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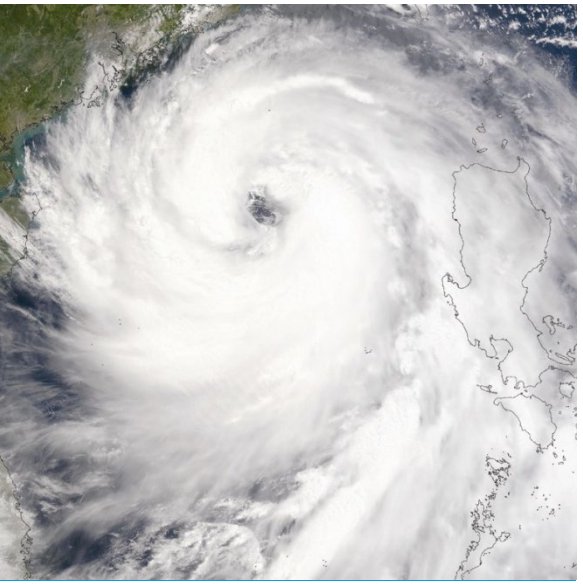

Dynamical Seasonal Prediction of Landfalling Tropical Cyclone Activity in East Asia

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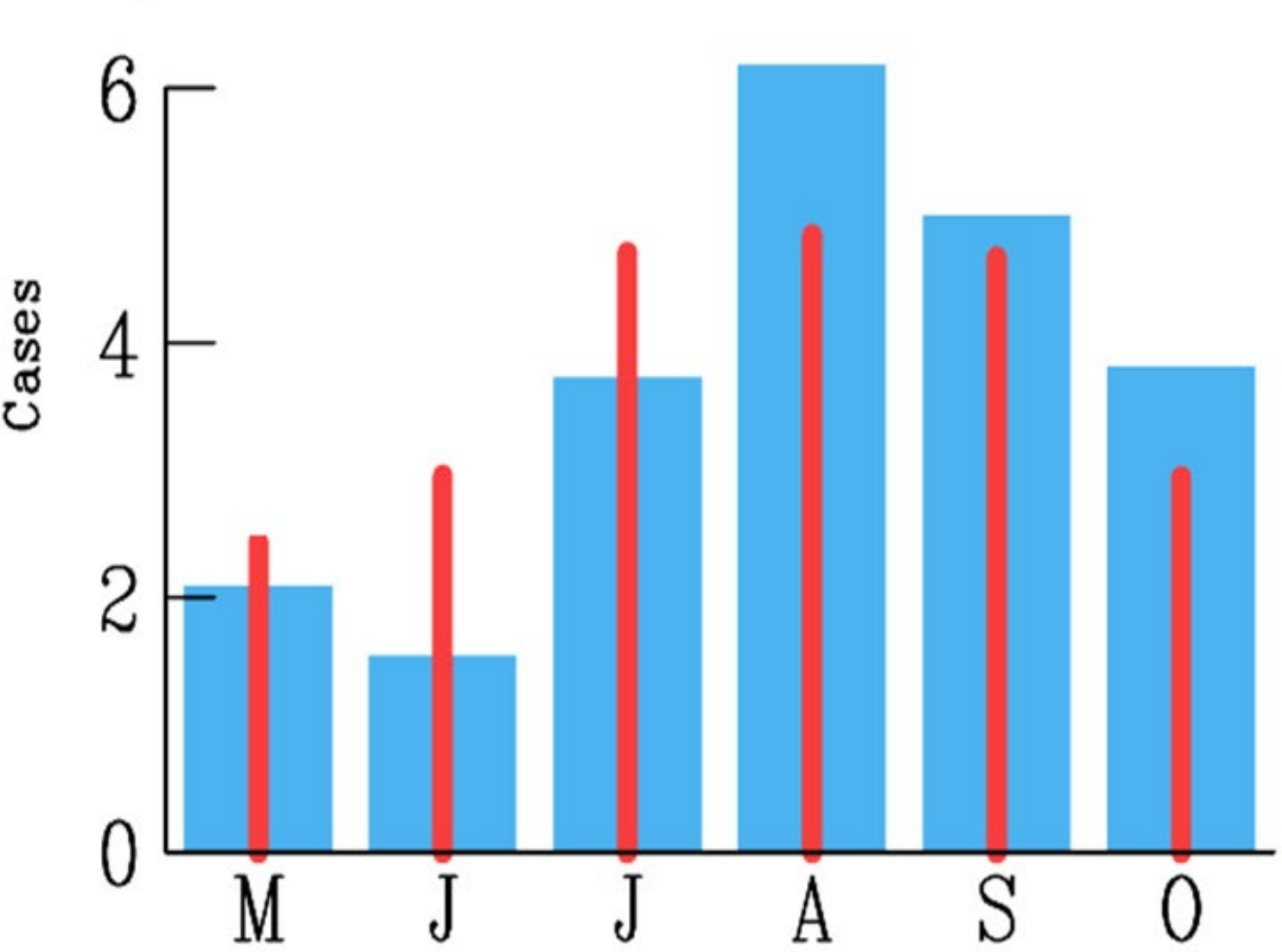
Outline

- Model description
- Model hindcasts
- Forecast verifications: 2016-2021
- Predicting seasonal landfall intensity
- Summary

