

# Lake Tahoe Experiment Summary

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Location: /data/validation/workspace/jconel/Lake\_Tahoe\_Plan\_updated.fm

## Introduction

An experiment involving AirMIS and ground observations has been conducted for Lake Tahoe. Coincident flight and surface data acquisitions were made on two days: October 19 and 21. The objective was to obtain multiangle observations of biomass smoke over deep waters of the lake, this in support of MISR algorithm validation for recovery of aerosols over deep clear water. Although skies were crystal clear, an otherwise excellent data set was acquired by AirMISR on Tuesday, October 19th. The second flight imaged the target through scattered clouds.

## Site Selection

Lake Tahoe was chosen as a site for this experiment because of its clear deep (1600 feet) waters. Also it was anticipated that a number of prescribed burns set by the Sierra District Department of Parks and Recreation, State of California, would supply smoke to the Tahoe Basin, and generate a smoke layer above the water. The location of the prescribed burns on the SW shore of the lake would supply smoke to the basin under the conditions of S or SW winds, which are the preferred wind directions for burning. Also, the ideal conditions are clear sky above, which are essential from our observational point of view. The fire season for prescribed burns is also from about from mid September through mid November.

We have laid out flight lines near the western shore of the lake. This site exists on a shallow shelf within the lake. The center coordinates are given in Table 1. This lake site was preferred because deep water is included within the AirMISR nadir footprint. Also there is a greater variation of water depth throughout the images, which means it may be possible to determine bottom influences on the MISR retrieval process. The water depth ranges from zero to around 457.2 m (1500 feet). All views include a portion of the shore line near Tahoe city for orientation purposes. One half to one third the the image area should be land, which is forested and may approximate DDV to one extent or another.

**Table 1: Center coordinates for AirMISR flight**

	Shallow shelf site
Latitude	39°09.92'
Longitude	120°06.7'
Altitude	1899 m (6229 ft)

## Flight Lines

Two separate lines were requested for each of three directions, for a total of 6 runs: (1,2) The first azimuth is 189° with a target overpass time of 10:15 LST. This corresponds approximately to

the model EOS overpass time and azimuth. A down and back pair is requested. The second overpass time can be whatever is required to complete the first line and to position plane for second; (3) The third azimuth lies in the solar principal plane at the moment. We have calculated approximately 135° for this; (4) The fourth azimuth is away from the Sun at an azimuth of about 315°; (5) The fifth line bisects the previous two approximately at an azimuth of 72°; (6) the final line lies at an azimuth of 252°.

To summarize The requested heading and overpass time for each line is given in the following table.

**Table 2: Flight line summary**

Line No.	Azimuth relative to true N	Time over target center UT (LST)
1	189	18:15 UT (10:30 LST, 11:30 PDT)
2	9	As permitted by sequential flight pattern and conditions. No specific timing required
3	~135	
4	~315	
5	72	
6	252	

**Data acquisition, Wednesday, 13Oct99**

Engineering flights were conducted with AirMISR over Mono Lake. One run was made over the lake in the science configuration. Several engineering runs were made. No ground data are available.

**Data acquisition, Tuesday, 19Oct99**

AirMISR successfully acquired data over the target site on Tuesday, 19Oct99. The camera did not make it beyond the Af position for Run 1, but all angles were acquired on Runs 2-6. The integration time should have been set to 13.4, 18.9, 25.6, and 21.8 for Bands Blue-NIR, for all camera view angle positions. For both these 19Oct99 data, as well as those acquired over Mono Lake on 14Oct99, there was an error in the integration time command for the An and the Af positions. These were commanded to 21.44 and 0 msec, respectively. Thus, no Af imagery were acquired, and the calibration for the An image is degraded.

The field team spent the day on the Tahoe Gal, a cruise ship which normally carries tourists. On this day we were able to set up our PARABOLA, CIMEL, MFRSR, and Reagan instruments on board. The lake was reported to be free of waves, and the skies were clear (none of the hoped for smoke, however).

**Data acquisition, Thursday, 21Oct99**

No AirMISR data were acquired on 20Oct99, as the ER-2 was sent to record a fault line due to our recent earthquake. It was later noted that a light smoke filled the Lake Tahoe basin that day.

AirMISR repeated the Lake Tahoe overflight on Thursday, 21Oct99. This time all camera positions were made, and all integration times were correctly set. Sky conditions were cloudy, however, with possible cirrus.

With the exception of the Reagan C, all instruments were stationed at a dock, with coordinates 39 10.402N, 120 08.060W, 1879M. Jim was set-up 2km away at the Coast Guard station.

### **Field Instruments**

The list of the instruments utilized in this campaign are:

Reagans at two sites separated by few km to measure sky variability

CIMEL to estimate phase function and single scatter albedo

PARABOLA to estimate upwelling and downwelling radiance. May be boat mounted or stationary at end of dock.

ASD for spectral HDRF from boat

Davis weather station for local winds. Other wind data from Coast Guard northeast of Tahoe City.

Microtops for quick estimates of aerosol optical depth (borrowed from ASTER)

**AirMISR hours available** at the start of the campaign was 10.5