

# How do ensemble initial perturbations change the size and advection flow of typhoon Sinlaku

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# Motivation

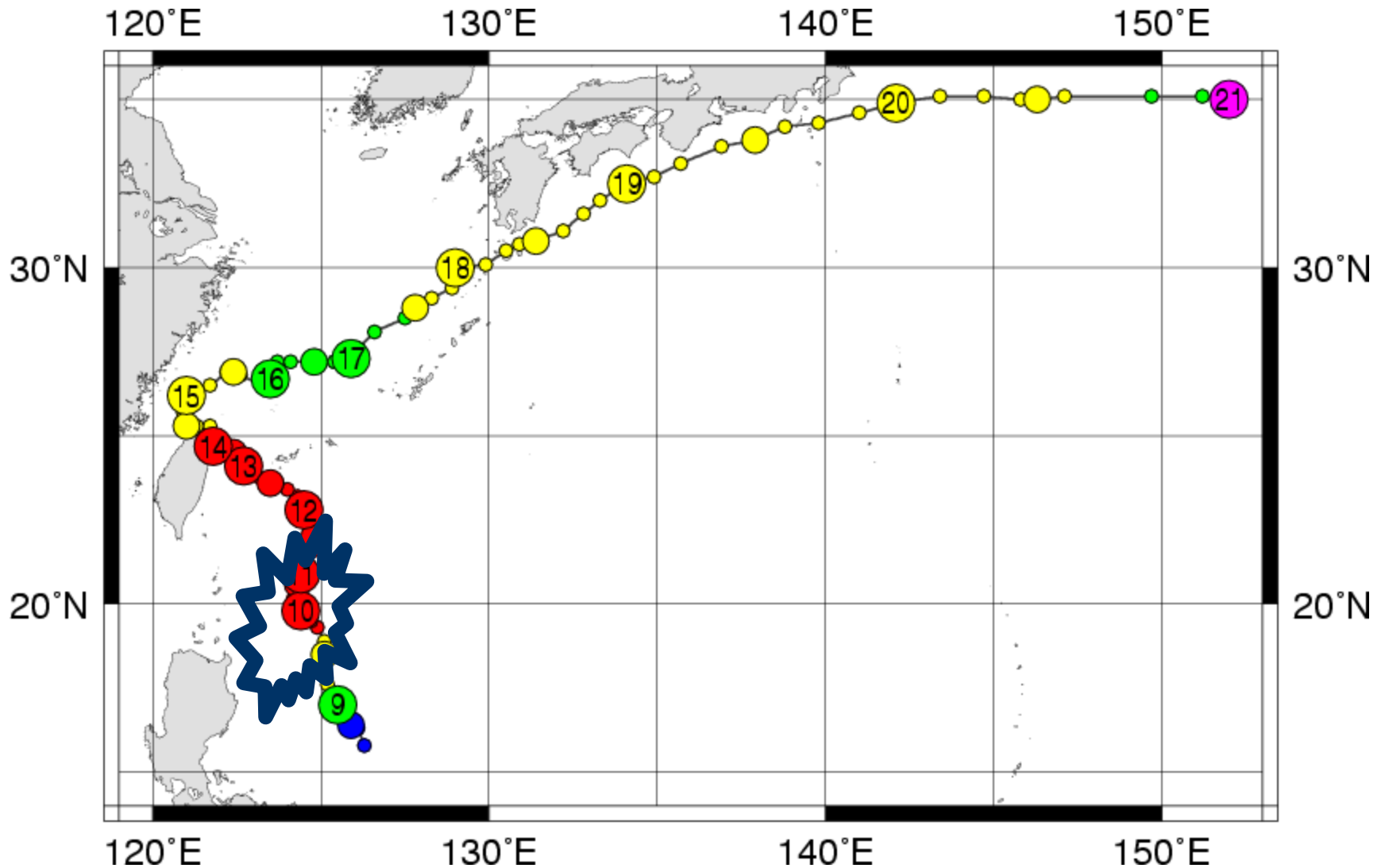
Ensemble initial perturbations for typhoon prediction should reflect error sources of initial conditions. Otherwise, the ensemble forecasts could not realize the proper forecast performance. When focusing on tracks, the **size** of typhoon and the **advection flow** could be **error sources**. Then I looked into how ensemble initial perturbations change them.

I looked into how ensemble initial perturbations change the structure of Typhoon **Sinlaku** in terms of the size and the advection flow, focusing on its stage **before, amid, and after recurvature**.

# What I found

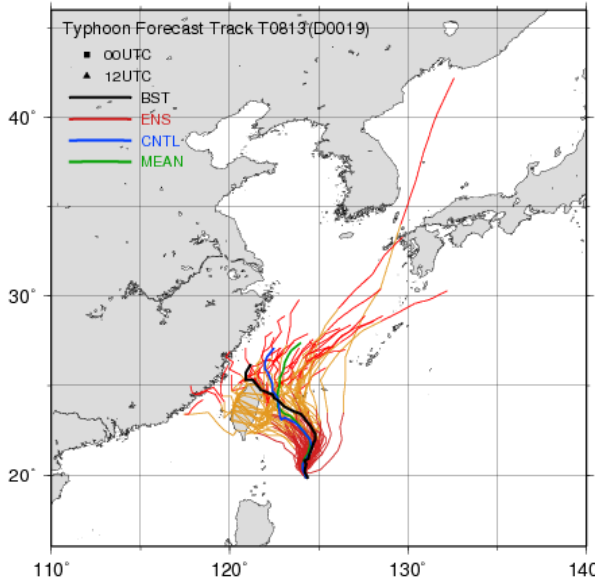
- ECMWF perturbations do not change the size a lot
- NCEP perturbations do change the size a little
- Both ECMWF and NCEP perturbations do change the advection flow
- In spite of the fact that the vertical and horizontal distributions of kinetic energy of the perturbations by both centers differ, the variance of the advection flow is similar between the two centers