The model

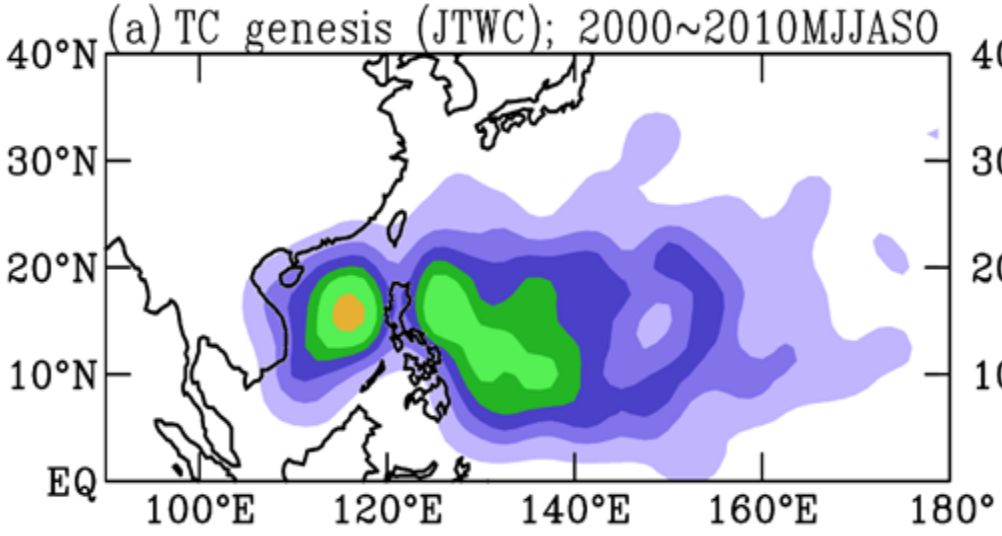
- **ICTP Regional Climate Model version 3**
  - Modified Emanuel cumulus scheme (Chow et al. 2006)
  - Vorticity & RH limitations
- Domain: 90^{o}E-170^{o}W, 14^{o}S-48^{o}N
- Resolution: 50 km
- 18 levels up to 1 hPa
- 8 ensemble members:
  initial time at 01Z00/06/12/18 and 02Z00/06/12/18 of the first month
- Integration for 7 months, with first month as spinup
- Initial and boundary conditions:
  - NCEP CFS hindcasts
  - NCEP CFS predictions

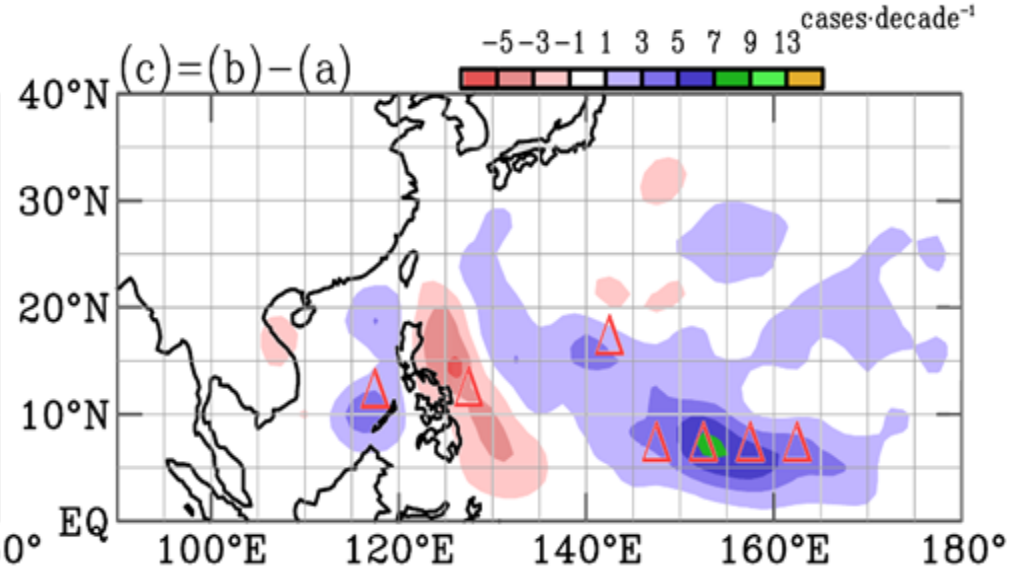
Hindcasts of TC numbers (2000-2010)

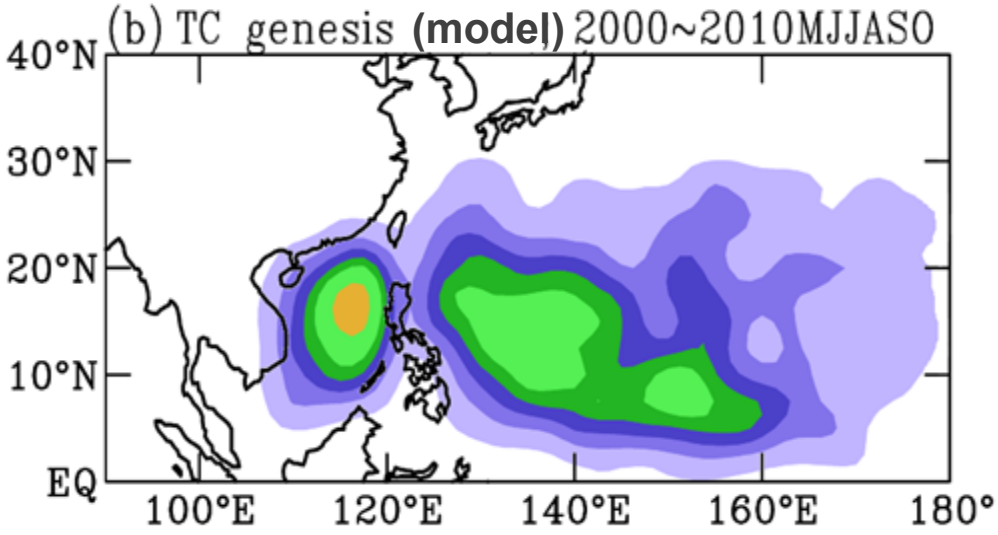


Total number per MJJASO season:
model: 22.54
obs: 22.36

Hindcasts of Spatial Distribution (2000-2010)



