[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

[A-AS03]Advances in Tropical Cyclone Research: Past, Present, and Future

convener:Masuo Nakano(JAMSTEC Japan Agency for Marine-Earth Science and Technology), Akiyoshi Wada(Typhoon Research Department Meteorological Research Institute), Sachie Kanada(名古屋大学宇宙地球環境研究所, 共同), Kosuke Ito(University of the Ryukyus)

Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Tropical cyclones (TCs) often bring torrential rainfall, gale, storm surge, and high surf that sometimes cause tremendous disasters. Therefore, understanding such phenomena associated with translation, intensity change, and precipitation of TCs and their accurate forecasts are important in the earth and planetary science. In addition, changes in the number and intensity of TCs due to global climate changes have been extensively studied by various approaches such as data rescue, data analyses, and climate modelling. Especially in 2017, Typhoon Talim made landfall on all of four major islands of Japan first ever since 1951 and Typhoon Noru had a strange track. In the Northern Atlantic, Hurricanes Harvey, Irma and Maria caused tremendous damage in U.S.

Advances in innovative observations such as Himawari-8,9, unmanned drone, meteorological aircraft reconnaissance and supercomputers such as the earth simulator and K-computer have led to novel development of numerical weather forecasting and understanding of the phenomena due to the improvement of numerical modelling.

In this session, we welcome papers on various aspects of TC studies. We hope that the session will provide new direction for future TC research activity.

[AAS03-P06]Future Enhancement of Heavy Rainfall Events Associated with a Typhoon in the Midlatitude Regions

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Keywords:Typhoon, Heavy Rainfall, Future Change

In August 2016, eastern Hokkaido in northern Japan had unusual typhoon landfalls (TY1607, TY1609 and T1611, Fig. 1) and experienced heavy rainfall events that caused severe disasters. To understand the impact of global warming on typhoon-related rainfall in such midlatitude regions, numerical experiments on one of the typhoons in August 2016, Typhoon Chanthu (TY1607), were conducted by using a high-resolution three-dimensional atmosphere–ocean coupled regional model in current and pseudo-global warming (PGW) climates. The model used in the study is a high-resolution three-dimensional atmosphere–ocean coupled regional model composed of the Cloud Resolving Storm Simulator version 3.4.1 (CReSS; Tsuboki and Sakakibara 2002) for the atmospheric part and the Non-Hydrostatic Ocean model for the Earth Simulator (NHOES; Aiki et al. 2006, 2011) for the oceanic part. The coupled model is referred to as CReSS–NHOES (Aiki et al. 2015). The horizontal domain of the coupled model spans 132°E–155°E and 25°N–50°N (Fig. 1), and is discretized with a grid spacing of 0.04° by 0.04°.The PGW simulations were conducted by the same procedure as in Kanada et al. (2017). The amount, intensity, and duration of rainfall in eastern Hokkaido associated with the typhoon increased in the warming climate. Due to the reduction of baroclinicity which led to a weakening of the jet streak along Japan, the PGW typhoon traveled northward with relatively slower translation speed and resulted in a delay in the landfalls for 6 h. Furthermore, large

amounts of near-surface water vapor >22 g kg$^{\–1}$ from the southern sea increased the convective instability around eastern Hokkaido and caused tall and intense updrafts. As a result, significant predecessor rainfall events with intense rainfall developed about 24 h before the typhoon landfall. Increased near-surface water vapor in the warming climate also enhanced rainfall associated with the typhoon passage over a widespread area. These results suggest that attention should be paid to future enhancement of heavy rainfall events in the midlatitude regions under global warming.