AN ANALYSIS OF LARGE-SCALE SOLAR STRUCTURES OBSERVED WITH ALMA

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The radiation of the solar chromosphere can be observed in the millimeter and submillimeter wavelength range. The new ALMA radio telescope can map the solar chromosphere with high spatial, temporal, and spectral resolution at wavelengths between 0.3 mm and 8.6 mm. Formation height of the continuum radiation increases with increasing observing wavelength which enables very accurate measurements of solar chromosphere’s temperature as a function of height. The study has an observational and a modeling part. In the observational part, data reduction is performed on ALMA CSV data made publicly available. Models of various observed solar structures were developed and compared with actual ALMA observations. Radiation models are based on various VAL and FAL atmosphere models with thermal bremsstrahlung as the dominant mechanism responsible for the emission at ALMA wavelengths. Fast-scan single dish maps are used to analyze the Sun’s millimetre radiation and to identify regions of interest. The visibility of various large-scale solar features (active regions, coronal holes, prominences, and inversion magnetic lines) is checked in solar ALMA images and compared with other measurements (optical and EUV images). Preliminary results indicate that active regions appear bright, inversion magnetic lines dark, while coronal holes and prominences on disc have negligible contrast against the quiet Sun background. These results are interpreted and compared with modeling efforts.