 2004) into the simulation (~1km) using weather prediction model (MM5) (BAO et al., 2006) (Right) Backward trajectories at 3 days from the (12 UTC, 16<sup>th</sup> February, 2004) into the simulation (300K ~ 2.8km) using NCEP Reanalysis data. Trajectory are simulated from the region in 35-40°N, 235-240°E.

26th March, 2005

(a) cluster 1

(b) cluster 2

Horizontal pathways



Vertical evolutions

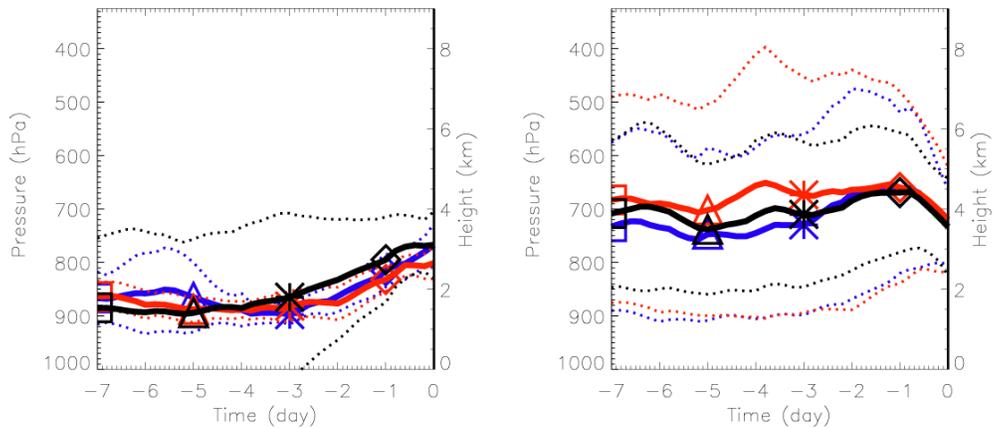


Figure 4. (top) Horizontal and (middle) temporal variation of vertical coordinate of 7-day back trajectories on the 300 K surface for (a; left) cluster 1 and (b; right) cluster 2 calculated using the NCEP (red), MERRA (blue) and ECMWF-interim (black) datasets for the 26<sup>th</sup> March, 2005 AR event. The shading show the reconstructed water vapor field at the 300 K surface averaged over 5 day trajectory simulation period from the target day (day = 0 ~ -5). The thick lines are the center of trajectories and the dashed lines are one standard deviation from the center of trajectories for different reanalyses. The symbols represent when center of trajectory gets to day = -1, -3, -5, and -7.