ORACLES P3 Flight Scientist Post-Flight Status

Date: ____18 August 2017_____

Flight number: ___PRF05_____

Routine flight or target of opportunity? ___target of opportunity_____

If target of opportunity, what is the goal? _____Ascension to Ascension 5 hour flight, coordinated in-flight instrument intercomparison with BAe-146_____

Flight scientist: ___Jens Redemann_____

Assistant flight scientist: _____

Ground scientist: ___Paquita Zuidema_____

Take-off: ___11:56UT_____

Landing: ____17:28UT_____

Quick summary:

Representative ACAOD or ACAOD range for flight: _0.15 (AODmax=0.36)_____

Do the models predict crossing a gradient in aerosol age?
Yes/**No**/Unclear

Did the flight cross a gradient in macroscopic cloud properties, like cloud fraction?
Yes/No/Unclear

Did the flight cross a gradient in aerosol loading?
Yes/No/Unclear (significantly more loading to the East)

At any point during the flight, was there a clear separation between the smoke plume(s) and cloud tops?
Yes/**No**/Unclear

How many of the following maneuvers took place?

Ramps ___1_____ Above plume legs _____

Square spirals ___1 (upward)_____

MBL legs __sawtoothing through entire

BL_____

Cloud legs __2+_____

Above cloud legs __2_____

Sawtooth legs __1_____

Plume legs __1 (just above cloud top; none in

dust layer)_____

Instrument status:

Instrument	Comments
P3	No issues on this flight; great communication with pilots; they seemed to have little trouble with coordinated flying
4STAR	10-15min chiller issue after coordinated flying portion along 8.5S
HiGEAR	Good flight; small leak issue at beginning of flight
HiGEAR-AMS	Great flight
HSRL-2	Great run over ARM site, interesting thin dust layer with significant depol
RSP	Computer start-up issue early on; about half the flight with door closed because of clouds
APR3	No problems in flight. A couple of significant, interesting cells
Cloud probes	Good flight; CDP issue – CDP images may have HSRL interference
CCN	Worked well, with new tubing
PDI	Issues with small sizes, possible HSRL interference?
Vertical winds	
WISPR/CVI	CVI = good surrogate inlet; good science
COMA	Worked well; got comparison with sonde during take-off
SSFR	Good flight; scene during square spiral presented issue
data	Overall good; some small map issues

PRF05Y17 date 08/18/2017 day-of-week Mission Report
flight scientist: Jens Redemann
ground scientist: Paquita Zuidema
flight plan and objective: 1-2 line synopsis, image of proposed flight plan

- **Coordinated flight with CLARIFY Bae146 to compare aerosol and cloud in situ and radiation measurements**
- **Flight plan calls for 18kft leg for coordinated radiation**
- **Second segment is in plume, the lowest (1kft) leg is cloud in situ leg**
- **Bae146 to formate onto P3**

Flight Summary: 7-8 line synopsis, include actual flight path (aircraft altitude-time from IWG and/or visible satellite image from NASA worldview with flight path superimposed)

Overall, a highly successful coordinated flight, given the difficult cloud and aerosol forecasts. Bae146 assumed formation during initial climb-out to WP2. We broke formation before reaching WP 2 and regained formation after turn at WP2. Cloud conditions were very broken except for leg between WP 4 and 5. Lots of full boundary layer profiling between WP 10 and 11. Finally an extended HSRL run over the ARM site.

