

# Jackson State University Mobile Meteorology Data Report

## Sundowner Winds Experiment (SWEX 2022)

### 'XOP-California' Supplementary Data

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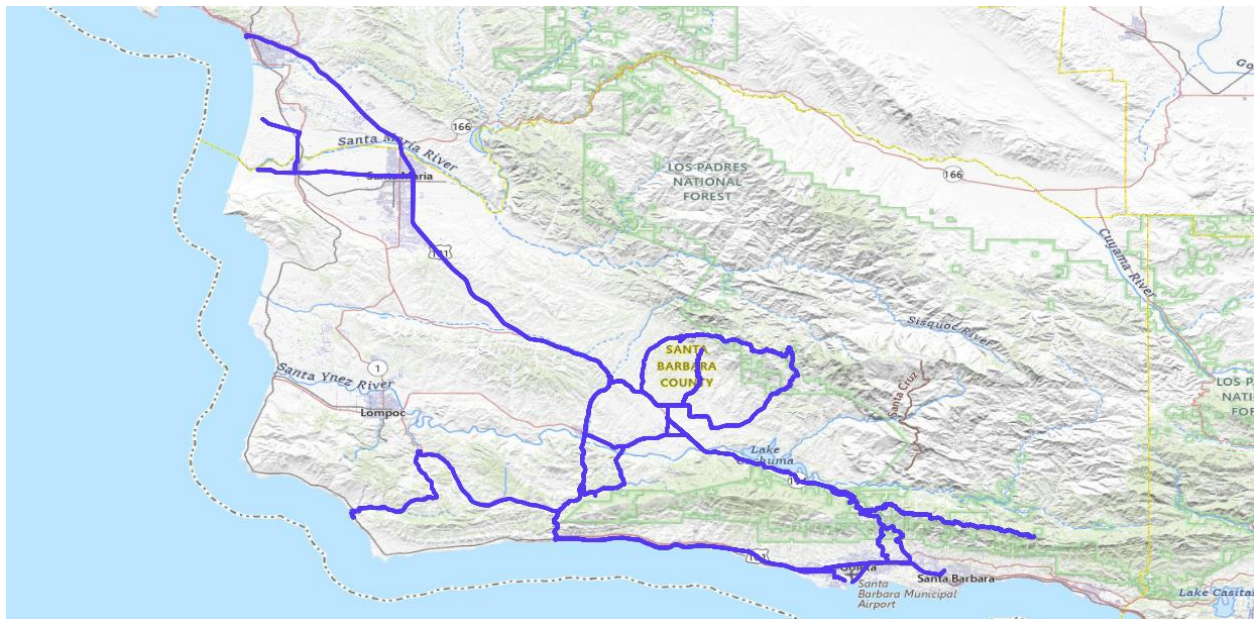
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Final data submission

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To complement various other observational datasets collected during SWEX, mobile measurements were made from instruments mounted on a vehicle operated within the study domain. The mobile platform (JSU Mobile Meteorology Unit—MMU) was based out of Sedgwick Reserve. For a complete description of the platform and of data processing, refer to the dataset collected during the IOP/EOP times (<https://data.eol.ucar.edu/dataset/600.021>).

On nine days there were data collected with the platform outside of the agreed IOP and EOP dates, referred to here as 'XOP'. The circumstances and routes driven varied. In general, sundowner winds were not expected although other locally influenced atmospheric patterns were noted.

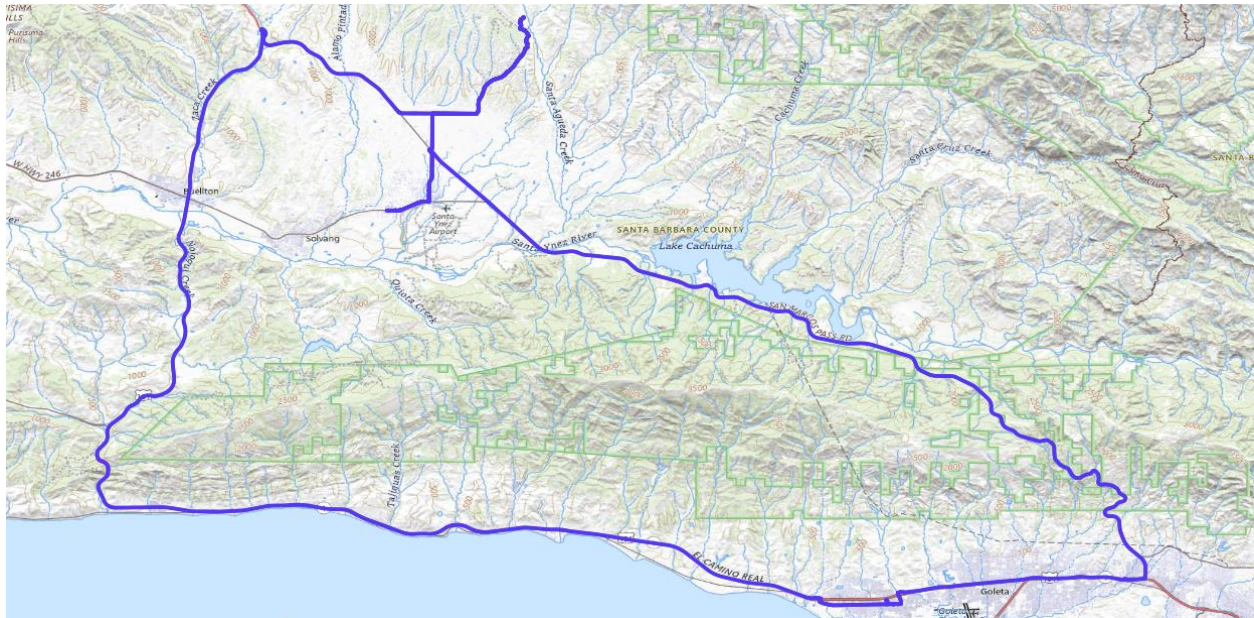
Temperature and humidity (dewpoint) measurements by sensors within the Gill and U-Tube shields were typically within a few tenths of a degree Celsius. In general, temperatures from the Gill shield are believed to be the most representative due to reduced radiative heating, although the T109 sometimes has an advantage for measurement of rapid changes. Approximately 2% of observations were affected by GPS issues as noted in the position, elevation, and speed. Corrected positions are believed to be accurate within about 30 m. Comparisons between the two barometers are difficult since they are differently influenced by vehicle air speed. Conversion of times from UTC to Pacific Daylight Time can be done by subtracting 7 hours.

