

THE APPLICATION OF GRAPES IN TROPICAL CYCLONE NUMERICAL PREDICTION

GRAPES_TCM

Shanghai Typhoon Institute/CMA

Beijing

Oct. 17, 2004

Introduction of the model scheme(1)

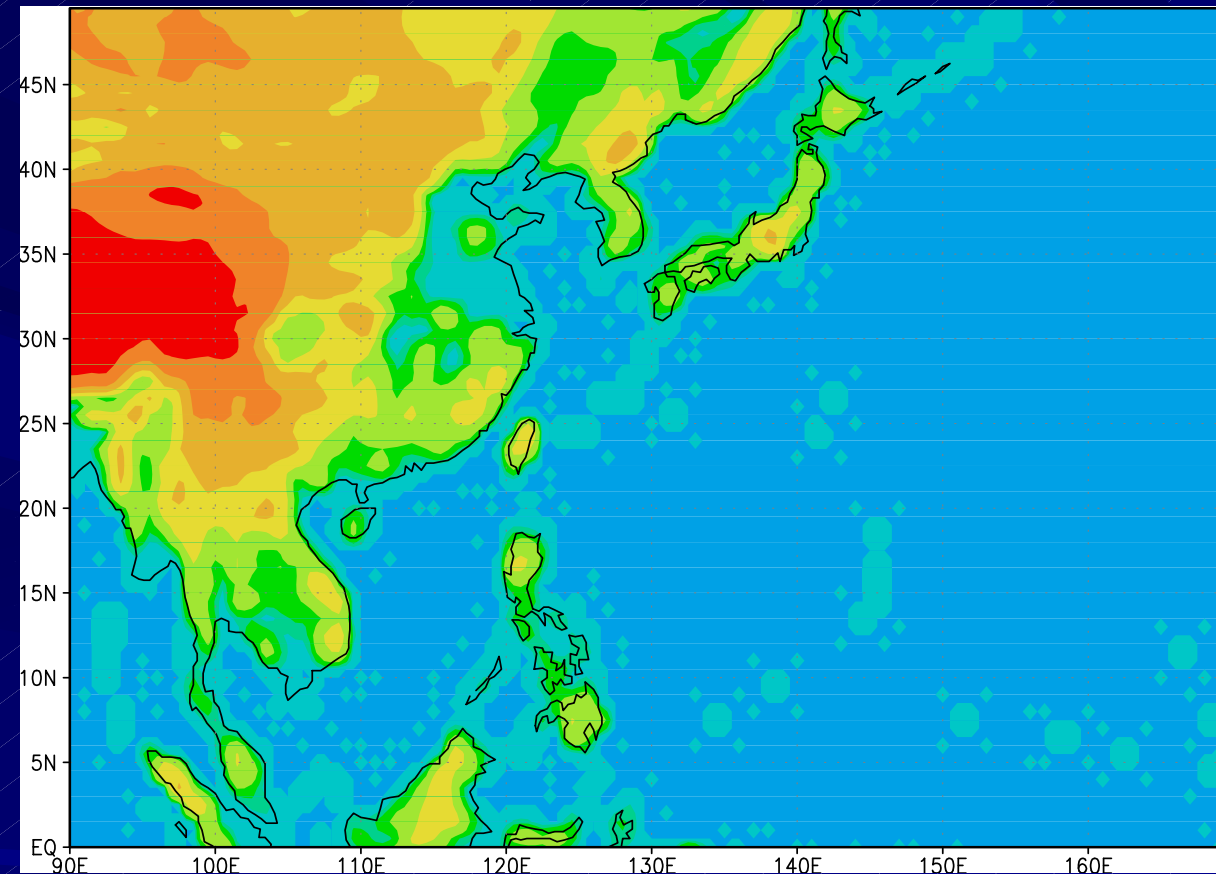


Fig: the topography of the domain

Domain: E90°~E170°, N0°~N50°

Horizontal resolution: 0.5°x0.5°

Grid number: 161x101

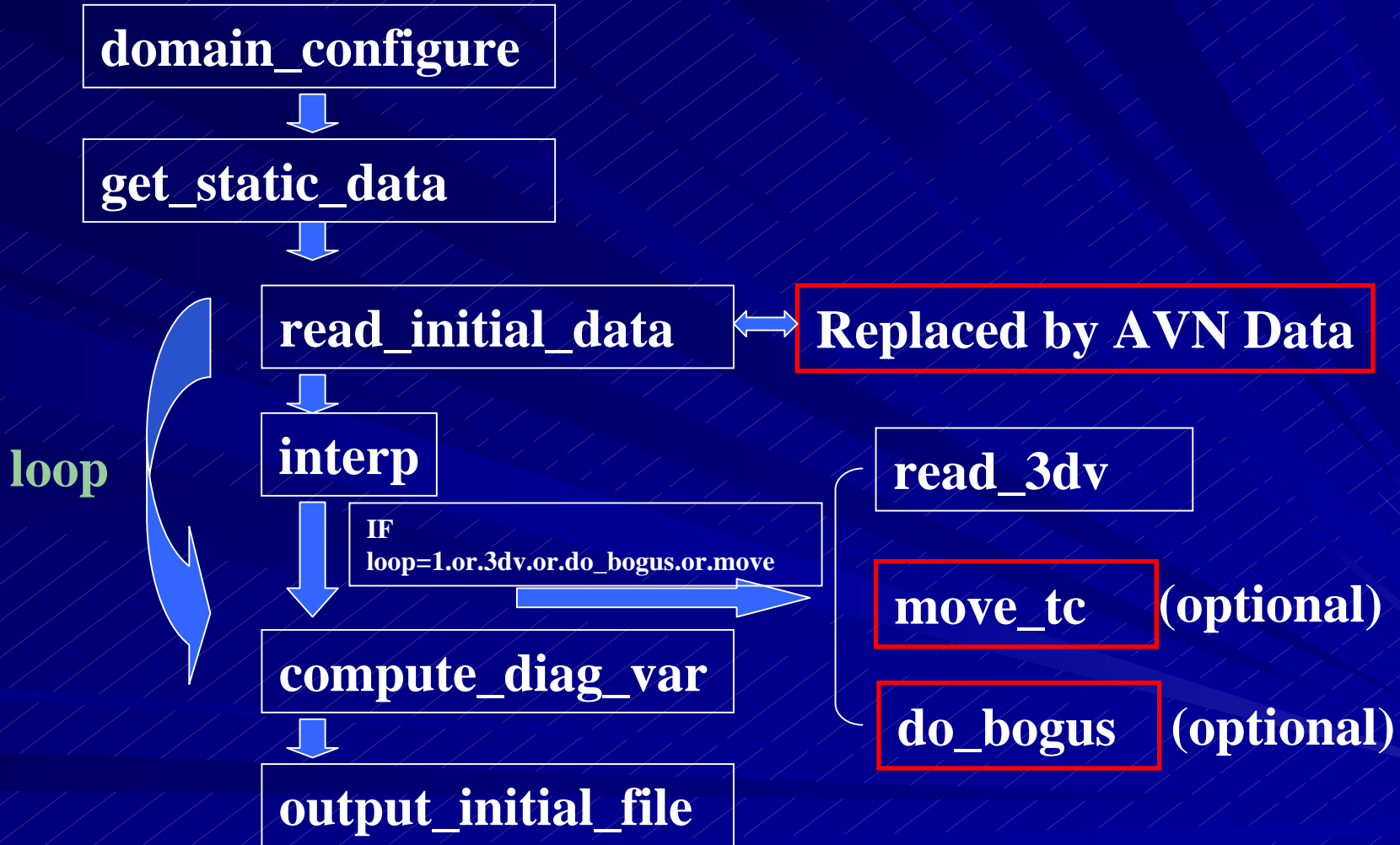
Vertical levels: 31(ztop: 35000m)

Introduction of the model scheme(2)

■ Physical Processes

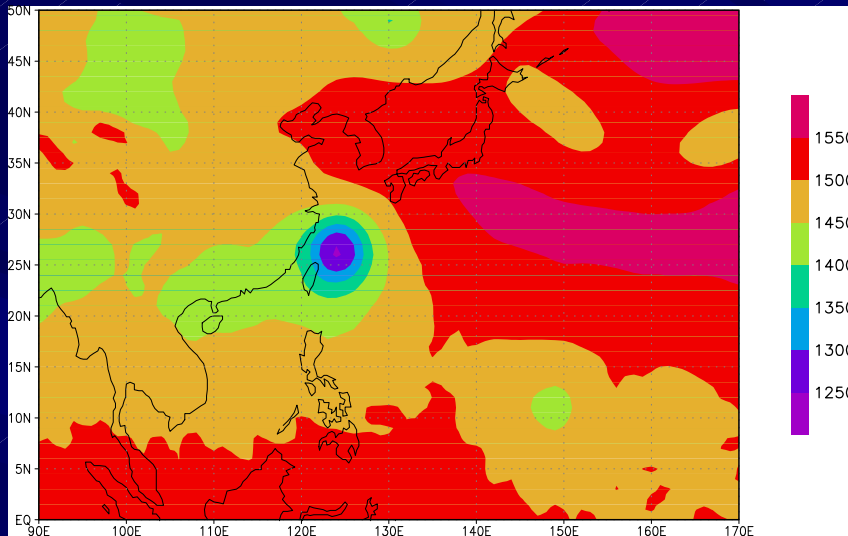
- Convective parameter scheme: **KF**
- PBL scheme: **MRF**
- Microphysics: **NCEP cloud3**
- Land-air Flux: **bulk scheme**
- Long wave radiation scheme: **RRTM scheme**

Modified GRAPES-TCM Initial Field



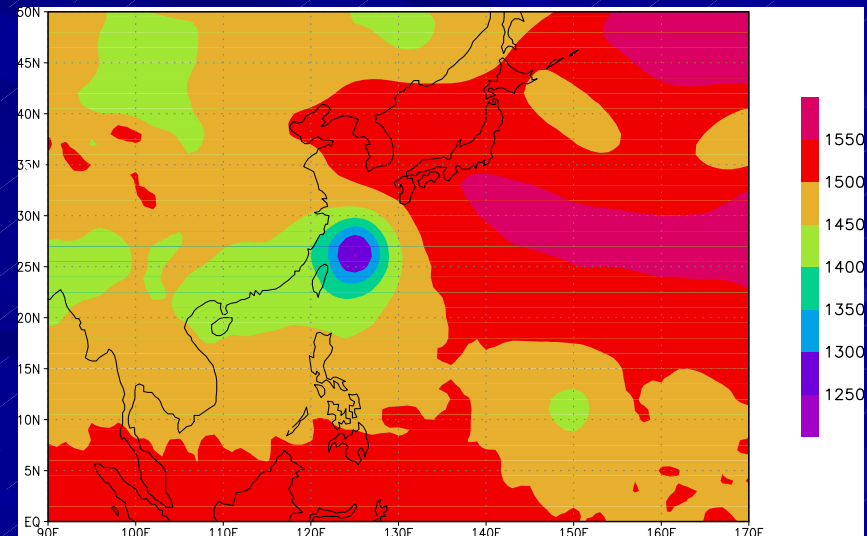
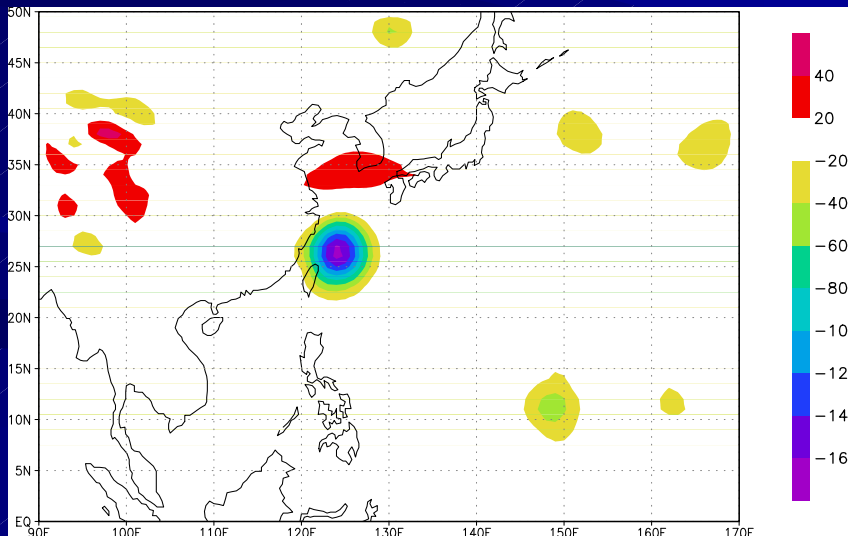
How to move a TC to the “best” position?

