Centimeter Continuum Emission From Young Stellar Objects in the Serpens South Protocluster

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ABSTRACT

The Serpens South protostellar cluster is a site of active star formation located in the Aquila Rift, with an abundance of embedded protostars at its core. Radio observations of centimeter emission from the region allow for the classifications of young protostars that are still heavily shrouded, and have proven to be an essential tool in the characterization of young stellar objects. We report the detection of centimeter wavelength ($\lambda = 4.135$ cm and $\lambda = 6.311$ cm) continuum emission from previously known and unidentified young stellar objects in the core of the Serpens South protostellar cluster. We use the Jansky Very Large Array (VLA) to give a detailed account of the radio properties of the young stellar objects, as well as characterize the evolutionary stage and luminosity source of young stellar objects in Serpens South in conjunction with infrared mappings of the region. We report the detection of centimeter sources lining up with more diffuse sources in micrometer wavelengths, verifying the presence of compact cores. This is the first mapping of centimeter continuum emission in this region at a spatial resolution of < 5 arcseconds.

1. Introduction

Radio observations of protostars have long been used as a tool to infer the presence of protostars deeply embedded in the clouds of dust and gas that are their progenitors (**?**).

Table 1. Caption...

Source Name	Int. Flux (mJy)	Int. Flux Err (mJy)	Peak Flux (mJy)	RA (J2000)	RA Err (arcsec)	DEC (J2000)	DEC Err (arcsec)	Bmaj (arcsec)	Bmin (arcsec)	Pos. Angle (degrees)	RMS (mJy)
lower.S1	0.06486	0.02438	0.06500	-82.44	0.8961	-2.024	0.7340	4.820	3.850	13.40	0.03806
lower.S2	0.5987	0.02511	0.6000	-82.46	0.09998	-2.009	0.08190	4.820	3.850	13.40	0.03806
lower.S3	0.04091	0.02534	0.04100	-82.47	1.476	-2.013	1.209	4.820	3.850	13.40	0.03806
lower.S4	0.1197	0.01196	0.1200	-82.48	0.2380	-2.010	0.1950	4.820	3.850	13.40	0.03806
lower.S5	0.07284	0.01367	0.07300	-82.49	0.4473	-2.013	0.3664	4.820	3.850	13.40	0.03806
lower.S6	0.9978	0.02082	1.000	-82.49	0.04973	-2.014	0.04074	4.820	3.850	13.40	0.03806
lower.S7	0.05687	0.02516	0.05700	-82.47	1.054	-2.025	0.8638	4.820	3.850	13.40	0.03806
lower.S8	0.04290	0.02563	0.04300	-82.48	0.0003964	-2.029	0.0003247	4.820	3.850	13.40	0.03806
lower.S9	0.000	0.000	0.04000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
lower.S10	0.000	0.000	0.1100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
lower.S11	0.1497	0.1033	0.1500	-82.49	1.646	-2.042	1.348	4.820	3.850	13.40	0.03806
lower.S12	0.1497	0.01350	0.1500	-82.49	0.2150	-2.043	0.1762	4.820	3.850	13.40	0.03806
lower.S13	0.4290	0.02459	0.4300	-82.49	0.1366	-2.046	0.1119	4.820	3.850	13.40	0.03806
lower.S14	0.000	0.000	0.03600	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
lower.S15	0.1696	0.01368	0.1700	-82.49	0.1923	-2.052	0.1575	4.820	3.850	13.40	0.03806
lower.S16	0.000	0.000	0.1700	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
lower.S17	0.03792	0.02311	0.03800	-82.48	1.453	-2.054	1.190	4.820	3.850	13.40	0.03806
lower.S18	0.000	0.000	0.05000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
lower.S19	0.1197	0.01004	0.1200	-82.49	0.1998	-2.062	0.1637	4.820	3.850	13.40	0.03806
lower.S20	0.05887	0.01186	0.05900	-82.50	0.4802	-2.067	0.3933	4.820	3.850	13.40	0.03806
lower.S21	0.1497	0.02503	0.1500	-82.46	0.3986	-2.069	0.3265	4.820	3.850	13.40	0.03806
upper.S1	0.09969	0.01901	0.1000	-82.44	0.2973	-2.024	0.2436	3.150	2.520	12.70	0.03004
upper.S2	0.5483	0.01932	0.5500	-82.46	0.05494	-2.009	0.04502	3.150	2.520	12.70	0.03004