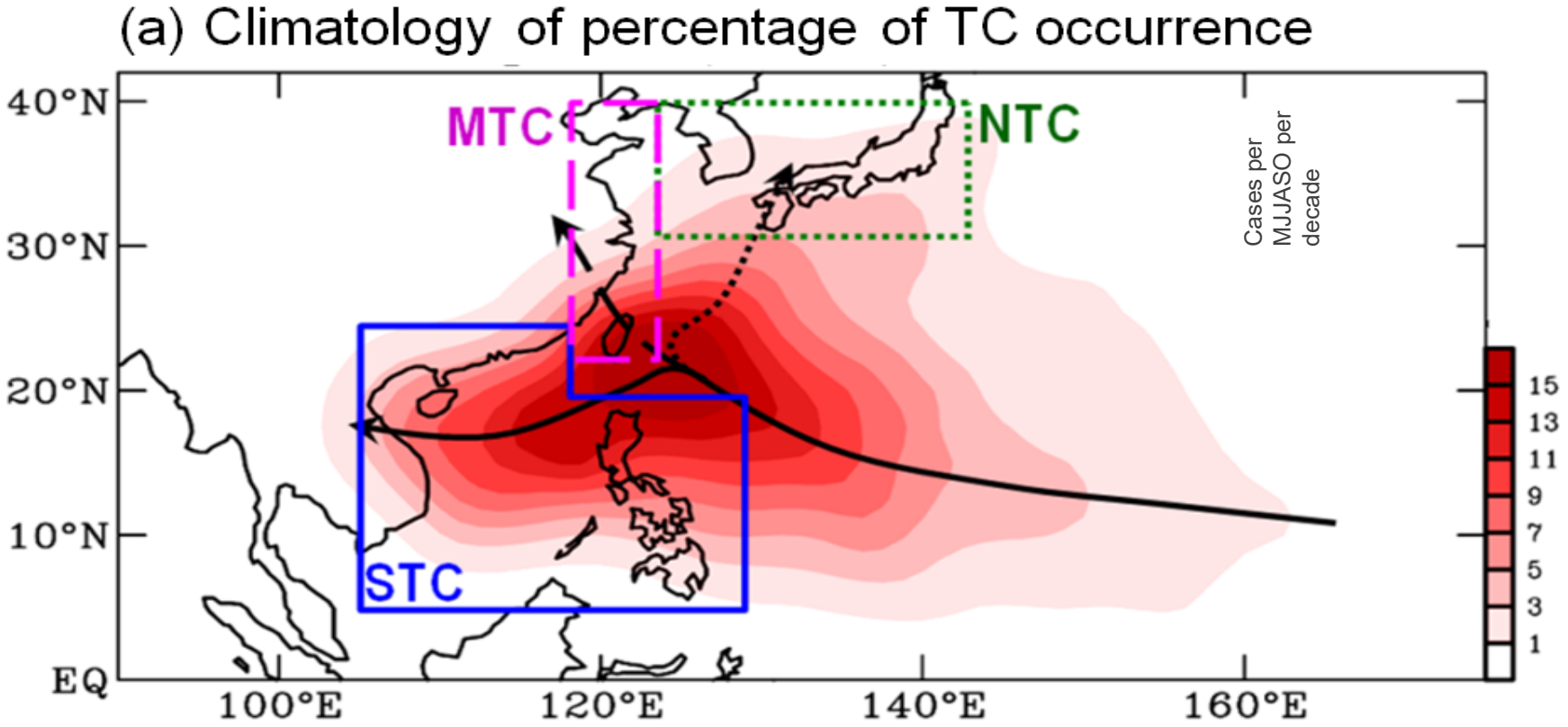




△ **significant at the 95% confidence interval**

TC Landfall

Chan and Xu (2009)



