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Two distinct mechanisms on East Asian surface temperature variability during summer

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The surface air temperature (SAT) in East Asia was examined in order to find global scale versus local scale factors that affected its variability during the summer (June-July-August). It was found that there exist a distinguished sub-seasonal variation, showing remarkable differences in its variability between early summer (June) and late summer (July and August). In particular, we pay attention to the variability of Korean SAT. This study revealed that Korean SAT during early and late summer is affected by different principal modes of SAT over East Asia domain. In particular, there was a significant warming trend in the Korean SAT during early summer, which was primarily influenced by a global warming trend that manifested in East Asia. Meanwhile, there exists the local scale variability of the Korean SAT, which is independent from the global warming signal. During late summer, on the other hand, the SAT variability in Korea was not significantly influenced by a warming trend, although the warming signal still accounts for majority of the SAT variance over East Asia. Instead, Korean SAT during late summer appears to be closely related to the atmospheric variability originated from the western tropical sea surface temperature (SST) forcing. These results implied that the East Asian SAT variability during early and late summer has different sources.