

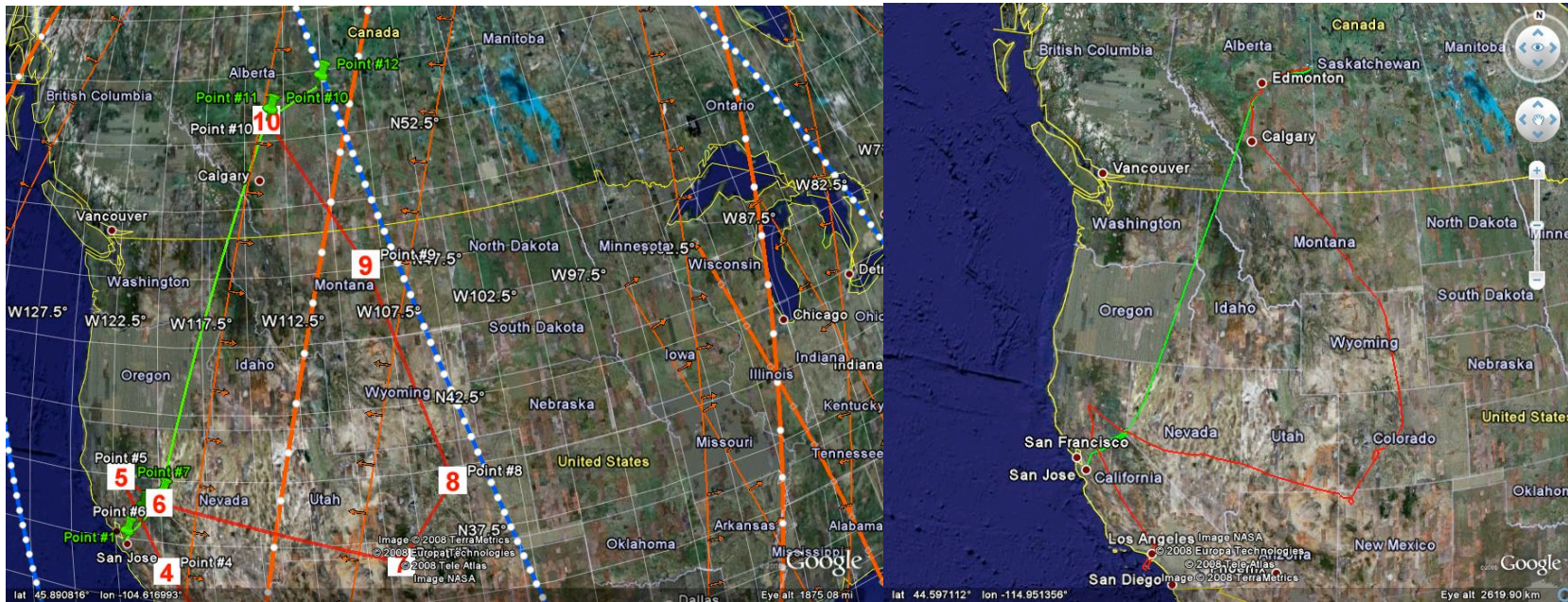
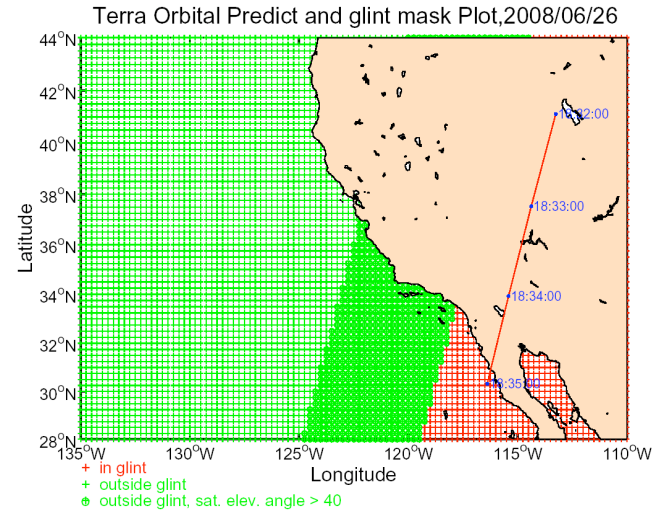
# Flight Report