### **Data Summary and Metrics during XOP-California**

# of observing points/times (during XOPs): 34,439  
# of observations with GPS errors: 597 (1.7% of total)  
# of corrected elevations: 512 (1.5%)  
Total distance: 1043.1 km  
Maximum speed: 30.0 m/s  
Minimum corrected elevation: 5 m  
Maximum corrected elevation: 1356 m  
Maximum solar/visible radiation: 1100 W/m<sup>2</sup>  
Mean Gill shield temperature: 16.3 C  
Mean U-Tube temperature: 16.5 C  
Mean T109 temperature: 16.4 C  
Mean Gill shield dewpoint: 8.0 C  
Mean U-Tube dewpoint: 7.8 C

## Description of XOP-California mobile transects

April 1-2



### Narrative:

XOP1-CA included a commute from Sedgwick Reserve to Santa Ynez for supplies and then to meet other SWEX investigators for a social gathering in Goleta. The route over San Marcos Pass was taken to Goleta, with a return trip after dark via Gaviota. Sky conditions were mostly clear. In the afternoon, conditions were notably cooler south of San Marcos Pass than inland. In the evening, there was less difference between coastal and inland locations and relative humidity was close to saturation.



**Notes:**

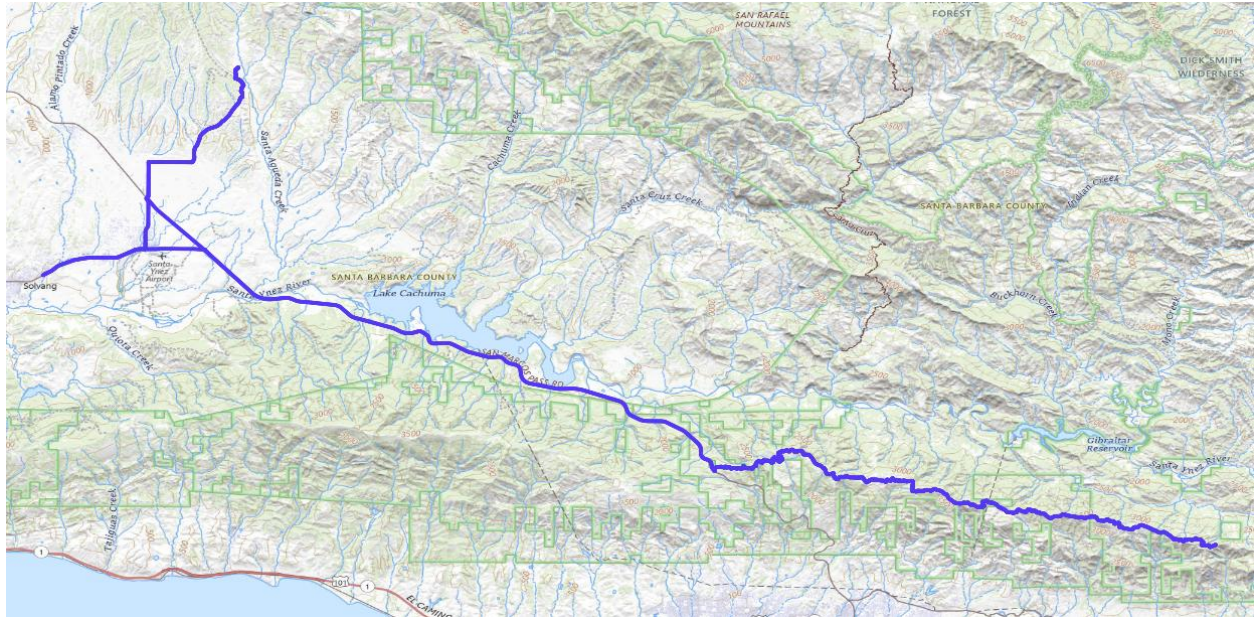
1. Stops within segments
  - a. Segment 1: 2200-2203 UTC
  
