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

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

Convener:*Motoki Nagura(Japan Agency for Marine-Earth Science and Technology), Takuya Hasegawa(Japan Agency for Marine-Earth Science and Technology), Ayako Seiki(Japan Agency for Marine-Earth Science and Technology), Tomoki Tozuka(Department of Earth and Planetary Science, Graduate School of Science, The University of Tokyo), Hiroki Tokinaga(International Pacific Research Center, University of Hawaii), Masamichi Ohba(Central Research Institute of Electric Power Industry (CRIEPI), Environmental Science Research Laboratory), Yukiko Imada(Atmosphere and Ocean Research Institute, the University of Tokyo), Chair:Motoki Nagura(Japan Agency for Marine-Earth Science and Technology), Ayako Seiki(Japan Agency for Marine-Earth Science and Technology)

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-P03_PG]Seasonal Variations of the Mascarene High and Related Changes in Jetstreams and a Stormtrack

3-min talk in an oral session

*Ayumu MIYAMOTO[1], Hisashi NAKAMURA[1], Takafumi MIYASAKA[1] (1.RCAST, University of Tokyo)

Keywords:subtropical high, Indian Ocean, Agulhas Return Current, SST front, jetstream, stormtrack

The subtropical high in the Southern Indian Ocean, called the Mascarene high, is an integral part of the climate system there, influencing not only weather conditions in the surrounding regions but also the oceanic state. The present study examines the mechanisms for the seasonal variations of the Mascarene high. The high resides over the eastern portion of the basin in summer, while it shifts westward in winter toward the Agulhas storm-track core in strengthening. This large seasonal displacement is a distinct feature of the Mascarene High from other subtropical highs. Our analysis reveals that, while low-level thermal contrasts between the Australian continent and southeastern Indian Ocean is important for the formation of the high in summer, its wintertime formation is owing primarily to eddy-feedback forcing due to the seasonally-enhanced storm-track activity that is maintained in the presence of pronounced SST gradient along the Agulhas Return Current. In winter, the mid-tropospheric subsidence over the

surface high is associated with upper-tropospheric convergence of the cross-equatorial divergent flow, indicative of a connection between the high and the Asian summer monsoon. From the viewpoint of vorticity budget, the cyclonic tendency by the upper-level convergence is balanced with the westerly advection of the anti-cyclonic vorticity. While the converging upper-tropospheric flux of Rossby wave activity from lower and higher latitudes acts to reinforce the high in winter, the high itself acts as a source of the climatological-mean planetary waves with the net local divergence of the flux, which is suggestive of the importance of the high even on the hemispheric scale.