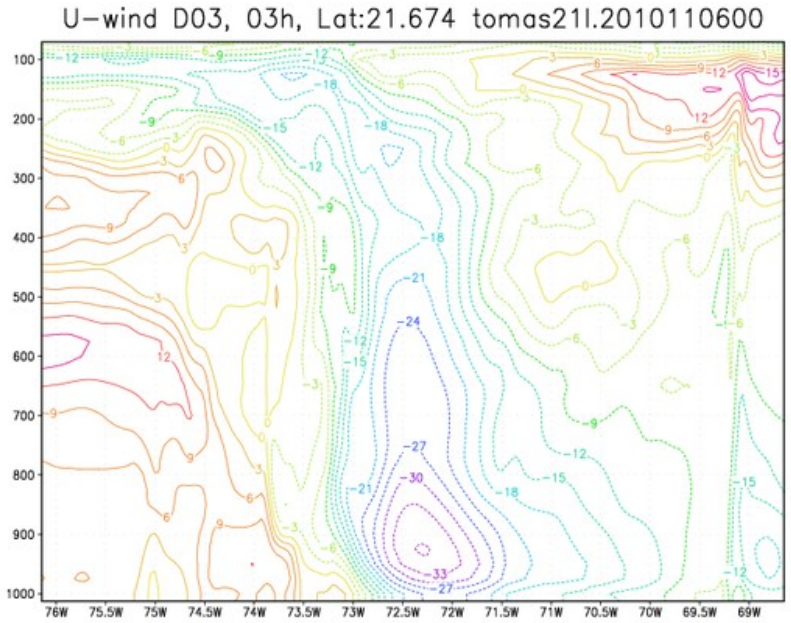
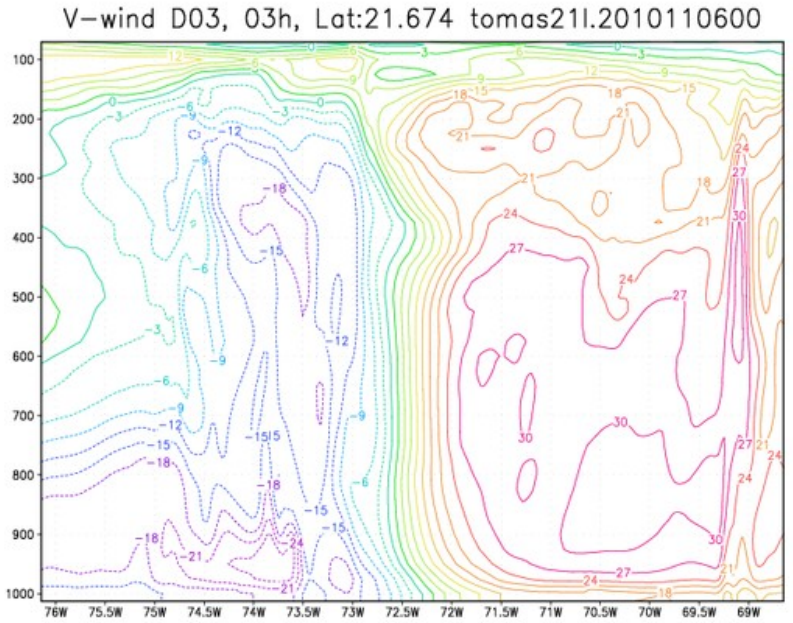
