EGU22-236, updated on 16 Aug 2022
https://doi.org/10.5194/egusphere-egu22-236
EGU General Assembly 2022

QBO-related Surface Air Temperature Change over the Western North Pacific in Late Winter

Chang-Hyun Park[1], Seok-Woo Son[1], Yuna Lim[2], and Jung Choi[1]
[1]School of Earth and Environmental Sciences, Seoul National University, Seoul, Korea
[2]Department of Earth System Science, University of California Irvine, California, USA

The impact of the quasi-biennial oscillation (QBO) on the surface air temperature in the Northern Hemisphere extratropics is investigated. It is found that the QBO, defined as 70-hPa zonal wind in the deep tropics, is negatively correlated with the surface air temperature over the western North Pacific in February and March. Cold temperature anomaly appears during the QBO westerly phase. Such relationship is likely mediated by the subtropical jet. During the QBO westerly phase, a horseshoe-shaped zonal wind anomaly forms in the upper troposphere and lower stratosphere and is connected to the equatorward shift of the Asia-Pacific jet. This equatorward jet shift is accompanied by a cyclonic circulation anomaly in the subtropical North Pacific and an anticyclonic circulation anomaly over northern Eurasia in the troposphere. The resultant temperature advection brings cold air to East Asia and the western North Pacific. This regional downward coupling in February and March, which is not sensitive to El Niño-Southern Oscillation, has become statistically significant in recent decades.