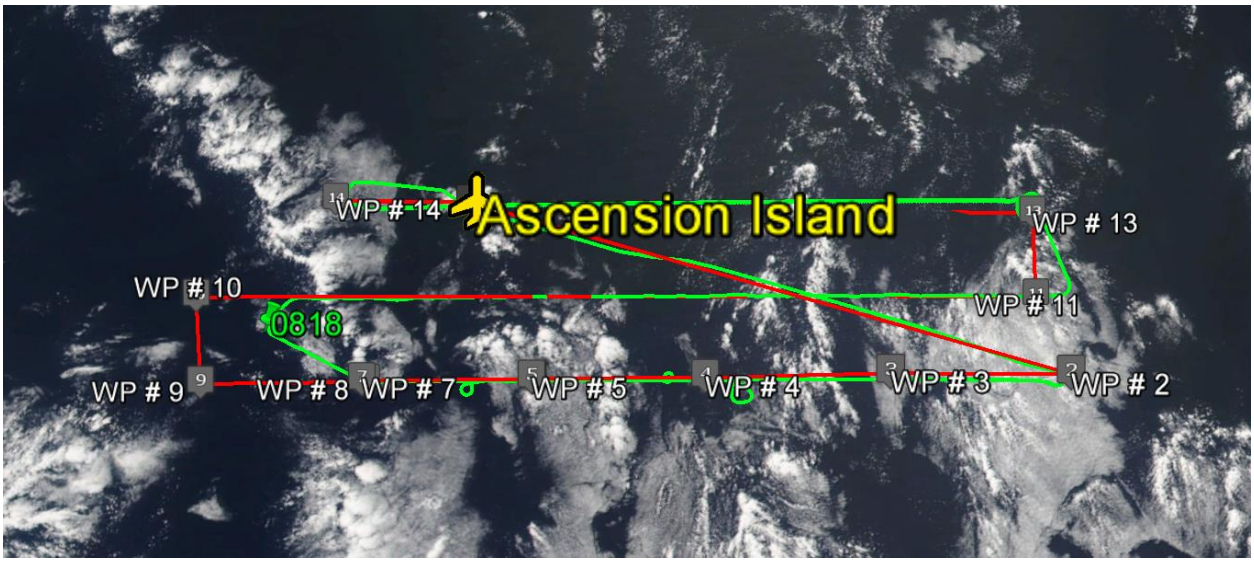


Figure 1: Planned (red) and actual (green) flight track for PRF05Y17, 18 Aug 2017 on top of VIIRS RGB image.

