Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

ACG04-P01 Room:Poster Time:May 1 18:15-19:30

Variation of the South China Sea Summer Monsoon onset

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In this study, we reveal factors of variation of the South China Sea Summer Monsoon(SCSSM) onset. The study area of South China Sea(SCS) is 5-15N, 110-120E. We use the data set of JRA-25/JCDAS, and, calculate the SCSSM onset date for 30 years, 1979-2008, defined as the zonal wind. In Kajikawa and Wang(2012), the authors point out an advance in the SCSSM onset date around 1993/94. Then, we divide the 30 years into 2 groups , before 1993(Prior) and after 1994(Later). Moreover, we pick out the advanced and delayed onset date for 3 years in each groups, after all, classify 30 years into 4 groups(Prior-Advanced, Prior-Delayed, Later-Advanced, Later-Delayed).

Focusing on time-changes of Sea Surface Temperature(SST), it is difference between Prior groups(P-A, P-D) and Later groups(L-A, L-D) for SST over the Philippine Sea(PS: 0-15N, 125-140E). The SST for Prior is higher about 0.5 degrees than that for Later. On the other hand, over the SCS, the SST is higher Advanced groups(P-A, L-A) than Delayed groups(A-D, L-D). This is reason why the strength of meridional surface wind over the SCS before April. Therefore, an effect of the SST to the SCSSM onset date is difference between over the SCS and over the PS. The SST over the SCS affect the annual variation of the SCSSM onset, and, the SST over the PS affect the 93/94 change.

The SCSSM onset is affected by a warming of the Tibetan Plateau(TP: 30-35N, 80-100E) too. In Ueda and Yasunari(1998), they reveal that the onset of summer monsoon over the Bay of Bengal and the SCS coincide with a time of rapidly increase in the thermal contrast the TP and surrounding ocean. We calculate the warming over the TP by a difference of geopotential height between 200hPa and 500hPa. Comparing the time-change of warming in 4 groups, we examine the difference of the period of rapidly warming over the TP in each groups. It is consider a relation between variation of the SCSSM onset and variation of the warming over the TP.

Then, we compare the anomaly of SCSSM onset date defined by the zonal wind, the anomaly of a time of rapidly warming over the TP, and, the anomaly of SST contrast between over the SCS and over the PS in April. As a results, the annual variation of SCSSM onset correlate clearly with the variation of the warming over the TP. Moreover, the low(high) SST difference in over the SCS and over the PS and the advanced(delayed) warming over the TP cause the advanced(delayed) SCSSM onset date.

Keywords: Asia, monsoon

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Recent changes in heavy precipitation occurrences along the eastern coast of the Indochina Peninsula

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Long-term changes of the frequency of heavy precipitation occurrence along the eastern coast of the Indochina Peninsula were analyzed using daily data from six Vietnamese meteorological stations for the period September–November of 1961–2010. The heavy precipitation days were defined by the 50 and 100 mm/day threshold values. The frequency of the coastal heavy precipitation days were decomposed into tropical cyclone (TC)-induced heavy precipitation days and non-TC heavy precipitation days, and their contribution to a recent increase in the coastal precipitation was examined. Over the 50-yr period, heavy precipitation occurrence indices show a significant increasing trend that is linked to an increasing trend in seasonal amount of the coastal precipitation. A rapid increase in the coastal heavy precipitation days was found from the mid-1990s through the 2000s. This marked increase is basically due to non-TC heavy precipitation events, suggesting that TC passages do not play a role in the recent increase in the seasonal precipitation amount and the heavy precipitation events. A role of tropical synoptic-scale disturbances (TSDs) as non-developing disturbances for TC formation in the non-TC heavy precipitation events was also explored. About 70% of the non-TC heavy precipitation events are associated with TSDs originated from the western North Pacific–South China Sea region. TSD passages are responsible for the recent increase in non-TC heavy precipitation events.

Keywords: heavy precipitation, synoptic-scale disturbances, Indochina Peninsula

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Climatology of explosively developing extratropical cyclones over the Kurosio Front

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When the East Asian winter monsoon is strong, the explosive cyclone activity tends to concentrate in the Kurosio Current(Yoshiike and Kawamura,2009). It is important to understand the relationship between the heat supply from the Kurosio extension region and the development process of cyclones. The purpose of this research is to reveal meteorological and oceanic environments that can provide deferences of the cyclone path or the rapid development.