2. GPS errors
  - a. Segment 1: 8 points
  - b. Segment 2: 1 point
  - c. Segment 3: 39 points
  - d. Segment 4: 18 points

**Statistics:**

# of obs: 5029  
Total distance: 169.1 km  
Maximum speed: 30.0 m/s  
Minimum corrected elevation: 11 m

Maximum corrected elevation: 670 m  
Maximum solar radiation: 984 W/m<sup>2</sup>  
Mean Gill shield temperature: 17.1 C  
Mean U-Tube temperature: 17.4 C  
Mean T109 temperature: 17.3 C  
Mean Gill shield dewpoint: 10.5 C  
Mean U-Tube dewpoint: 10.4 C

April 2-3



**Narrative:**

This was primarily a practice run to test equipment and become familiar with road conditions along the Santa Ynez Mountains crest, in particular East Camino Cielo. Conditions changed from broken cloud cover to fog at the higher elevations. Low cloud base and fog conditions resulted in very small values of “IRTS minus Gill shield temperature” and reduced solar radiation. Sunset was at 0222 UTC during the drive from San Marcos Pass to Solvang.



**Notes:**

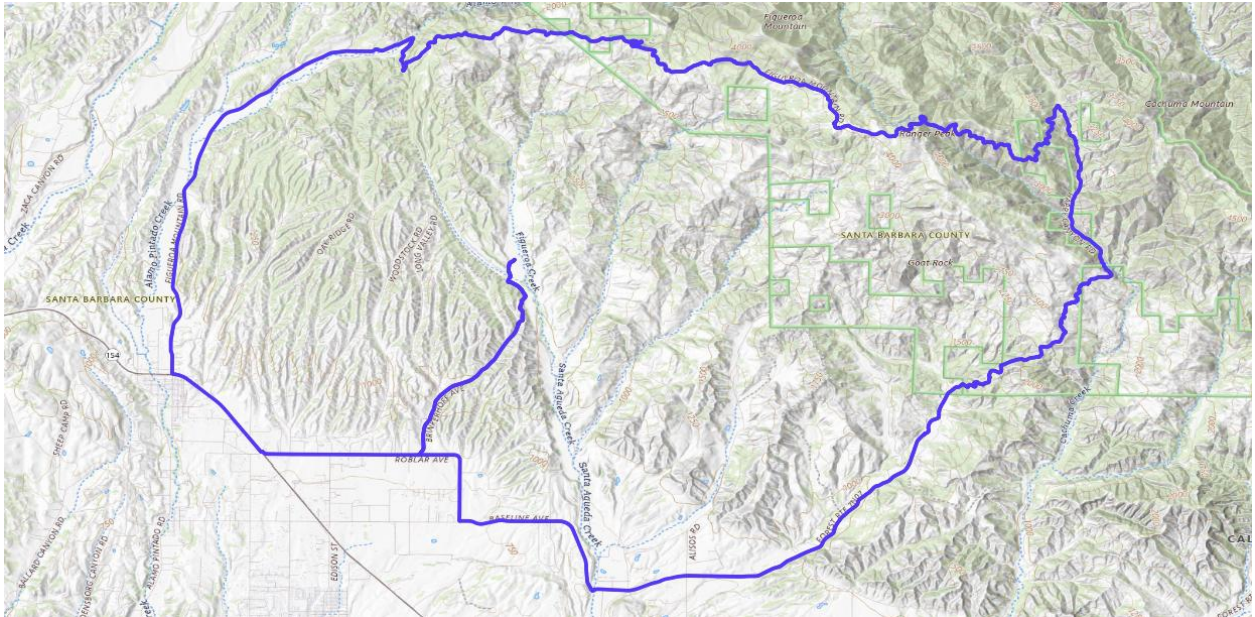
1. Stops within segments
  - a. Segment 2: 2356-0000 UTC
  - b. Segment 3: 0134-0138 UTC
  
2. Data gap
  - a. Segment 4: 21:12:05 to 21:12:23

**Statistics:**

# of obs: 6275  
Total distance: 145.2 km  
Maximum speed: 25.6 m/s  
Minimum corrected elevation: 142 m  
Maximum corrected elevation: 1206 m  
Maximum solar radiation: 780 W/m<sup>2</sup>  
Mean Gill shield temperature: 12.8 C  
Mean U-Tube temperature: 13.0 C  
Mean T109 temperature: 12.9 C  
Mean Gill shield dewpoint: 10.4 C

