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The role of changes in the seasonality in strong wind season shortening over China

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Previous studies have shown that long term temperature change is not only reflected in the annual means of temperature records but also in the changes in seasonality (seasonal cycle), especially in the extra tropical regions. Since surface wind speed is also an important index for describing climate change, the change in seasonality of wind speed raise interest in recent years. In this study, the seasonality and long term trends in seasonal cycles in China are analyzed, based on the dataset of daily surface wind speed records at 600 weather stations during the period 1970-2005. The seasonality here is referred to as a refined modulated annual cycle (MAC). Several methods are used for describing the physical features of seasonality. The Ensemble Empirical Mode Decomposition (EEMD) is applied to extract modulated annual cycle (MAC) of surface wind speed, and the Mann-Kendall test is used for the assessment of long term trend in seasonality. The results show that strong wind season in selected stations has arrived significantly earlier by 2-3 days (/10 years) in the past 40 years along with prominently late ending by 1-3 days (/10 years), which is mostly due to phase changes in the seasonality and low frequency variability. Furthermore, the peak value of strong wind season has weakened in the past 40 years by 10%-20%, which is due to the amplitude changes in the seasonality. Variations in the MAC component explain over 90% of the total variance in the surface wind speed records.