ORACLES P3 Flight Scientist Post-Flight Status

Date: _____23 October 2018_____

Flight number: ____PRF13Y18_____

Routine flight or target of opportunity? *Pseudo*-routine:survey flight to west, along 5S to 3W__If target of opportunity, what is the goal? _____

Flight scientist: _____Paquita Zuidema_____

Ground scientist: _____Sarah Doherty_____

Take-off: ____06:52:42 UTC_____

Landing: _____14:41:56 UTC_____

Quick summary:

Representative ACAOD or ACAOD range for flight: max AOD of 0.19_____

Do the models predict crossing a gradient in aerosol age? Not really. All about 7-9 days old along 5S

Did the flight cross a gradient in macroscopic cloud properties, like cloud fraction? Cloud fraction high south of ~3S. almost all boundary layer sampling done west of 5E.

Did the flight cross a gradient in aerosol loading? Only between 0-5S

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

How many of the following maneuvers took place?

Ramps _____

Square spirals _____

MBL legs ____3_____

Cloud legs _____

Above cloud legs _____

Sawtooth legs _____

Plume legs _____

Above plume legs _____

Instrument status:

Instrument	Comments
P3	No issues.
4STAR	Unremarkable. 0.19 aod max.
HiGEAR	Swapped out the PSAP yesterday, towards comparing the 2 PSAPs. Everything worked great. Good CVI data. Good nav runs.
HiGEAR-AMS	Worked well. Went on CVI a lot.
HSRL-2	Computer glitch at beginning, needed a reboot. Lidar back by ~7:18utc. Otherwise went well. Not an issue for transit.
RSP	Worked fine.
APR3	One of our best flights. All 3 frequencies worked. Useful spirals
Cloud probes	Good flight. Useful flight for comparing vertical profiles of cloud properties to aerosol.
CCN	Worked well.
PDI	Seemed to work.
Vertical winds	Seemed to work
WISPR/CVI	Worked fine. Precipitation got into the CVI and will invalidate those isotope measurements but not a problem with the instrument.
COMA	Good flight. Middle-of-the-road 85-180 ppb values.
SSFR	Worked well, good day, under-cloud legs might be good
data	Mostly well. Some issue with the Litton that will affect the wind measurements, but solvable.
PTI&SP2	No PTI data (no operator). No SP2 problems.
filter	Every filter was exposed for 15 minutes total