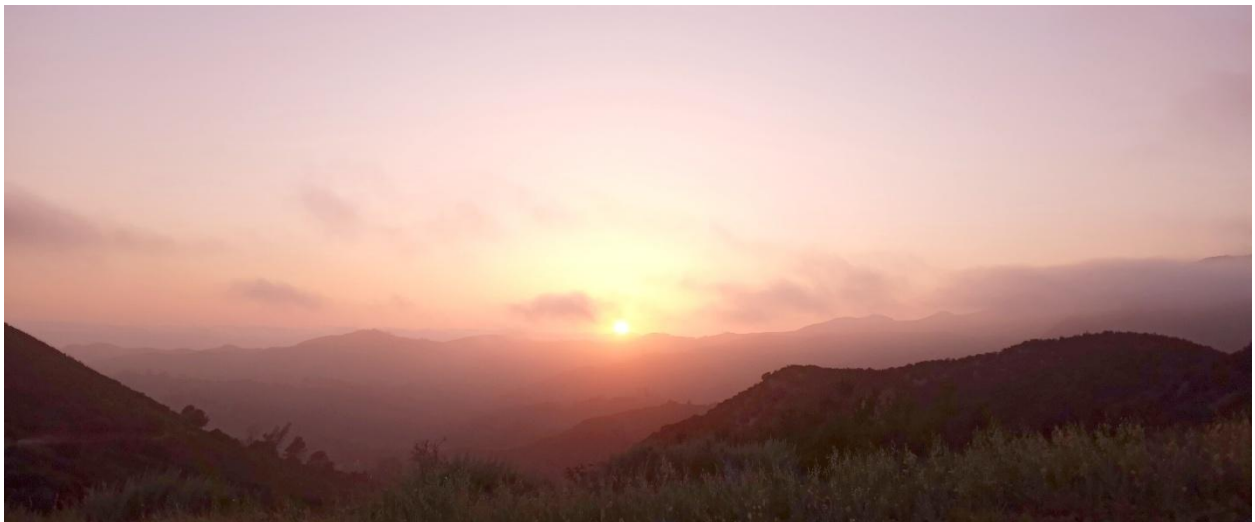
Mean U-Tube dewpoint: 10.3 C

April 3-4



**Narrative:**

A clockwise loop was made of Figueroa Mountain, Happy Canyon, and the Santa Ynez Valley under mostly clear skies. Generally warmer temperatures at the higher elevations were indicative of an inversion around 800 m. Sunset was at 0223 UTC.



**Notes:**

- 1. Stops within segments

- a. Segment 1: 2359-0001 UTC
- b. Segment 2: 0036-0038 UTC
- c. Segment 3: 0152-0155 UTC

**Statistics:**

# of obs: 4567

Total distance: 75.8 km

Maximum speed: 24.3 m/s

Minimum corrected elevation: 208 m

Maximum corrected elevation: 1356 m

Maximum solar radiation: 719 W/m<sup>2</sup>

Mean Gill shield temperature: 14.2 C

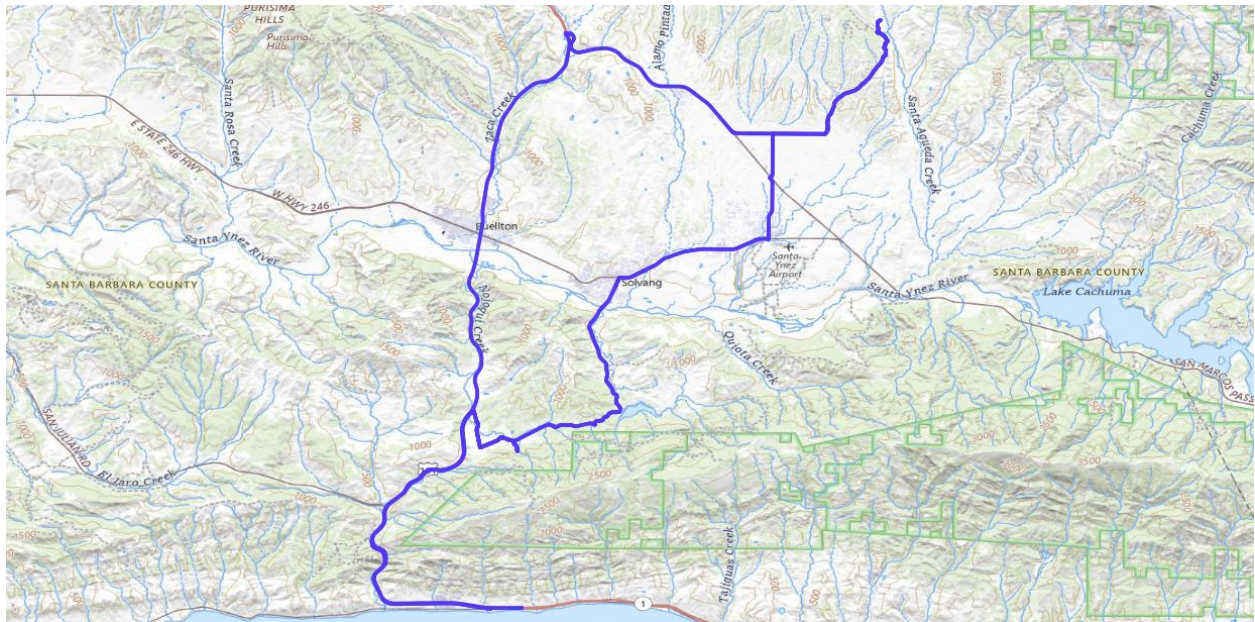
Mean U-Tube temperature: 14.4 C

Mean T109 temperature: 14.3 C

Mean Gill shield dewpoint: 8.5 C

Mean U-Tube dewpoint: 8.3 C

April 7-8



**Narrative:**

During a period of unusually hot dry weather and light offshore winds, a drive was taken to compare small scale influences of the Alisal Valley (including Nojoqui Falls) and coastal terrain.



