

# **PACE-PAX research report 2024/09/29**

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2024/10/08**

**Reviewed by Samuel LeBlanc**

ER-2 (alone) flight with a long PACE track overflight along the Sierra Nevada mountains and California Central Valley. Generally cloud free, low aerosol loading over land and marine stratocumulus clouds over ocean. Good coordination with gliders.

## **ER-2**

Take off: 17:48

Landing: 00:30

Duration: 6.7 hrs

Pilot: Tim Williams, mobile: Dean Neeley

All instruments operated successfully

## **Twin Otter**

Operations concluded

## **PACE**

20:35 California. ER-2 ground track intentionally observes a line offset from the center swath, but still within the PACE-OHS swath.

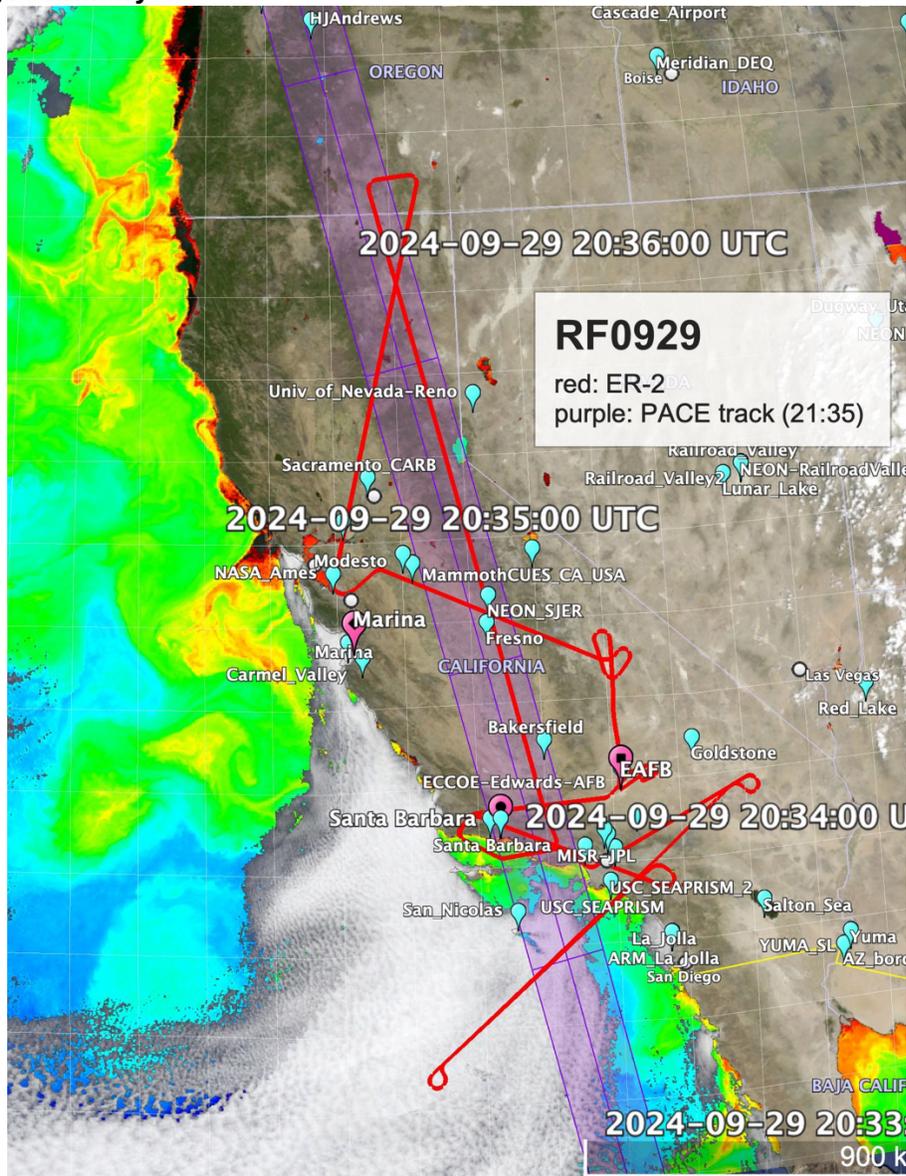
## **EarthCARE**

Not targeted

## **Gliders**

Operational

## Overall image summary



## Validation Traceability Matrix itemized objectives

VTM elements in **black** satisfied, **blue** partially satisfied, **red** to be confirmed