Composite analysis for cyclones developed over the westerly(TypeW_P) or easterly(TypeE_P) Kurosio extension region was conducted. The Result suggests the existence of mesoscale circulation over the Sea of Japan is important to northwardly path of the TypeW_P cyclone. In addition, before the maximum deepning of the TypeW_P cyclone, latant heat flux clearly increased at the Kurosio extention region. It was result of easterly winds, to blow in front of a warm front of cyclone. The Kurosio extension region, which was meander north and south direction, responded to the winds. These results not appear in composite analysis for the TypeE_P cyclone. The influence on weather of Kanto region are also investegated. the results show the TypeW_P cyclone tend to provide heavy rain or snow, and the TypeE_P cyclones provide severe winds on that region. These results show the important contribution of water vapour provided from the Kurosio extension region to the TypeW_P cyclone. We conducted more composite analysis for that cyclones. Composite analysis at the cyclone center revealed some difference in advection of water vapour. The water vapor flux, blow from southeast quadrant to cyclone center, was more stronger in the TypeE_P, but The precipitable water that extend to south of cyclones was greater in the TypeW_P. As the result of strong water vapor advection, development of the TypeE_P cyclone was assisted. On the other hand, more humidity air masses cotributed to development of the TypeW_P cyclone. These experiments were conducted for cyclones that developed over the westerly or Easterly Subarctic frontal zone of the northwstern Atrantic(TypeW_A and TypeE_A, respectively). But no clear difference appeared in low-level environment associated with the TypeW_A or the TypeE_A cyclone. These results suggests that the deferences of low-level fields associated with the difference of the maximum deepning position are particular phenomenon in the Kurosio extention resion. In addition, the contribution of water vapour advection to the cyclone center was stronger for cyclones developed over the kurosio extension region.

Keywords: Explosively developing extratropical cyclone, East Asian winter monsoon

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Variability of GPS precipitable water vapor over the northeast Bangladesh

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Precipitable water vapor (PWV) derived from Global Positioning System (GPS) which were installed in the northeast Bangladesh was analyzed for different seasons. A GPS utilized for the analysis of pre-monsoon (May 2011) was installed at Sylhet. Two GPS utilized for the analysis of monsoon (July 2007) and winter seasons(December 2007) were installed by UNAVCO at Jamalpur and Jaflong. The simultaneous observation with GPS and radiosondes were conducted in May 2011. The PWV derived from GPS was well corresponded with that derived from radiosondes. A sharp PWV increase frequently observed during the passage of severe storms during the pre-monsoon season. The active and break monsoon periods in July 2007 showed average PWV of 67 mm and 62 mm, respectively. Severe flood occurred over Sylhet area during the active period. The PWV in the winter season showed 10-15-day periodicity in PWV between 15 mm in minimum and 25 mm in maximum. The amplitude of diurnal variation was larger in the break monsoon period than the active monsoon period. The nocturnal maximum and early afternoon minimum were remarkable in the diurnal variation of PWV in the monsoon period. The amplitude of diurnal variation was also large in winter. The phase in the diurnal variation was different in the two GPS stations. The PWV was increase on 12-18 LT at Jaflong, but the PWV had minimum on the same period of time at Jamalpur.

Keywords: GPS precipitable water, Bangladesh, Intraseasonal variation, Diurnal variation

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Distributed hydrological model simulation on the diurnal-cycle of Ciliwung River basin

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A systematic diurnal-cycle of water level is persistently generated over Ciliwung River basin during the Intensive Observational Period of HARIMAU2010 (15 January to 15 February 2010). It is almost uniquely explained by diurnal-cycle of rainfall observed with weather radar (C-band Doppler Radar) over Jakarta and surrounding area.

In this study, we have shown a simulation of the diurnal cycle of Ciliwung River water level by distributed hydrological model (the CDRMV3 model). Using the CDR rainfall data, river discharge is simulated both for short period and one-month period in two station, i.e. Manggarai (downstream outlet) and Katulampa (upstream outlet), and verified by comparing with the observation discharge from those two station.

Further improvement of the simulation scheme for the diurnal-cycle rainfall is also discussed.

Keywords: Diurnal-cycle, Weather radar, Distributed hydrological model, Rainfall, Runoff