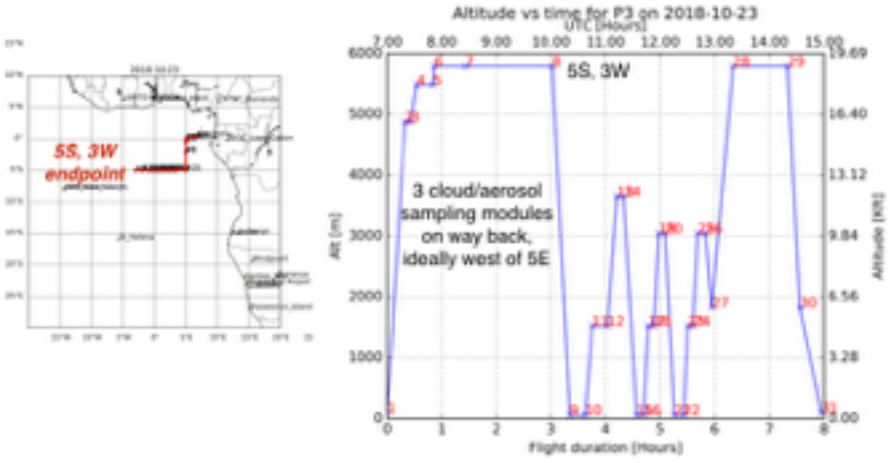
PRF13 23 October 2018 Mission Report

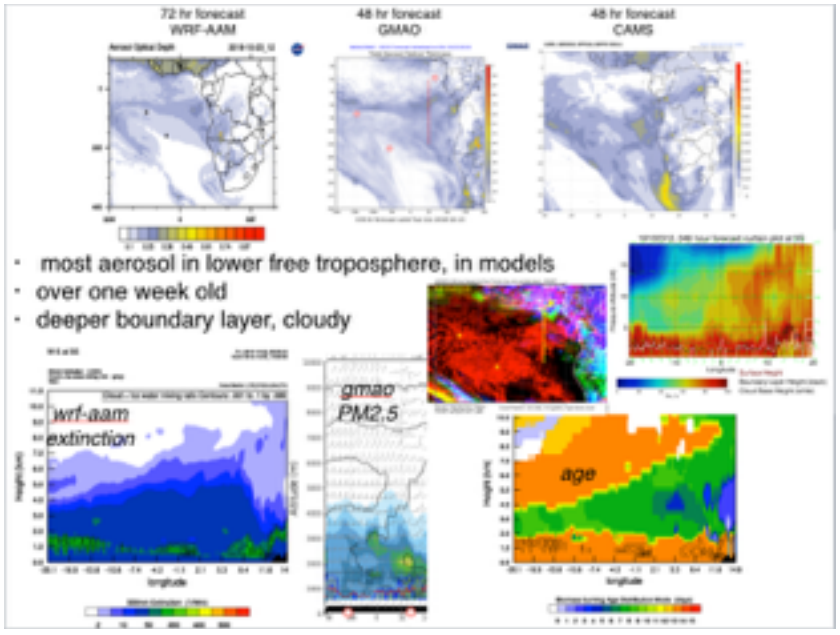
flight scientist: Paquita Zuidema
ground scientist: Sarah Doherty

flight plan and objective: survey flight going west. high-altitude along 5E to 5S, then turn west, out to 3W along 5S. Three samples of the cloudy boundary layer on the way back.

Notable features: 4 sawtooths through double-layered stratocumulus in which the lower layer cloud droplet number concentrations exceeded those in the upper layer.

A-Priori Outlook
concern about convection at Sao Tome may shorten flight. high-level cloud, outflow from convection to north expected to reach 5S. little aerosol loading anticipated based on the forecasts, along with low cloud reaching north of 5S.