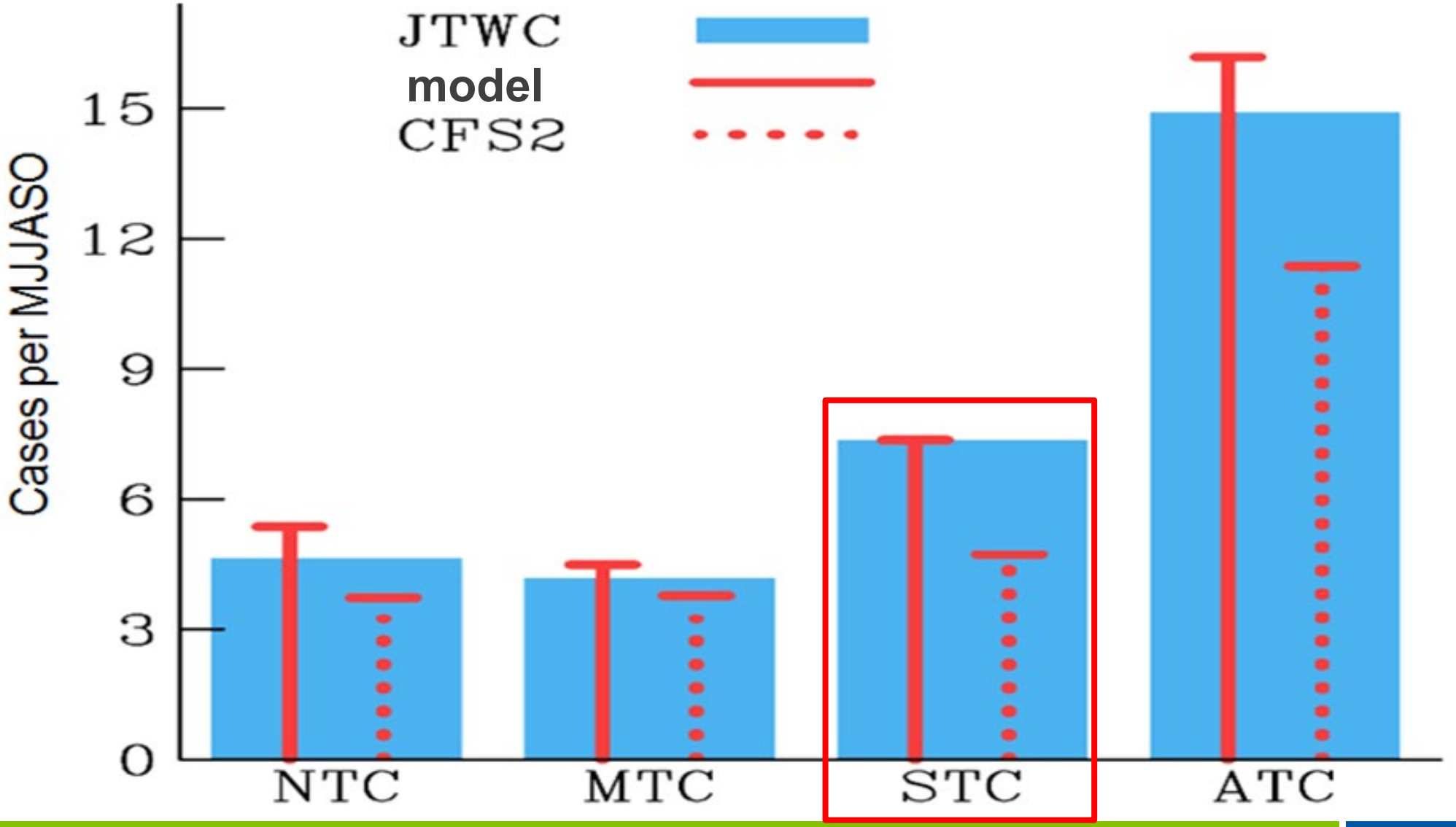
South TCs (STC) – TC landfall in South China, Vietnam and the Philippines

Middle TCs (MTC) – TC landfall in East China

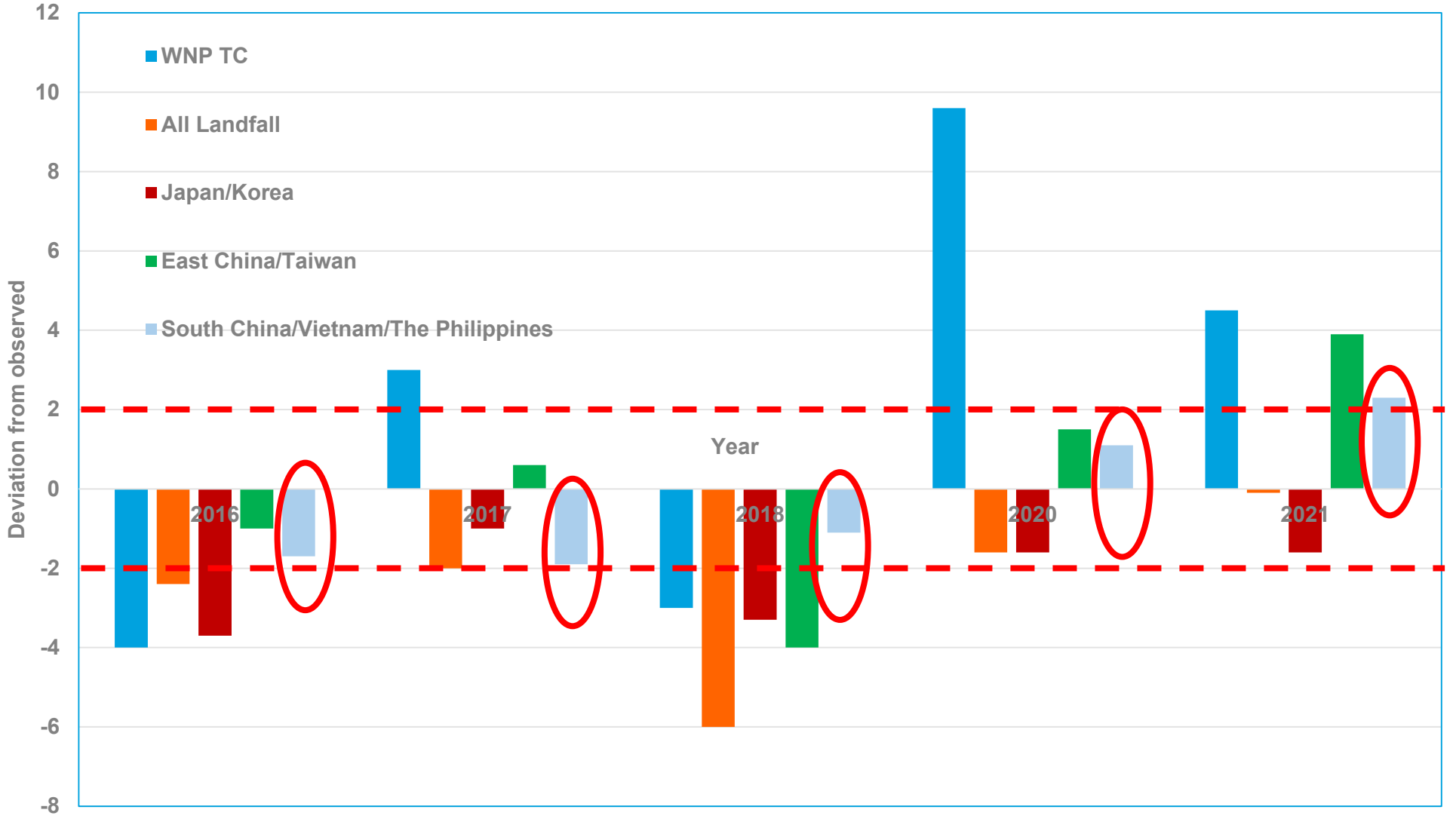
North TCs (NTC) – TC landfall in the Korean peninsula and Japan