1

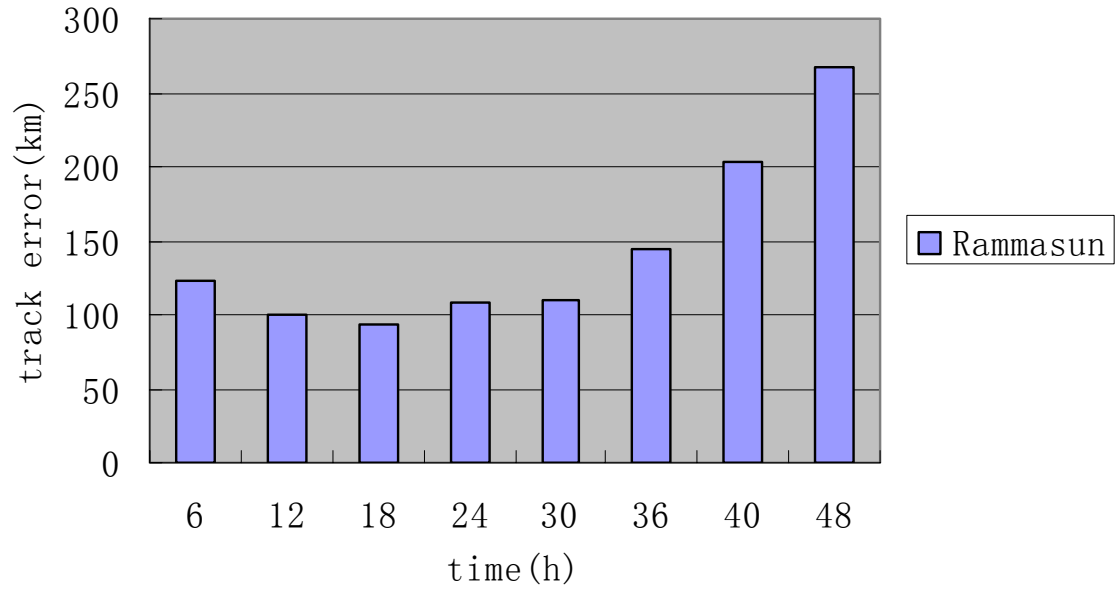
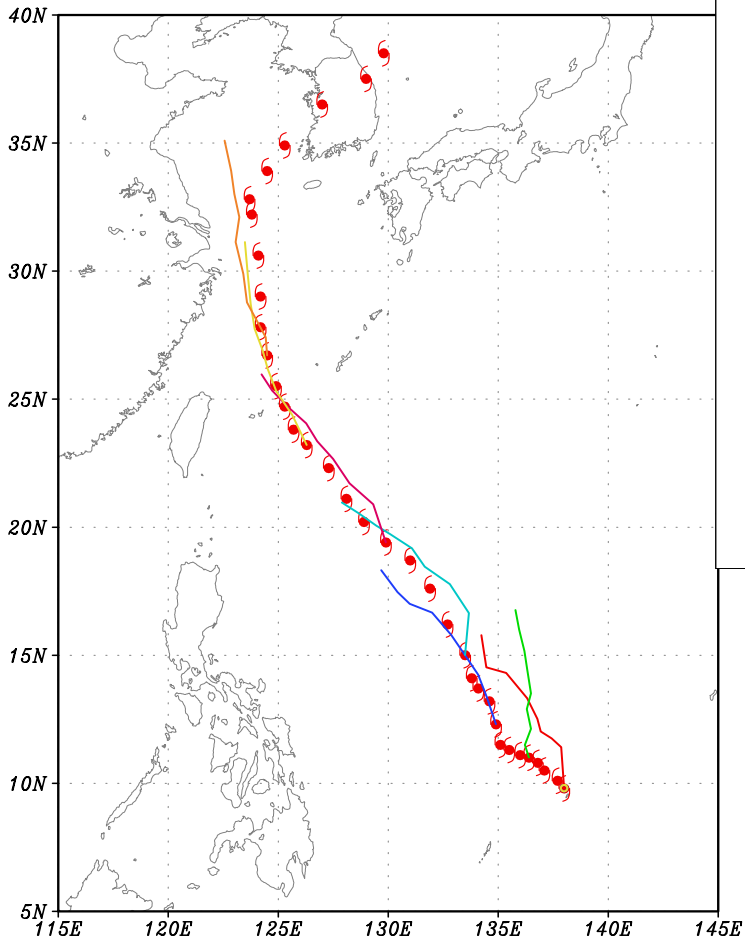


1. First-guess height field at 850hPa
2. Pick up the vortex
3. Move the vortex and add it to the environmental field

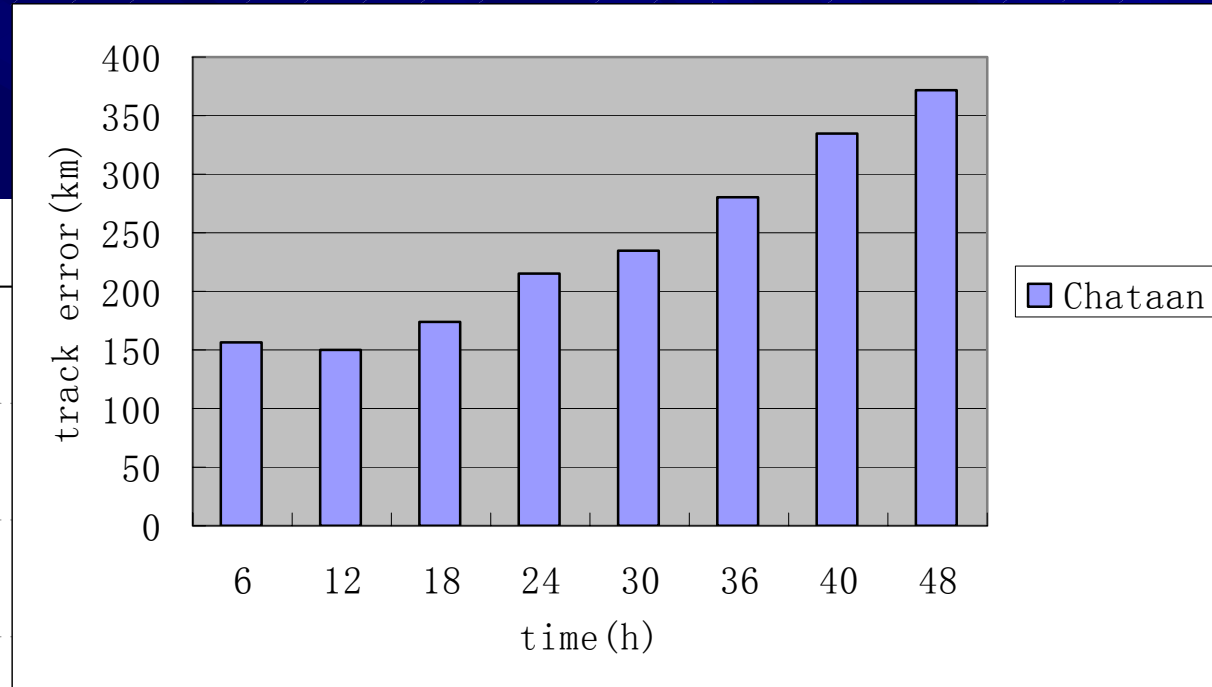
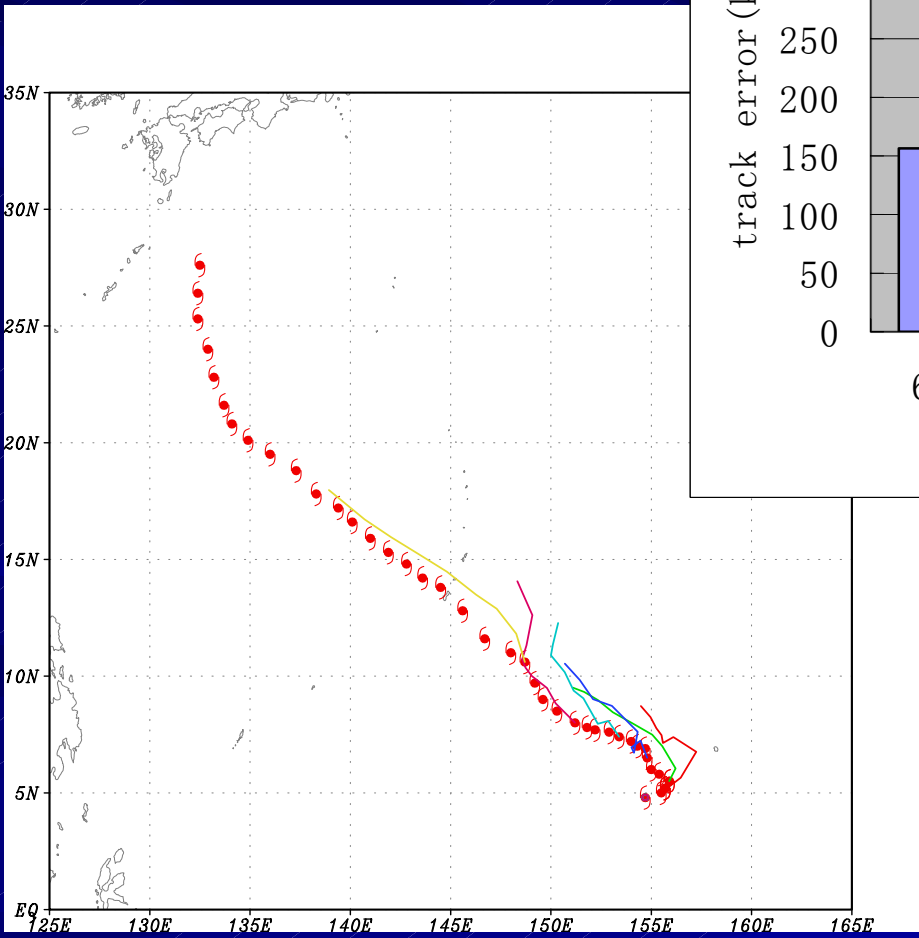
2



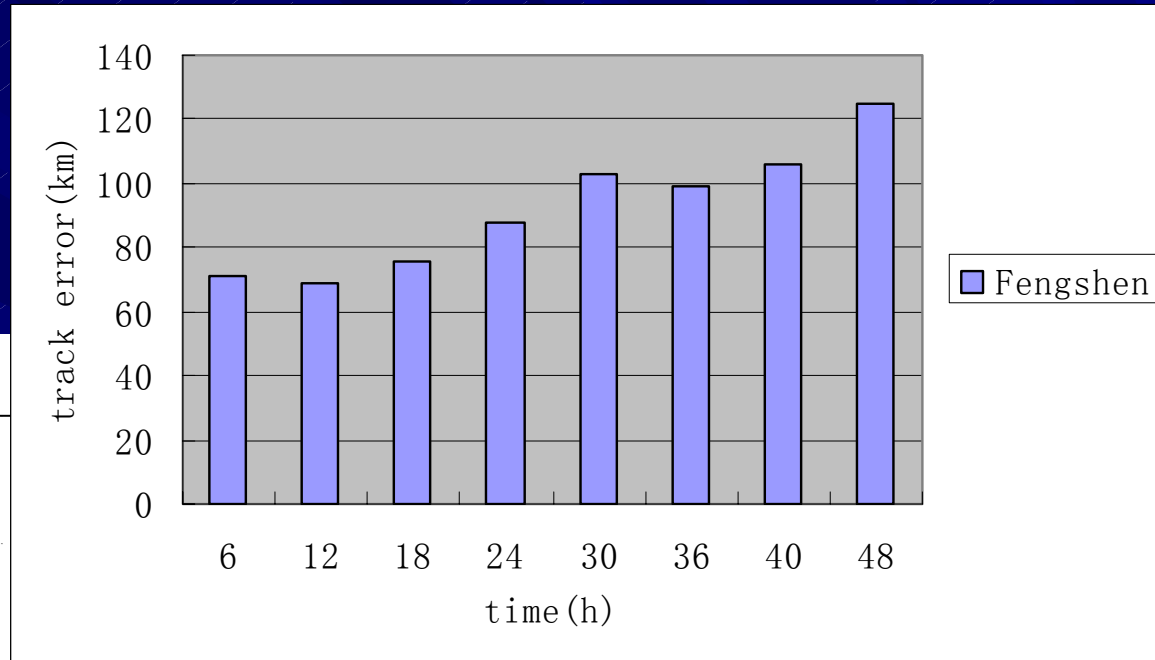
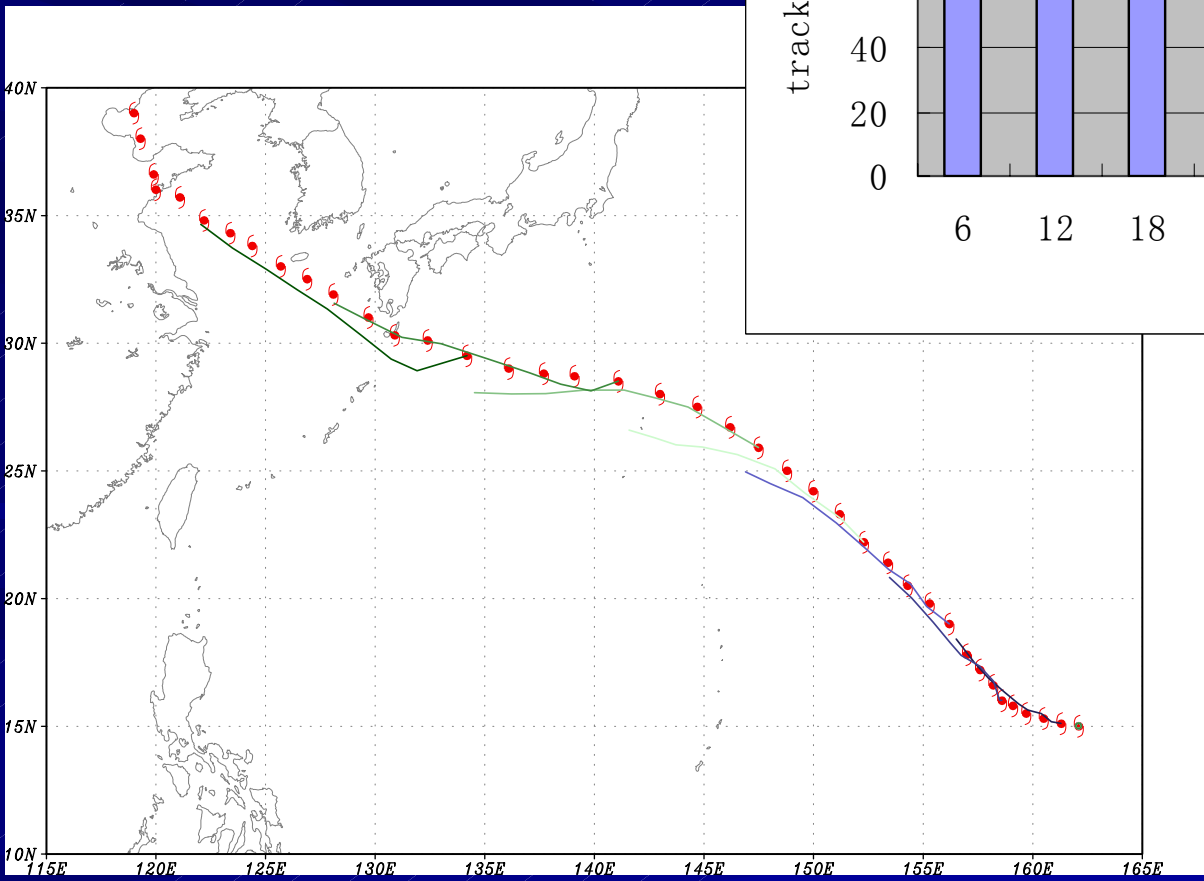
Prediction of TC Rammasun(0205)