Time UTC	Platform	VTM(hrs)	
17:48	ER2		ER-2 takeoff
18:30	ER2	6a(0.5)	Starting line over central valley, beginning near smoke from "Happy" fire
18:37	ER2	1a(0.5), 1d(0.5)	ER-2 overflies NEON_SJER AERONET site. AOT(500)=0.13
18:46	ER2	1d(0.5)	ER-2 overflies Turlock AERONET site. AOT(500)=0.045
18:55	ER2	1d(0.5)	ER-2 overflies NASA_Ames AERONET site. AOT(500)=0.075
19:02	ER2	1b(0.5), 1c(0.5), 6h(0.5)	ER-2 overflies Sacramento_River AERONET site. AOT(490)=0.05
19:48	ER2, PACE	1d(3.0), 3b(3.0)	ER-2 on long PACE track, which ends at 20:58. Intentionally offset from satellite ground track (but within

			PACE-OHS) to validate other portions of SPEXone swath. Cloud free, low to moderate (smoke) aerosols.
<b>20:35</b>	<b>PACE</b>		<b>PACE Sierra Nevadas and California Central Valley</b>
20:39	ER2, PACE-OHS	1a(1.0), 1d(1.0)	ER-2 overflies NEON_SJER AERONET site. AOT(500)=0.12
20:50	ER2, PACE-OHS	1d(0.5), 3b(0.5), 6c(0.5*0.5)	ER-2 overflies Bakersfield AERONET site. AOT(500)=0.11, near the end of the PACE line, multiple aerosol layers
21:07	ER2, Gliders	1b(1.0), 1c(1.0), 4b(0.5), 6i(1.0)	PACE overflies gliders in biologically productive waters. Glint
21:12	ER2		Begin line inland from Santa Barbara down to eastern LA basin. Latter portion has smoke. Line ends 21:38
21:30	ER2	1d(0.5)	Over WC_Whittier_CA (which apparently survived fires) AERONET site. AOT(500)=0.12
21:41	ER2	1e(1.0*0.5)	Begin long leg over the ocean. Lots of cloud observations here. Backtrack on same line ending roughly at 22:42. Although no comparison the amount of data results in a partial score.
21:47	ER2	1b(0.5), 1c(0.5), 4b(0.5), 6k(0.5), 3a(0.5*0.5)	Over USC_SeaPRISM site, AOT(490)=0.05, Glint, Partial aerosol within PACE-OHS (in between clouds, from 20:35 overpass)
22:44	ER2	1b(0.5), 1c(0.5), 6k(0.5)	Over USC_SeaPRISM site, AOT(490)=0.05
22:45	ER2		Long line over smoke from LA basin fires, ends 23:02
22:58	ER2	1d(0.5*0.5)	Over smoke plume, but no AEROENT
23:10	ER2		Long line over smoke from LA basin fires, ends 23:26
23:25	ER2	1d(0.5)	Over CalTech AERONET site. AOT(500)=0.07
23:40	ER2, Gliders	1b(1.0), 1c(1.0), 6i(1.0)	ER2 overflies gliders in biologically productive waters, where previous PACE-OHS/OH
00:30	ER2		ER-2 lands

PACE-O: within swath of PACE's OCI instrument

PACE-OH: within swath of PACE's OCI and HARP2 instruments

PACE-OHS: within swath of PACE's OCI, SPEXone and HARP2 instruments

TO: Twin Otter

RB: R/V Blissfully

RS: R/V Shearwater

### Assessment:

- 0.009 of objectives observed. Successful coordination between ER-2 and gliders, plus underpass of PACE.
- No scores above 6.0. Largest is still PACE aerosol in narrow swath over ocean (3a) at 5.7