All TC (ATC) – the total number of landfalling TCs in Asia

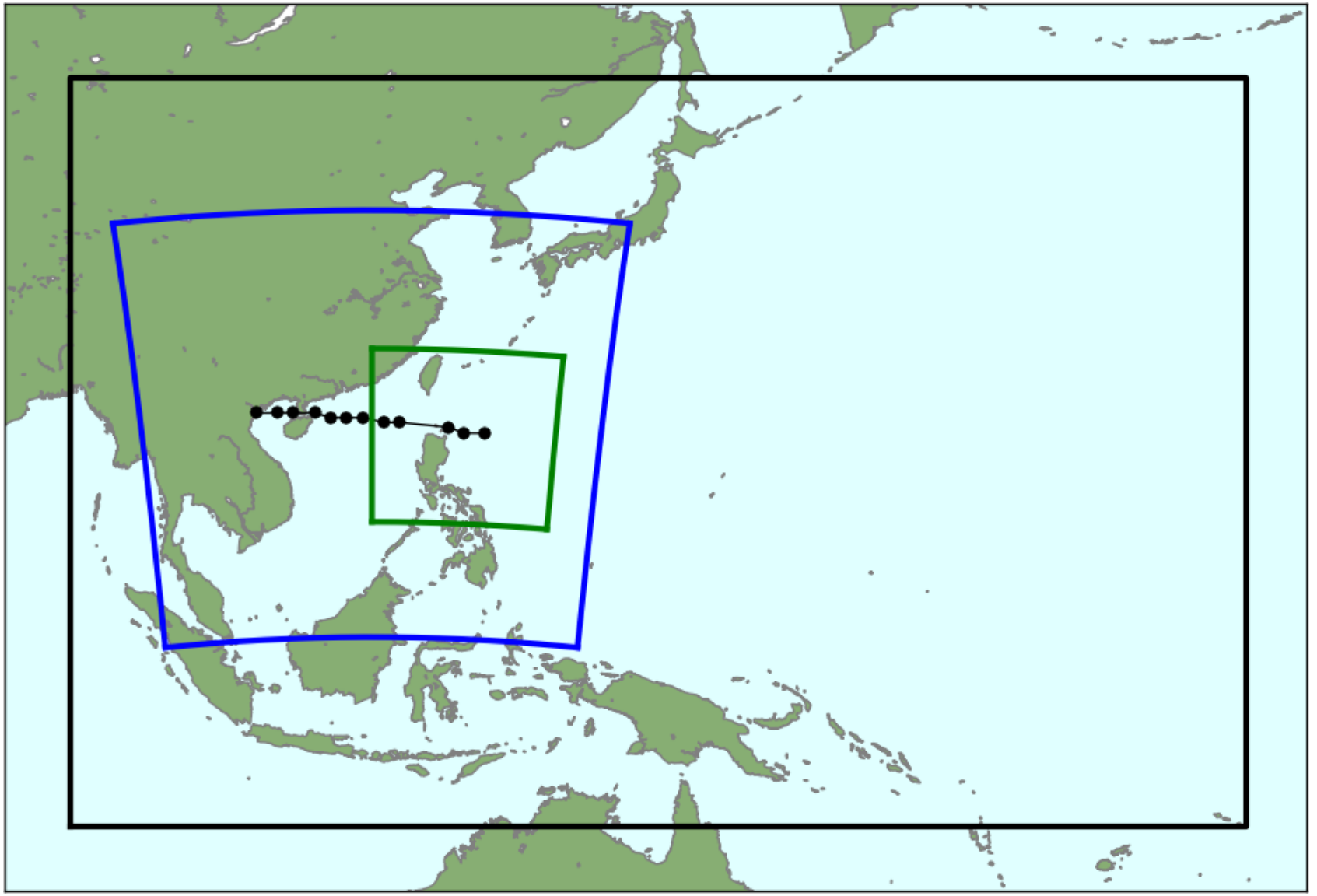
Hindcasts of TC Landfall (2000-2010)



