

PROCESSING AND ANALYSIS OF AIRBORNE SYNTHETIC APERTURE RADAR IMAGERY ACQUIRED OVER MAYA SETTLEMENTS IN CENTRAL AMERICA

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In March 2004, the Airborne Synthetic Aperture Radar (AIRSAR), based out of San Jose, Costa Rica, collected data over several sites in Central America. One target area was the Petén region in Northern Guatemala. During an eight-hour flight on March 7, AIRSAR acquired thirteen image swaths, each 12km wide by 150km long. 1,800 hectares were imaged within each image swath for a total of over 23,000 hectares. Other flight lines were acquired as well, notably over the Usumacinta river area. The objective of this experiment was to acquire regional SAR imagery over both known and unknown archaeology sites, so as to develop remote sensing protocols for identifying areas for further exploration.

After processing the interferometric and polarimetric data from these flight lines, the next step was to remove systematic artifacts from the topographic information derived from the C-band interferometer. After these systematic artifacts were removed, it was possible to directly compare the AIRSAR Digital Elevation Model (DEM) with the SRTM DEM. This showed that the AIRSAR derived DEM was of comparable vertical accuracy as SRTM, but much higher spatial resolution. The polarimetric L-band and P-band data were then co-registered to the C-band DEM. The data were next examined where Maya settlements were known to exist, and in neighboring regions.

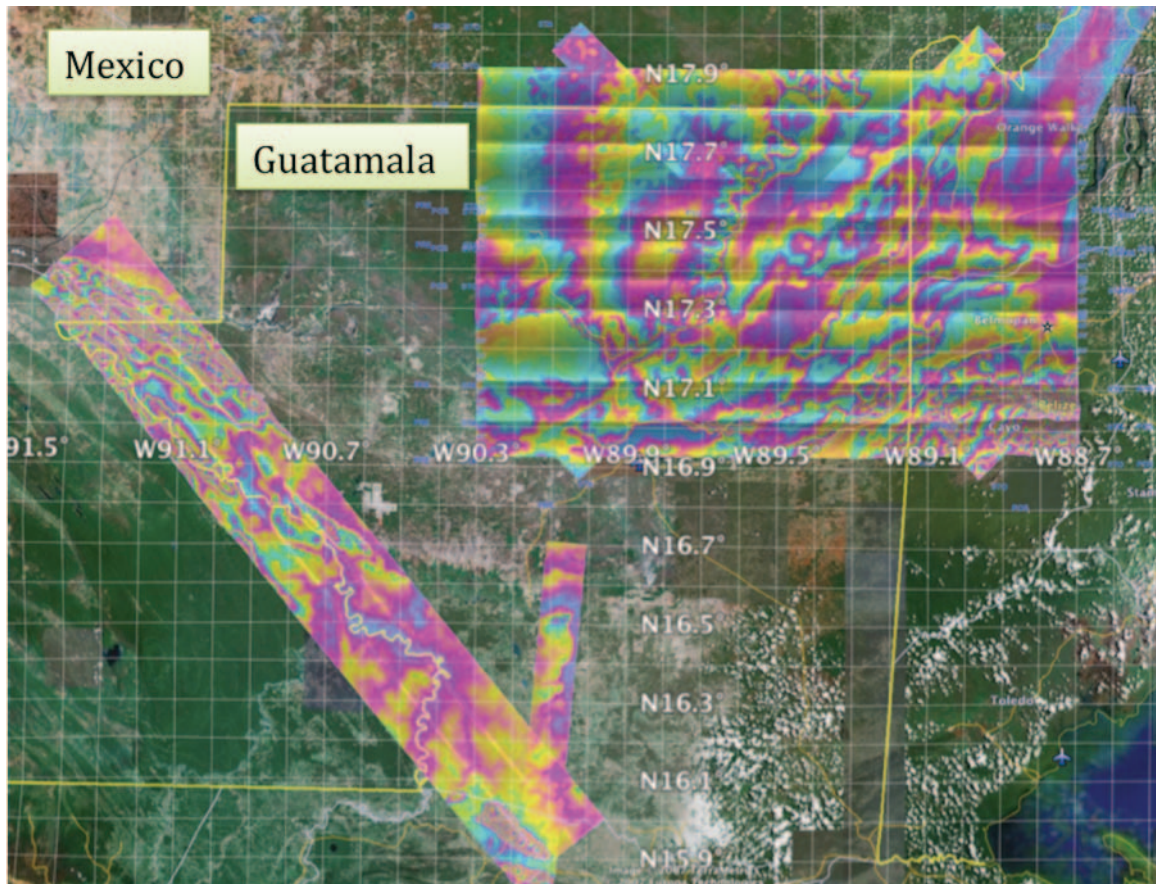


Figure 1: Observation plan March 2004.

A follow-up experiment has been planned involving the NASA/JPL Uninhabited Aerial Vehicle Synthetic Aperture Radar (UAVSAR). This experiment, scheduled for January 2010, has two objectives:

- 1) Repeat pass InSAR observations of La Avispa, a site detected in AIRSAR 2004 topography data, but not visible in L and P band polarimetric data. This site is a prototype for other Mayan sites that are undetectable in the polarimetric imagery. With a zero baseline repeat pass InSAR pair, we will examine whether L-band coherence and phase are sensitive to the under-canopy structures. With a non-zero baseline pair, which will be sensitive to topography and forest structure, we will examine whether the structural information seen in the AIRSAR topography data may be detected by repeat pass INSAR from UAVSAR.
- 2) Examine the utility of high resolution L-band SAR and provide this imagery to archaeologists studying the surrounding landscape.

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References:

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