Geophysical Research Abstracts
Vol. 19, EGU2017-12847, 2017
EGU General Assembly 2017

Tropical cyclones-Pacific Asian Research Campaign for Improvement of Intensity estimations/forecasts (T-PARCII): A research plan of typhoon aircraft observations in Japan

Kazuhisa Tsuboki
Institute for Space-Earth Environmental Research (ISEE), Nagoya University, Nagoya, Japan (tsuboki@nagoya-u.jp)

Typhoons are the most devastating weather system occurring in the western North Pacific and the South China Sea. Violent wind and heavy rainfall associated with a typhoon cause huge disaster in East Asia including Japan. In 2013, Supertyphoon Haiyan struck the Philippines caused a very high storm surge and more than 7000 people were killed. In 2015, two typhoons approached the main islands of Japan and severe flood occurred in the northern Kanto region. Typhoons are still the largest cause of natural disaster in East Asia. Moreover, many researches have projected increase of typhoon intensity with the climate change. This suggests that a typhoon risk is increasing in East Asia. However, the historical data of typhoon include large uncertainty. In particular, intensity data of the most intense typhoon category have larger error after the US aircraft reconnaissance of typhoon was terminated in 1987.The main objective of the present study is improvements of typhoon intensity estimations and of forecasts of intensity and track. We will perform aircraft observation of typhoon and the observed data are assimilated to numerical models to improve intensity estimation. Using radars and balloons, observations of thermodynamical and cloud-microphysical processes of typhoons will be also performed to improve physical processes of numerical model.

In typhoon seasons (mostly in August and September), we will perform aircraft observations of typhoons. Using dropsondes from the aircraft, temperature, humidity, pressure, and wind are measured in surroundings of the typhoon inner core region. The dropsonde data are assimilated to a cloud-resolving model which has been developed in Nagoya University and named the Cloud Resolving Storm Simulator (CReSS). Then, more accurate estimations and forecasts of the typhoon intensity will be made as well as typhoon tracks. Furthermore, we will utilize a ground-based balloon with microscope camera, X-band precipitation radar, Ka-band cloud radar, aerosol sonde, and a drone to observe typhoon-associated clouds and precipitation. After a test flight in March 2017, typhoon observations will be made for next 4 years; 2017-2020. The main target area of observation is the south of Okinawa where a typhoon reaches the maximum intensity and often changes its moving direction.

This research will advance aircraft observation technique of typhoon in Japan. The aircraft observation will be a breakthrough to improve typhoon intensity estimations. Assimilation of the aircraft observation data to the cloud-resolving model will improve intensity estimations and forecasts of typhoons. This is the first step for the future advanced aircraft observation and will contribute to prevention or reduction of typhoon disasters.