## ARCTAS P-3B Data Flights 13 & 14, flown 26 Jun 2008 (Transit/Science)

Submitted by Phil Russell

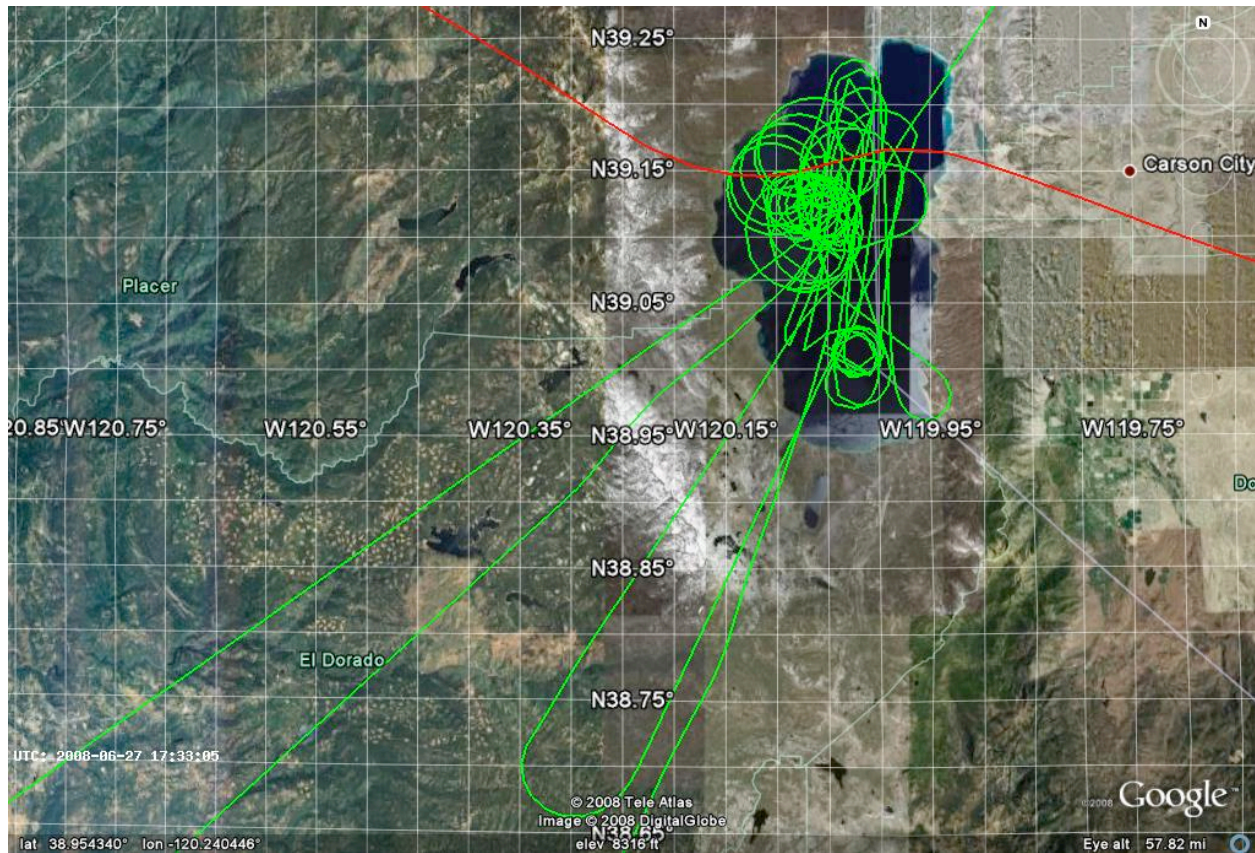
### Objectives

- 1) Transit Ames-Edmonton-Cold Lake
- 2) Lake Tahoe smoke radiation study in DC-8 lidar curtain
- 3) Central Valley smoke radiation gradient study
- 4) Lake Tahoe smoke radiation study under Terra overpass