2016-2021 Real-time Forecasts and Verification



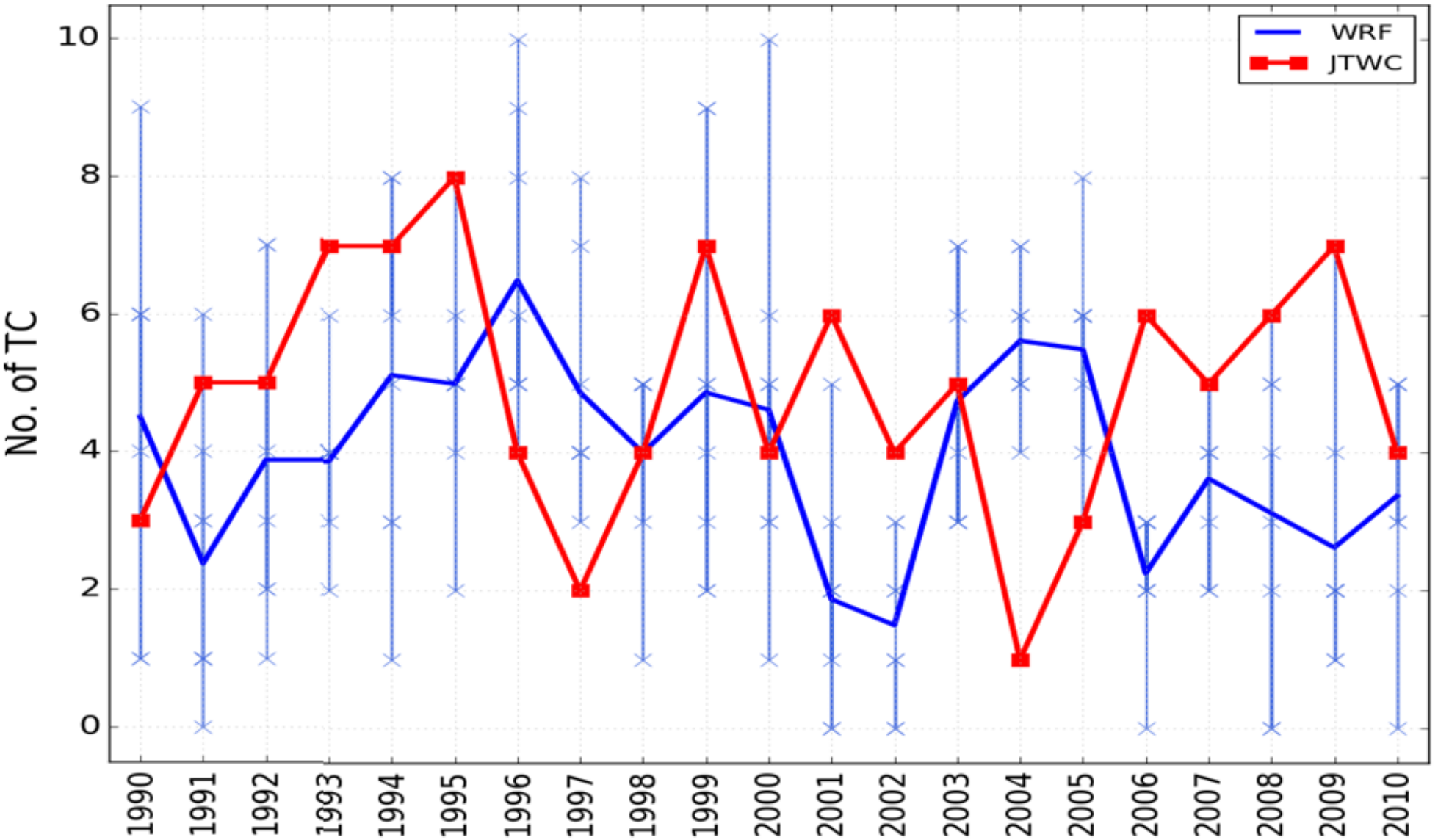
Predicting seasonal intensity



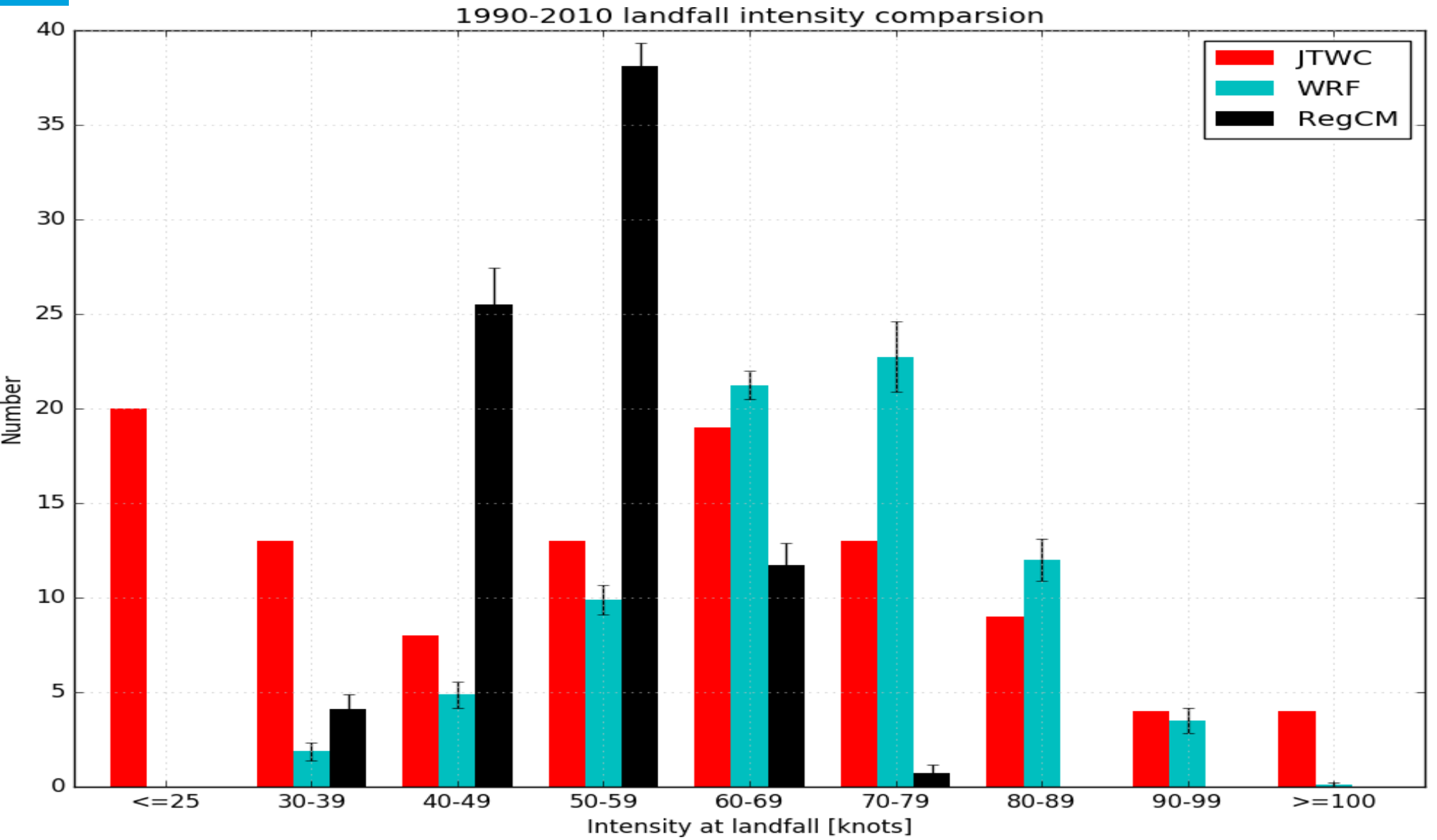
Predicting seasonal intensity

- Estimate the intensity at landfall and calculate the PDI (= V^3)