# 09.10.00UTC (before recurv.)

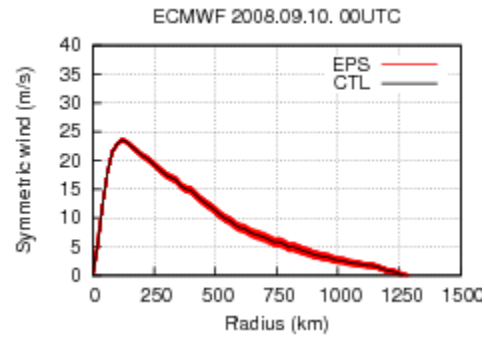


The big circle represents the position at 00UTC of the day

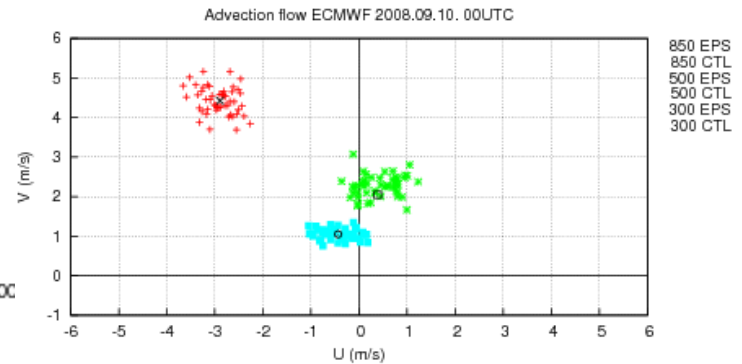
# ECMWF



## Size

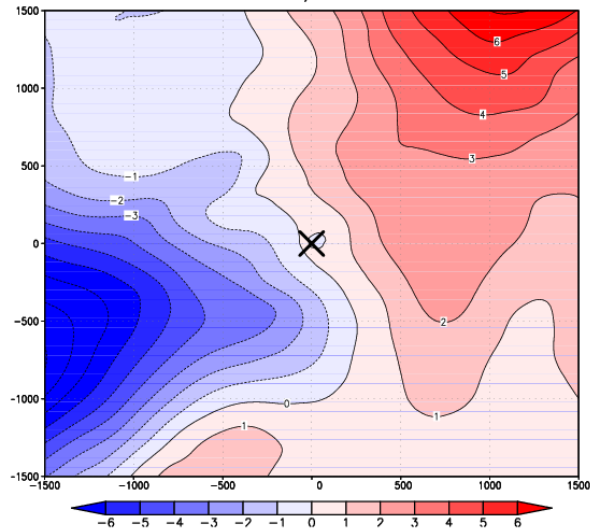


## Advection flow



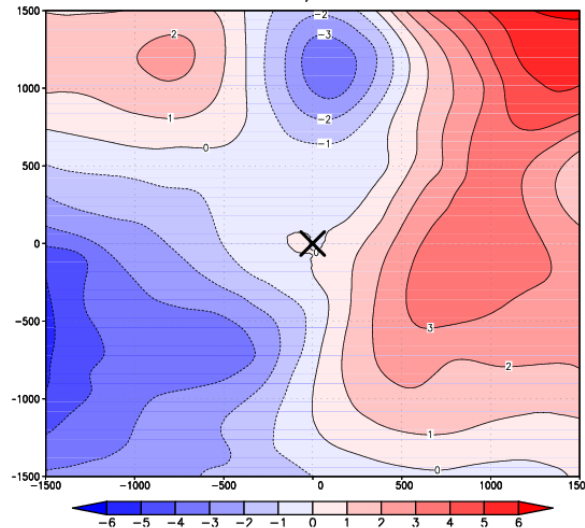
## 850 hPa

ECMWF ASYM 2008.09.10 00UTC



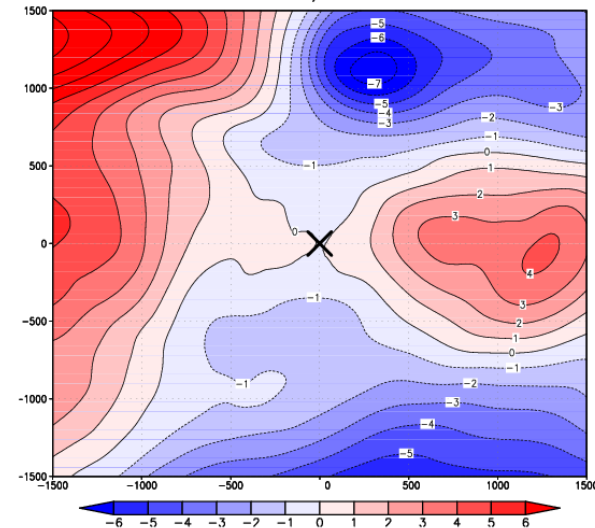