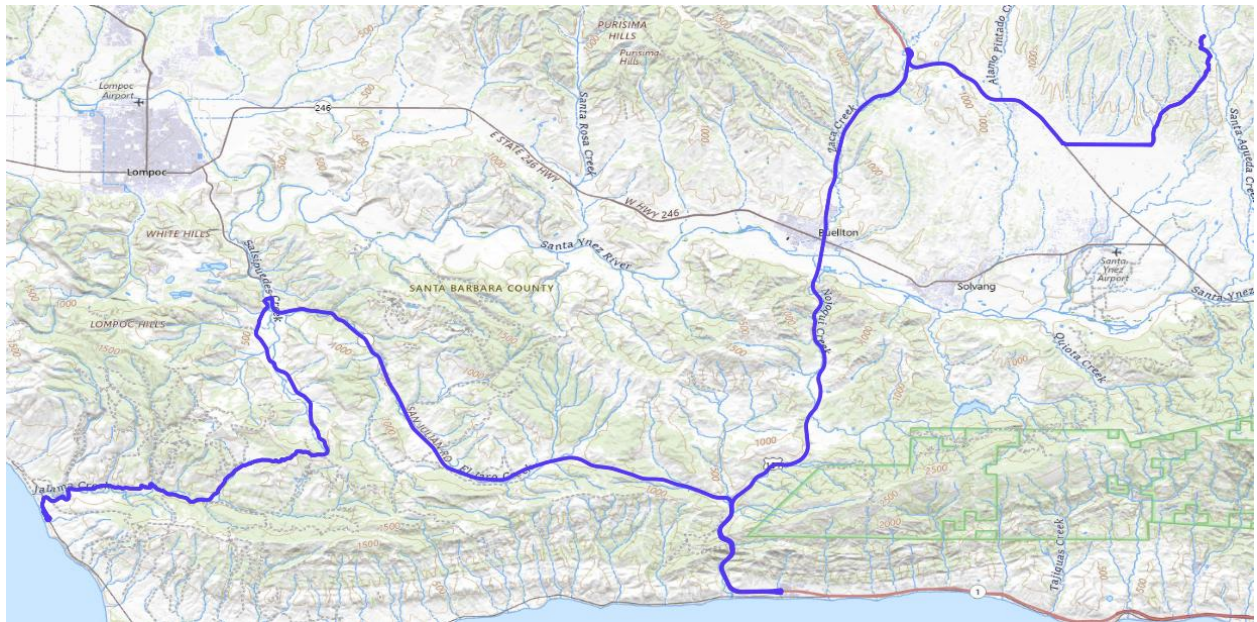
**Notes:**

1. GPS errors
  - a. Segment 3: 3 points

**Statistics:**

# of obs: 3046  
Total distance: 99.8 km  
Maximum speed: 29.4 m/s  
Minimum corrected elevation: 16 m  
Maximum corrected elevation: 367 m  
Maximum solar radiation: 892 W/m<sup>2</sup>  
Mean Gill shield temperature: 31.7 C  
Mean U-Tube temperature: 31.9 C  
Mean T109 temperature: 32.0 C  
Mean Gill shield dewpoint: 0.6 C  
Mean U-Tube dewpoint: -0.0 C

April 11



**Narrative:**

This was an evening return trip from Jalama Beach, with a sidetrip through Gaviota. Unfortunately no data were collected going to Jalama Beach. Sunset was at 0230 UTC.