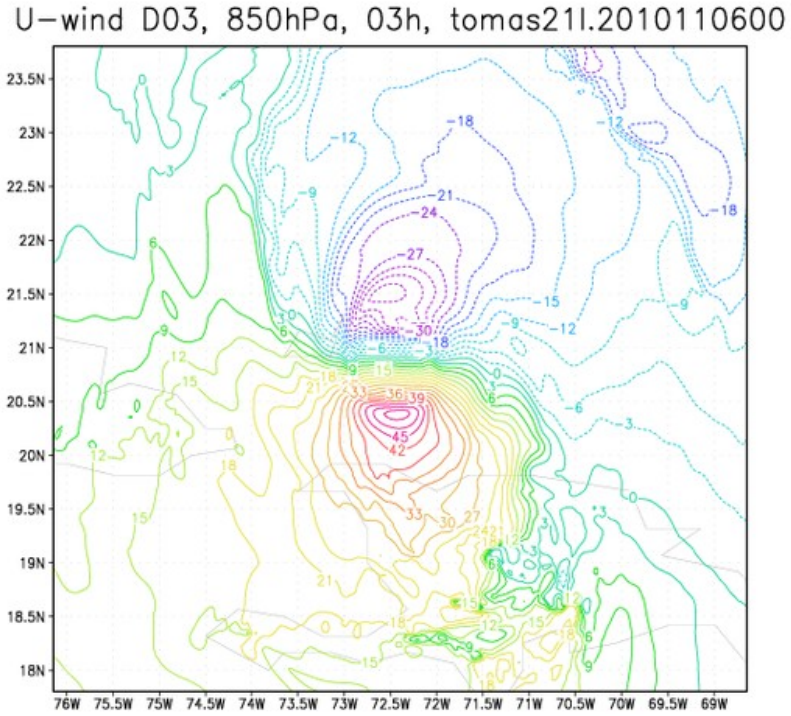
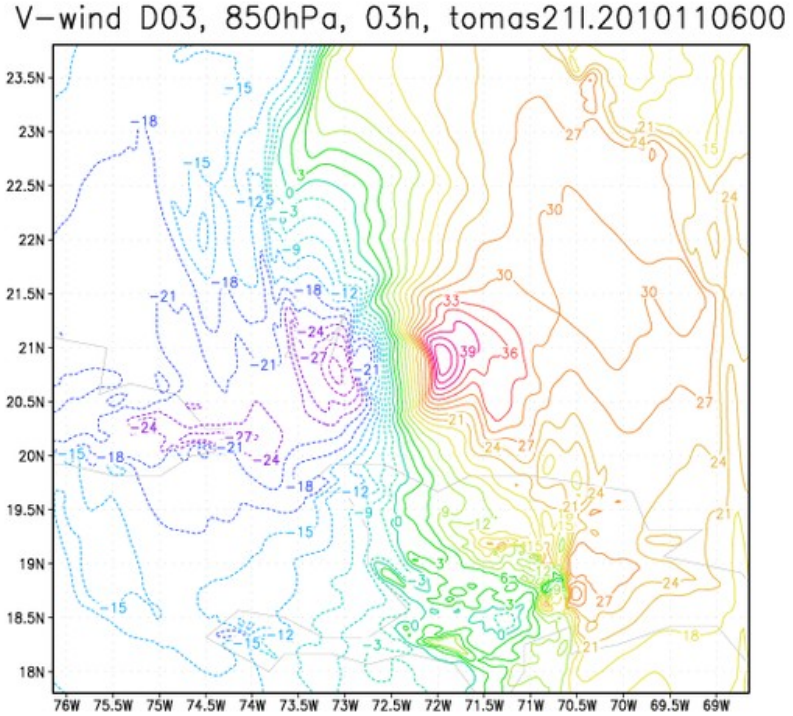
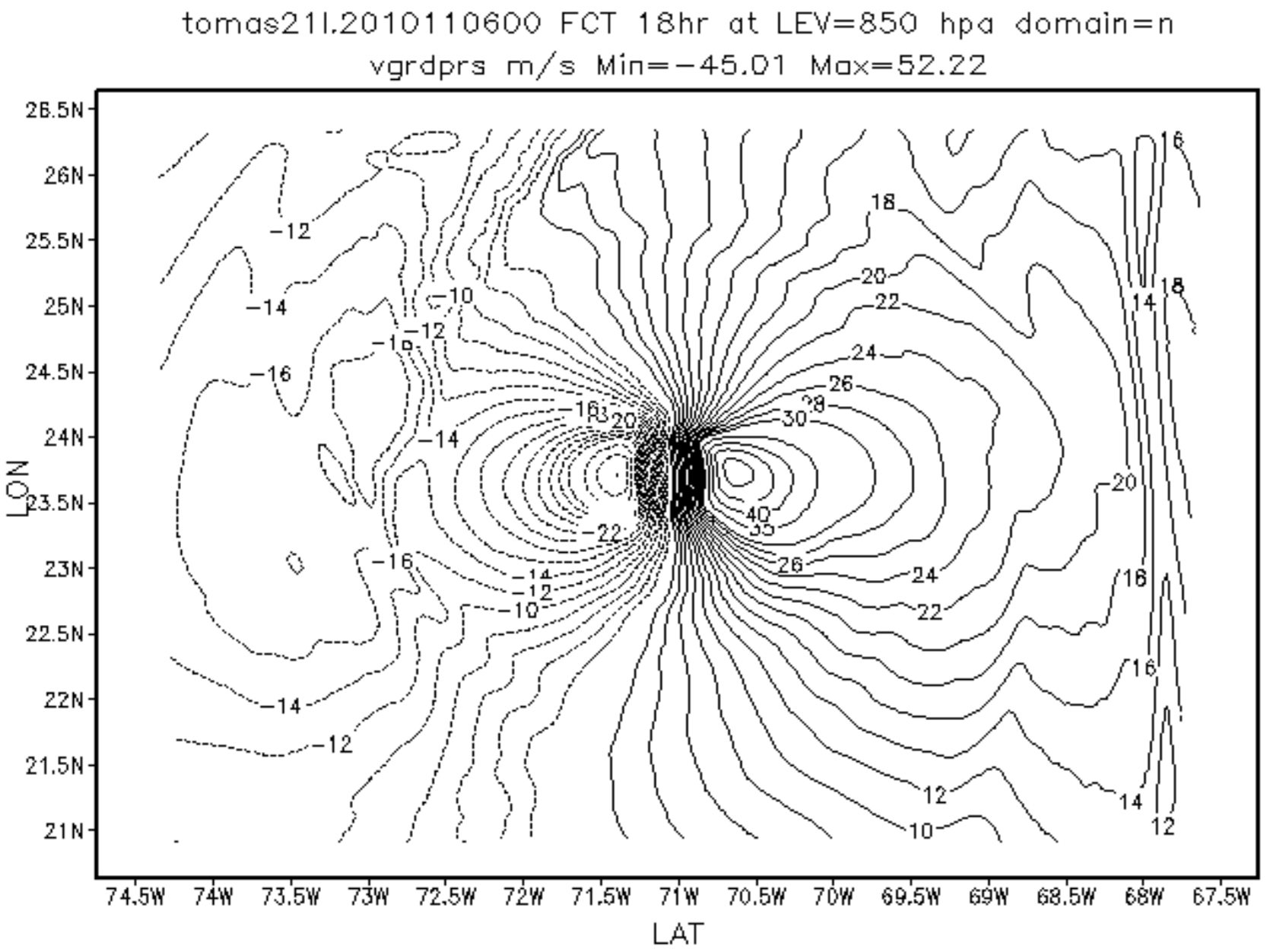
Moving nest bug related to the discontinuity along the lateral boundaries


