



C U B E S A T

With the challenges of polar orbits, CubeSats are an effective solution to standard satellites for providing coverage at a cheap affordable cost with a decay orbit that helps to minimize the impact of space debris. The future of CubeSat technology is a promising technological frontier that can offer communication solutions for high-latitude regions in sufficient numbers to ensure full coverage of regions like Alaska.

Improving Arctic maritime communications is a critical initiative within the U.S. Coast Guard (USCG) Arctic Strategy Implementation Plan. Currently, marine vessels operating across the Bering, Chukchi, and Beaufort Seas experience limited realtime communication capability at extended ranges from shore based facilities. Low earth, polar orbiting, small satellite technology (known as CubeSats) offer a potentially useful solution to connect maritime operators conducting missions in the U.S. Exclusive Economic Zone (EEZ) with their respective command and control.

The Alaska Satellite Facility (ASF) houses, tests, and maintains a prototype high-latitude ground station that will downlink maritime domain information and communications collected from CubeSats passing over the Arctic for the Department of Homeland Security (DHS) and United States Coast Guard (USCG) Research and Development Center (RDC). This work is in scope of the Basic Ordering Agreement (BOA) between ADAC and DHS in that it involves:

- Testing and evaluating capabilities to provide Arctic Domain Awareness
- Improving command, control, communications, computers, intelligence, surveillance, reconnaissance (C4ISR) capabilities, and enhancing information collection for maximum use in the Arctic environment
- Providing subject matter expertise in Arctic environments

In this study, the project team built and tested a Mobile Cubesat Command and Control (MC3) ground station at University of Alaska Fairbanks (UAF) as part of the ASF's CubeSat Antenna Farm Experiment (CAFE). ASF's CAFE will provide a vital ground segment in the evaluation of USCG use of CubeSats in support of Arctic communications. Incidental to the planned research effort, this investigation will benefit future UAF CubeSat academic programs and research through demonstrations and evaluations of CubeSat technology to test the capabilities of these assets to monitor the Arctic.