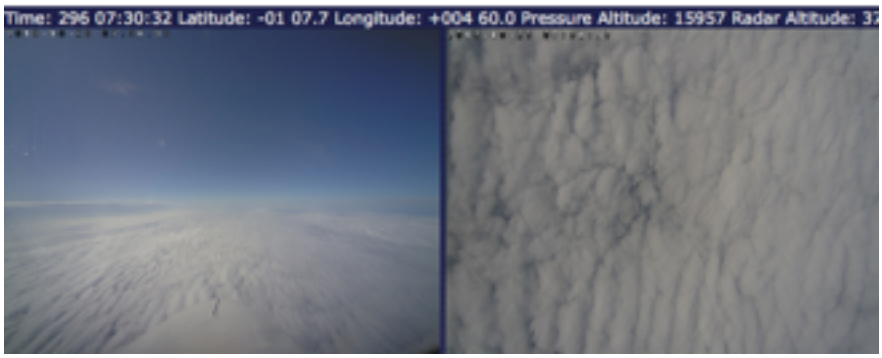


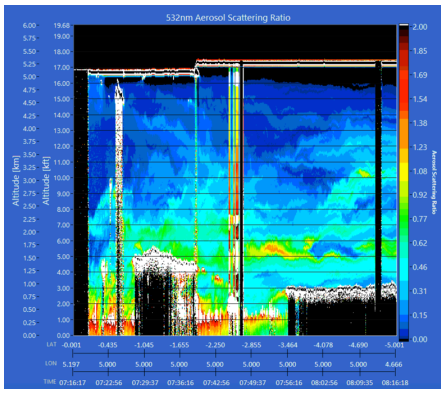


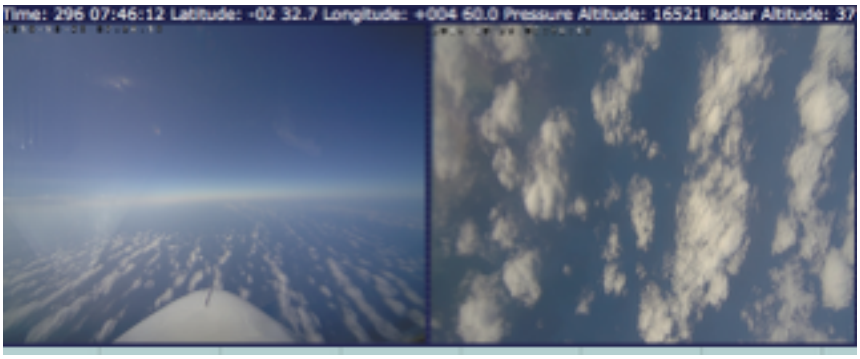
description	beginning time (UTC)	end time (UTC)	altitude	notes
takeoff	6:52:42			
high-altitude to 5S along 5E	~7:16	8:13	16-18kft	CVI drying exercise onroute, HSRL calibration. plane rose at one point to get above cloud.
high-altitude along 5S, from 5E to 3W	8:13	9:40		prime meridian ~9:10
square spiral at 3W	9:50	10:27	- —	3 level squares during the spiral down at 3W, first at end of highaltitude leg as part of the RSP run. the other two at 8kft and 4.5kft, for wind calibration. 30-second level legs. 8 and 4.5kft also coincide with aerosol. left the spiral at 4.5kft going east
sub-cloud for 7 minutes going east 3 dull sawtooths, above-cloud leg for 7 minutes,	10:35 10:42 11:02	10:42 11:02 11:12		smooth ocean surface. includes a slow descent at 100ft/minute, for WISPR, at 10:42. 2-minute level leg 200ft above cloud, 200 ft below cloud no level leg. clean BL - scattering of 12-20/Mm.
aerosol plume leg	11:15	11:30	6.5kft	
above-cloud leg	11:37	11:43		400 ft above. in aerosol.
4 sharp sawtooths going W	11:47	12:05		a backtrack. polluted 2-layer cloud, with higher Nd lower in cloud than higher in cloud.
sub-cloud layer going E	12:05	12:13		400ft below main cloud deck
above-cloud 200 ft	12:15	12:25		
aerosol plume	12:28	12:43	6.5kft	
spiral to surface, 2 sharp sawtooths, level leg above cloud 7 minute level leg search, sub-cloud	12:45 12:59 13:12	12:59 13:09 13:19		slow circular spiral. turned N upon 5E @ 13:12. 1.4 kft, 200 ft AC. searched for a 400-ft SC leg for filters, but encountered precip.
above-cloud 200 ft 3 minutes	13:31	13:34		went through thick cloud to get here. 1.5 km alt.
mini sharp sawtooths	13:34	13:44		almost all clouds sampled on this flight were precipitating.
aerosol plume leg	13:49	14:10	6 kft	20 minutes.
landing	14:41:56			

visual notes:

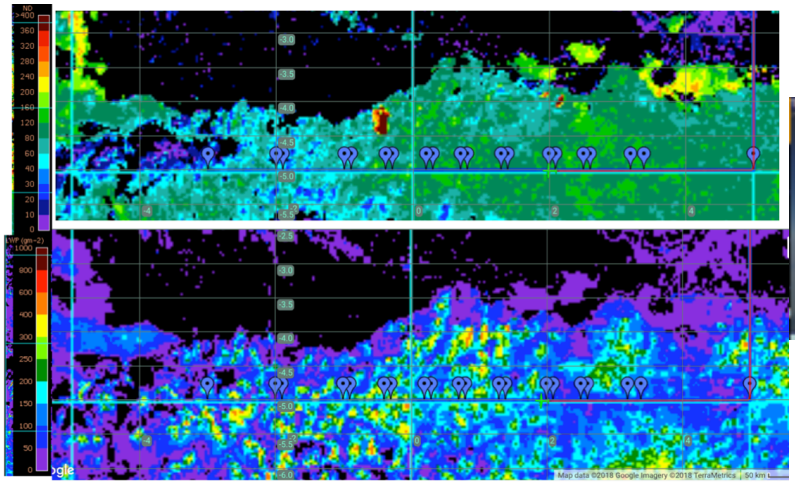
hsrl shows aerosol touching low cloud at 7:30 utc; visual below

