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Author(s)	宮, 湛秋
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学 位 論 文 内 容 の 要 旨

博士の専攻分野の名称 博士（理 学） 氏 名 宮 湛秋

学 位 論 文 題 名

Understanding intraseasonal propagating oscillation in air temperature and its association with heatwaves over Eurasia during boreal summer
(北半球夏季におけるユーラシア季節内気温振動の伝播と熱波との関連性)

The intraseasonal propagating oscillation in air temperature over Eurasia during boreal summer can cause extreme meteorological events such as heatwaves, which pose widespread and substantial risks on human livelihoods. Although previous studies have explored the quasi-stationary nature of the Eurasian intraseasonal oscillations and their effects on the heatwaves (HWs), the comprehension of their propagating properties and connection with summer HWs over Eurasia still remains elusive. Therefore, in this study, we aim to investigate the characteristics and mechanisms of the propagating oscillations in air temperature in the lower troposphere over Eurasia during boreal summer and establish its linkage with HWs. First, we examine eastward propagation signals using complex empirical orthogonal function (CEOF) method. The summer air temperature anomalies over Eurasia propagates eastward. The upper-tropospheric geopotential height and meridional wind anomalies are closely associated with the lower-level air temperature anomaly and both anomalies propagate eastward. This indicates that the low-level temperature eastward propagation may be attributed to the upper-tropospheric forcing. According to the temperature budget analysis, it is found that the horizontal temperature advection plays a critical role in the eastward propagation, while the diabatic heating rate provides partial compensation. Further decomposition results show that meridional temperature advection contributes significantly to temperature changes, particularly in regions where the eastward propagation signals are strong. The vertical components in the adiabatic process also partially contribute to temperature eastward propagating oscillation. Subsequently, by employing a metric designed to quantify the intensity of propagation signals, a total of nine years which exhibits the strongest propagating signals are identified. A close association between the eastward propagating HWs and reconstructed air temperature anomalies of CEOF mode 1 can be observed in the years with strong values of the amplitude metric, which indicates a robust linkage. Our results can reinforce the understanding of summer intraseasonal oscillations over Eurasia, and it may also contribute to future monitoring and forecasting capabilities.