PACE-PAX progress tracking															
Validation objectives	ID	Measurement objectives	Importance, w	Observation time, h (hours)	Total observed (hours)	Fractional success 9/23	Fractional success 9/24	Fractional success 9/25	Fractional success 9/26	Fractional success 9/27	Fractional success 9/29	Fractional success 9/30	Total success	Remaining score	
1. Validate new retrieval properties	a	Land surface parameters	8	2.0	1.5	0.000	0.000	0.000	0.000	0.000	0.015	0.000	0.986	0.1	
	b	Ocean radiometric parameters	10	8.0	15.5	0.100	0.000	0.000	0.003	0.001	0.000	0.000	0.999	0.0	
	c	Aerosol parameters over the ocean	12	8.0	18.0	0.000	0.000	0.000	0.014	0.003	0.001	0.000	0.998	0.0	
	d	Aerosol parameters over land	12	8.0	19.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.0	
	e	Cloud parameters	12	8.0	6.8	0.058	0.000	0.000	0.000	0.023	0.000	0.000	0.920	1.0	
	f	Ocean surface parameters	1	8.0	1.5	0.000	0.000	0.000	0.133	0.000	0.000	0.000	0.354	0.6	
3. Validate in a narrow swath	a	Aerosol parameters over the ocean (PACE)	10	8.0	1.0	0.000	0.000	0.000	0.000	0.000	0.076	0.000	0.430	5.7	
	b	Aerosol parameters over land (PACE)	10	8.0	7.0	0.132	0.000	0.000	0.103	0.000	0.113	0.000	0.751	2.5	
	c	Cloud parameters (PACE)	5	2.0	2.0	0.000	0.000	0.000	0.000	0.181	0.000	0.000	0.895	0.5	
	d	Aerosol parameters (EarthCARE)	8	4.0	3.0	0.038	0.000	0.000	0.053	0.000	0.000	0.000	0.918	0.7	
	e	Cloud parameters (EarthCARE)	8	4.0	2.5	0.152	0.167	0.000	0.000	0.000	0.000	0.000	0.632	2.9	
4. Validate radiometric and polarimetric properties	a	Validate large reflectances	6	2.0	0.0	0.000	0.000	0.000	0.194	0.000	0.000	0.000	0.953	0.3	
	b	Validate large reflectances with high polarization	6	2.0	1.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.826	1.0	
	c	Validate large reflectances with low polarization	6	2.0	1.5	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.970	0.2	
	d	Overfly vicarious calibration sites	6	4.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.268	4.4	
	e	High aerosol loads over land	4	2.0	0.5	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.0	
6. Focus on specific processes or phenomena	b	High aerosol loads over ocean	4	2.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.393	2.4	
	c	Multiple aerosol layers	1	2.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.0	
	d	Aerosol under thin cirrus	2	2.0	3.5	0.826	0.000	0.000	0.000	0.000	0.000	0.000	0.826	0.3	
	e	Aerosol above liquid phase cloud	4	2.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.826	0.7	
	f	Broken clouds with complex structure	4	2.0	3.0	0.186	0.000	0.000	0.000	0.181	0.000	0.000	0.895	0.4	
	g	Dust aerosols over ocean	4	2.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.430	2.3	
	h	Aerosol and ocean parameters over turbid waters	2	2.0	1.5	0.000	0.000	0.000	0.046	0.036	0.028	0.000	0.901	0.2	
	i	Aerosol and ocean parameters over biologically productive waters	4	2.0	5.0	0.000	0.000	0.000	0.043	0.028	0.004	0.000	0.993	0.0	
	k	Smoke aerosols over ocean	1	2.0	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.713	0.3	
	total:			150	98	94.3	0.041	0.011	0.000	0.021	0.019	0.009	0.000	0.821	
					ER-2 flight hours		2.8	0	0	0	0	0	0	0	2.8
				TO flight hours		2.5	0	0	0	0	0	0	0	2.5	
				Shearwater days		0	0	0	0	0	0	0	0	0	
				PACE-PAX overall objectives satisfied:		0.821									

Note: images and data presented in this report are preliminary, and not for publication, presentation, or scientific use. The PACE-PAX data archive is:

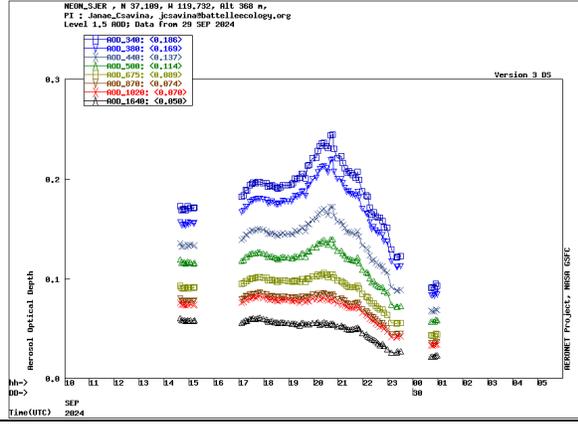
<https://www-air.larc.nasa.gov/missions/pacepax/index.html>

