V119b DESHIMA: Calibration of the on-sky MKIDs response

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We are developing an ultra-wideband spectroscopic instrument, DESHIMA, by integrating the on-chip filter-bank and microwave kinetic inductance detector (MKID) technologies to investigate dusty starburst galaxies in distant universe at millimeter and submillimeter wavelength. On-site experiment of DESHIMA using the ASTE telescope was promoted in 2017, and we constructed a conversion model to estimate the line-of-sight brightness temperature from the frequency response of the microwave readout system for the MKIDs. Using skydip dataset under various precipitable water vapor (PWV, 0.4–3.0 mm, obtained by the ALMA radiometers), we obtained calibration model curves which converted the frequency response to the line-of-sight brightness temperature. We also estimated PWVs of each skydip data using the brightness temperature spectrum estimated using the calibration model in order to estimate calibration parameters iteratively. As a result of analysis, we obtained flux calibration errors of $1\sigma \sim 4\%$ typically, from the calibration model curves and estimated PWVs.