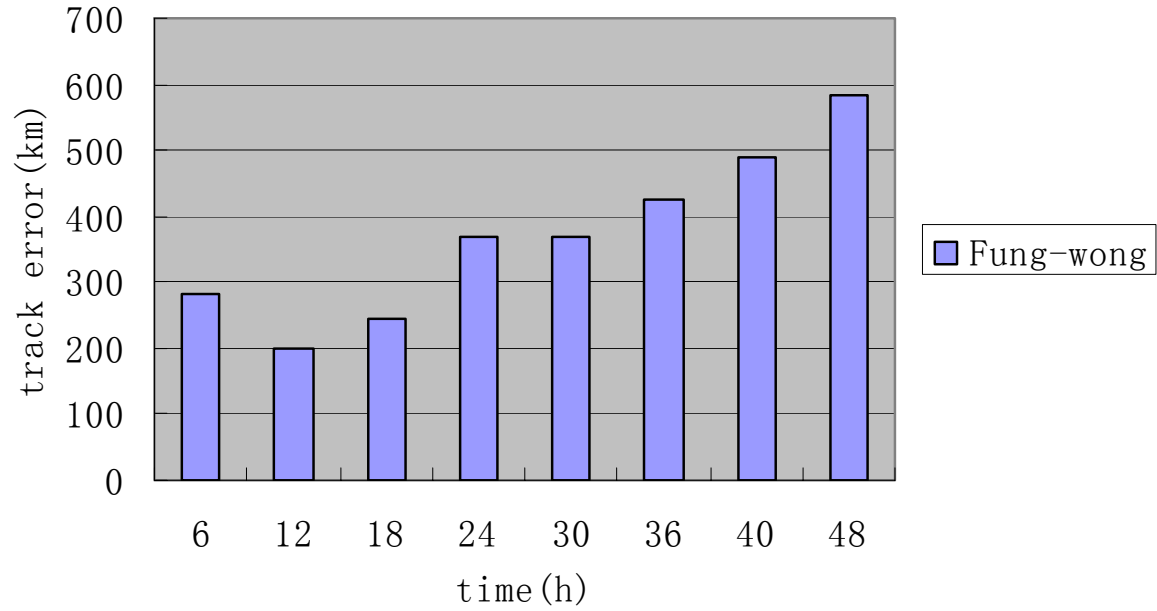
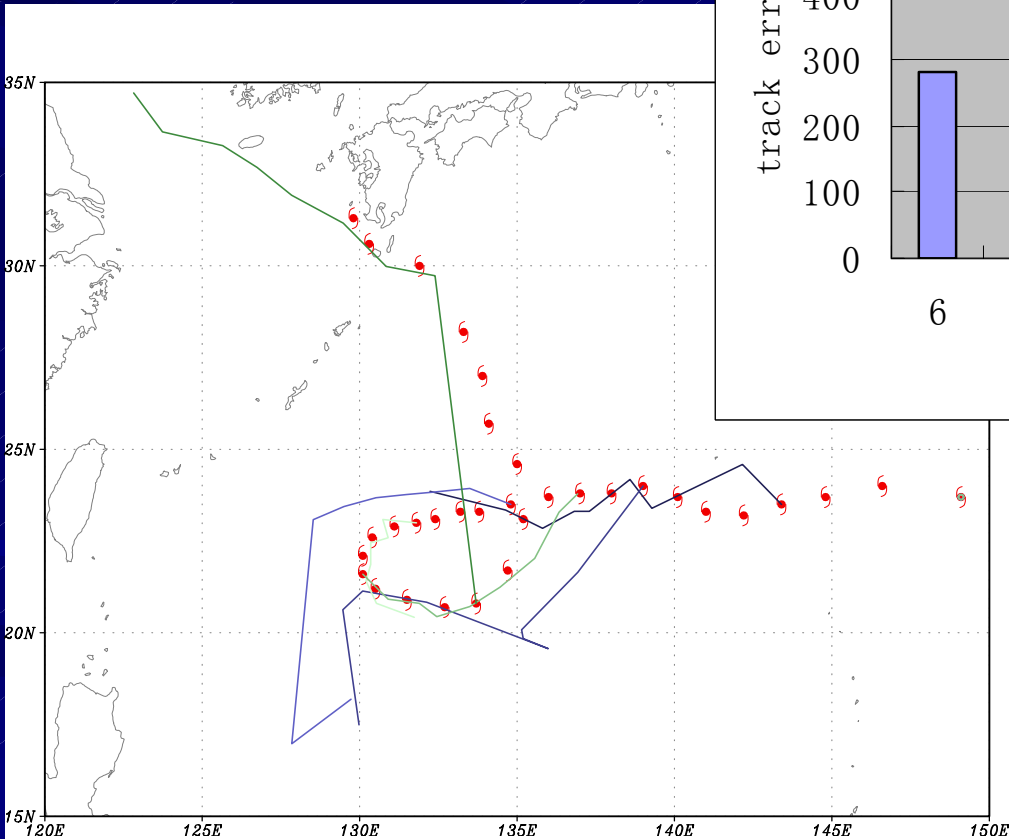
Prediction of TC Chataan(0206)



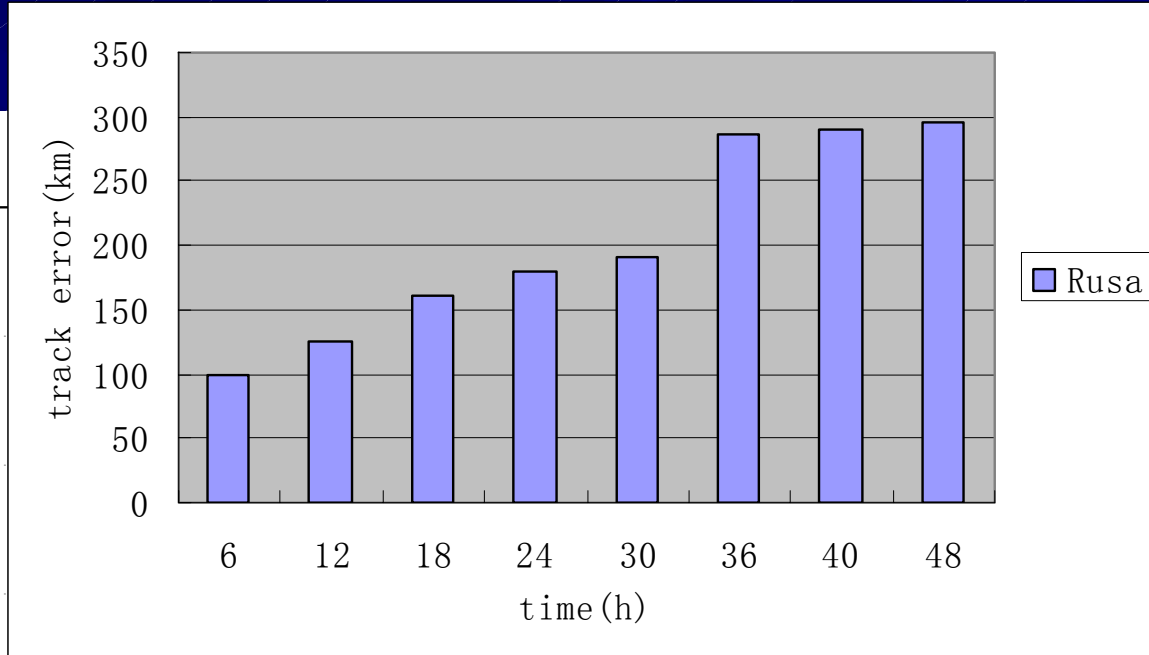
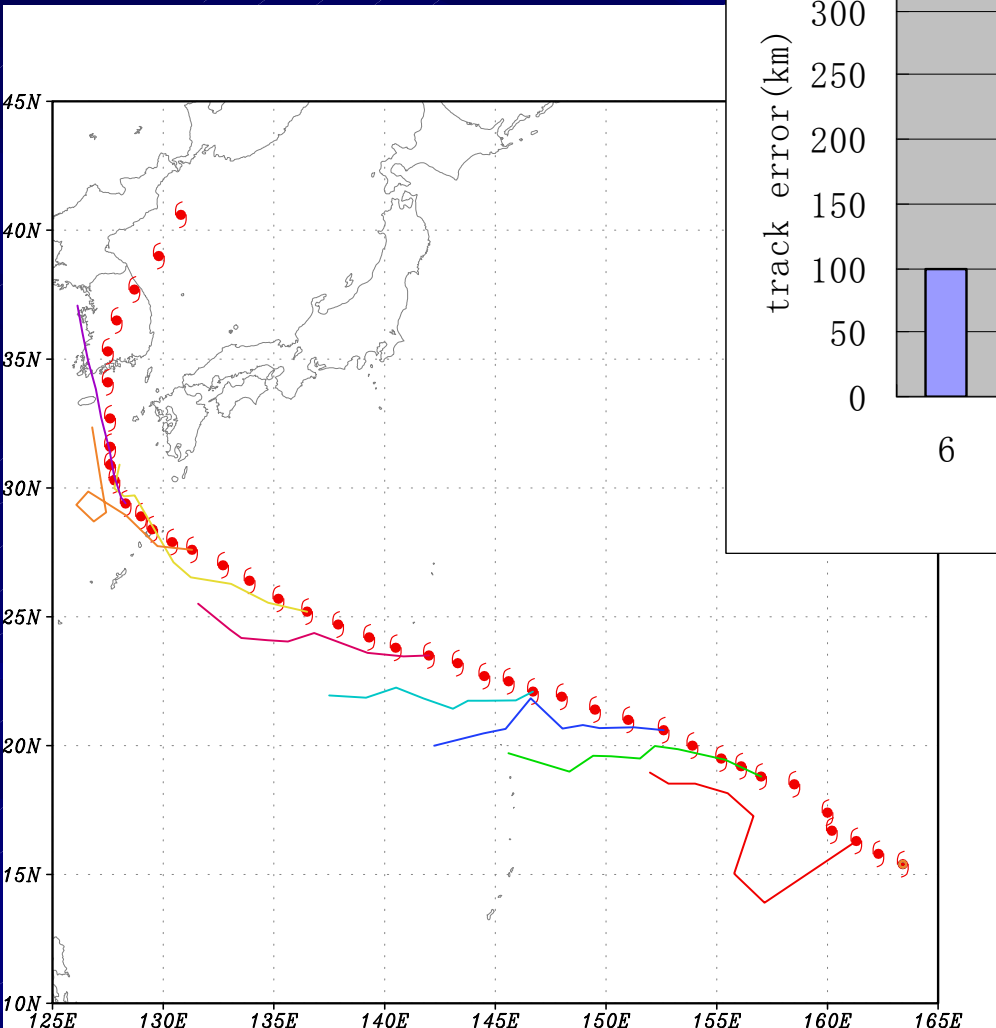
Prediction of TC Fengshen(0209)