U−wind D03, 03h, Lat:21.674 tomas21l.2010110600


V−wind D03, 03h, Lat:21.674 tomas21l.2010110600


U−wind D03, 850hPa, 03h, tomas21l.2010110600


V−wind D03, 850hPa, 03h, tomas21l.2010110600



The stream 1.5 HWRF also had this problem.

Printed out U, V & T around the eastern boundary at every time step in order to see exactly where and when the problem start.

1) only U and V (not T) become zero when nest is moving only SE or SW directions but not in other directions at all.

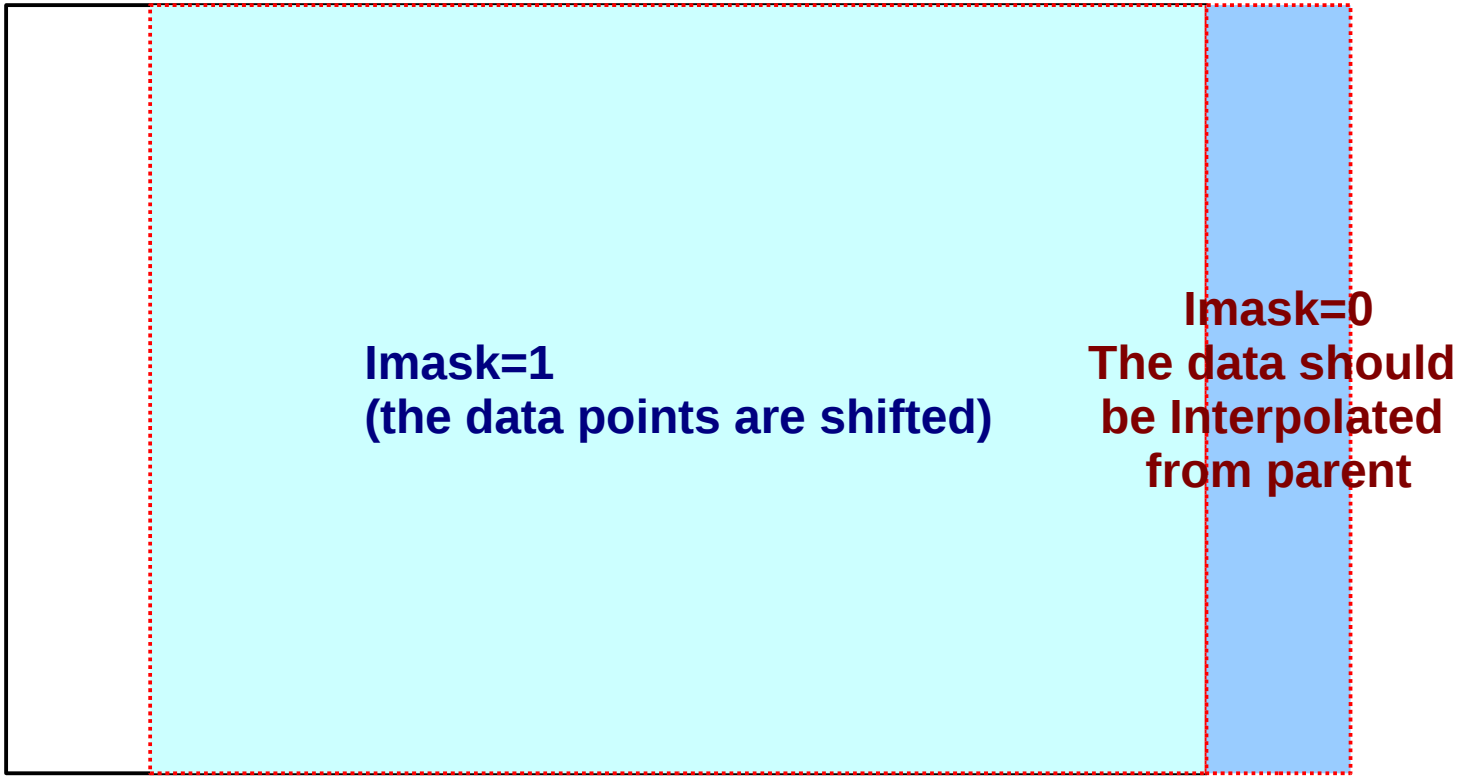
2) The points become zero are at odd y arrays but at not even arrays