## 500 hPa

ECMWF ASYM 2008.09.10 00UTC

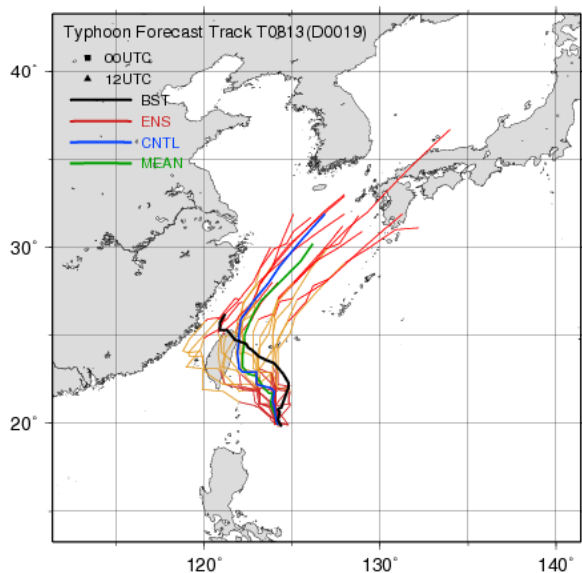


## 300 hPa

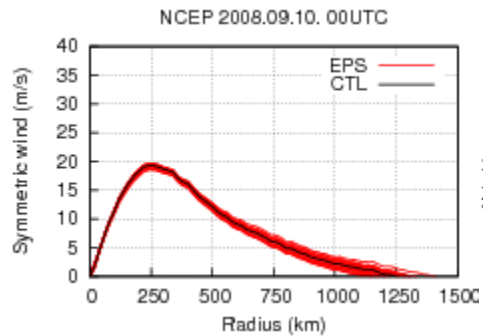
ECMWF ASYM 2008.09.10 00UTC



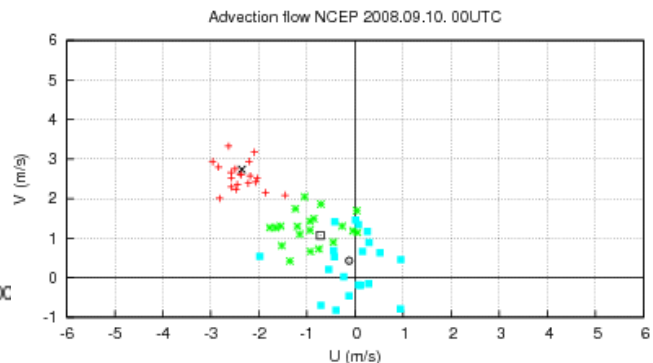
# NCEP



## Size



## Advection flow



## 850 hPa

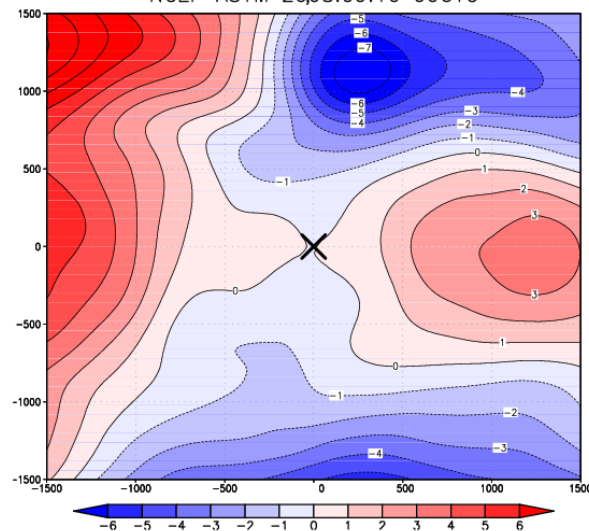
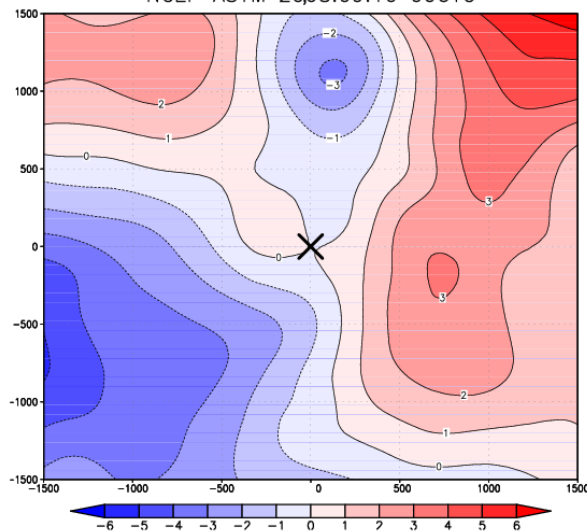
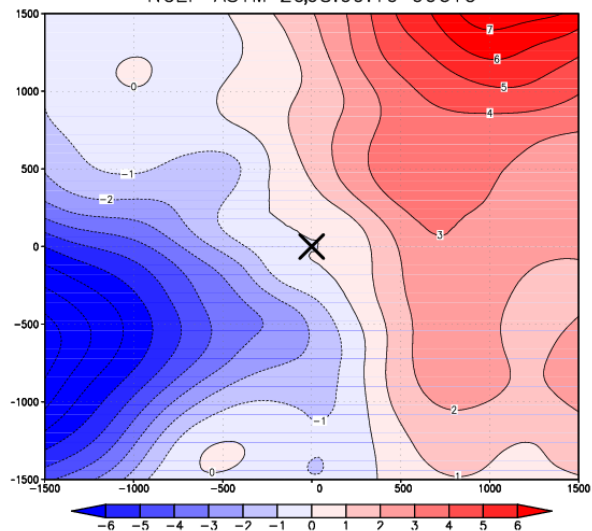
## 500 hPa