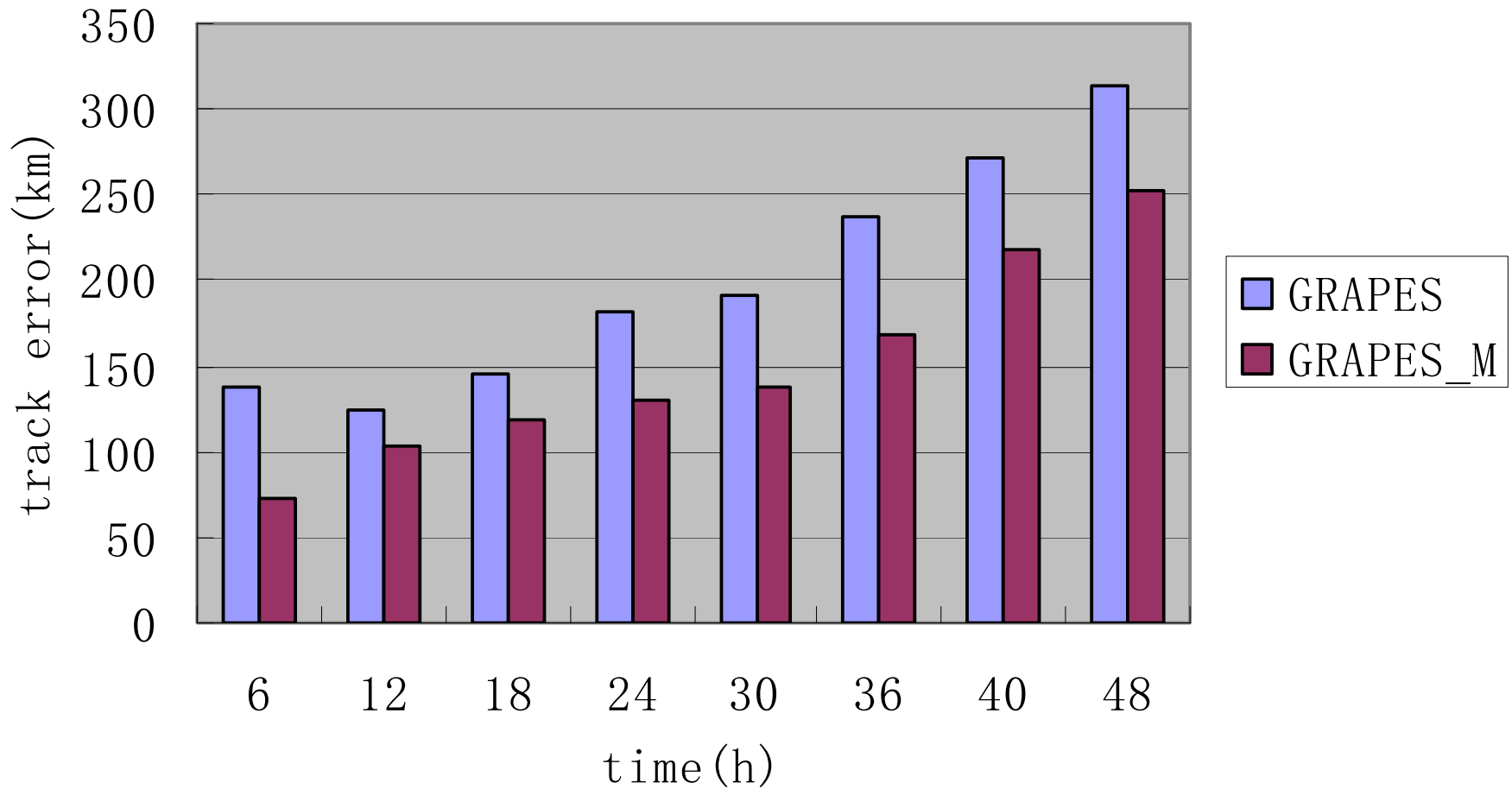
Prediction of TC Fung-wong(0211)



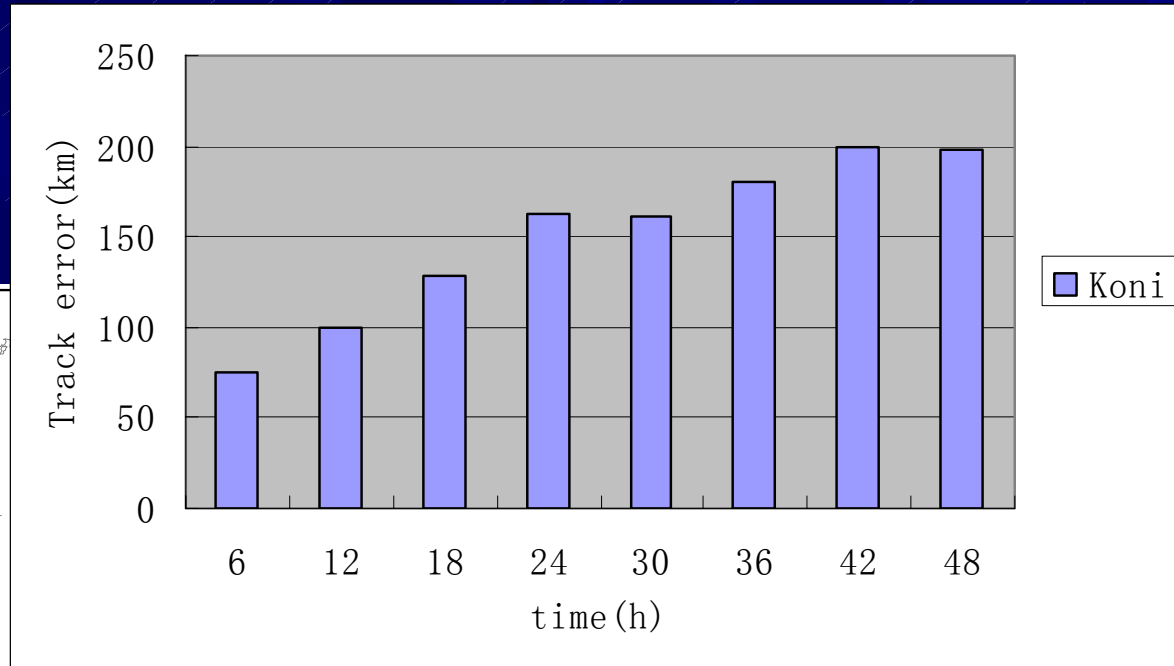
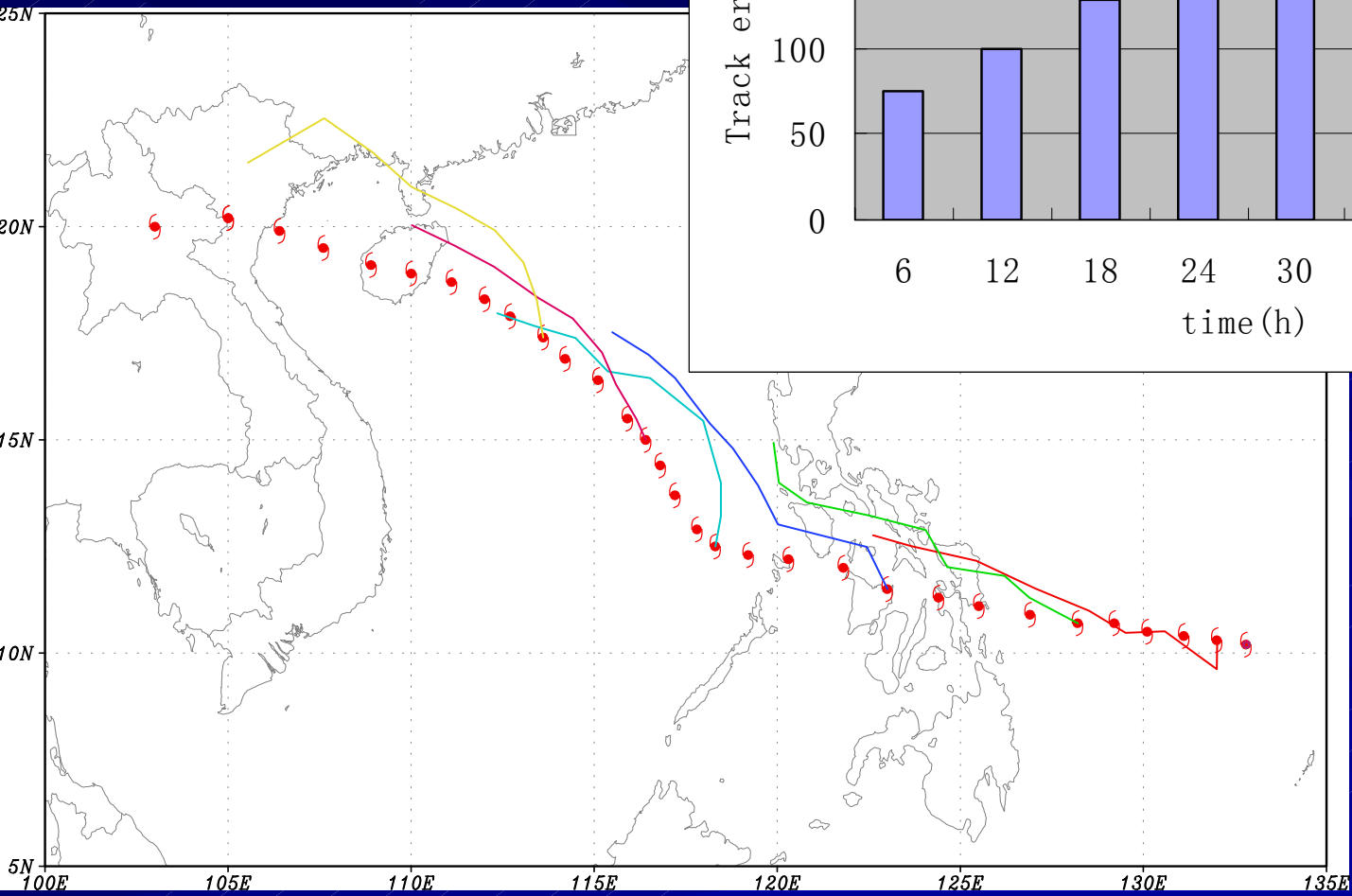
Prediction of TC Rusa(0215)



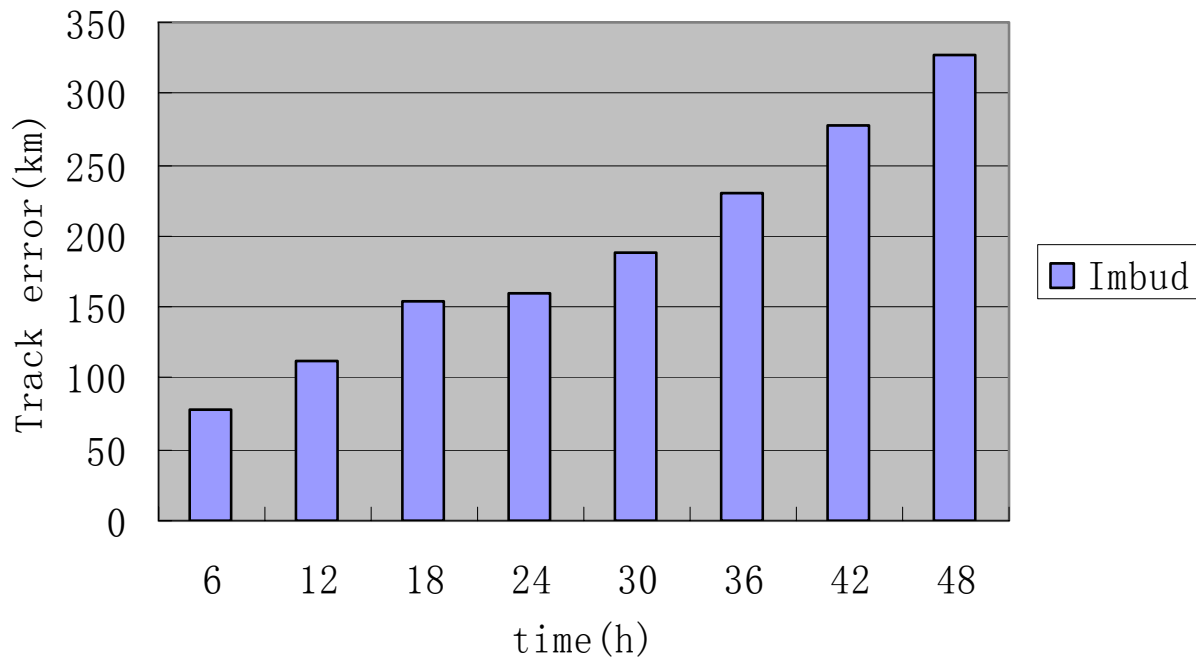
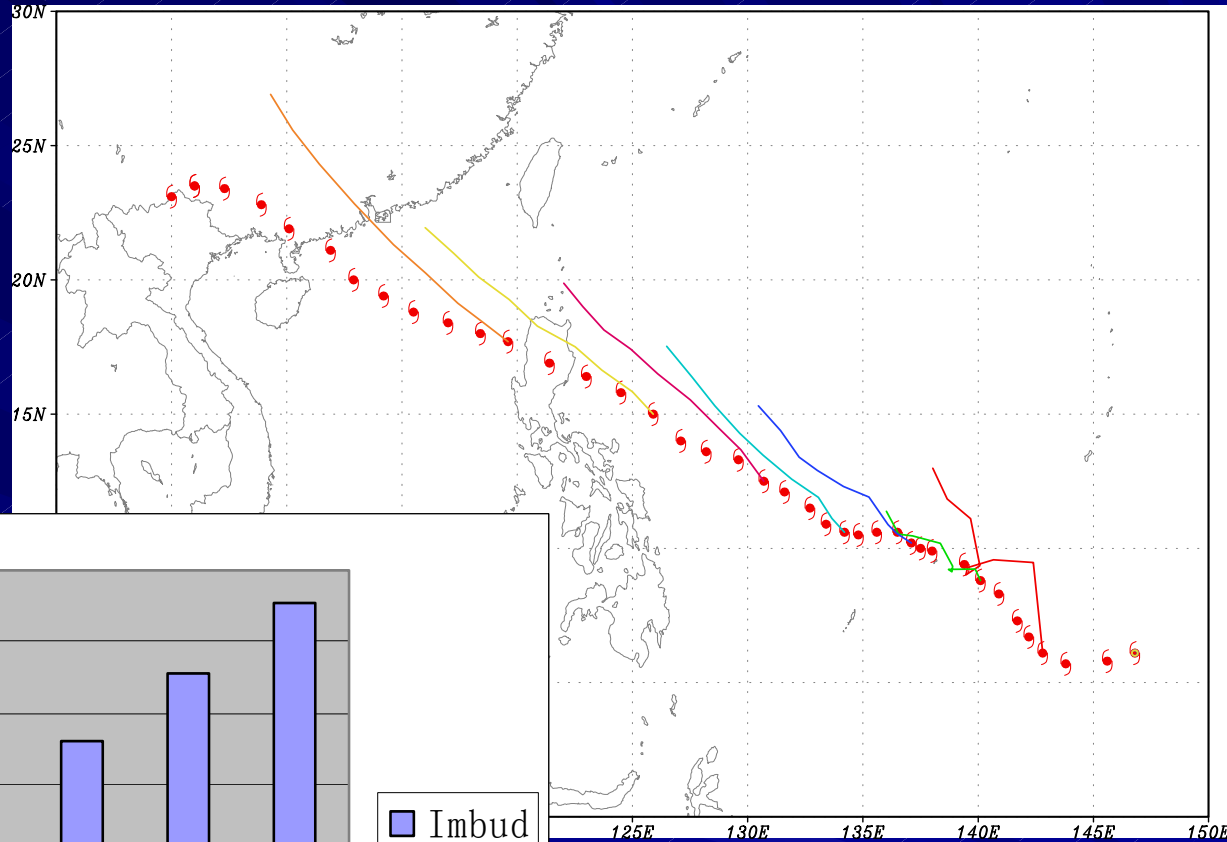
Average Track Errors of GRAPES for 2002



