CHAPTER 6
CONCLUSIONS

Over the IDP, this study revealed spatio-temporal wintertime wind variability and identified principal modes of the wind at 850 hPa by using the EOF method. The spatial patterns of the primary (real) and secondary (imaginary) parts of the leading mode show prominent northeasterly wind that agrees with the NE monsoon dominating over the IDP. These results are consistent with the circulation characteristic of EAWM exhibiting wind blowing along the coast of East Asia and the influence of the Borneo vortex, whereas the second mode presents prevailing easterly wind at the bottom part of the IDP.

For the first mode, it shows good correlations with the EAWM indices characterized by low latitude winds than do others. The comparison of correlations between PC1s and EAWM indices indicates that the UMI index is a suitable EAWM index to reveal the variability of winter monsoon over the IDP. Thus, the influence of EAWM on the IDP related to wind blowing along the East Asia coastline, passing the SCS, and penetrating to the IDP. Hence, the relation of PC1s to EAWM indices is not fully correlated. Thus, the first mode related to the EAWM, and there is another possible forcing influences on this mode. For the second mode, it does not significantly correlated to the EAWM indices that indicates the second mode does not related to the EAWM.

The forcing from SSTA was examined to show whether it was associated with the first mode or not. The correlation analyses show that there is more significant correlation between PC1s and SSTA in the Pacific Ocean than that in the Indian Ocean. The strong (weak) phase of PC1 significantly correlate to cooling (warming) of SST in the central-east Equatorial Pacific Ocean and warming (cooling) of SST in the west Pacific Ocean. Thus, the possible forcing influences the NE monsoon variability over the IDP is mainly related to SSTA in the Pacific Ocean. It was confirmed by correlations of PC1s to Niño 3.4 and DMI indices. The analyses show there is association between PC1s and Niño 3.4 index from previous five months to following three months, whereas the correlation between PC1s and DMI is not significant. This indicates that NE monsoon variability over the IDP represented by PC1s associated with ENSO represented by Niño 3.4 index, but it is not associated with IOD in terms of the linearity relationship due to the possibility that the IOD is not the leading mode of SST variability in the Indian Ocean. The ENSO triggers

monsoon over the IDP, and then it sends signal back to the SST forcing. This agrees with the ZWC and WPHC vertical circulation cells present strengthening of low-level easterly and northerly winds over the equatorial Pacific Ocean and the west Pacific Ocean, respectively, during strong phase of PC1s. This indicates that more induces wind blowing in south-west ward resulting in strengthening northeasterly wind.

The analyses of concurrences between the strong/weak phases of the NE monsoon and the ENSO represented by PC1s and Niño 3.4 index, respectively, found that: (1) during neutral ENSO phase, strong and weak NE monsoon do not occur, (2) weak NE monsoon tends to occur during El Niño period, and (3) strong NE monsoon tends to occur during La Niña period. Nevertheless, there are two special coincident events requires further research using modelling system on the two special events to explore the influences of other climate modes affecting NE monsoon variability over the IDP. On the other hand, it implies to more (less) supply of moisture to the IDP during strong (weak) phase of NE monsoon represented by PC1s that is possible impact on the IDP.

The impacts of the NE monsoon on precipitation and temperature were exhibited by regression analysis. The result of regression of precipitation anomalies on PC1s showed positive values over the areas from the Central Coast of Viet Nam to the Mekong Delta, southern part of Cambodia, southern tip of IDP, and central part of Myanmar that indicate the NE monsoon strengthening resulting more precipitation over these areas. The weakening of NE monsoon represented by decreasing PC1s values showed the reduction of precipitation over there. Whereas more temperature drop in most parts of Thailand, Laos, Viet Nam, and Cambodia when NE monsoon strength becomes stronger than the normal, and vice versa for the weak NE monsoon. In addition, this study introduced the simple index v-index that significantly correlated to PC1s. The impacts on precipitation and temperature given by its regression on the v-index showed quite similar spatial patterns to those given by PC1s.

Therefore, the variability of winter monsoon over the IDP represented by PC1s and v-index corresponds to northeasterly wind (NE monsoon) over the IDP that connected to the wind circulation of EAWM. Besides EAWM, the variability significance correlated to SSTA in the Pacific Ocean, and was more associated with ENSO than IOD. In addition, the difference of the NE monsoon phases shows different impacts on precipitation and temperature over the IDP. This study gives more understanding on winter monsoon over the IDP, and basic information for management during different phases of NE monsoon

and ENSO in winter season. Nevertheless, modelling system is required to study further in detail on mechanism and the influences of other climate modes.