- Calculate the mean PDI for the season by summing up the PDI for each landfalling TC and dividing by the number of landfalling TCs

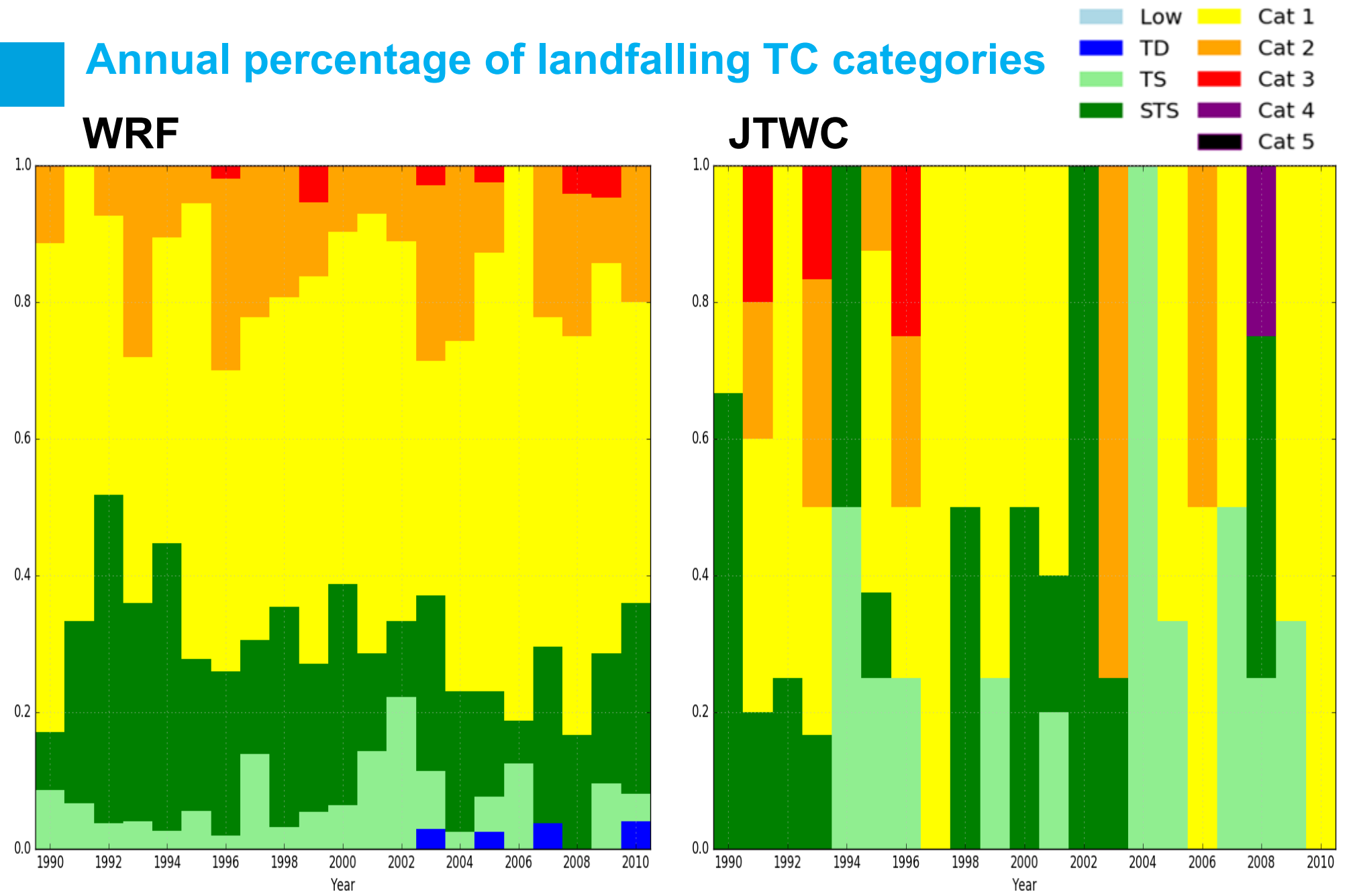
Annual number of landfalling TC along South China coast