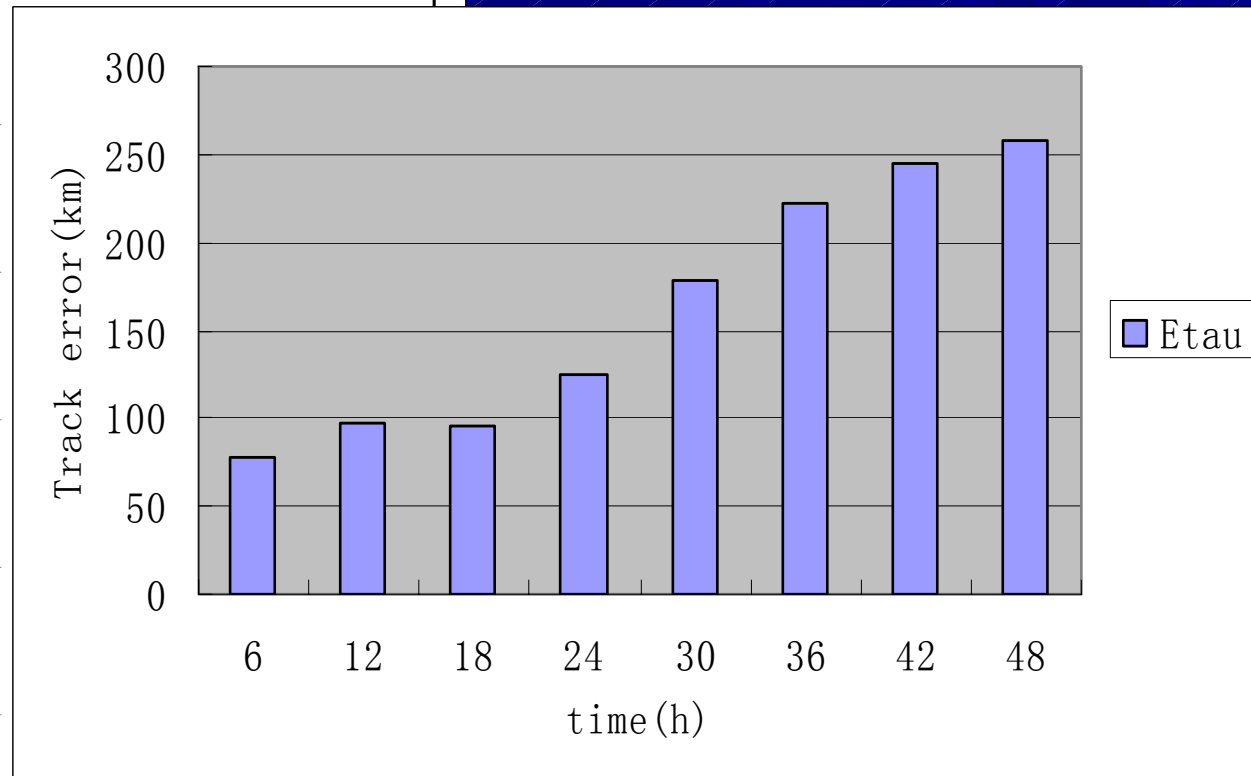
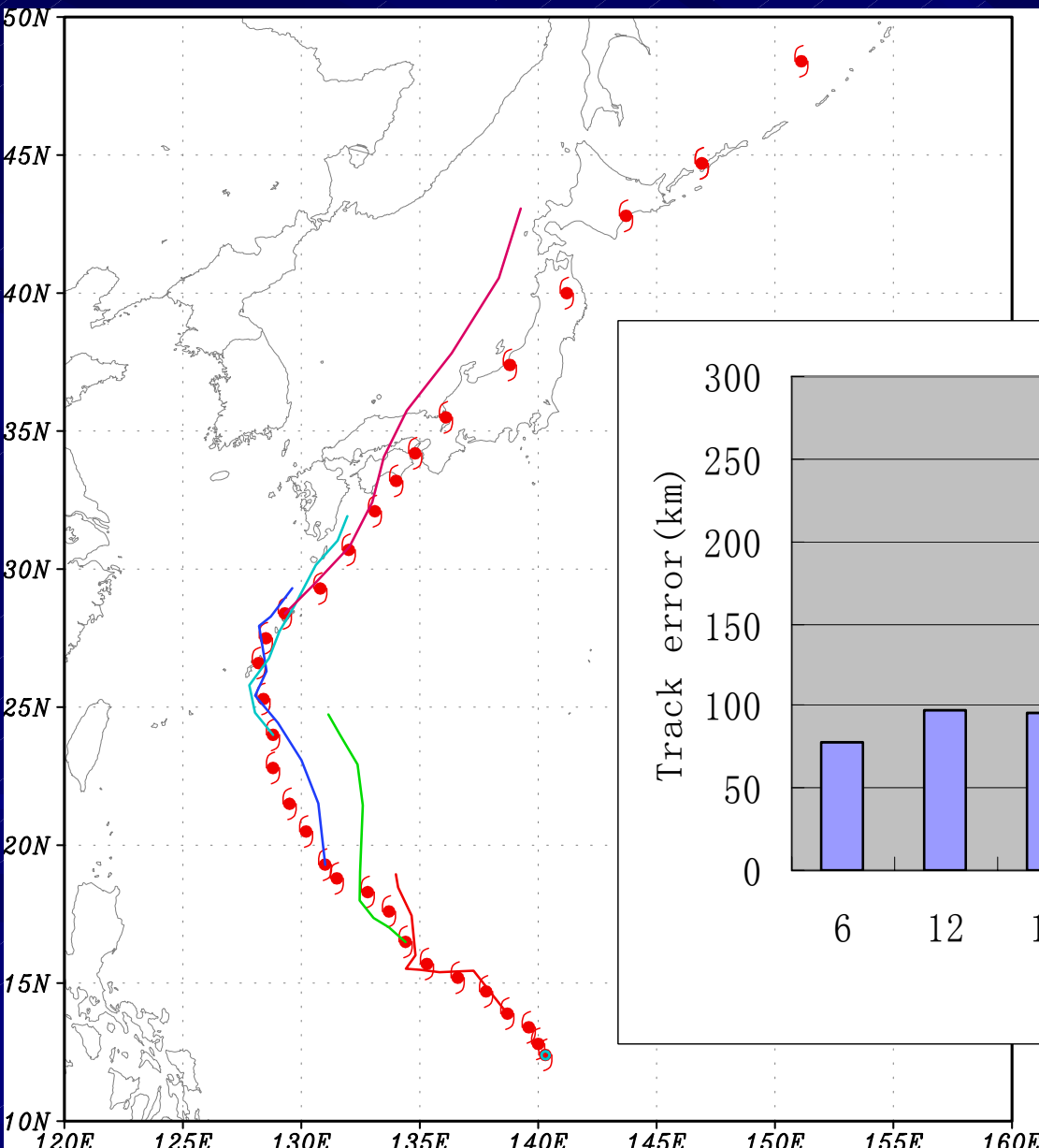
Prediction of TC Koni(0308)



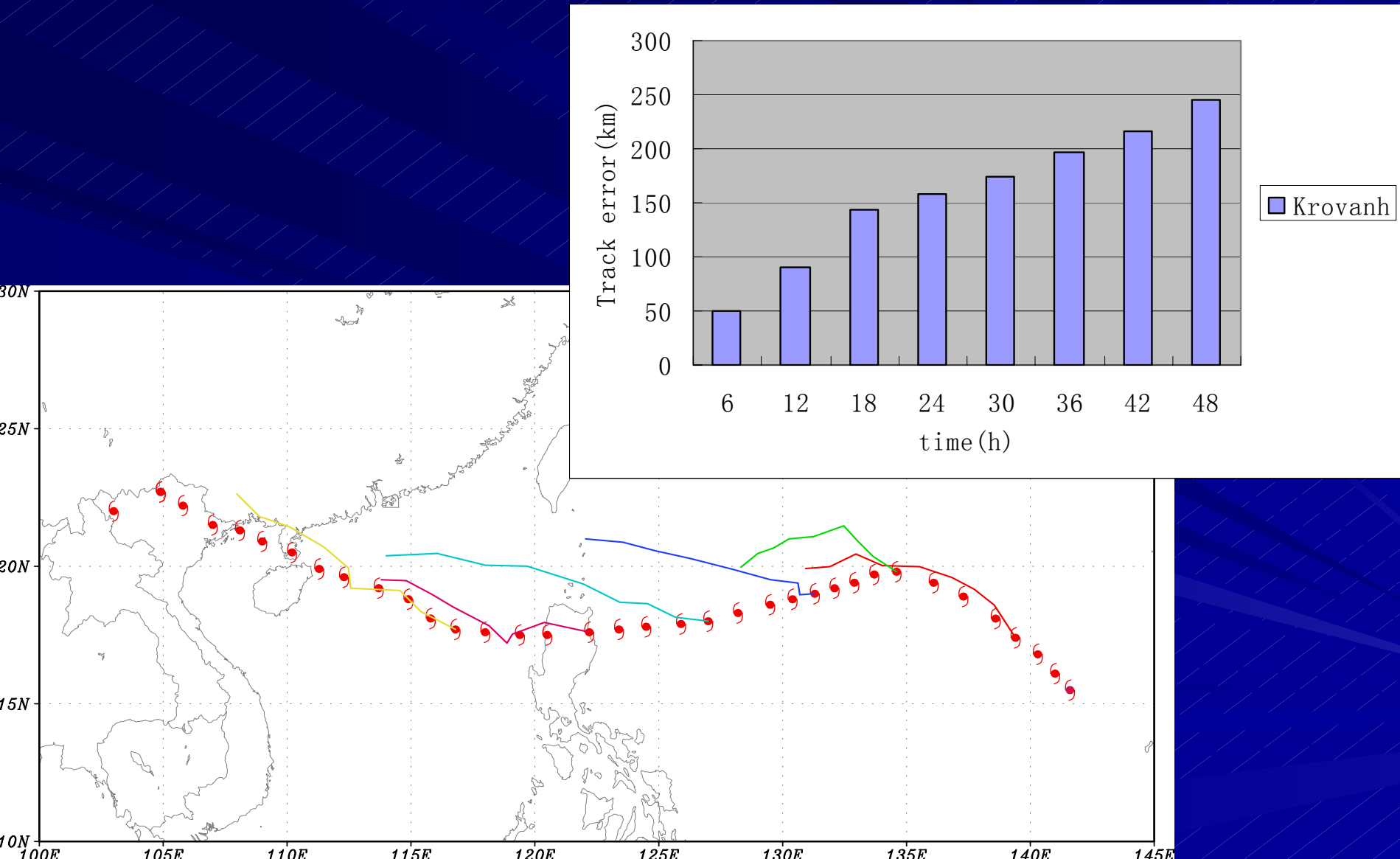
Prediction of TC Imbud(0307)



