

Z117r HaloSat and astrophysics small satellite programs supported by NASA

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HaloSat was the first CubeSat funded through the NASA Astrophysics Research and Analysis (APRA) program. HaloSat surveyed the entire sky 85 eV resolution at 0.68 keV and an effective field of view of 0.035 sr. The mission had good sensitivity to the O VII and O VIII lines present in the hot gas within the Interstellar Medium and the Circumgalactic Medium of the Milkyway. Astrophysical diffuse emission from the ISM and the galactic halo was separated from Heliospheric charge exchange emission, instrument background, and the cosmic diffuse X-ray background by spectral separation.

The HaloSat mission, from concept development through publication was led by Prof. Phil Kaaret, then at the University of Iowa. I will review the history of the HaloSat proposal, implementation, launch, operations, and scientific results, with an emphasis on lessons learned that may be of value to small satellite experimenters funded by NASA or other space agencies. HaloSat achieved two aims of the APRA program: (1) unique scientific results from a small mission were reported in over a dozen refereed papers, and (2) educating the next generation of scientists and engineers, with the majority of the publications being led by early career scientists including undergraduates, Ph.D. candidates, and post-doctoral researchers. While some lessons are unique to the NASA environment, others have relevance for any astrophysicists considering Small Satellite experiments.

I also summarize other small NASA Astrophysics missions and provide a perspective (strictly my own) on potential opportunities for Japanese researchers to participate collaboratively in future Small Satellite projects.