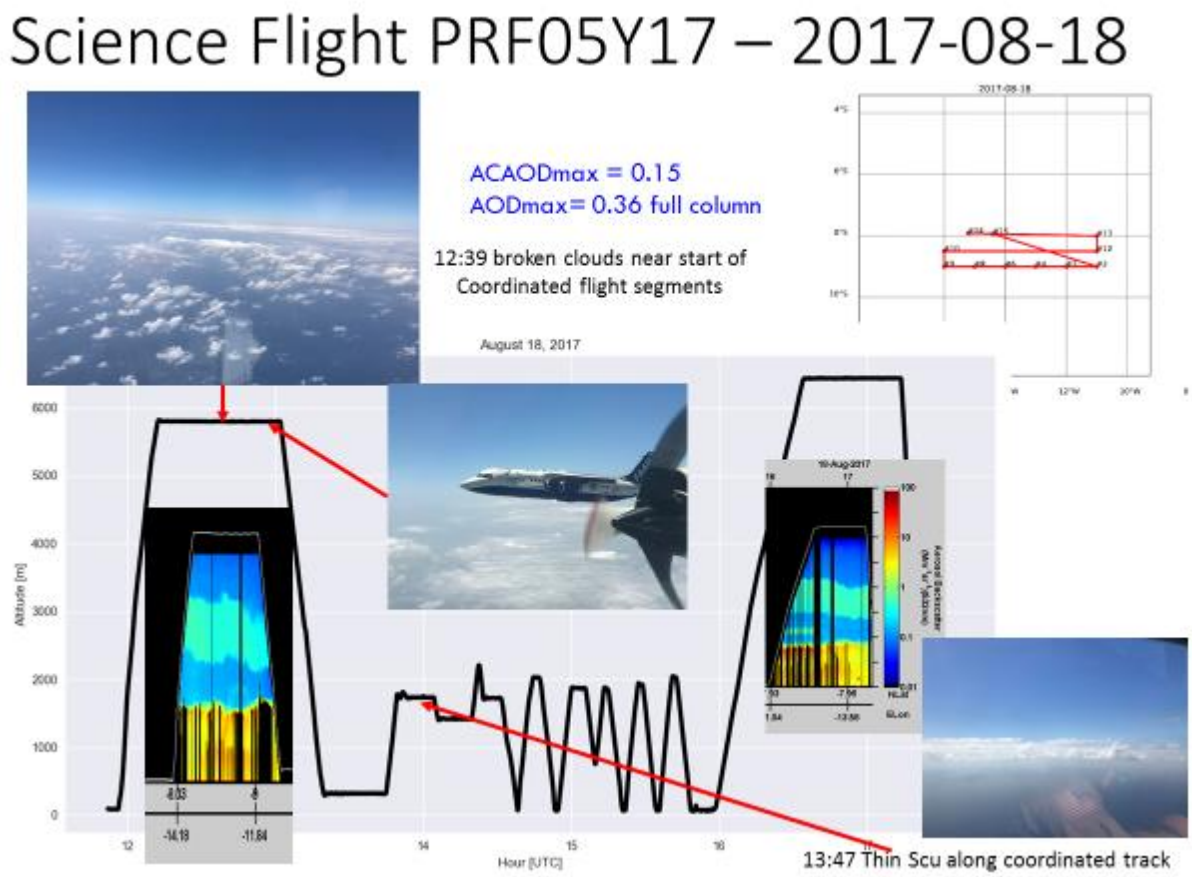


Figure 2: Altitude-time profile, indicating interesting obs period

A-Priori Forecast: 4-5 line synopsis with selection of images taken from the forecast briefings, Available at http://bocachica.arc.nasa.gov/ORACLES/oracles_2017.html, bottom of page e.g.,

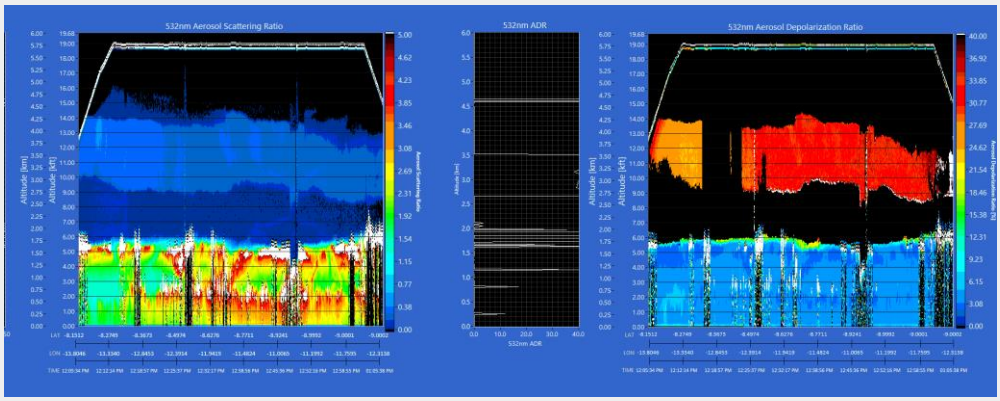
- **Broken clouds to the South of ASI**
- **Most aerosol to the East and South**