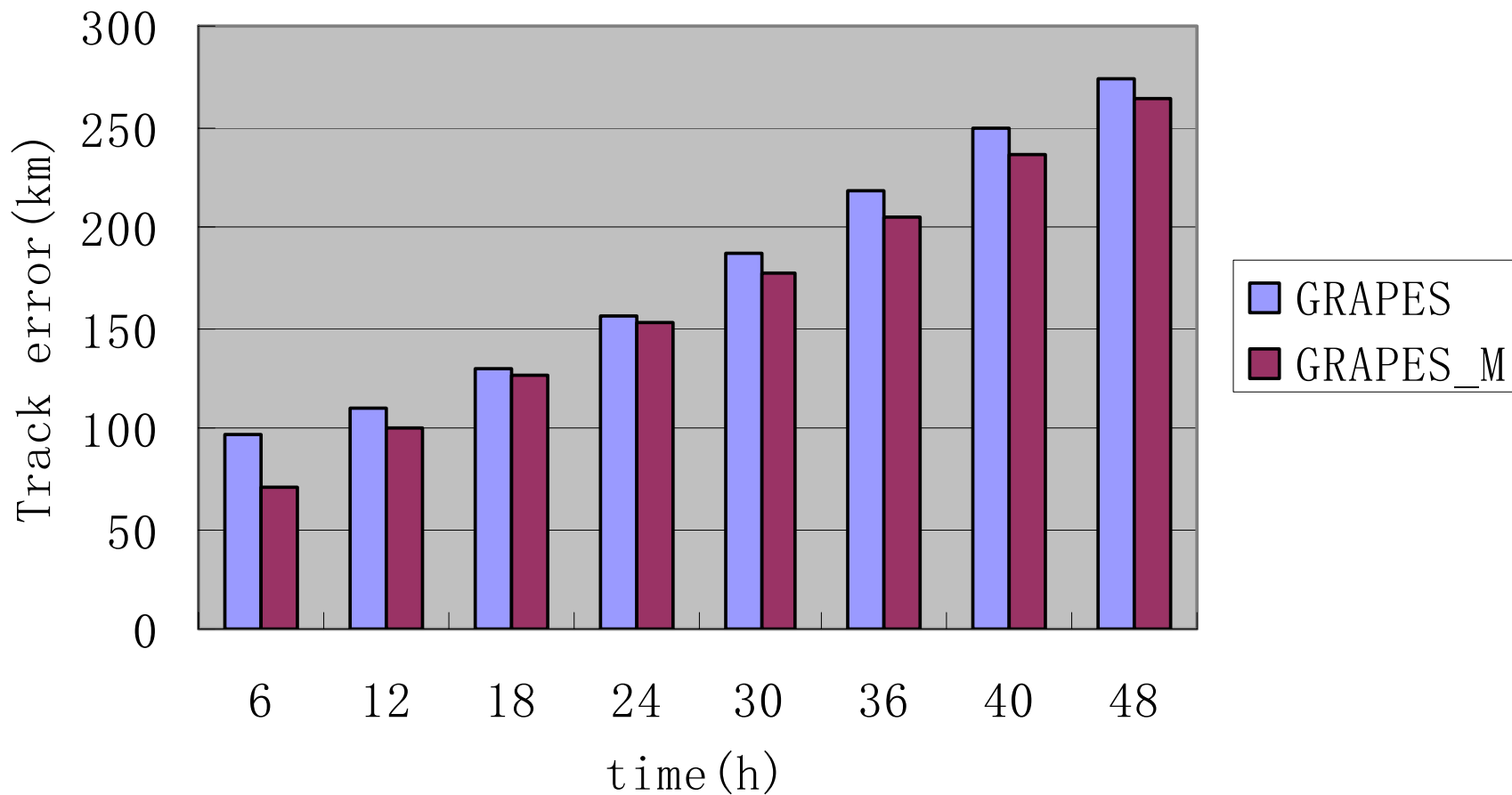
Prediction of TC Etau(0310)



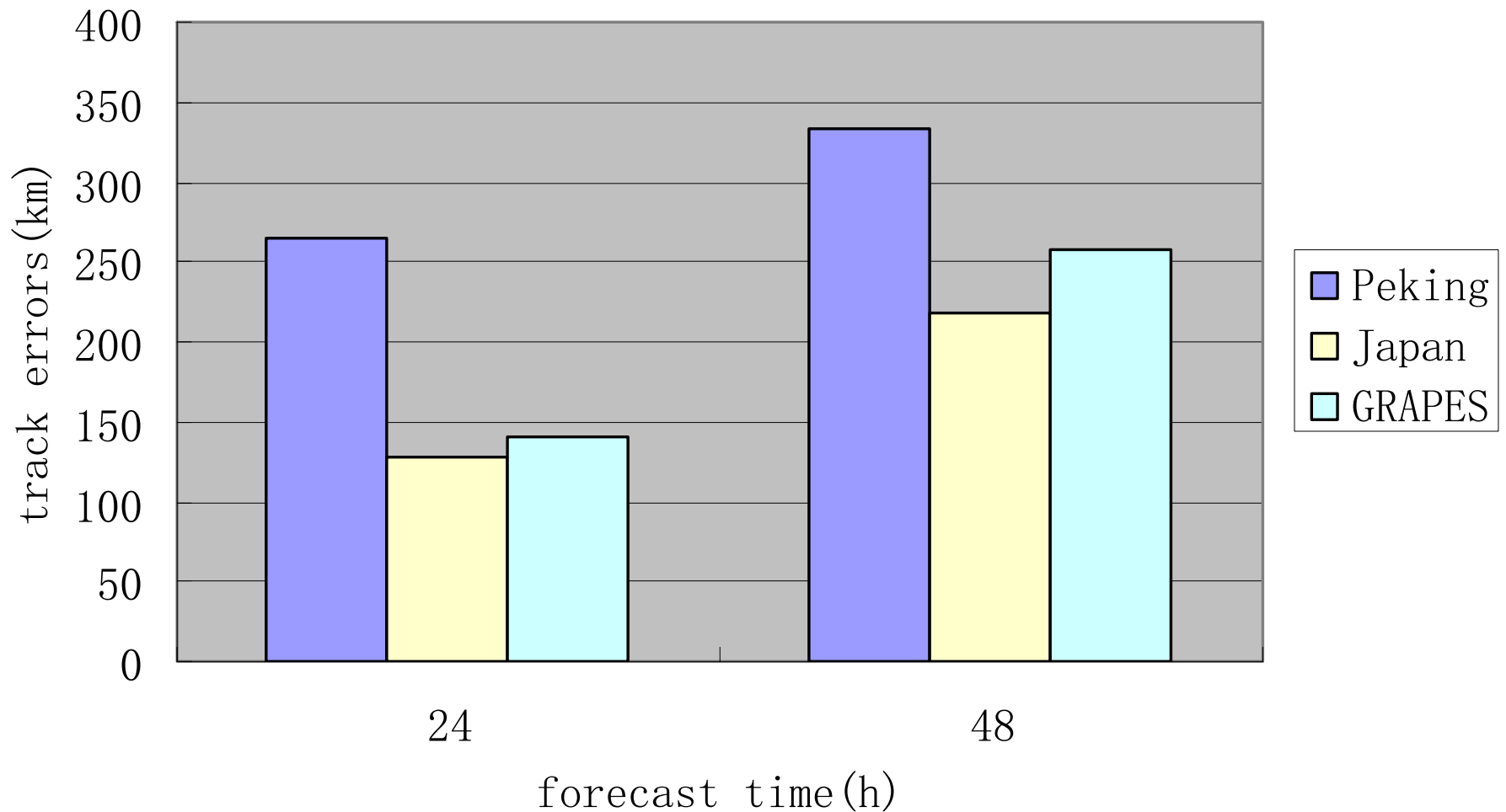
Prediction of TC Krovanh(0312)