**Notes:**

1. GPS errors

- a. Segment 1: 4 points
- b. Segment 2: 7 points

**Statistics:**

# of obs: 2751

Total distance: 96.6 km

Maximum speed: 29.0 m/s

Minimum corrected elevation: 16 m

Maximum corrected elevation: 367 m

Maximum solar radiation: 6 W/m<sup>2</sup>

Mean Gill shield temperature: 10.8 C

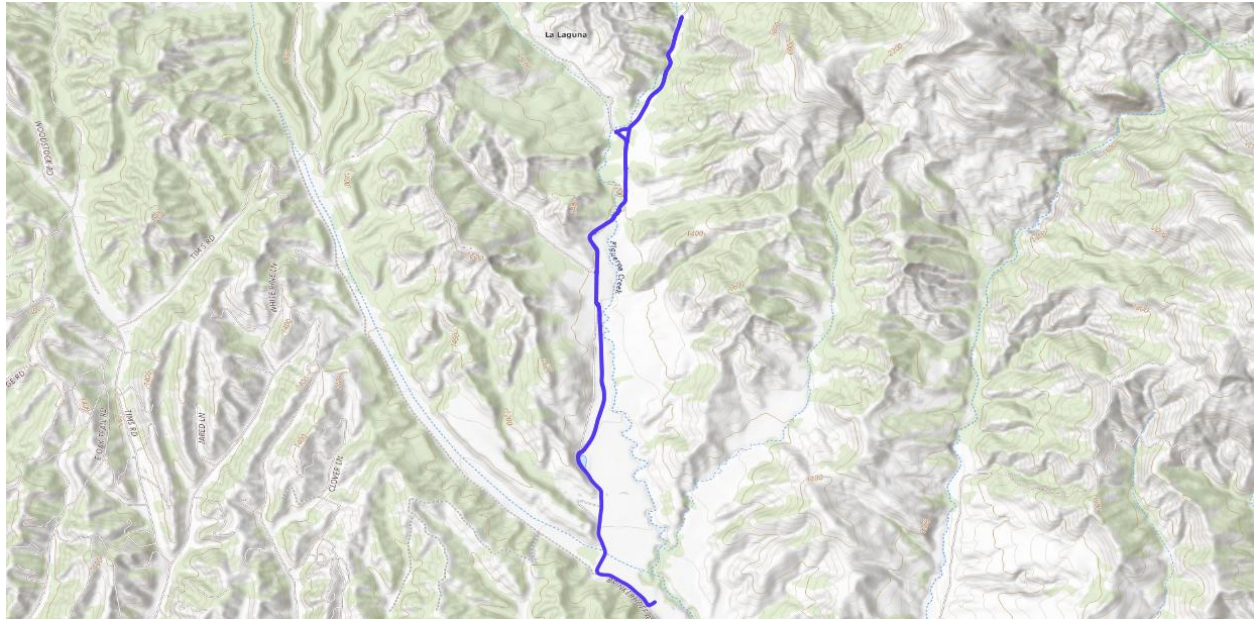
Mean U-Tube temperature: 10.8 C

Mean T109 temperature: 10.7 C

Mean Gill shield dewpoint: 5.2 C

Mean U-Tube dewpoint: 5.1 C

April 13



**Narrative:**

This was a test of the utility of the mobile system to document microclimatic patterns during late afternoon across the Sedgwick Reserve. Although skies were clear, much of the transect was shaded by terrain.



**Notes:**

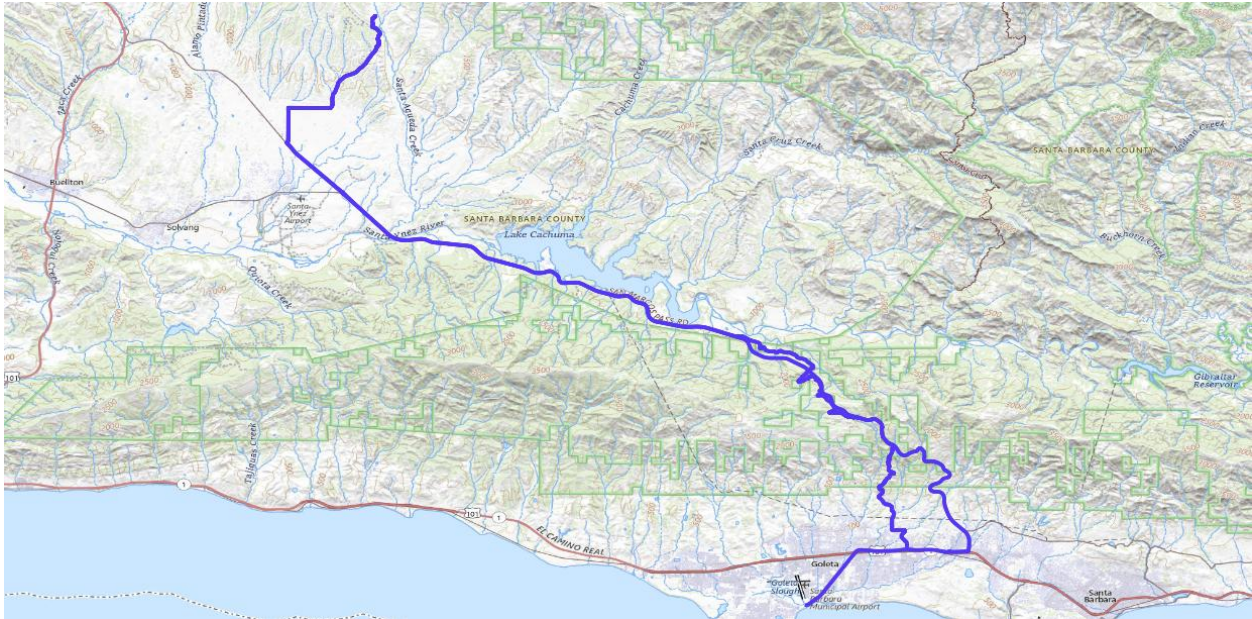
1. Stops within segments
  - a. Segment 1: 0106-0108 UTC
  - b. Segment 2: 0136-0139, 0143-0145 UTC

**Statistics:**

# of obs: 1167  
Total distance: 8.1 km  
Maximum speed: 7.8 m/s  
Minimum corrected elevation: 323 m  
Maximum corrected elevation: 396 m  
Maximum solar radiation: 278 W/m<sup>2</sup>  
Mean Gill shield temperature: 11.6 C  
Mean U-Tube temperature: 11.7 C  
Mean T109 temperature: 11.5 C  
Mean Gill shield dewpoint: -0.5 C

Mean U-Tube dewpoint: -0.6 C

April 15-16



**Narrative:**

This was a roundtrip via San Marcos Pass to the SWEX science meeting at UCSB. On the return trip, alternate older roads were used from Santa Barbara to the head of Lake Cachuma for comparison with the usual highway route. Sunset was at 0232 UTC, shortly before rejoining SR 154.