## 300 hPa

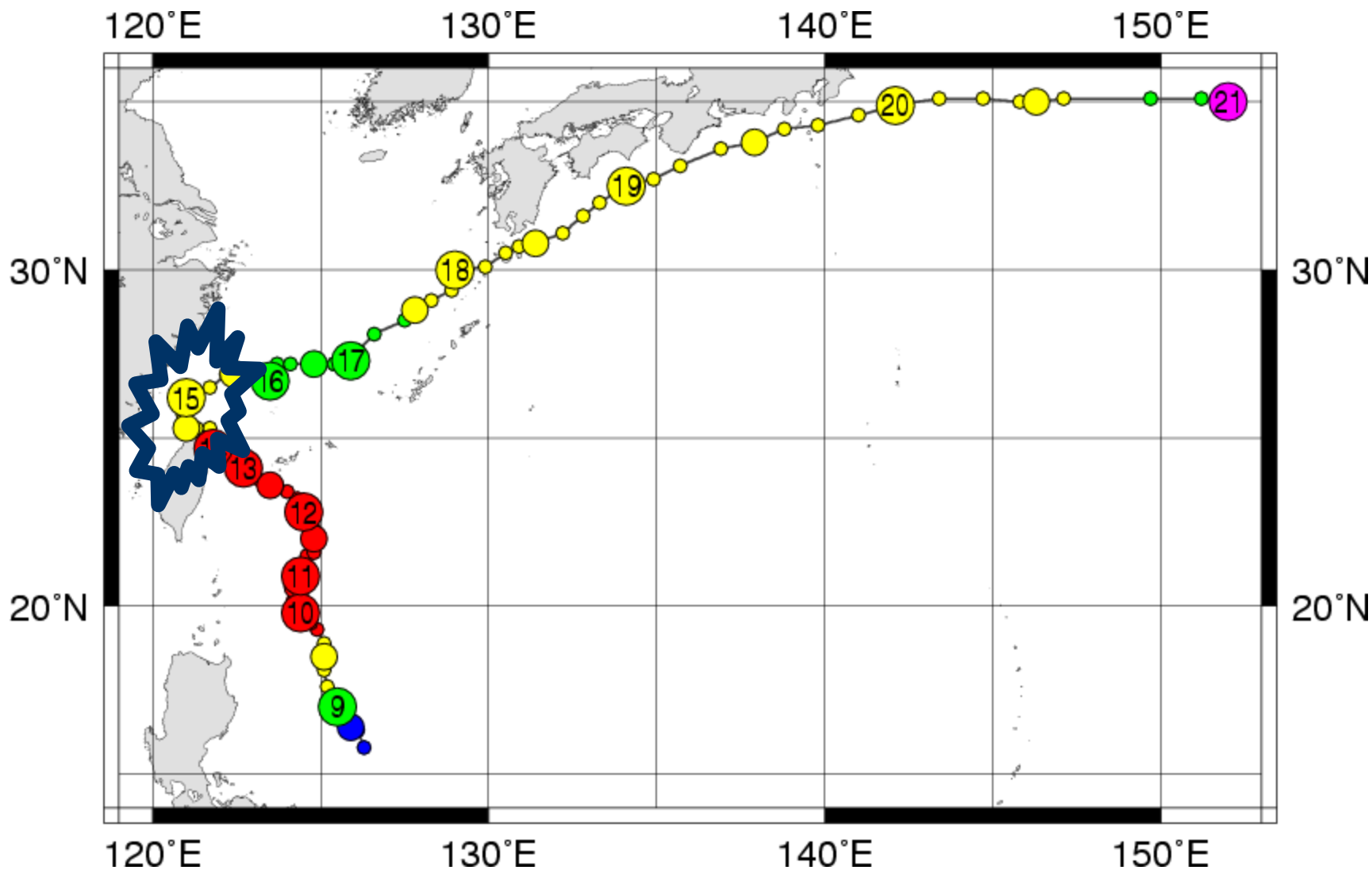
NCEP ASYM 2008.09.10 00UTC

NCEP ASYM 2008.09.10 00UTC

NCEP ASYM 2008.09.10 00UTC

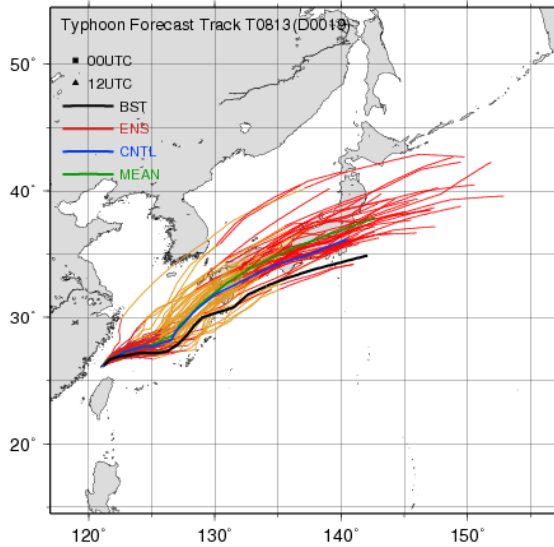


# 09.15.00UTC (amid recurv.)

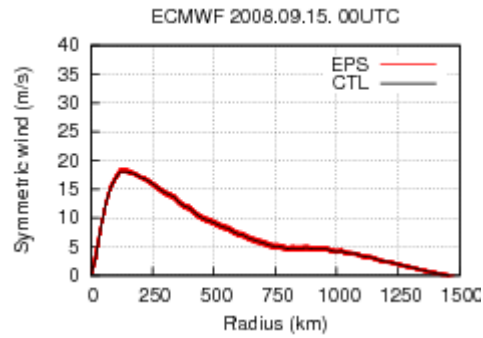


The big circle represents the position at 00UTC of the day

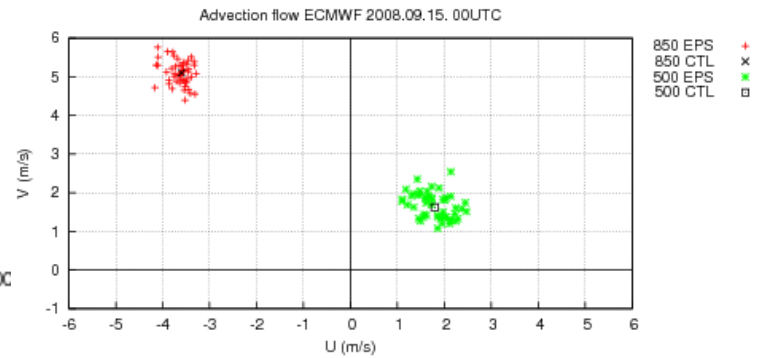
# ECMWF



## Size

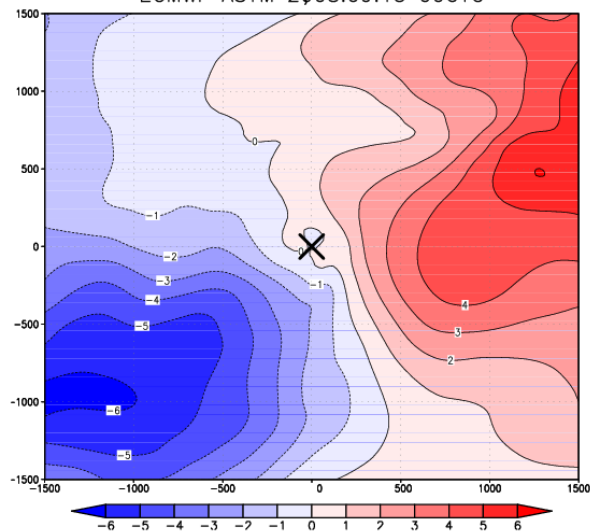


