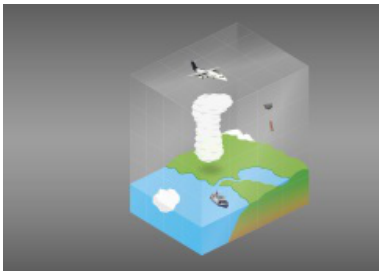

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Analysis and forecast using dropsonde data from inner-core region of tropical cyclones obtained during the aircraft missions of T-PARCII

Tuesday, 11 June 2019 17:30 (30 minutes)

The inner core of tropical cyclone (TC) Lan was observed on 21-22 October 2017 by newly developed GPS dropsondes during the aircraft missions of the Tropical Cyclones-Pacific Asian Research Campaign for the Improvement of Intensity Estimations/Forecasts (T-PARCII). On 25-28 September 2018, the inner core of TC Trami was also observed by T-PARCII team with the support of Science and Technology Research Partnership for Sustainable Development (SATREPS). So far, the eyewalls were penetrated nine times with a Gulfstream II jet and 90 dropsondes were dropped from 43,000 ft. The estimated minimum sea-level pressure was 925 hPa in the aircraft missions for TC Lan, while it was 920 hPa for TC Trami. From 2018, we started to transmit the BUFR data on GTS through Japan Meteorological Agency (JMA). To evaluate the impact of dropsondes on forecast skill, the forecast experiments were conducted using a JMA non-hydrostatic model (JMA-NHM) with a JMANHM-based mesoscale four-dimensional data assimilation system with a grid-spacing of 5 km for TC Lan. Then, we evaluated the forecast skill against the best track data published by the Regional Specialized Meteorological Center (RSMC) Tokyo. Track and heavy rainfall forecast skills generally improved by about 10 % with the assimilation of the dropsonde data, while the intensity forecasts were generally degraded. The degeneration of the intensity forecast skill is, however, potentially due to uncertainties in the best track data as the best track data set usually relies on the Dvorak technique involving the error of the order of 10 hPa. The benefits of inner-core observations described are encouraging, yet at the same time they remind us of the importance of the ground truth in the researches of TC forecasting. Other relevant researches including the assimilation with a JMA global data assimilation system and sensitivity analysis will be also presented.

Primary authors: ITO, Kosuke (University of the Ryukyus); Prof. YAMADA, Hiroyuki (University of the Ryukyus); Dr YAMAGUCHI, Munehiko (Meteorological Research Institute, Japan Meteorological Agency); Dr NAKAZAWA, Tetsuo; NAGAHAMA, Norio (Meisei Electric Co., LTD.); SHIMIZU, Kensaku (Meisei Electric Co., LTD.); Dr OHIGASHI, Tadayasu (National Research Institute for Earth Science and Disaster Resilience); Prof. SHINODA, Taro (Nagoya University); Prof. TSUBOKI, Kazuhisa (Nagoya University); Prof. TAKAHASHI, Yukihiro (Hokkaido University); Prof. KUBOTA, Hisayuki (Hokkaido University)

Presenter: ITO, Kosuke (University of the Ryukyus)

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