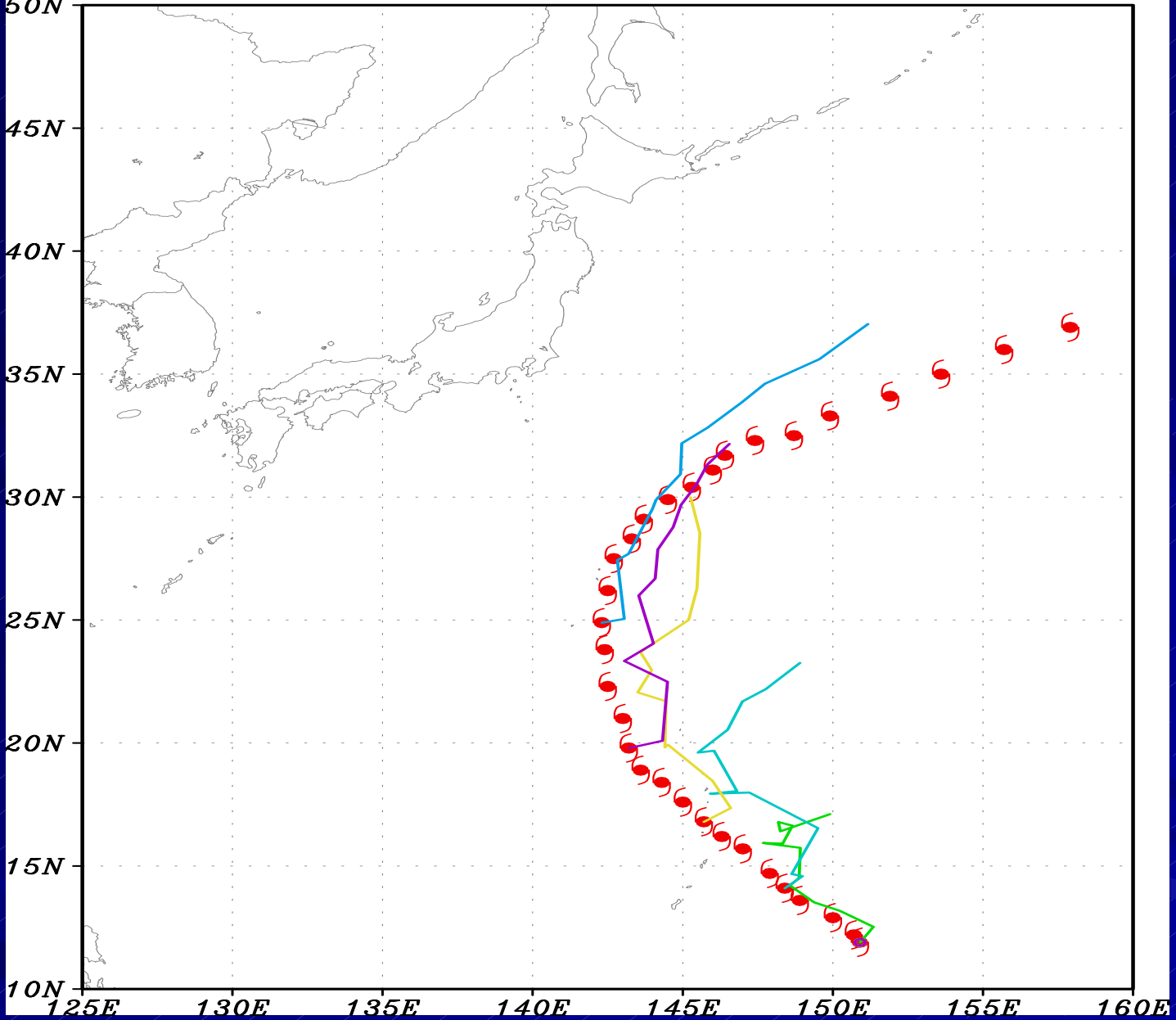


Average Track Errors of GRAPES for 2003

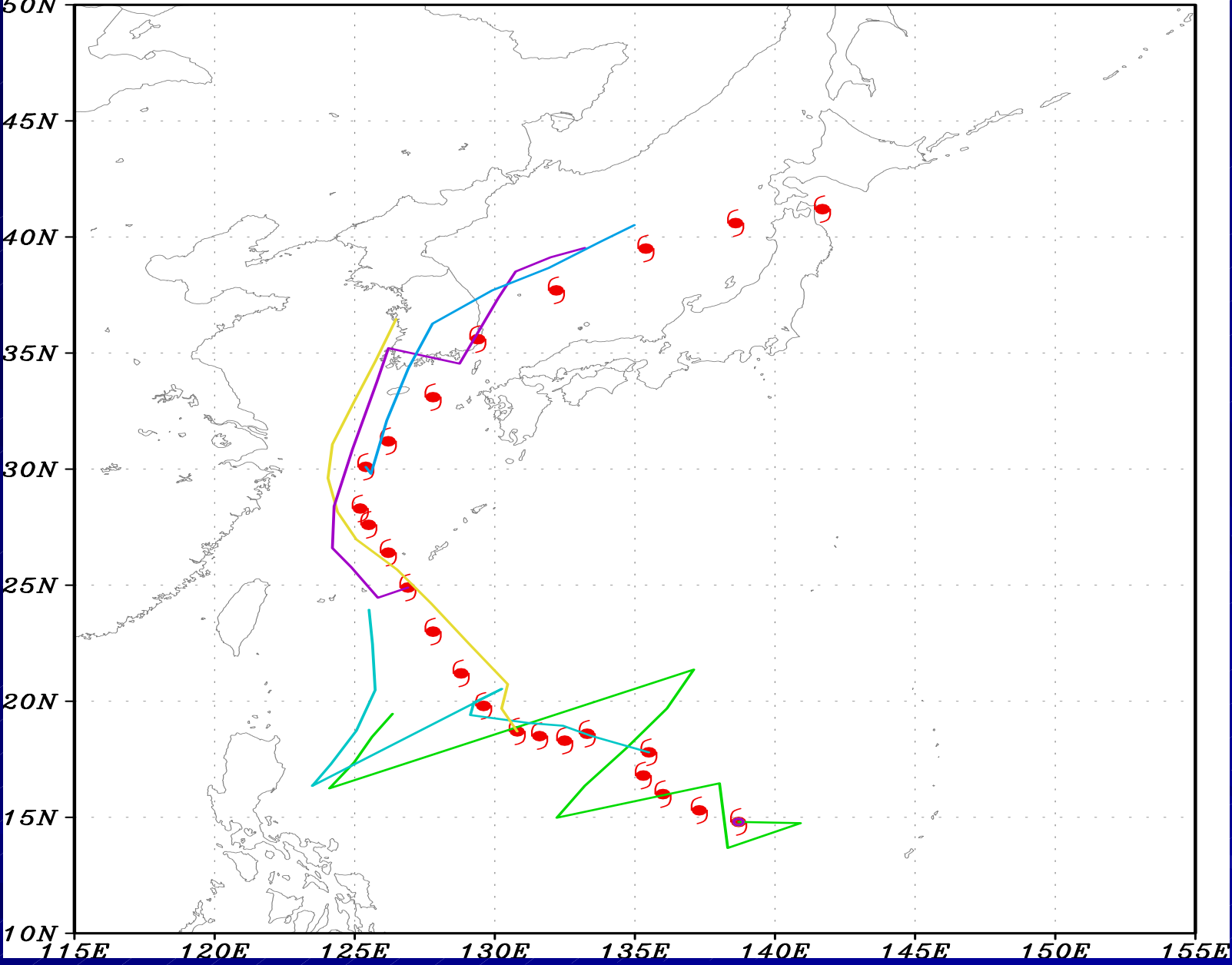


Comparison with other models

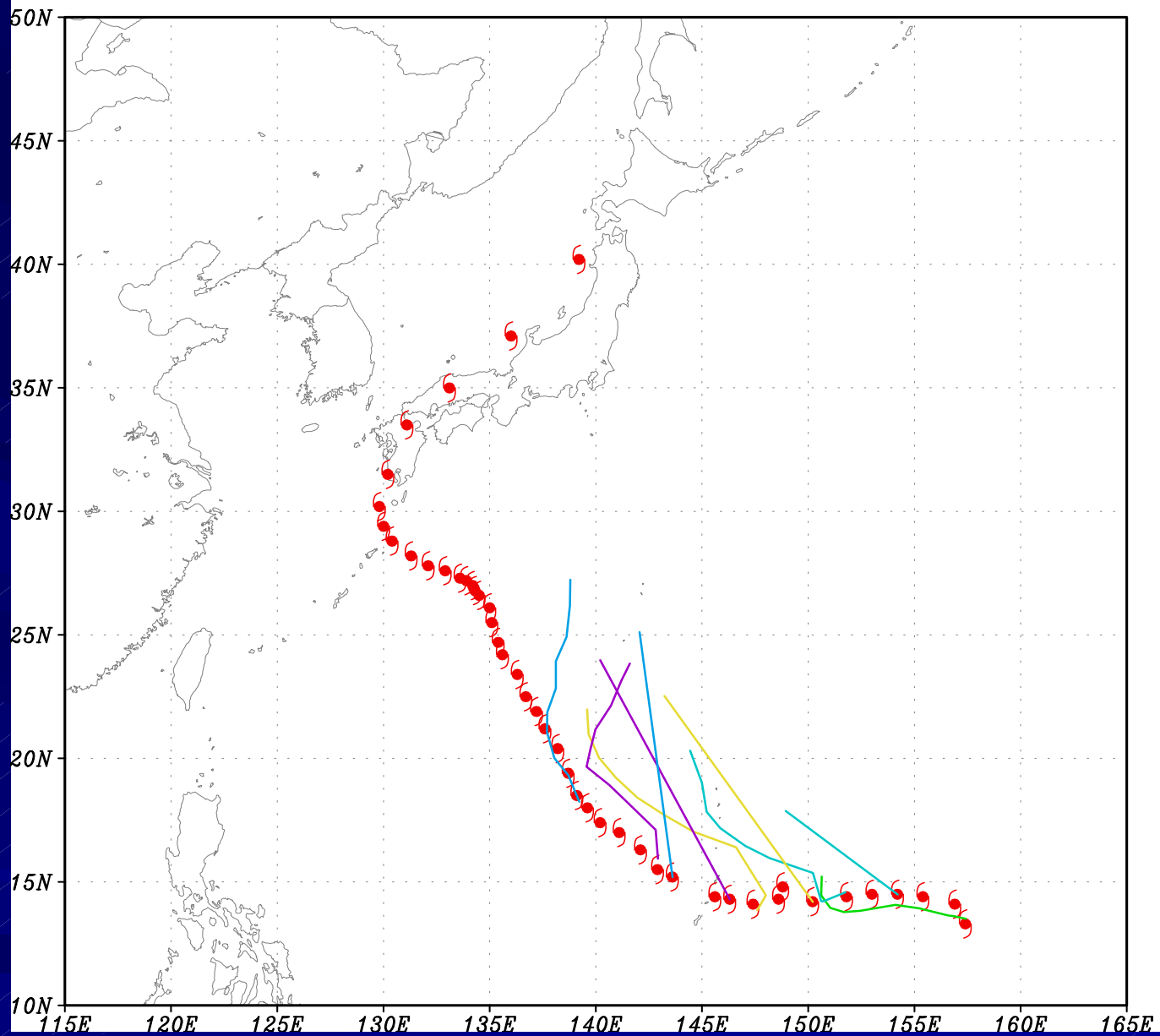




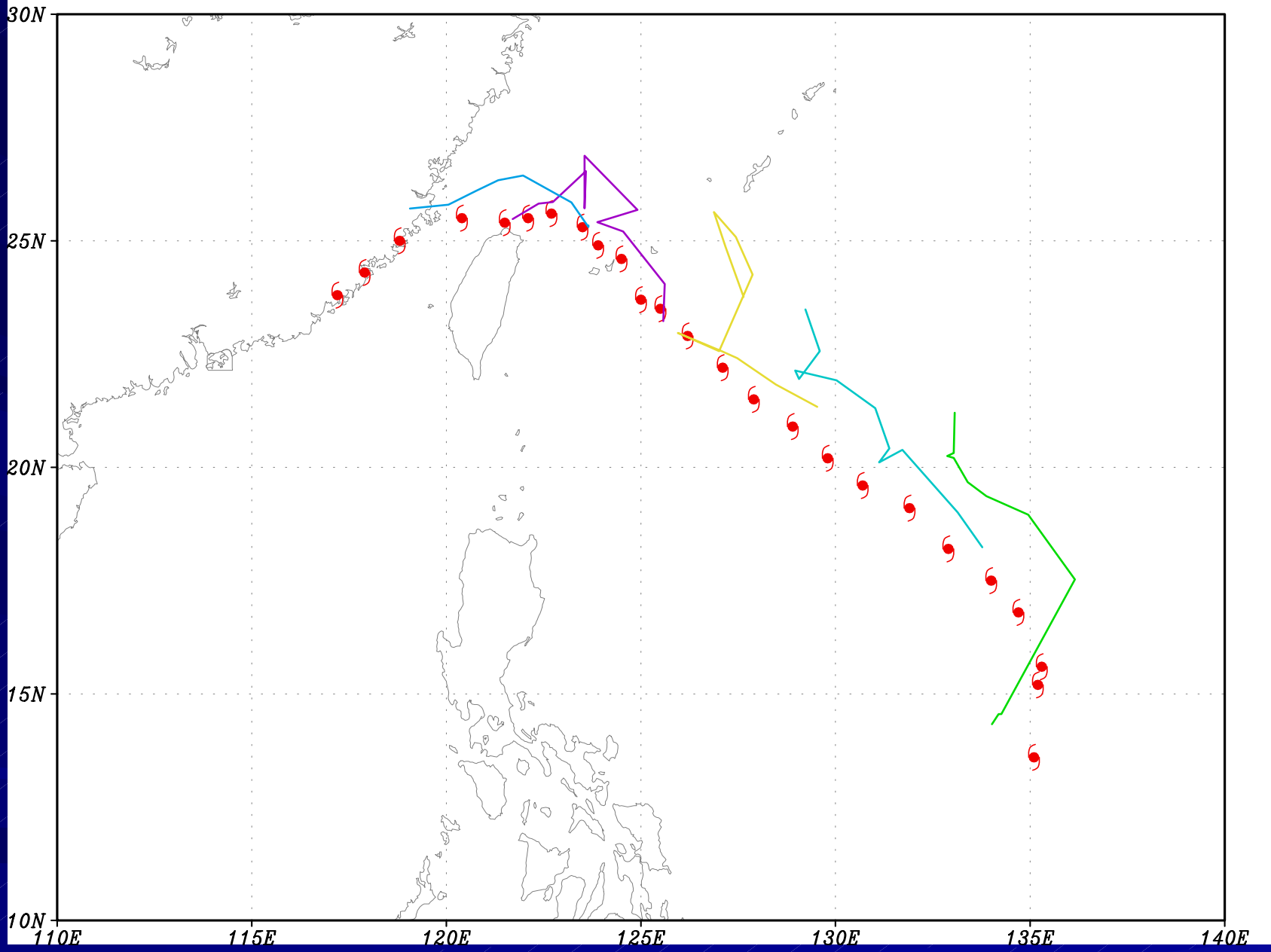
TC(0408)



TC(0416)

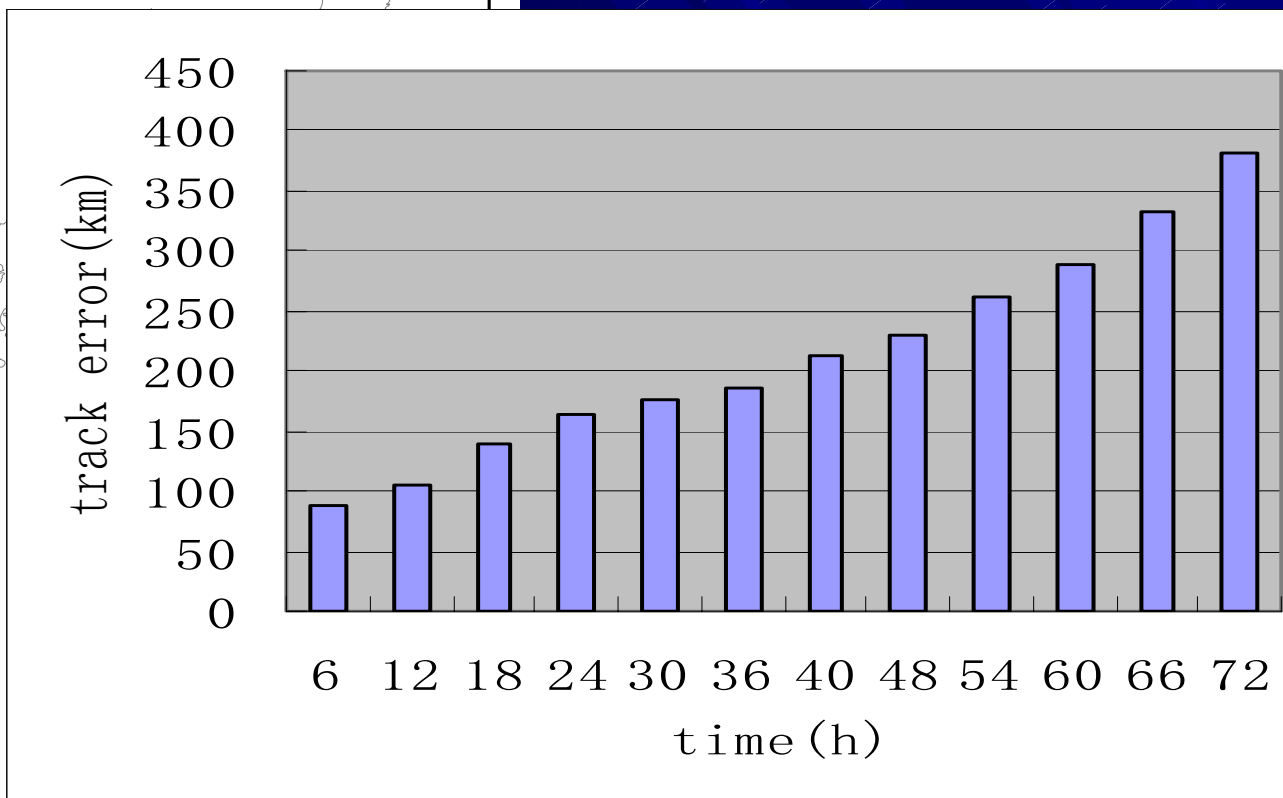
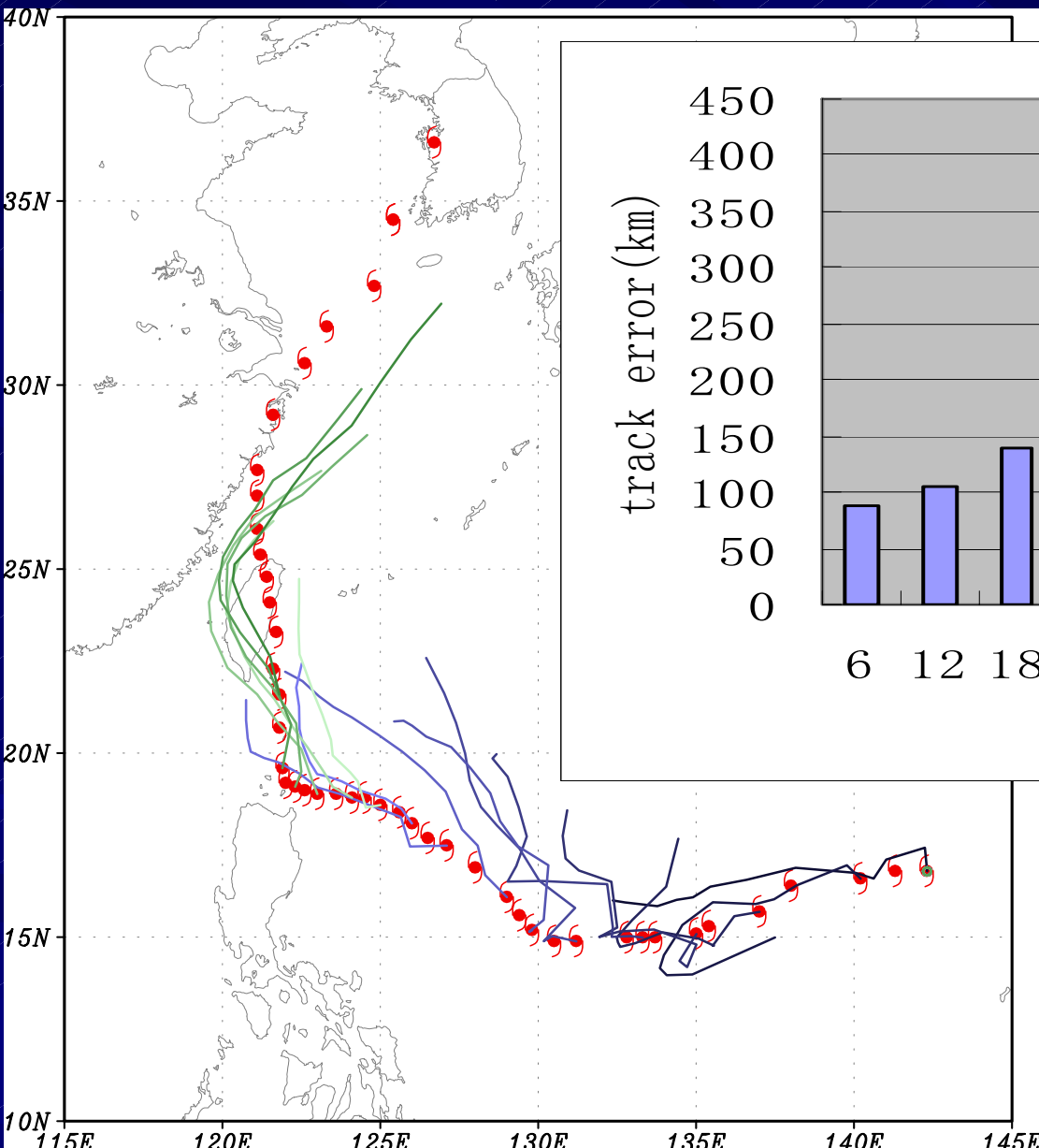