3) The zero points are 5 points inside of eastern boundary points

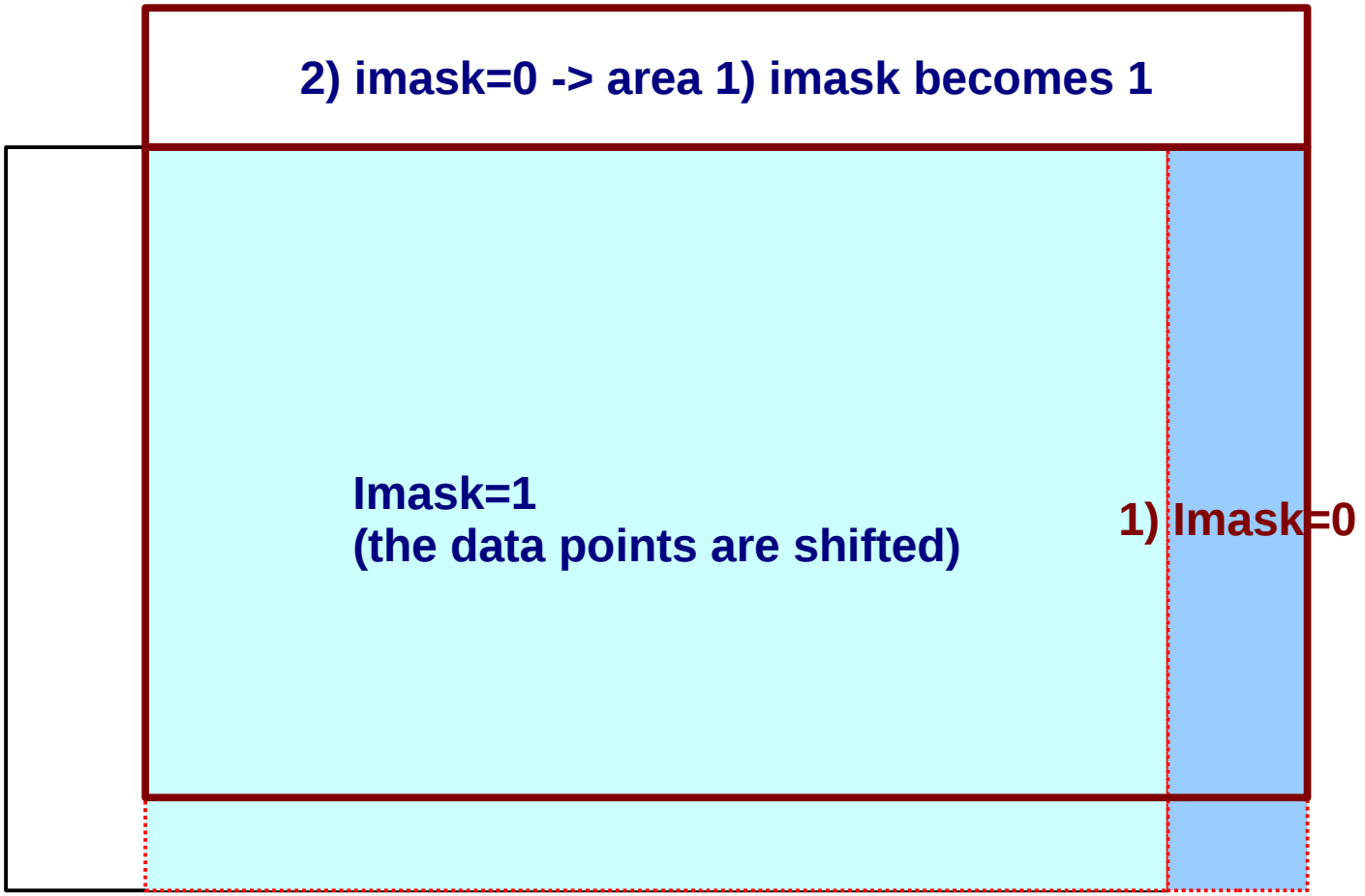
Initially, the problem is from zeroing out phantom wind arrays at the odd j points. But this does not explain why this problem does not happen when a nest moves eastward.

```
grid%imask_nostag = 0                          :imask=0 means leading edge

  IF ( disp_x > 0 ) THEN
    IF ( E_BDY ) THEN
      DO J=jps,min(jde-1,jpe)
      DO I=ips,min(ide-1,ipe-2-mod(j+1,2))
        grid%imask_nostag(i,j) = 1             :imask=1 means overlapped area
      END DO                                    before and after moving
      END DO
    ELSE
      DO J=jps,min(jde-1,jpe)
      DO I=ips,min(ide-1,ipe)
        grid%imask_nostag(i,j) = 1
      END DO
      END DO
    END IF
  END IF
  IF ( disp_x < 0 ) THEN
    IF ( W_BDY ) THEN
      .............
  END IF                                        dyn_nmm/shift_domain_nmm.F



  IF ( disp_y > 0 ) THEN
    IF ( N_BDY ) THEN
      ............                  When a nest domain moves diagnoally, the setting of
  ENDIF                             imask=0 for x movement will be overwritten by y-move setup
```

One-direction movement of a nest domain
(e.g. Eastward movement)