## Advection flow



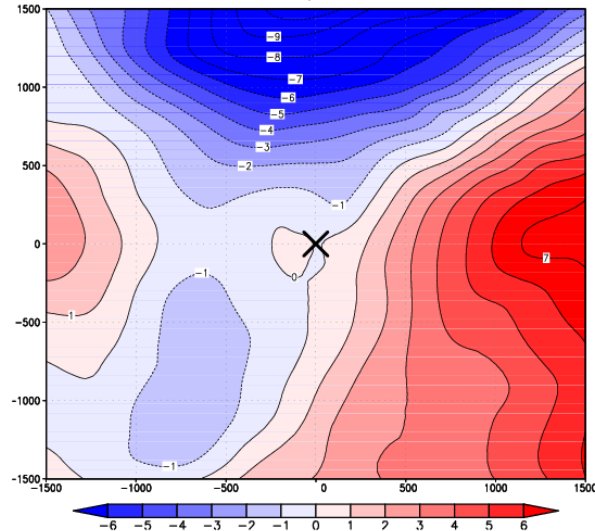
## 850 hPa

ECMWF ASYM 2008.09.15 00UTC



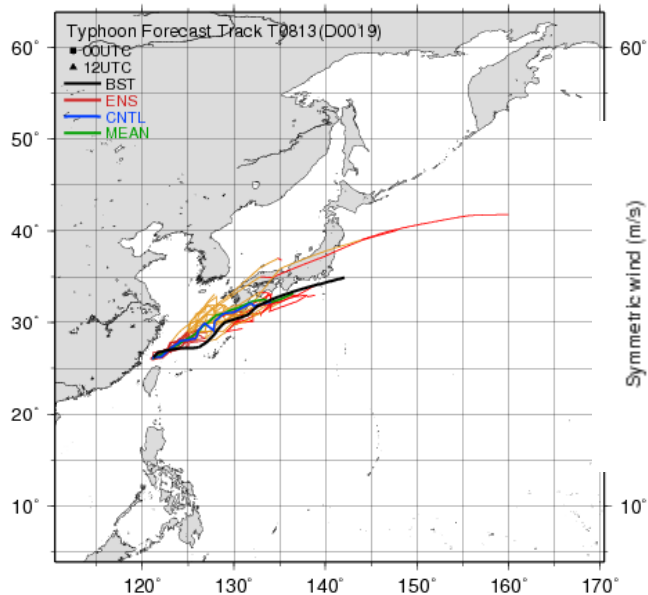
## 500 hPa

ECMWF ASYM 2008.09.15 00UTC

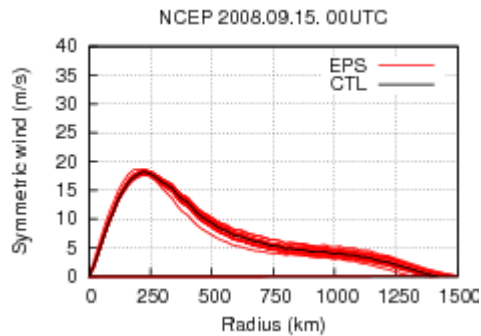


## 300 hPa

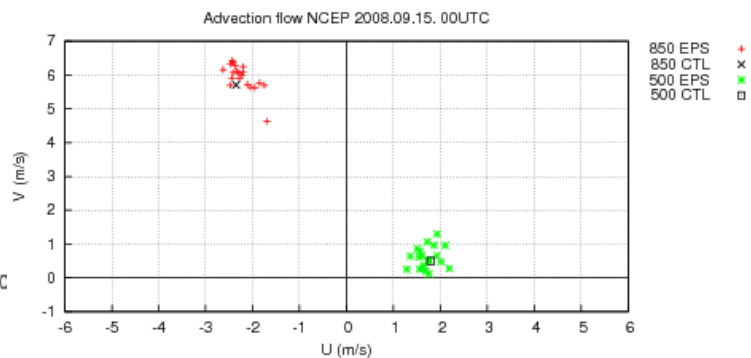
# NCEP



## Size



## Advection flow



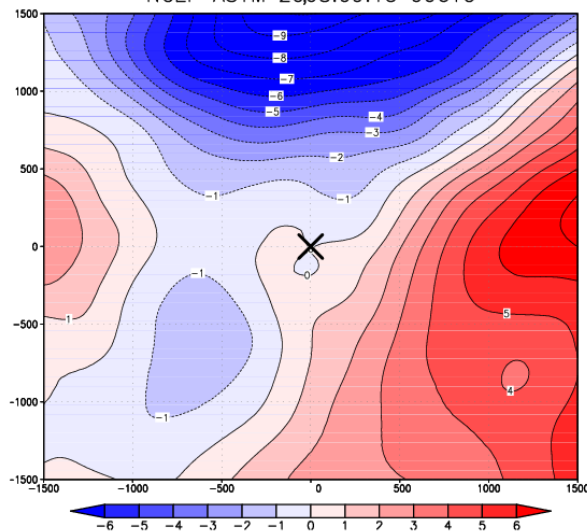
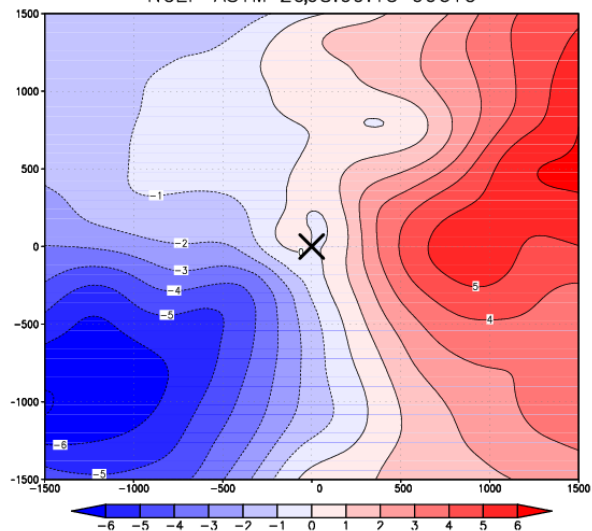
## 850 hPa