Flight Instrument status: see table above

Flight Instrument/logistics notes: 4-5 lines on anything of note

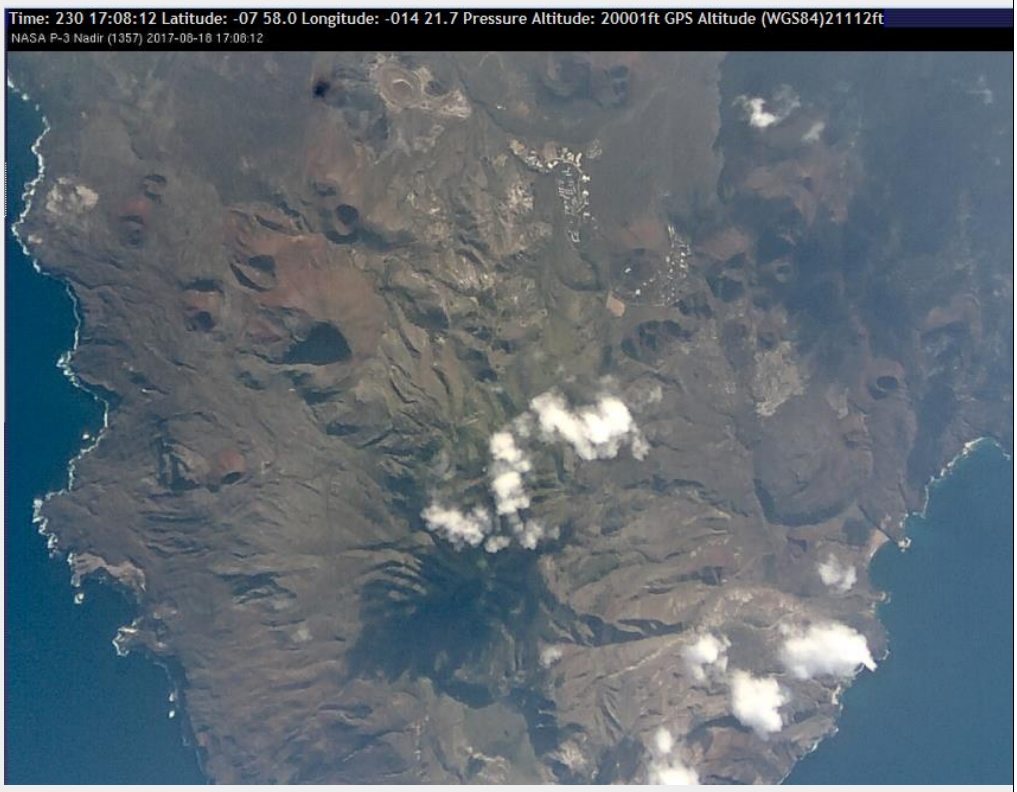
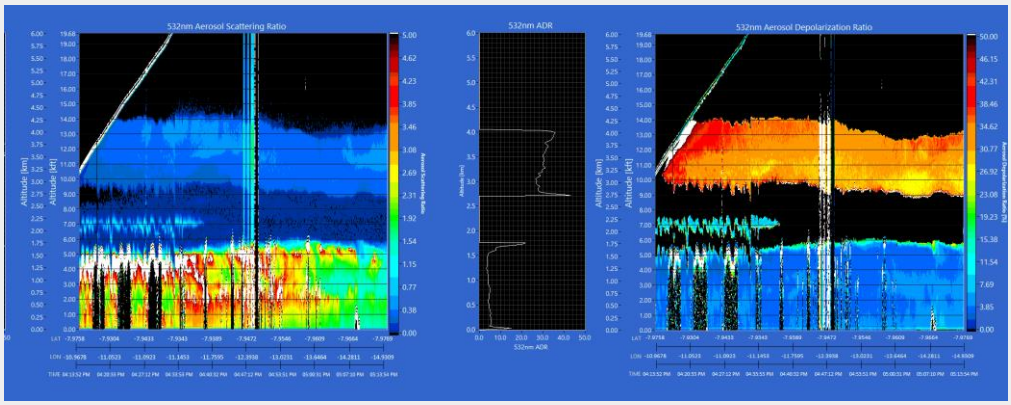
Run Table [UTC; **approximate times okay, lack of detail okay. Just note major transitions, such as takeoff, time at point of furthest extent, time at beginning and end of major profiles with their detail relegated to the notes, such as spirals,level legs,straight profiling, and landing time**]

description	beginning time	end time	altitude	notes
Takeoff, ascent to 18kft going east along 8S	**11:56:13**	12:40		**BAe-146 followed 5 minutes later, stayed 1000 ft lower. Lidar profiling of low-optical-depth Saharan dust plume**
	11:56			take-off well-mixed layer up until 6kft, second layer
	12:16			Broken/scattered clouds and Cu in the forward camera on our way to WP2
				