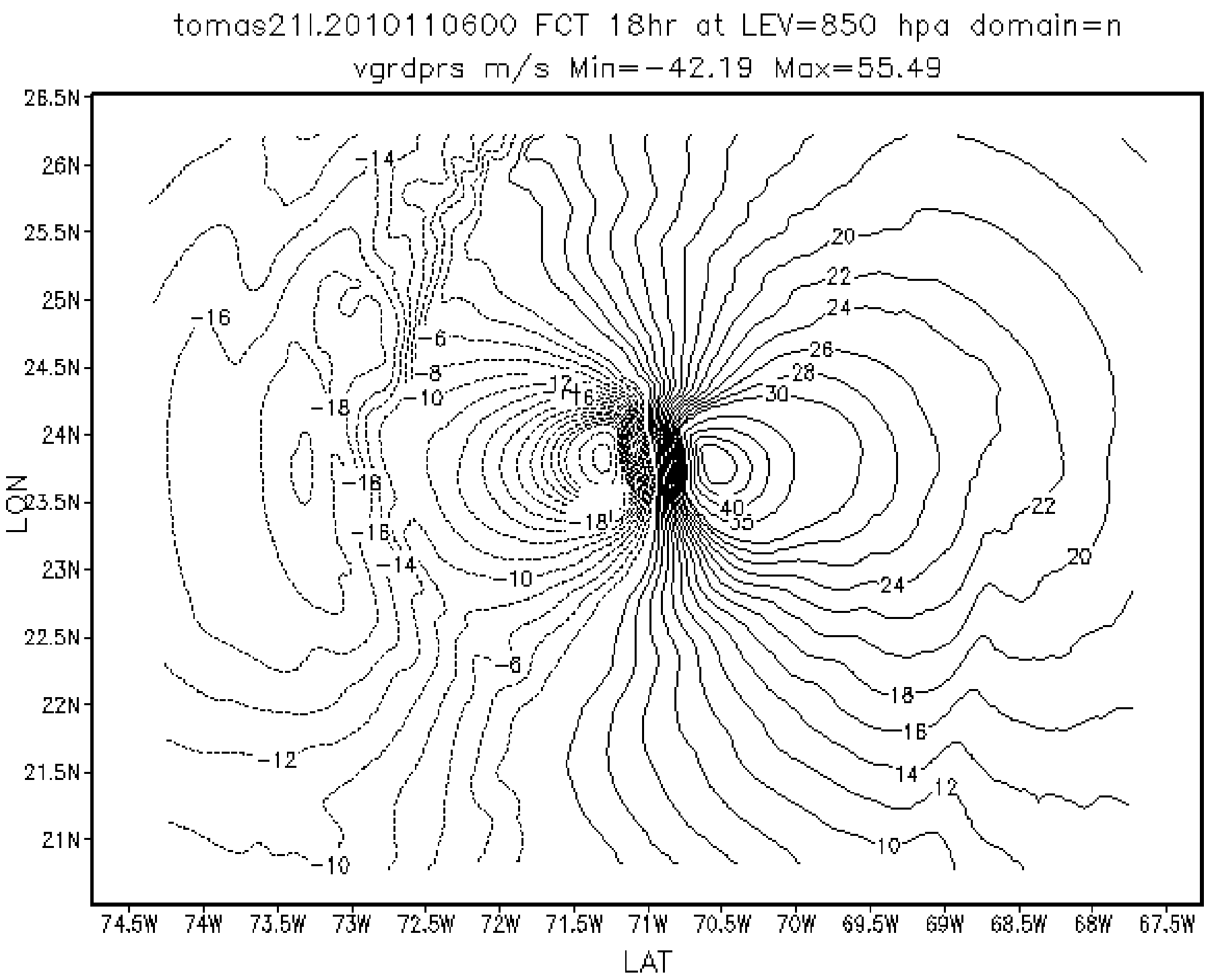


Diagnonal movement of a nest domain
(e.g. north-eastward movement)



Modified the shift_domain_nmm.F to accommodate the diagonal movement

```
grid%imask_nostag=0

IF ( disp_x > 0 ) THEN
   IF ( E_BDY ) THEN
        grid%imask_nostag(i,j) = 1
   ELSE
        grid%imask_nostag(i,j) = 1
   END IF
IF ( disp_y > 0 ) THEN
   IF ( N_BDY ) THEN
        grid%imask_nostag(i,j) = 0
   ENDIF
ELSEIF ( disp_y < 0 ) THEN
   IF ( S_BDY ) THEN
        grid%imask_nostag(i,j) = 0
   ENDIF
ENDIF
```


tomas21l.2010110600 FCT 18hr at LEV=850 hpa domain=n
vgrdprs m/s Min=-42.19 Max=55.49
26.5N
26N
25.5N
25N
24.5N
24N
23.5N
23N
22.5N
22N
21.5N
21N
LON
74.5W
74W
73.5W
73W
72.5W
72W
71.5W
71W
70.5W
70W
69.5W
69W
68.5W
68W
67.5W
LAT

Possible impact after fixing the bug

1. Tracks and intensity of the simulated storms would be changed.
2. Model failures or numerical instabilities shown in some cases (Maria, Igor and more) could be reduced.
3. The noises shown by Dave Zelinsky(NHC) from htcf will be reduced
4. The discontinuities along the lateral boundaries (especially E bdy) would be gone