R12a Distribution of dense molecular gas and star formation activity in the central 1 kpc of the galaxy NGC 1808

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The central 1 kpc of the nearby (11 Mpc) starburst galaxy NGC 1808 was observed by Atacama Large Millimeter/submillimeter Array in cycle 2. In addition to the previously presented images of CO (1-0) and CO (3-2), we report the detections of the following rotational lines: HCO^+ (1-0), $H^{13}CO^+$ (1-0), HCO^+ (4-3), HCN (1-0), $H^{13}CN$ (1-0), SiO (2-1), HOC^+ (1-0), C_2H (1-0), CS (2-1), and HNCO (1-0), and present their line intensity ratios toward selected star-forming regions and the circumnuclear disk (CND; central 200 pc). The line intensity ratio of HCN (1-0) to HCO^+ (1-0) is enhanced in the CND, with maximum values (~ 2) in a ring of 100 pc radius from the galactic center. We derived the star formation rate (SFR) and star formation efficiency (SFE) in the selected regions using the 3 mm continuum (free-free emission as SFR tracer), 0.9 mm continuum and CO (1-0) (gas mass tracers). The SFE is of the order of 10^{-8} yr^{-1}, implying a short depletion time consistent with the Kennicutt-Schmidt law in starburst galaxies (Kennicutt 1998). The line intensity ratios of CO and HCO^+ were applied in a non-local-thermodynamic-equilibrium analysis to estimate the physical conditions (gas density and temperature) of molecular clouds in the star-forming regions (beam-averaged over 100 pc). The investigated massive ($\gtrsim 10^6$ $M_\odot$) clouds in the starburst exhibit high density ($\sim 10^5$ cm^{-3}) and low temperature (~ 15 K), conditions similar to the cores of Galactic clouds.