	12:45			first formation with Bae146 on way to WP2, pix of low-clouds, thin, but fairly homogeneous

description	beginning time	end time	altitude	notes
				
	12:51			**18kft leg for intercomparison**
	13:00			12.25W during descent see drizzle in APR
				
Descent to 1kt	12:40?	**13:31?**		**? times on MTS problematic. Square spiral descent, 1st rendezvous with BAe-146. 8S, ~12.8W. overflight of a good cumulus cluster at ~13:04.**

description	beginning time	end time	altitude	notes
	13:08			descending through optically thin dust layer (see lidar curtain above)
	13:12			pilots maneuvering to get us descending through hole in clouds
	13:41			clouds disappear completely at 14.25W, British made the right call to reverse course and work clouds between 13 and 14W
	13:47			Thin Scu along coordinated track
				
	13:49			cloud leg between WP 6 and 4 at 5650ft GPS
	13:52			during cloud leg we can often see water below, turning and doing leg at 4,650ft (trying to find different cloud layer)
	14:12			planning to do saw-toothing at WP6
	14:35			deconflicted from Bae146

description	beginning time	end time	altitude	notes
	14:46			picked up constant latitude line along 8.5S in original flight plan; significant cloud early on
	15:09			thick cloud with 500/cc
	15:20			at 12.85W, two layer cloud structure starts again along this leg, lowest layer bottom is near 1500ft, higher cloud layer bottoms at 3,000ft
	15:2x			thick cloud band with drizzle near 12.5W
	15:53			AOD of 0.32-0.36
	16:09			elevated aerosol layer from ~6.5-7.5kft
HSRL curtain,	**16:36**	**17:12**	20kft	Level leg, overflight of Ascension along (slightly north of) 8S between 17:07 to 17:08 (estimated)
	17:08			overpass of ARM site under mostly clear conditions at 21kft GPS; 5min straight and level past the ARM site

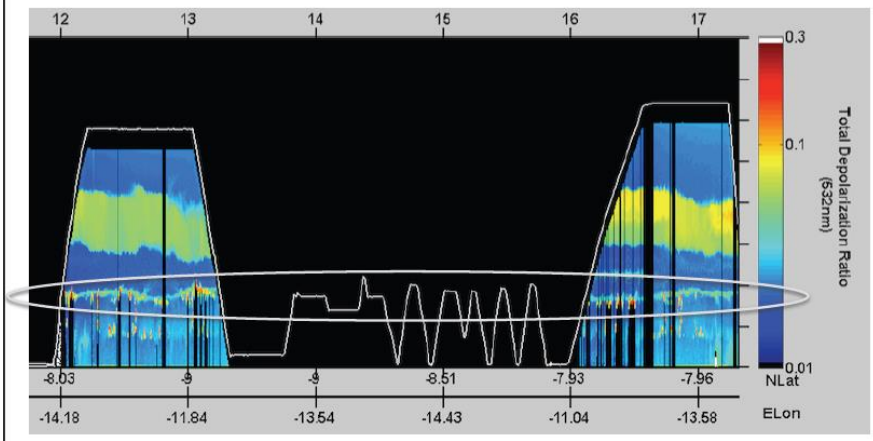
description	beginning time	end time	altitude	notes
	 			
Descent to landing	**17:12**	17:28:37		**Highest CO of the day (160) during final descent at ~9kft (17:20UT)**

visual notes: **any photographs, additional images**

please upload to https://espo.nasa.gov/ORACLES/node/add/mission-science-report when done, if access is a problem either email to bernadette.luna-1@nasa.gov to upload or ask her to grant access permission.

After flight, in science team meeting, Paquita raises issue of thin aerosol layer near cloud top:

interesting thin layer of elevated aerosol/total lidar depolarization ratio at/ above inversion base
is this been brought up within active cumulus clouds and detrained into drier layer aloft?



do in-situ instruments see this?