

[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)

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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-P05]Relation of convective bursts to changes in the intensity of typhoon Lionrock (2016) simulated by an atmosphere-wave-ocean coupled model

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Keywords:Convective burst, Typhoon, Atmosphere-wave-ocean coupled model

Typhoon Lionrock (2016) made landfall in northern Japan for the first time since the start of statistics in 1951. One of interesting events was occurrence of consecutive deep convections (convective bursts: CBs) before making landfall on 31 August. Lionrock could maintain its intensity although storm-induced sea surface cooling (SSC) was induced by Lionrock along the track. To examine the role of CBs in changes in the intensity of Lionrock under the condition of the occurrence of SSC, numerical simulations were conducted with a 3-km-mesh coupled atmosphere-wave-ocean model. CBs were defined as upward vertical velocity greater than 7 m/s in the mid-to-upper troposphere. The coupled model successively simulated CBs occurred in the northern side of the near-surface convergence area, which was formed by the confluent of near-surface spiral inflow due to surface friction with tangential winds while keeping relatively fast translation and an asymmetric structure. Lower tropospheric horizontal and upward moisture fluxes became locally enhanced around the convergence area although storm-induced SSC reduced air-sea latent heat in the inner core of the storm. The upward moisture fluxes led to increases in condensational heating on the upstream (moving direction) side in the mid-to-upper troposphere by active CBs. This resulted in increases of pressure gradient forces on the upstream side in the lower troposphere. This helped maintain maximum wind speeds and central pressure even under the condition of the occurrence of SSC during the decay phase. From sensitivity experiments, an asymmetric storm with a relatively fast translation in mid-latitude is expected to

rapidly increase maximum wind speed near the sea surface on the upstream side under a favorable oceanic condition because vertical moisture fluxes and the number of CBs could increase around a surface frictional convergence area. The number and distribution of CBs are sensitive to oceanic environmental conditions and are considered to play an important role in the storm-track simulation as well as the maximum surface winds.