



Study on the Air Mass Variability over East Asia during Boreal Summer using Vertical Integrated Energy Variables

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The variability of air mass over East Asia during summer have received much attentions to analyze summer monsoon, heat wave, and drought. Most of the studies have concentrated only one variable or only one or two pressure level. From this point of approach, there can be a loss of information. Rather, we will try to use a vertical integration of thermal energy, latent energy from water vapor, and kinetic energy. Then, we will adopt an EOF analysis. Two leading modes have 48%, 18% variances. The first mode represents, possibly, Walker circulation variability. This mode relates with 1994, 2010 East Asian heat wave. Also, this mode coincides with the SST variability over Pacific. However, this mode does not have any relationship with precipitation pattern over East Asia. The second mode has a great correlation with precipitation over East Asia which is a typical pattern of the East Asian summer monsoon from past researches. The second mode is related to the Indian Ocean SST variability. Additionally, we used a dataset from CMIP5 AMIP experiment (7 models). We projected our two leading modes onto AMIP dataset. Principle components from 7 AMIP models have 0.24 – 0.62 (first mode) and -0.27 – 0.38 (second mode) temporal correlation coefficients during 1979-2008. From this calculation, even with observed SST forcing, we possibly conclude that we still cannot simulate the East Asian summer monsoon (second mode from our EOF result) properly and its future projections (e.g. RCP45, RCP85) is not reliable.