Table 1—Continued

Source Name	Int. Flux (mJy)	Int. Flux Err (mJy)	Peak Flux (mJy)	RA (J2000)	RA Err (arcsec)	DEC (J2000)	DEC Err (arcsec)	Bmaj (arcsec)	Bmin (arcsec)	Pos. Angle (degrees)	RMS (mJy)
upper.S3	0.02592	0.01936	0.02600	-82.47	1.164	-2.013	0.9542	3.150	2.520	12.70	0.03004
upper.S4	0.05084	0.008597	0.05100	-82.48	0.2636	-2.010	0.2160	3.150	2.520	12.70	0.03004
upper.S5	0.04985	0.008045	0.05000	-82.49	0.2516	-2.013	0.2062	3.150	2.520	12.70	0.03004
upper.S6	0.3988	0.01086	0.4000	-82.49	0.04245	-2.014	0.03479	3.150	2.520	12.70	0.03004
upper.S7	0.04486	0.01182	0.04500	-82.47	0.4107	-2.025	0.3365	3.150	2.520	12.70	0.03004
upper.S8	0.04785	0.01226	0.04800	-82.48	0.3994	-2.029	0.3273	3.150	2.520	12.70	0.03004
upper.S9	0.02592	0.007830	0.02600	-82.49	0.4709	-2.033	0.3859	3.150	2.520	12.70	0.03004
upper.S10	0.05284	0.04357	0.05300	-82.49	1.285	-2.040	1.053	3.150	2.520	12.70	0.03004
upper.S11	0.05284	0.03196	0.05300	-82.49	0.9428	-2.042	0.7726	3.150	2.520	12.70	0.03004
upper.S12	0.05284	0.008033	0.05300	-82.49	0.2370	-2.043	0.1942	3.150	2.520	12.70	0.03004
upper.S13	0.04486	0.01037	0.04500	-82.49	0.3603	-2.046	0.2952	3.150	2.520	12.70	0.03004
upper.S14	0.000	0.000	0.03900	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
upper.S15	0.1894	0.01814	0.1900	-82.49	0.1493	-2.052	0.1223	3.150	2.520	12.70	0.03004
upper.S16	0.1894	0.01372	0.1900	-82.48	0.1129	-2.053	0.09251	3.150	2.520	12.70	0.03004
upper.S17	0.03888	0.01403	0.03900	-82.48	0.5624	-2.054	0.4609	3.150	2.520	12.70	0.03004
upper.S18	0.05084	0.009118	0.05100	-82.49	0.2796	-2.057	0.2291	3.150	2.520	12.70	0.03004
upper.S19	0.1196	0.007314	0.1200	-82.49	0.09530	-2.062	0.07810	3.150	2.520	12.70	0.03004
upper.S20	0.02592	0.009043	0.02600	-82.50	0.5438	-2.067	0.4457	3.150	2.520	12.70	0.03004
upper.S21	0.09969	0.01154	0.1000	-82.46	0.1804	-2.069	0.1478	3.150	2.520	12.70	0.03004

– Present problem

– Previous studies

– Importance of field

– Basic specs on data

– Outline of paper

2. Observed Region

– History of region

– Other studies of region, and current thoughts on dynamics and evolution of region

– Other studies of region in radio and other wavelengths

– Overview of telescope used in the study

3. Observations & Data Reduction

– Data reduction processes, RFI problems, antennas, etc..

– RMS values, cleaning steps

– Acknowledgment of artifacts and bugs in images

– Resolution of beam

– Possible errors in aperture synthesis technique

4. Sources

– Note on sources, how they were chosen

5. Results & Analysis

6. Discussion

7. Conclusions

REFERENCES

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