




Results from the Allen Telescope Array:
Launching the ATA Galactic Center Transient Survey

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ABSTRACT

The ATA Galactic Center Transient Survey (AGCTS) launched in May 2009 and is observing 55 square degrees of sky at 1.43 and 2.01 GHz simultaneously for ~6 hours every night. It will run for a period of 6 months commensally with SETI observations (cf. #407.07). The data products of the completed survey will include robust measurements of or limits to transient event rates at a wide range of timescales and a large-area intermediate-resolution map of the GC region with spectral index information. The sensitivity, effective search area, and observing cadence of the AGCTS make it a novel and powerful survey for transient events.

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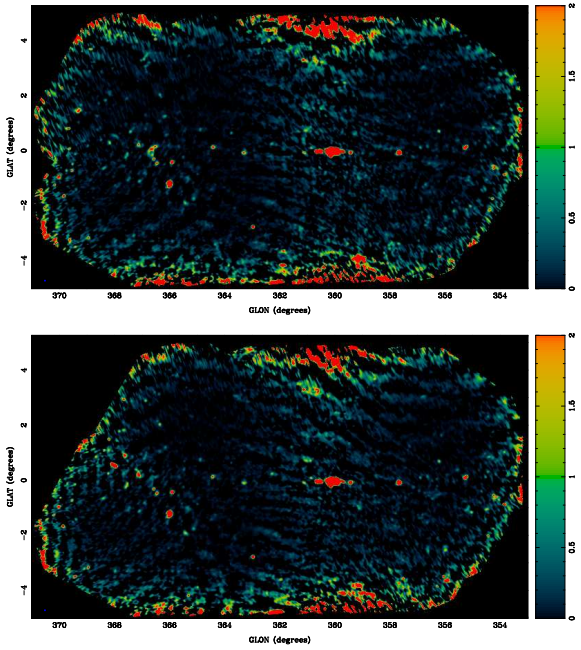
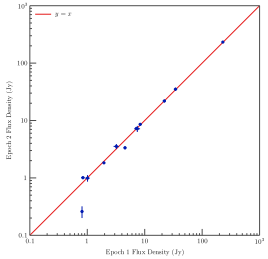
SETI Institute

Allen Telescope Array

Right: Preliminary images from two consecutive nights of AGCTS observations. Each is a mosaic of ~40 pointings, mapping the AGCTS field and the surrounding area. The color scale ranges from 0 to 2 Jy; the peak flux of Sgr A in these data is ~160 Jy/bm with a 250" circular beam. Each pointing was integrated for ~3 minutes. While there are obvious artifacts in the images, mainly due to the poorly-developed sky model used here, **the bright (>½ Jy) sources show good repeatability.**





Left: Two-epoch comparison of selected source fluxes from the preliminary images. **The measurements are stable from night to night.**

	VLA 330	AGCTS
Obs. Frequency (Ghz)	0.33	1.43, 2.01
FOV per epoch (deg²)	~5	~55
Number of epochs	~25	~180
Single-epoch sensitivity (mJy / bm)	~100	~50

Left: The 330 MHz VLA survey of Hyman *et al.* (2002, 2005) is similar to the AGCTS. **The AGCTS benefits from the survey-optimized design of the ATA and a significantly larger observing time allocation, leading to a much larger effective survey area.**

Previous GC Radio Transient Detections

The properties of several previous GC radio transients are tabulated below. **Assuming a flat spectrum, all would be detectable by the AGCTS in a few minutes at their peak flux densities.**

Name	Obs. Frequency (GHz)	Peak Flux Density (mJy)	Reference
A174-28	0.96	~480	Davies *et al.* (1976)
Galactic Center Transient	1.4	~800	Zhao *et al.* (1992)
GCRT J1746-2757	0.33	~220	Hyman *et al.* (2002)
GCRT J1745-3009	0.33	~1000	Hyman *et al.* (2005)
CXOGC J174540.0-290031	43	~80	Bower *et al.* (2005)
GCRT J1742-3001	0.235	~100	Hyman *et al.* (2009)

Static Results of the Survey

Although the AGCTS is primarily aimed at detecting transients, a key data product of the survey will be a map of the survey region with spectral index information. The RMS of the final map will be ~0.2 mJy / bm. The compact configuration of the ATA will yield an intermediate-resolution map, filling in the gap between single-dish and VLA-like maps (e.g., Law *et al.* 2008). **The static ATA map will be sensitive to large-scale structures in the GC such as SNRs, nonthermal filaments, and H II regions.**

References

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