## 500 hPa

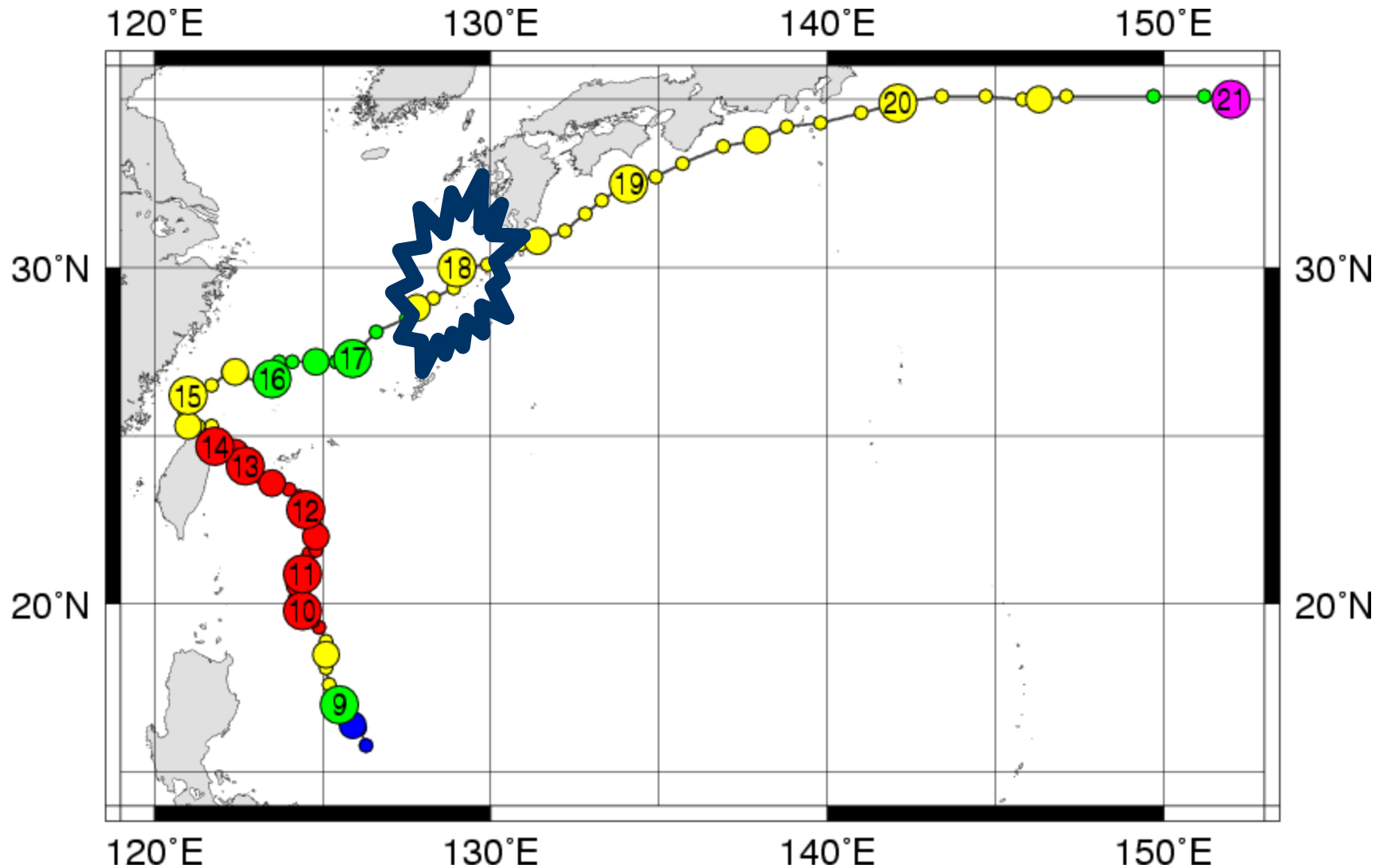
## 300 hPa

NCEP ASYM 2008.09.15 00UTC

NCEP ASYM 2008.09.15 00UTC

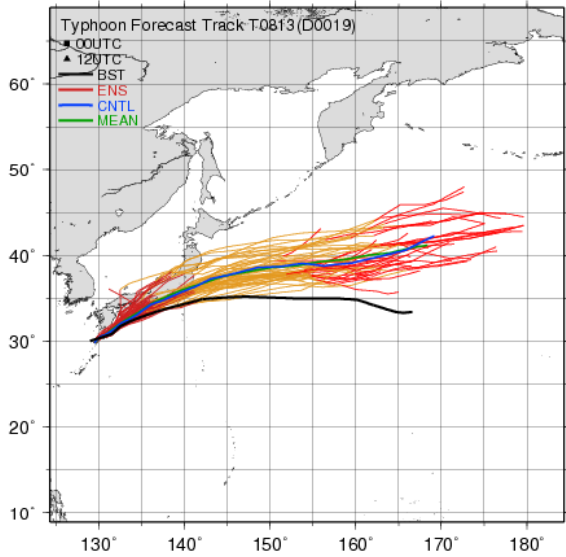


# 09.18.00UTC (after recurv.)

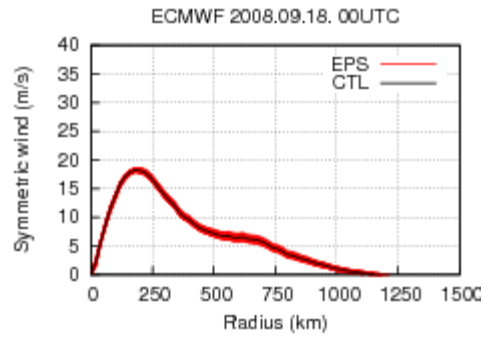


The big circle represents the position at 00UTC of the day

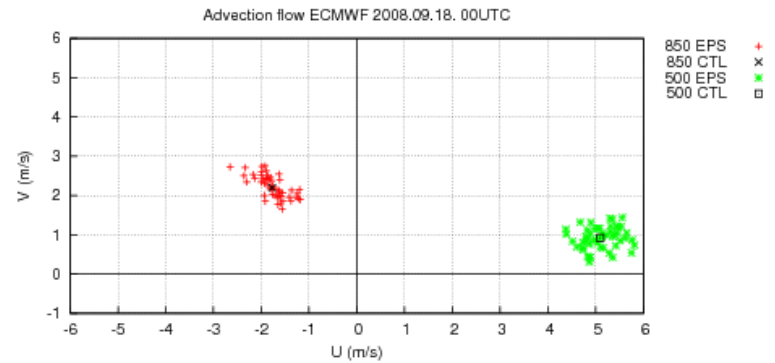
# ECMWF



## Size

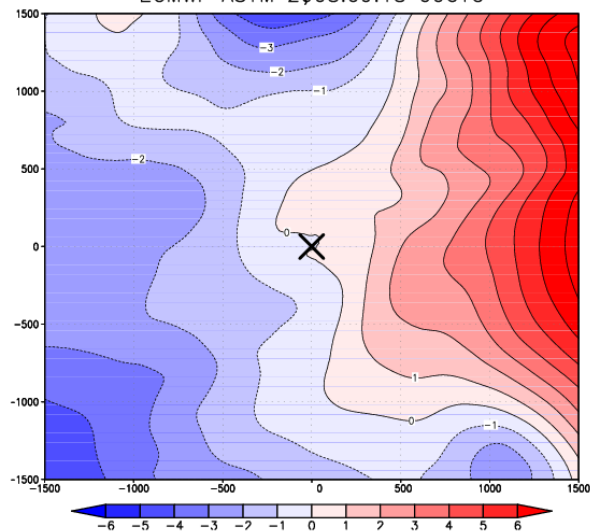


## Advection flow



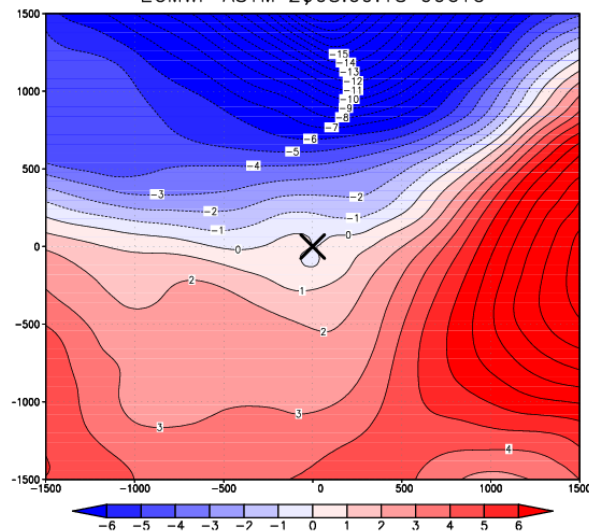