**Statistics:**

# of obs: 3673

Total distance: 113.1 km

Maximum speed: 28.7 m/s

Minimum corrected elevation: 5 m

Maximum corrected elevation: 682 m

Maximum solar radiation: 825 W/m<sup>2</sup>

Mean Gill shield temperature: 14.0 C

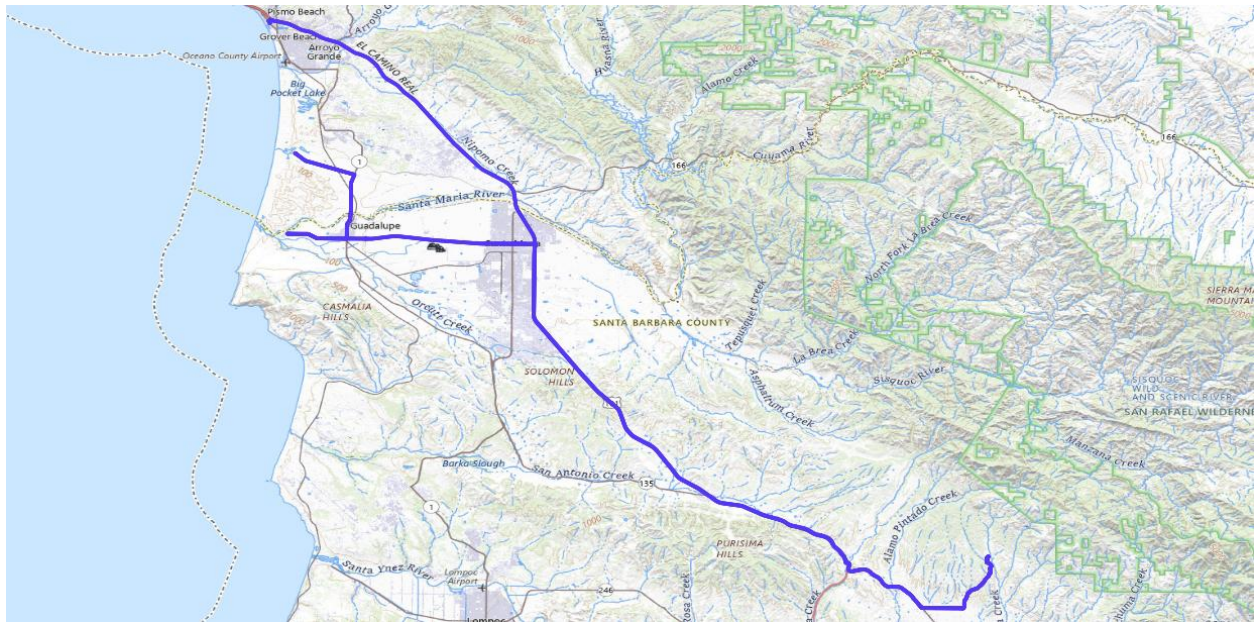
Mean U-Tube temperature: 14.2 C

Mean T109 temperature: 14.1 C

Mean Gill shield dewpoint: 8.5 C

Mean U-Tube dewpoint: 8.3 C

April 30-May 1



**Narrative:**

This was a roundtrip to coastal locations northwest of the Santa Ynez Valley. Stops were made near Guadalupe Dunes and Pismo Beach. Skies were clear, with strong onshore winds at the beach. The return from Pismo Beach was after dark.



