

# Long-term trends and interannual variability in precipitation over Vietnam during 1984-2016

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The precipitation variability in Vietnam is unique because different types of precipitation are dominant during the boreal summer and winter. During the late summer, tropical disturbances are associated with the precipitation variation in Vietnam. On the other hand, cold or northerly surges of the winter Asian monsoon play important role during winter. Thus, long-term variations in precipitation should be investigated with consideration of the seasonal march, including sub-seasonal time-scale. This study investigated the long-term variations in precipitation over Vietnam for the period from 1984 to 2016, which was corresponded to the economical exaggeration era of the country. The results showed that the long-term trends in precipitation over Vietnam greatly differed from region to region on decadal timescale. To understand the long-term changes associated with climatological precipitation characteristics, we analyzed the long-term changes on a monthly basis. Focusing on long-term changes in precipitation of decadal timescale from September to February, in October and February the decreasing trend was witnessed across mostly overall the country while in September, November and December, precipitation generally increased. In term of sub-climatological regions, North Central Area and Highland tended to be less rainy than South Central Area and Southern Vietnam. In addition, we also analyzed wind fields at 850hPa and water vapor fluxes. The decadal changes in atmospheric circulations are basically consistent with that of precipitation. Moreover, we will discussed the cause of the long-term changes in terms of the climatological seasonal march, including sub-seasonal time-scale, in precipitation and atmospheric circulation.

Keywords: rainfall trend, precipitation variations, vietnam, northeast monsoon