## 850 hPa

ECMWF ASYM 2008.09.18 00UTC



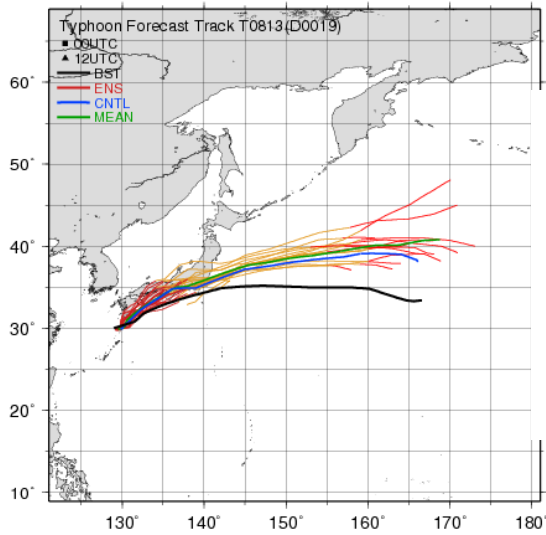
## 500 hPa

ECMWF ASYM 2008.09.18 00UTC

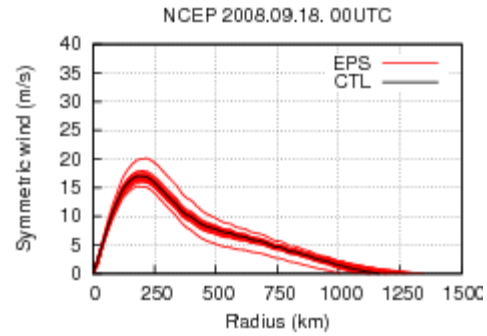


## 300 hPa

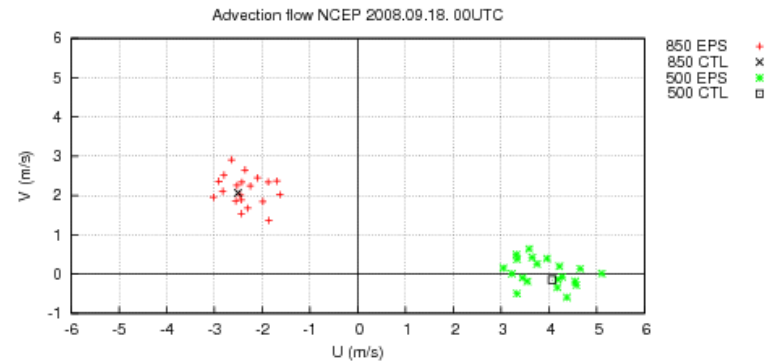
# NCEP



## Size

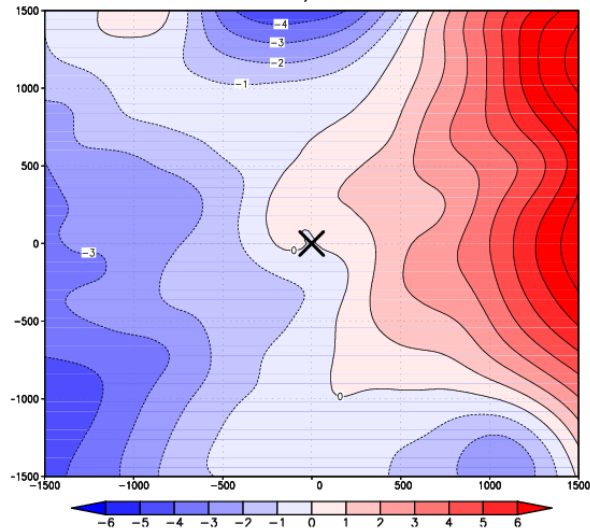


## Advection flow



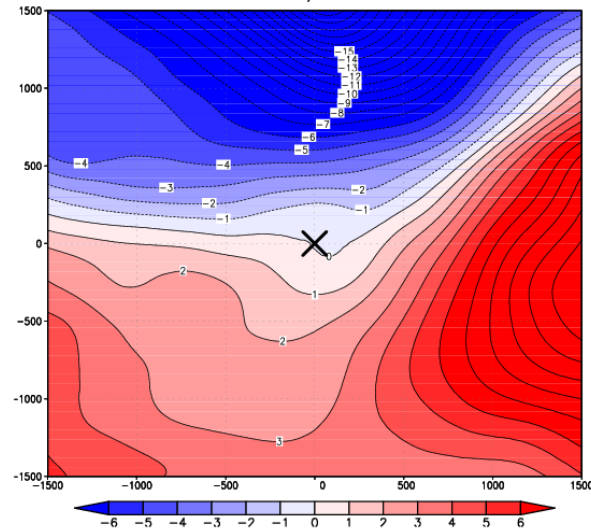
## 850 hPa

NCEP ASYM 2008.09.18 00UTC



## 500 hPa

NCEP ASYM 2008.09.18 00UTC



## 300 hPa

# Questions

How can I investigate the impact of perturbations when focusing on genesis?

It turns out that the advection flow is significantly different among vertical levels. In the case of ECMWF at 09/15, for example, the advection flow at 850 hPa is NW, but that at 500 hPa is ENE. The actual direction of the typhoon is ENE. Why the entire system heads toward ENE in spite of the NW advection flow at 850 hPa?