**Notes:**

1. GPS errors

- a. Segment 1: 200 points
- b. Segment 2: 49 points
- c. Segment 3: 268 points

**Statistics:**

# of obs: 4318

Total distance: 181.5 km

Maximum speed: 29.8 m/s

Minimum corrected elevation: 7 m

Maximum corrected elevation: 368 m

Maximum solar radiation: 786 W/m<sup>2</sup>

Mean Gill shield temperature: 16.4 C

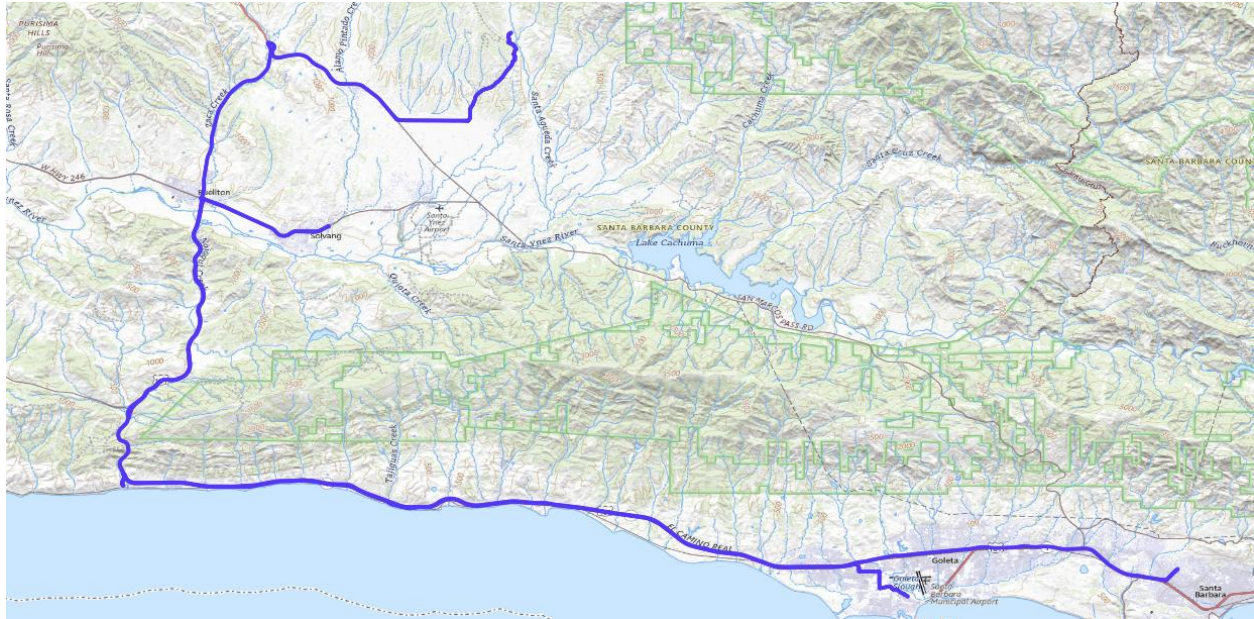
Mean U-Tube temperature: 16.7 C

Mean T109 temperature: 16.5 C

Mean Gill shield dewpoint: 9.2 C

Mean U-Tube dewpoint: 8.9 C

May 3-4



**Narrative:**

The route through Gaviota was taken to attend a science meeting at UCSB. Stops were made at Buellton and Gaviota, as well as Solvang on the return trip. Sunset was at 0245 UTC.



**Notes:**

1. Stops within segments
  - a. Segment 2: 1948-1950 UTC
  
2. Anomalously high temperatures in U-Tube on Segment 2. The cause was not determined.

**Statistics:**

# of obs: 3613  
Total distance: 153.9 km  
Maximum speed: 29.4 m/s  
Minimum corrected elevation: 5 m  
Maximum corrected elevation: 368 m  
Maximum solar radiation: 1100 W/m<sup>2</sup>  
Mean Gill shield temperature: 18.4 C  
Mean U-Tube temperature: 18.7 C  
Mean T109 temperature: 18.5 C  
Mean Gill shield dewpoint: 8.6 C  
Mean U-Tube dewpoint: 8.3 C

<b>Period</b>	<b>Leg</b>	<b>Year</b>	<b>Month</b>	<b>Day</b>	<b>Begin UTC</b>	<b>End UTC</b>	<b>From</b>	<b>To</b>	<b>km</b>
XOP 1	1	2022	4	1	2156	2221	Sedgwick Reserve	Santa Ynez	14.0
	2				2254	2316	Santa Ynez	Sedgwick Reserve	14.0
	3			2	0015	0114	Sedgwick Reserve	Goleta	63.1
	4				0322	0423	Goleta	Sedgwick Reserve	78.0
XOP 2	1	2022	4	2	2305	2341	Sedgwick Reserve	San Marcos Pass	39.1
	2				2343	0050	San Marcos Pass	Romero Saddle	28.4
	3			3	0100	0156	Romero Saddle	San Marcos Pass	28.3
	4				0202	0227	San Marcos Pass	Solvang	32.6
	5				0308	0332	Solvang	Sedgwick Reserve	16.8
XOP 3	1	2022	4	3	2329	0014	Sedgwick Reserve	Figueroa Mountain	29.8
	2				0022	0044	Figueroa Mtn	Ranger Peak	8.1
	3			0137	0256	Ranger Peak	Sedgwick Reserve	37.9	
XOP 4	1	2022	4	7	2223	2258	Sedgwick Reserve	Nojoqui Falls	37.3
	2				2341	2355	Nojoqui Falls	San Onofre Beach	16.6
	3			8	0020	0112	Canada del Molino	Sedgwick Reserve	45.9
1	2022	4	11		0232	0323	Jalama Beach	Mariposa Reina	50.4
2				0323	0403	Mariposa Reina	Sedgwick Reserve	46.2	
XOP 6	1	2022	4	13	0102	0121	Sedgwick house	Sedgwick north	3.4
	2				0133	0152	Sedgwick north	Sedgwick house	4.7
XOP 7	1	2022	4	15	1612	1704	Sedgwick Reserve	UCSB	60.1
	2				16	0158	0308	UCSB	Sedgwick Reserve
XOP 8	1	2022	4	30		2323	0027	Sedgwick Reserve	Guadalupe Dunes
	2				5	0030	0045	Guadalupe Dunes	Oso Flaco Lake
	3			0341		0444	Pismo Beach	Sedgwick Reserve	88.8
XOP 9	1	2022	5	3	1856	1922	Sedgwick Reserve	Buellton	26.6
	2				1935	1950	Buellton	Gaviota SP	18.1
	3			2025	2054	Gaviota SP	UCSB	38.9	
	4			4	0226	0259	Santa Barbara	Gaviota SP	50.3
	5				0322	0338	Gaviota HS TrIHd	Solvang	20.0