TC(0417)

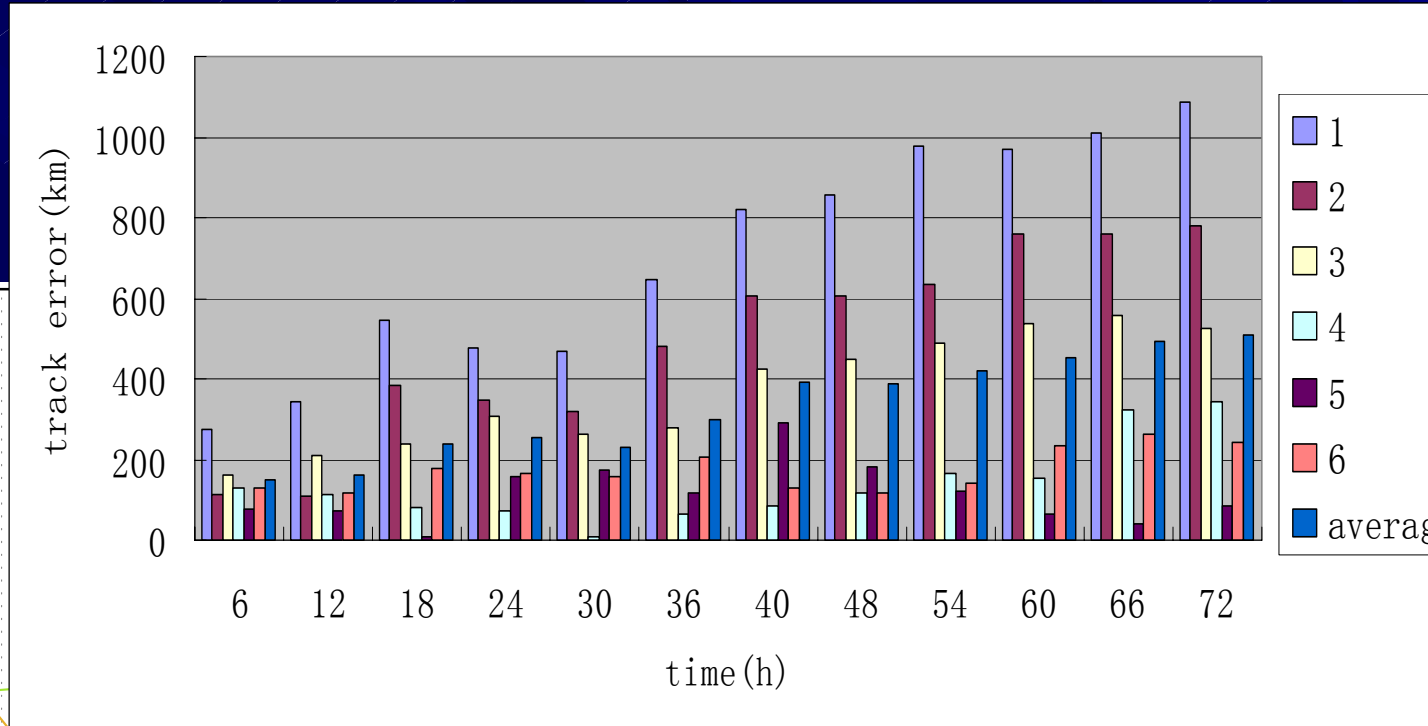
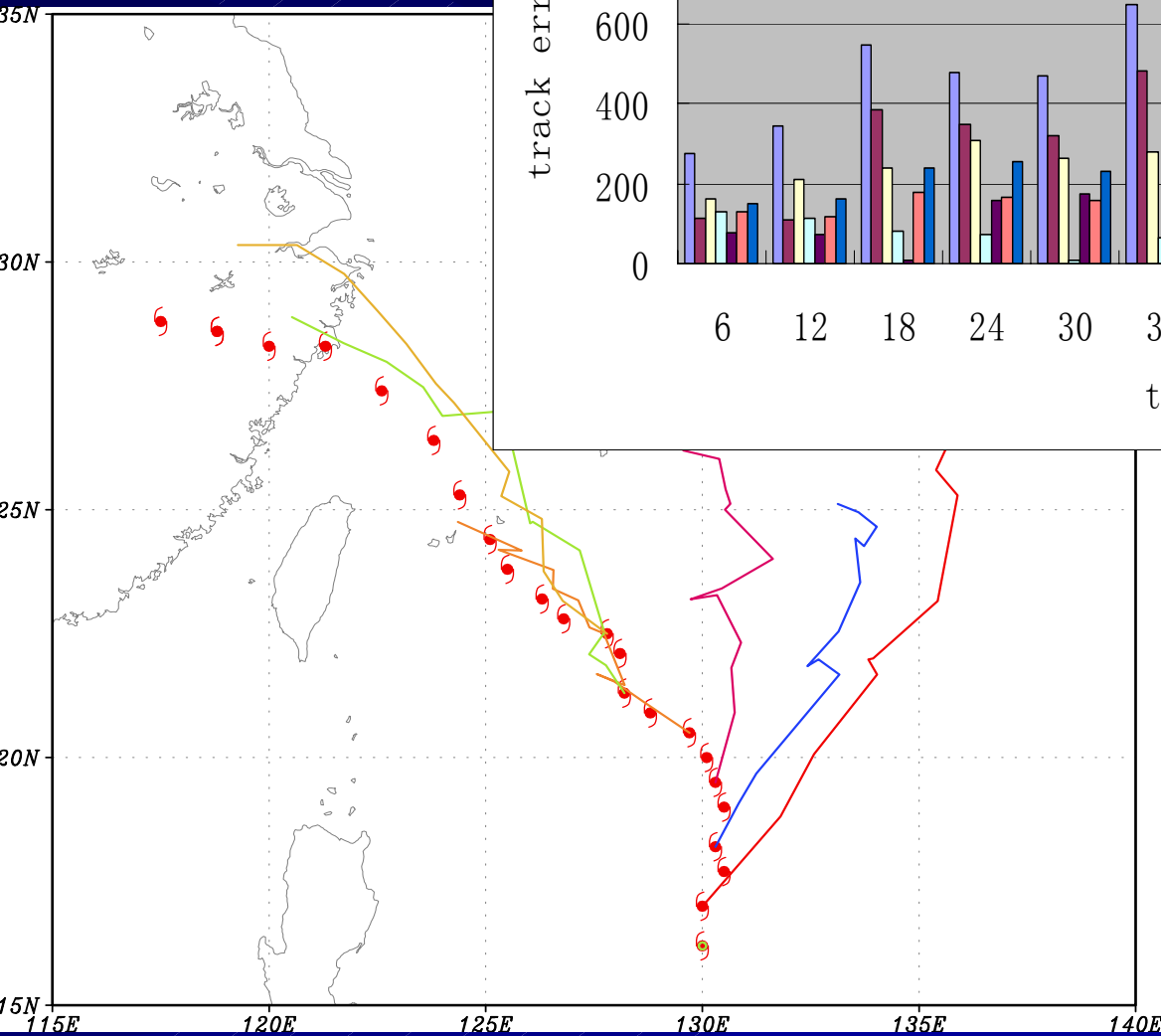


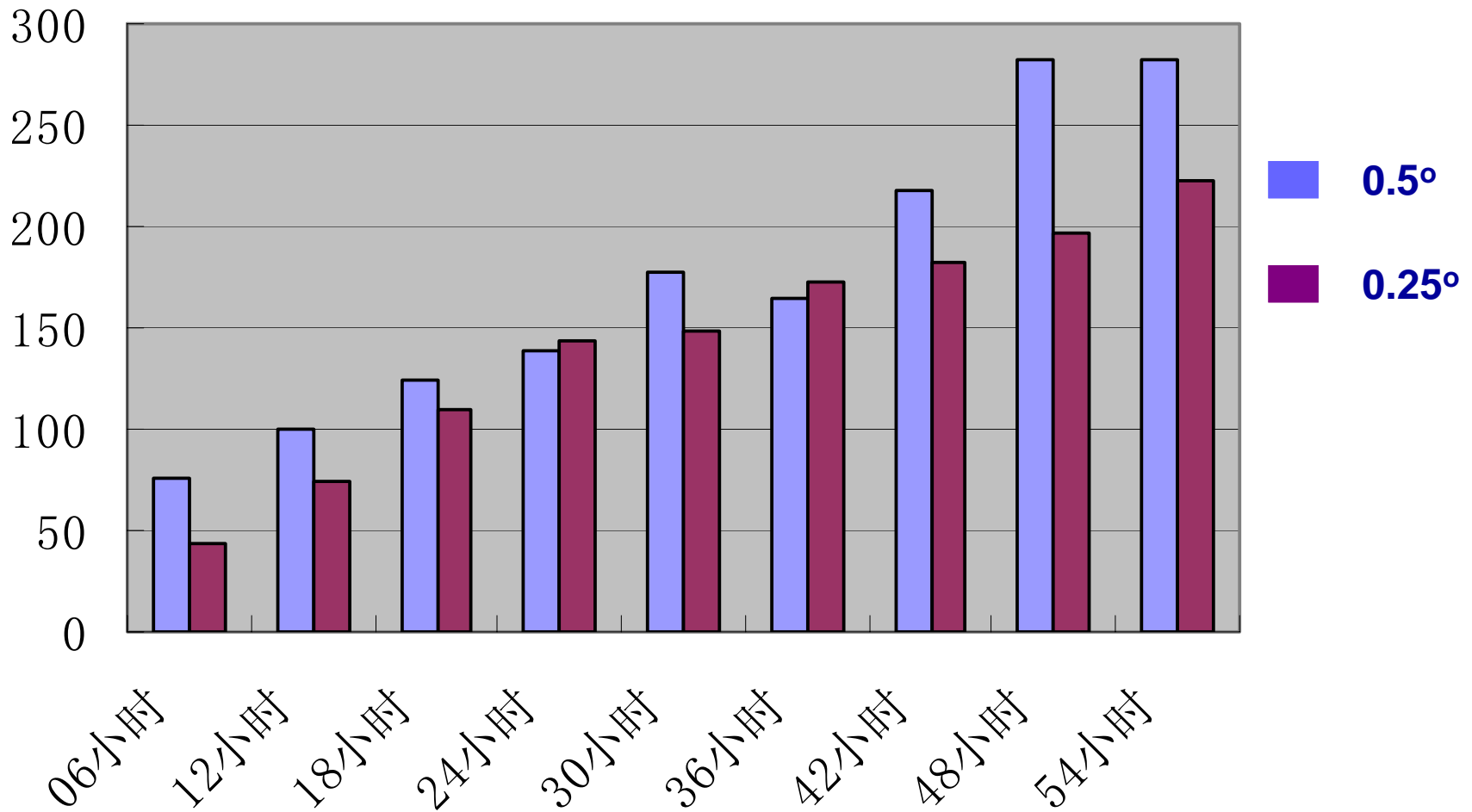
TC(0418)

Case Midule(0407) track prediction (every 12 h)



Case Rananim(0414) track prediction (every 12 h)





The effect of resolution of model on the accuracy of TC track (total of 14 cases occurred in 2004)

Can it work as an operational model?

- **A relatively steady forecast of TC track**
- **Integral for 48h cost about 1 hour**
 - Parallel compute, 4 CPU
- **Persistent support by CMA?**

Works for GRAPES_TCM next year

- Study the result and evaluate the performance of GRAPES in TC track numerical prediction system further
- Modify the BOGUS scheme to fit for the Model
- Establish GRAPES_TCM operational system
- Quasi-operational run in 2005 typhoon season.

Future Work for GRAPES_TCM

- **To improve GRAPES_TCM's initial field with GRAPES_3D or 4D**
- **To develop a new boundary layer and convective parameter scheme that fit for GRAPES_TCM**
- **To evaluate the capability of the prediction for the distribution of wind and rainfall**

Thank you
for your attention