Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

ACG033-03 Room: Function Room A Time: May 23 09:30-09:45

Indian Ocean Subtropical Dipole Mode and Its Influence on the Southern African Region

Tomoki Tozuka[1*], Yushi Morioka[1], Toshio Yamagata[1]

[1]The University of Tokyo

Using a non-linear statistical analysis called self-organizing maps, the interannual sea surface temperature (SST) variations in the southern Indian Ocean and their impacts on the southern African rainfall during austral summer are investigated. The SST anomalies during austral summer from 1951 to 2006 are classified into nine types with differences in the position of positive and negative SST anomaly poles. To investigate the evolution of these SST anomaly poles, heat budget analysis of mixed-layer using outputs from an ocean general circulation model is conducted. The warming of the mixed-layer by the climatological shortwave radiation is enhanced (suppressed) as a result of negative (positive) mixed-layer thickness anomaly over the positive (negative) SST anomaly pole. This contribution from shortwave radiation is most dominant in the growth of SST anomalies. In contrast to the results reported so far, the contribution from latent heat flux anomaly is not so important. The discrepancy in the analysis is explained by the modulation in the contribution from the climatological heat flux by the interannual mixed-layer depth anomaly that was neglected in the past studies. Also, it was found that large differences in the southern African rainfall anomalies exist owing to differences in moisture flux anomalies associated with differences in the position of positive and negative SST anomaly poles. The present study suggests the importance of predicting the position of SST anomaly poles to improve prediction of rainfall anomalies over the southern Africa.

Also, our joint project with the Republic of South Africa supported by JST (Japan Science and Technology Agency) and JICA (Japan International Cooperation Agency) through SATREPS (Science and Technology Research Partnership for Sustainable Development) will be introduced. In particular, we plan to conduct dowscaling prediction for the Limpopo River area.

Keywords: Subtropical Dipole Mode, Southern Indian Ocean, Interannual climate variability, Ocean-atmosphere interaction, Southern African rainfall