

THE JPL AIRCRAFT TOPOGRAPHIC SYNTHETIC APERTURE
RADAR (TOPSAR) PROGRAM

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During the last few years, JPL has developed a C-band (6cm wavelength) aircraft radar system that acquires **interferometric** maps of the earth. This is an adjunct to the NASA/JPL Aircraft Synthetic Aperture Radar (**AIRSAR**) system that acquires **multi-polarization** SAR images at P-band (70cm wavelength), at L-band (25cm wavelength) and at C-band. The TOPSAR/AIRSAR system routinely flies on the DC-8 Airborne Laboratory operated by the NASA Ames Research Center. This TOPSAR/AIRSAR system operates such that the C-band **interferometry** can be acquired simultaneously with the P-band and L-band **polarimetric** data.

The TOPSAR system is implemented via two antennas mounted nearly vertically on the left side of the aircraft with a 2.6 meter baseline spacing. **Interferometric** maps of the surface are constructed by comparing the phase differences between SAR images from the two antennas. Statistical elevation errors for the TOPSAR system range from 1.0 meters for **flat** land to 3.0 meters for mountainous areas. Typical data acquisitions are for areas of 10 km across-track (i.e. in range) and up to 50 km along track (i.e. in azimuth). However a recent, summer 1993, observations in the Galapagos Islands (**Islas Fernandina** and **Isabella**) demonstrated that these 10 km-by-50 km topographic maps could be mosaicked together for an area of about **50km-by-50km**.

During the summer of 1993, we experimented with "repeat pass" interferometry in an attempt to acquire phase-coherent SAR images from two separate, but nearly identical, aircraft flight paths. During 1994, we expect to improve the TOPSAR aircraft radar system by using a much better **GPS/INS** unit, which will enable **mosaiking** via dead reckoning. These aircraft observations are a precursor for a possible earth-orbiting Topographic **SATellite** (TOPSAT), which is currently in premission studies at **JPL**.