Planned flight track

Actual flight track



**Data Flight 13 (Ames-Edmonton):**

Takeoff 1523 UT (0823 PDT). Before takeoff AATS had measured AOD(499 nm) ~1.4 on ground at Moffett Field. Red sun thru smoky skies. AATS parked for initial climb, to avoid dirt deposition on window.

~1532 UT: 8,000 ft pressure altitude, AOD(499 nm) ~0.13. Very hazy below. Brown haze to left, white to right.

~1550: Over Sierra foothills. Fresh smoke plumes to N & W.

~1552: 21,574 ft. Few Sierra peaks sticking above thick haze. Lake Tahoe South shore barely visible ahead. AOD ~0.01.

~1558: 23,034 ft. Start 10 min leg at this altitude (5 min out, 5 back) for HiGEAR & flux radiometers.

~1611: Fresh smoke plumes W of Tahoe are blowing to W.

1612: Start 1,000 fpm spiral down over Lake Tahoe. AOD 0.10.

1613: Xchat from DC-8 says lidar sees smoke up to 9,000 ft.

1624: 11,100 ft. AOD ~0.03, CO ~102 ppb.

1626: Planned DC-8 overpass time.

1627: 8,100 ft. AOD ~0.12, CO ~180 ppb.

1628: CO ~400 ppb. AERO3X does not see aerosol increase seen by other sensors. This is start of discovery of plumbing leak that may have been leaking cabin air into AERO3X & COBALT. Later partially patched with duct tape.

1629: 6,789 ft. AOD 0.43.  
1629: 6,515 ft. AOD>0.5, CO>500 ppb.  
1630: Too murky for straight leg across lake at minimum altitude. Climbing instead.  
1635: 7,800 ft & level. AOD ~0.2.  
1641: 8,275 ft. Start 3-minute radiation leg over lake, AOD ~0.07.  
1644 Turn, 8,188 ft, scattering  $450 \text{ Mm}^{-1}$ .  
1645: 8200 ft, AOD 0.13.  
1649-1658: Parking garage with level radiation legs at 7,000 & 8,700 ft. Horizontal variations in AOD observed on each level leg.  
1659-1715: 6 CAR circles at 7,860 ft (2,000 ft above lake surface). AOD ~0.17-0.23.  
1730: 19,000 ft, heading for Central Valley to attempt gradient study. Wings level for flux radiometers, ramping down.  
1753: 3,300 ft. AOD 0.38. Lots of scattering and CO. Head back toward lake at this altitude, attempting gradient study.  
1754: Climbing to avoid terrain.  
1809-1811: 10,000 ft. AOD varies from 0.13 over land to 0.08 over lake. This suggests aerosol layer is rising higher over land than over lake. Will lidar curtain show this?  
1817-1822: Spiral descent over lake, 10,000 ft to 6200 ft (200 ft above water); AOD 0.04 to 0.43. Head for airport for low approach, but conditions are too murky to see obstacles. Instead climb.  
1828-1833: 3 CAR circles at 6560 ft, 600 ft above lake.  
1833: Terra overpass.  
1836-1839: 6560 ft radiation leg, AOD 0.3 to 0.4.  
1839: Start climb, heading for Edmonton. Cirrus on horizon, but sky above looks blue.  
2136: Land Edmonton.

#### **Data Flight 14 (Edmonton-Cold Lake):**

Takeoff delayed waiting for weather to improve in Cold Lake.  
2350: Takeoff.  
2356: in cloud, GPS 15,000 ft.  
0024: Flying thru rain, GPS 3746.  
0028: Land in rain.