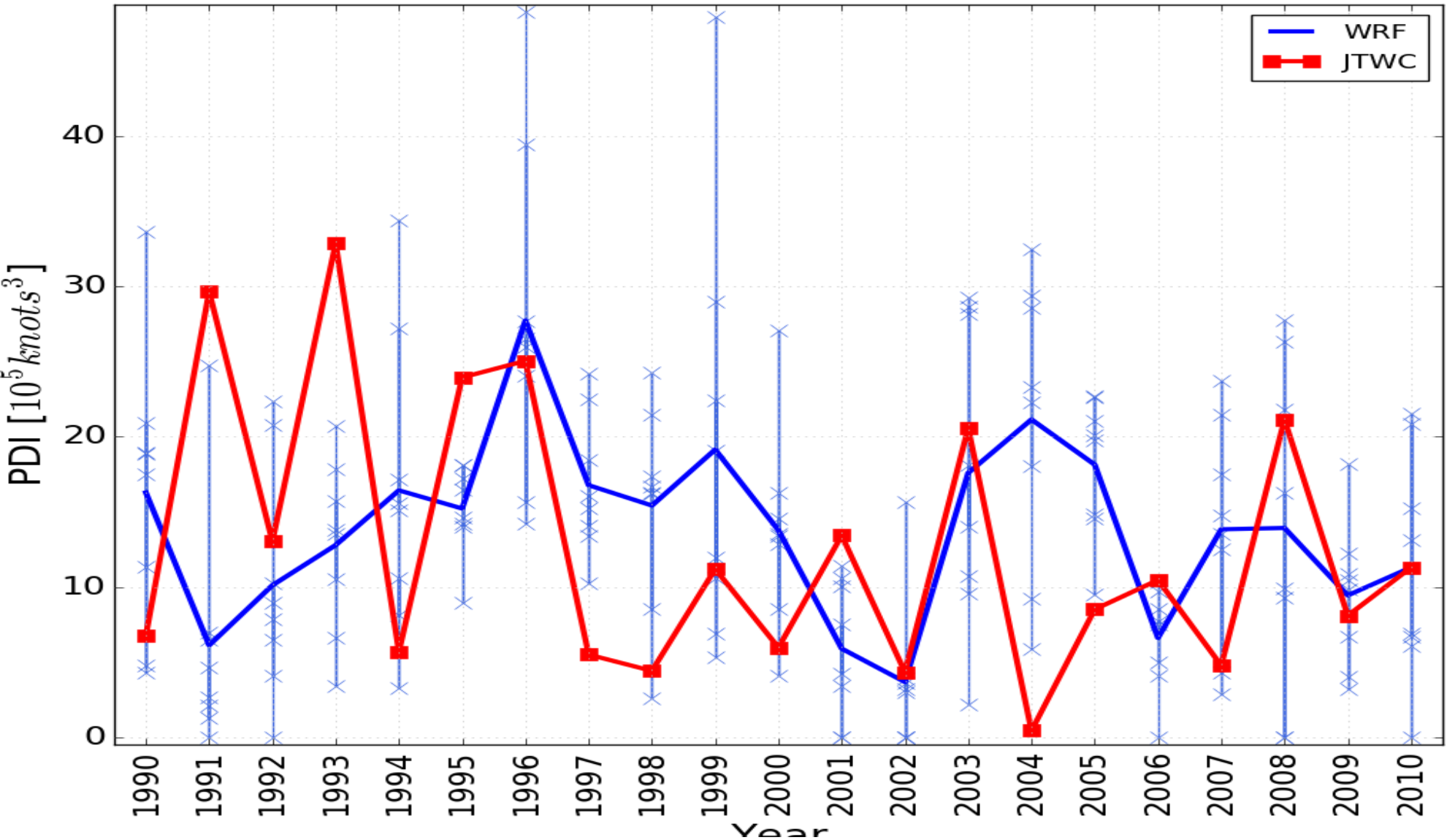
Distributions of TC intensity at landfall (1990-2010)



Annual percentage of landfalling TC categories



Annual PDI at TC landfall



Summary

- Dynamical seasonal forecasting of tropical cyclone (TC) activity appears to be promising, especially for the frequency of landfalling TCs
- However, the model might need to be “tuned” for different regions because of the possible difference in physical processes such as convection.
- Increasing the horizontal resolution could enable the forecasting of the average intensity of landfalling TCs
- As the TC circulation interacts with the ocean, further improvements in the prediction may come from air-sea coupled models