#### Earth Sciences Summer Student Program

# The Dependence of Future Projected Changes in Tropical Cyclones to the Tropical Cyclone Detection and Tracking Criteria

熱帶氣旋偵測與軌跡訂定方法與使用參數對未來推估熱帶氣旋變化的影響

Supervisor:

Primary supervisor: Prof. Cheng-Ta Chen (NTNU, Department of Earth Sciences)

### **Project description:**

The majority of current approaches for using dynamical model to project the impact of climate change on the tropical cyclone (TC) activities involved the detection and tracking of TC-like vortices simulated in the model. Although typically the detection and tracking schemes used the common structure and environmental conditions associated with TCs as their objective criteria, there are thresholds and specifications needed to be adjusted to the model characteristics to make the statistics of TC climatology in the model comparable to the observational TC archives. The guestion remained on how reliable are these schemes. Can one just simply tune the various thresholds used in the schemes to obtain better model TC statistics? What are the influences from individual criteria and thresholds? Can the same scheme applied to different model simulations. If the tunable thresholds are resolution dependent, what are the proper spatial scaling factors to use? Fundamentally the answer relies on testing the schemes to a reliable high resolution meteorological analyses that can resolve TC activities. Unfortunately the scale of TC and limited observational data prevent the availability of such data. The aim of study is to develop a methodology to test the reliability of TC detection and tracking algorithm using reanalysis data first. How sensitive the hit and false alarm rates against best track archive to the thresholds and criteria will be analyzed and formulate a standard procedure to facilitate the comparison of TC simulation results from different models. The dependence of future projected changes in TC activities by CMIP5 climate models to the TC detection and tracking criteria will be examined.

#### Preferred background of student candidates:

- Senior or Junior students with good English skills are both welcome.
- Strong knowledge/experience in computers (linux system) is essential.
- Good programming skills would be a plus.

## Stipend during the research period (summer 2015) would be NT\$ 20,000 per month for July and August.