## WFF Flight Report

<b>Aircraft :</b>	NASA P-3B
<b>Operating Site(s) From / To :</b>	KNUQ/CYEG/CYOD
<b>Flight Date :</b>	June 26, 2008
<b>Flight Number / Data Flight # :</b>	587/ ARCTAS Transit & Science Flight # 13 & 14
<b>Time out:</b>	<b>1510 (Z) 2337 (Z)</b>
<b>Time in:</b>	<b>2144 (Z) 0032 (Z)</b>
<b>Flight Time :</b>	6.6 /.9
<b>Flt Request # / PI:</b>	<b>8P301/ Phil Russell</b>
<b>Purpose of Flight :</b>	<b>Data [ X ] Ferry [X] Functional Check [ ] Other [ ]</b>
<b>Sensor Payload :</b>	ARCTAS ( flight)
<b>Comments :</b>	<p>Aircraft is in an up status and ready for the next flight.</p> <p>All science instruments are functioning nominally. Both Lake Tahoe smoke radiation studies (in DC-8 lidar curtain and under Terra overpass) were carried out successfully, as were CAR circles over Lake Tahoe. The Central Valley smoke radiation gradient study was shortened to ensure that the second Tahoe smoke study coincided with Terra overpass. Pilot execution of required maneuvers was excellent. We encountered lots of smoke haze everywhere in California. Aerosol optical depth (AOD) on takeoff at Moffett was 1.44, producing a red sun. Over Lake Tahoe AOD was as large as 0.5. So there was plenty of smoke optical depth to cause measurable effects on atmospheric radiation. The data set should be very rich, including in situ measurements of aerosol physics and chemistry, ozone, &amp; carbon monoxide in addition to the radiative measurements. The horizontal gradients in AOD may complicate some</p>

analyses, while enabling others.

**REVEAL:** Overall it is functioning as expected. We received in-flight imagery through Iridium links; DC8/P3 fly tracks as expected; we maintain xchat most of the time; and we received reasonable amount of DIAL data from DC8. We had significant improvement over Tuesday's performance. The xchat reconnection problem seems fixed, and DIAL data uplink is more reliable. We experienced xchat drops during the first 3 hours of the flight, and it took a long time for reconnecting (5 to 10 minutes). Larry and Mark Bradford examined the xchat server configuration, and made some changes. The last few hours of flight REVEAL was able to re-start xchat server within 2 minutes.

DIAL data was too sparse on Tuesday's flight. Larry reconfigured the DIAL UDP process, and we had much improved data stream, especially on the second half of the flight.

Aircraft systems are all functioning nominally. The lack of weather radar impacted the transit from Edmonton to Cold Lake due to thunderstorms. The Garmin GPS proved invaluable, though FM radar coverage does not extend north of Cold Lake.

ESPO did an outstanding job in preparation for the P3 arrival into Cold Lake.

**SUBMITTED BY: Colleen Kelly**

**26 June 2008**

### Flight Hours for ARCTAS Campaign

<b>Flight</b>	<b>Date</b>	<b>Aircraft Flight #</b>	<b>Data Flight#</b>	<b>Duration (hr)</b>	<b>Remaining Hours*</b>
<i>Total Allocated</i>					<i>90.3</i>
Reveal Test /Training Flight	6/13/2008	583	PCF 1	2.0	88.3
Transit To NUQ	6/19/2008	582	Trans	7.7**	No charge
PCF/Data	6/22/08	584	#11	3.5	84.8
CARB/Data	6/24/08	585	#12	8.0	76.8
ARCTAS Transit Flt	6/26/08	587	#13/14	6.6/.9	69.3

\*Allotted flight hours include the following:  
 ARCTAS – 75 hours  
 CARB – 8 hours  
 Hours carried over from Spring ARCTAS – 7.3

\*\* transit flight billed as a maintenance flight