Oral | Symbol A (Atmospheric, Ocean, and Environmental Sciences) | A-CG Complex & General

[A-CG37_28AM2]Multi-scale ocean-atmosphere interaction in the tropics

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Mon. Apr 28, 2014 11:00 AM - 12:31 PM 423 (4F)

El Nino/Southern Oscillation, Indian Ocean Dipole, Atlantic Nino, and Atlantic Meridional Mode are ocean-atmosphere interaction phenomena in the tropics. These phenomena have interannual timescales of two- to seven-year periods. It has been pointed out that they are related to various phenomena of shorter (e.g., intraseasonal) and longer (e.g., quasidecadal, multidecadal to long-term trend) timescales as well as phenomena of various spatial scales. In addition to interactions among the tropical phenomena, links with atmospheric and oceanic variations in mid to high latitudes have been discussed in past studies. These phenomena strongly affect weather, climate, and climate variations over the globe including those in Japan. To enhance our understanding of tropical ocean-atmosphere interactions and other related phenomena, cooperation between various fields (meteorology, oceanography, climatology, etc.) needs to be strengthened. This session aims to give an opportunity for researchers of atmosphere and ocean to present results on phenomena on various spatial and temporal scales, including tropical ocean-atmosphere interactions on interannual timescales, Madden-Julian Oscillation (MJO), tropical cyclones (typhoons), quasi-decadal to multi-decadal variations, climate change and other related phenomena, so that researches on tropical multi-scale ocean-atmosphere interactions are promoted. We welcome submissions on theoretical, observational, and modeling studies.

12:25 PM - 12:31 PM

[ACG37-P01_PG]Multiscale Interactions In The Genesis Of Tropical Cyclone Observed In PALAU2013

3-min talk in an oral session

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To understand the formation of a tropical cyclone (TC), has long been a captivating subject at the frontier of science and remains challenging because of the complex multi-scale interactions involved. During the genesis stage, sustained convective activities, which may stem from a variety of processes in a favorable environment, develop into a surface mesoscale or synoptic vortex. The mesoscale processes in the genesis stage have been the least understood aspect of the lifecycle of a TC. Although the climatological large-scale conditions favorable for TC genesis have been well known since Gray (1968, 1979), the interactions between the large-scale conditions and mesoscale processes have been poorly understood. The main purpose of this study is to conduct a detailed analysis on the multiscale

interactions involved in the cyclogenesis based on observational data and numerical simulations.The Japan Agency for Marine-Earth Science and Technology (JAMSTEC) conducted a field project named the Pacific Area Long-Term Atmospheric Observation for Understanding of Climate Change (PALAU2013) over the northwest Pacific Ocean. In this project, a sounding and radar network was deployed over the ocean during the early summer of 2013. During PALAU2013, the four initial disturbances growing tropical depression (TD) or tropical storm (TS) were observed. This study focused on the disturbances, growing TS (T1304) in association with the temporal changes in large-scale environment. We analyzed re-analysis data (JMA-GSM data), observational data during PALAU2013, and simulation results using WRF-ARW. The radiosondes were launched every 3h on the R/V Mirai and every 6h at Koror and Yap. The Doppler radar was installed on this sip, collected volume-scan every 10 and 7.5 min.Initial disturbances which occurred at (3N, 175W) in 03UTC June 10, 2013, passed through the observation point R/V MIRAI MR13-03 at (12N, 135E), grew T1304 in 00UTC June 18. The disturbance was developing along the convergence region between the trade easterlies and monsoonal westerlies. Results of radiosonde show that potential temperature was higher in the middle and upper troposphere and CAPE increased as disturbances approached. Moreover, the zonal wind component of the lower troposphere changed to the strong easterly, corresponding to the meridional wind component of the troposphere also changed to the south from the north. The temporal variation of the radar-echo area during the convections showed the organization of convective clouds to form the intense cyclones.