



## **From One Minute to the Next Ten Million: Transients in the 340 MHz VLITE Commensal Sky Survey (VCSS)**

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A novel approach to low frequency radio transient surveys is the use of commensal, or parallel systems that leverage infrastructure of other radio interferometers operating at higher frequencies. A pioneering instrument in this domain is the VLA Low-band Ionosphere and Transient Experiment (VLITE) installed on the Karl G. Jansky Very Large Array (VLA). The independent optical path of the VLA prime focus receivers leverages an additional 6000 hours per year of 340 MHz data simultaneously with most regular VLA observing programs. In addition to routine observations, a special mode was implemented to record data during all 3 GHz VLA Sky Survey (VLASS) observations to generate a VLITE Commensal Sky Survey (VCSS). The larger low frequency field of view piggybacked on an observing strategy crafted for 3 GHz produces a series of highly overlapping snapshots of the VCSS sky. However, the offset Cassegrain optics that enable VLITE's commensal mode also present an obstacle due to the offset, asymmetric, and rotating primary beam that produces a unique attenuation for each image. We have recently overcome this obstacle using archival data from the instrument itself to generate models for calibrating VLITE and VCSS images. With calibrated VCSS light curves we can probe transient phenomena brighter than 80 mJy on minute to hour timescales over 30,000 square degrees in each observing epoch. Calibrated snapshots are combined in the image plane to create more sensitive VCSS mosaics that can be compared to source catalogs for probing fainter transients on year to decade timescales. We present results from the first two VCSS observing epochs to illuminate the sub-GHz phase space where the surface density of detected, unidentified MHz transients dominates predictions derived from all known populations.