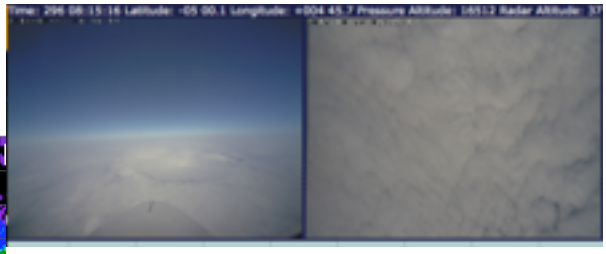




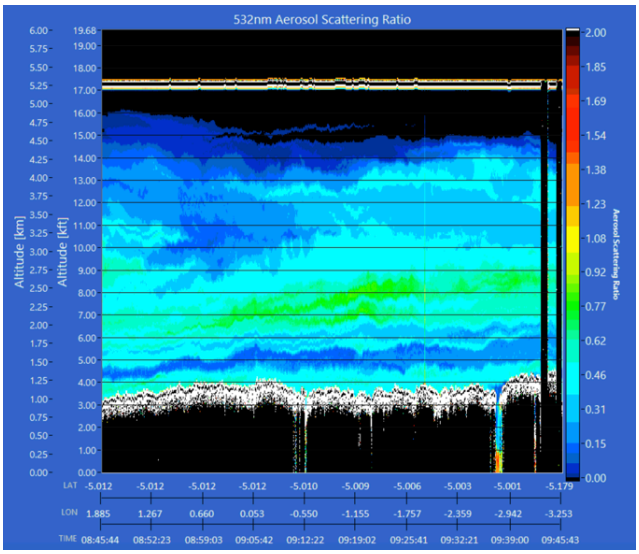


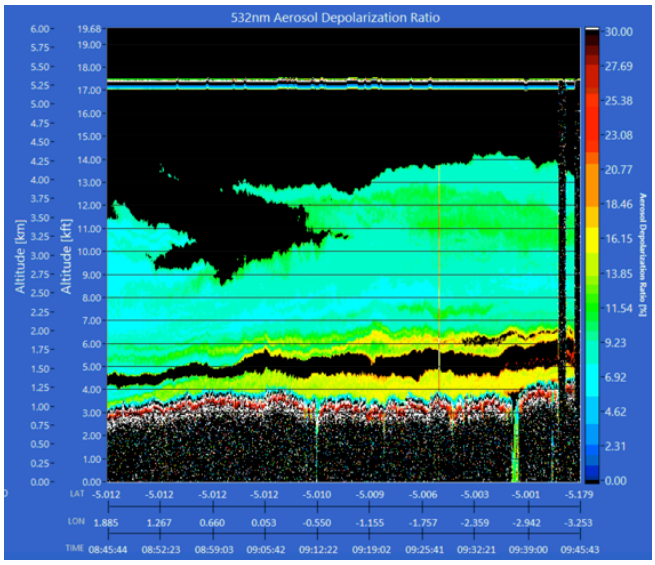
8:15 utc Nd (top) and LWP (bottom) image along flight track.

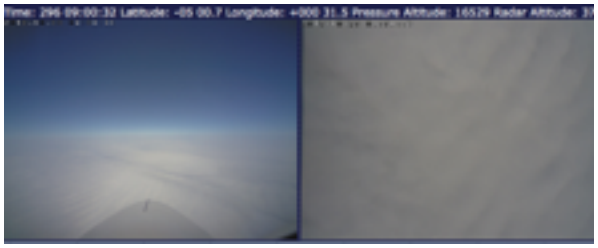


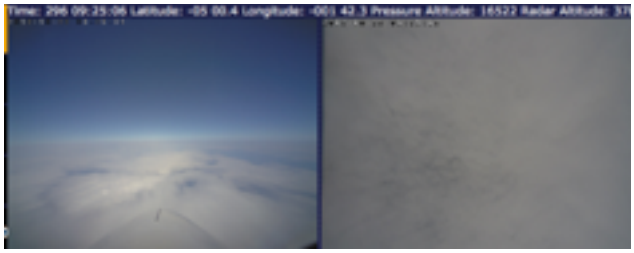


imagery along 5S line. aerosol layer at ~7kft consistent throughout flight. elevated depol suggestive of dust, large outflow off of Namibia on Oct 21 and seen on previous

