

Frequency Allocation Request

Program of Research & Experimentation:

Three airborne Ku band radars will be used to simultaneously record synthetic aperture radar (SAR) signal data from the same swath. The SAR signal data will be processed to form high resolution SAR images and to compute the terrain topography. The radars will be installed in and operated on a Canberra jet aircraft. One of the radars will be placed in a wing pod on each Canberra wing tip. The third radar will be installed in the Canberra bomb bay. Operated at 43,000 feet AGL, the radars will cover a swath of ground extending from six to 25 kilometers from the aircraft ground track.

Each of the radars uses a single slotted waveguide transmitter and antenna which directs the transmitter beam 90 degrees to the side to illuminate the swath. The transmitted signals from the three radars are highly correlated with pulses interleaved so that they do not mutually interfere.

Each of the radars also has four separate receivers and slotted waveguide receiver antennas that also view the swath at 90 degrees to the side. Each receiver antenna covers a segment of the swath (a sub-swath) so that all four receiver antennas cover the full swath. SAR signal processing of the signals obtains SAR images of each sub-swath. As the aircraft moves, the radars image a rectangular area with its length in the direction of motion. The SAR signal data from each of the twelve receivers is recorded on high density digital data storage devices.

The three transmitter beams and four receiver beams from each of the three radars cover the swath from slightly different positions. This produces phase differences that depend on the terrain elevation. Interferometric SAR (IFSAR) processing obtains the terrain elevation at periodic sampling points.

Specific Objectives:

Low cost production of high resolution SAR images and digital surface matrix data of the land.

Contributions to Radio Art:

This system will enable economical collection of high resolution ground topography data. The unique and innovative characteristics are the use of three radars with a total of twelve receivers to collect SAR signal data from wide swaths.