

JWST MIRI Observations of the Low-mass Protostellar System L483

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Revealing physical and chemical structures of the envelopes and disks around low-mass protostars is crucial in understanding the process of star and planet formation. While (sub-)mm interferometric observations have offered a way of characterizing the cold (~ 10 – 100 K) gas around protostars, mid-infrared observations with the James Webb Space Telescope (JWST) provides access to the warmer ($\gtrsim 100$ – $1,000$ K) gas (plus ice) with its unprecedented sensitivity and spectral resolving power. We present JWST MIRI observations toward the low-mass protostellar system L483 as part of the CORINOS program. L483 is located in Aquila L16 (d ~ 200 pc), and harbors a close protobinary as resolved by high-resolution ALMA observations. Previous molecular line observations with ALMA have revealed that the inner $\lesssim 100$ au region is rich in warm gaseous water and complex organics while carbon-chain molecules are abundant in the outer envelope. We analyzed the MIRI MRS spectra focusing on the gaseous emission, which resulted in the detections of H_2O , CO , CO_2 , and CH_4 . An LTE analysis provides a high gas temperature ($\sim 1,300$ K) for CO while lower temperatures (~ 150 – 200 K) for the other species, which is similar to the case for another CORINOS source IRAS 15398-3359. Additionally, the emission appears slightly offset from the protostar position, possibly indicating local shock heating and/or infrared pumping. We will discuss the possible mechanisms for exciting these molecules and their implications for the physical and chemical structures around L483.