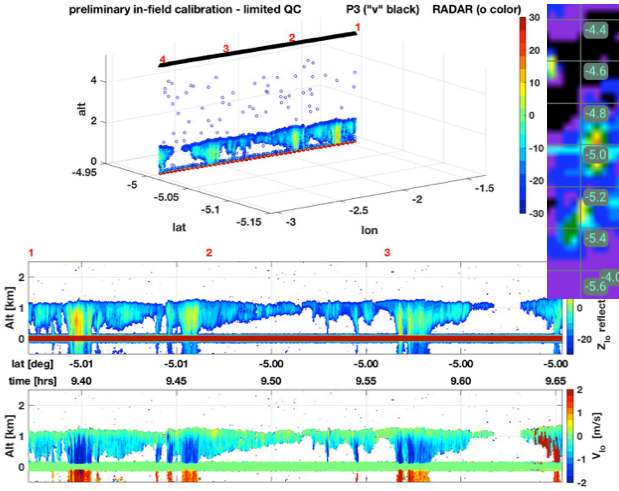


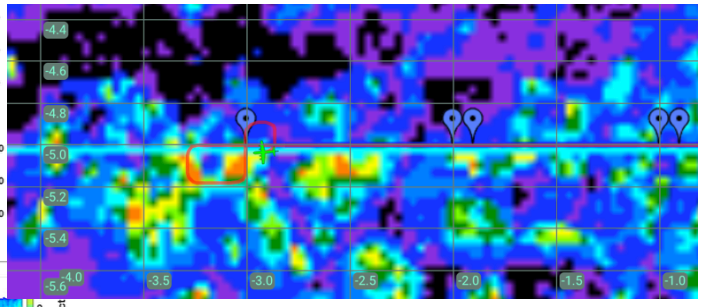






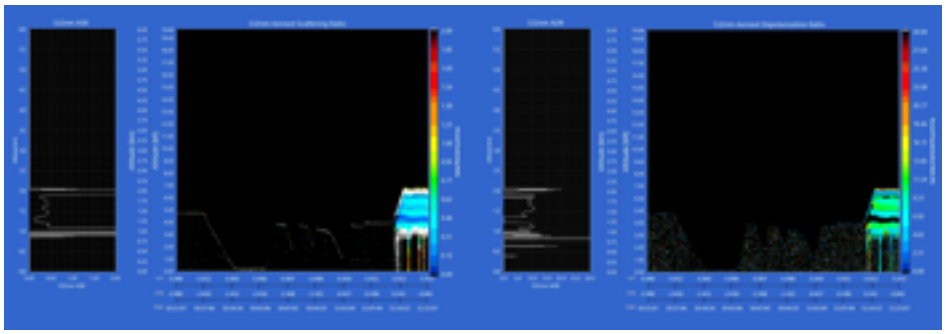
at 5S, 3W, square spiral ~10 utc



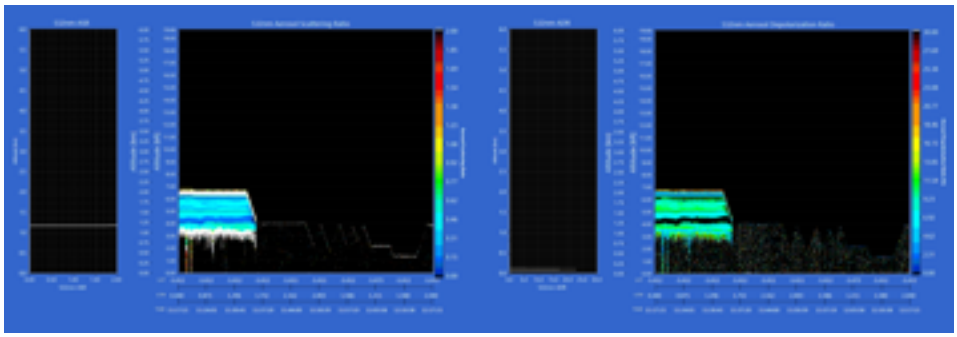


8:45utc MTS screen grab.
broken clouds below.

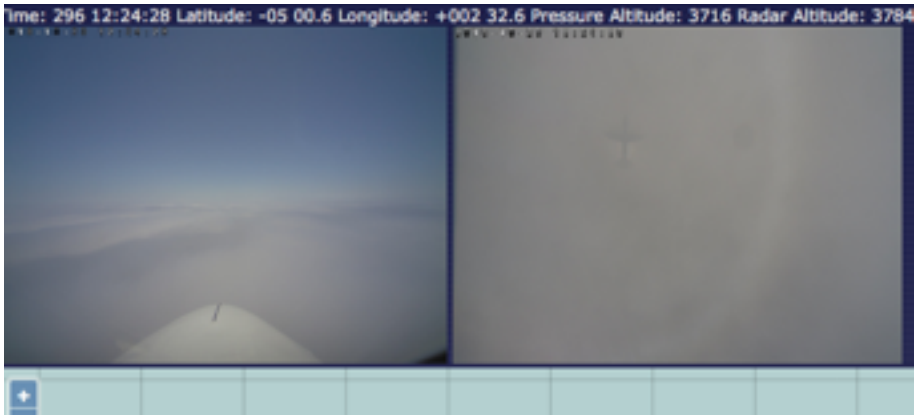
first set of sawtooths. precipitating clouds



second set of sawtooths. double-layered Stcu w/ higher Nd in lower layer



airplane glory



precipitation just prior to landing, wet runway