It has been revealed that Ultrafast Kelvin waves (UFKs) in the upper mesosphere and lower thermosphere (MLT) region can be generated by the convective heating in the troposphere (e.g. Forbes, 2000). In our previous study (Chen and Miyahara, in preparation), we have investigated behaviors of UFKs (zonal wavenumber s=1) in the Kyushu University general circulation model (the Kyushu-GCM). It has been found that vertical profiles of amplitudes and phases of UFKs in this model have systematical upward propagating structures from the troposphere to the MLT region. We have conjectured that UFKs are excited by the convective heating in the troposphere, but no analysis has been done on the relationship between activities of UFKs in the MLT region and tropospheric convective heating.

In the present study, we analyze the relationship between activities of UFKs in the MLT region and tropospheric convective heating. Results show that there are close relationships between the amplitude variation of zonal wavenumber s=1 eastward-propagating components of convective heating in the 2.5-4.0 days period band and the amplitude variation of UFKs. The lag correlation between them reaches 0.8 around 10-15 days. The time lag of 10-15 days is consistent with the theoretically estimated time scale that UFKs propagate from the troposphere to the MLT region.

We conclude that UFKs in the MLT region are excited by the convective heating in the troposphere.