**MVIS imagery**

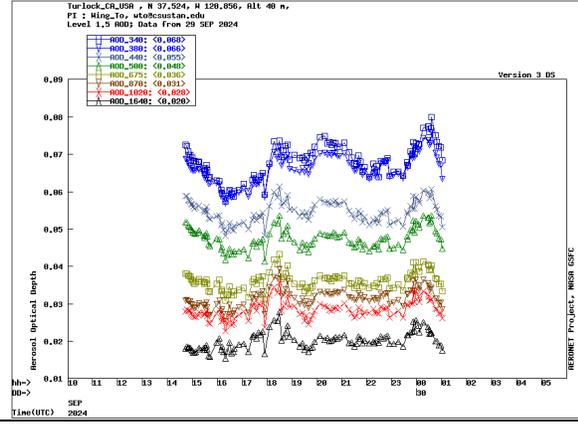
<p>20:35, PACE overpass</p> 	<p>21:07, over gliders</p> 
<p>21:30, Over WC_Whitter_CA AERONET</p> 	<p>21:47 USC_SeaPRISM</p> 
<p>22:58 smoke plume</p> 	<p>23:15 smoke plume farther downwind</p> 
	

# AERONET plots

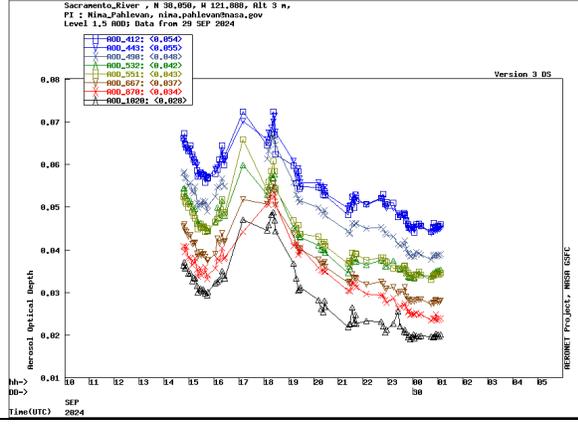
## NEON\_SJER



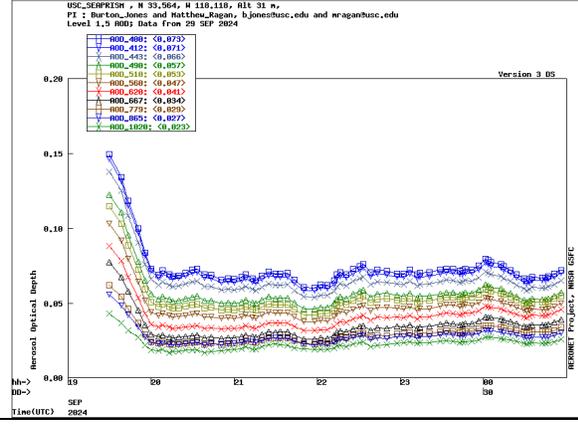
## Turlock\_CA\_USA



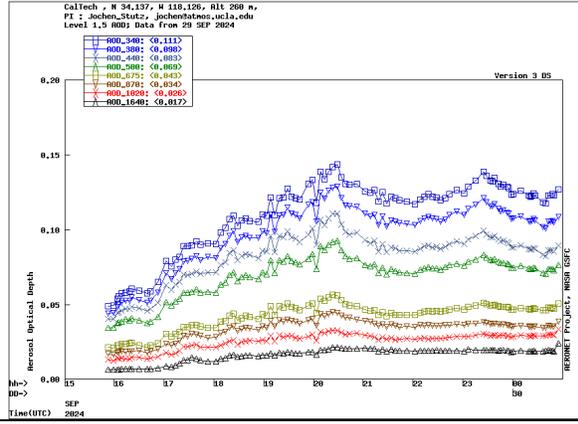
## Sacramento\_River



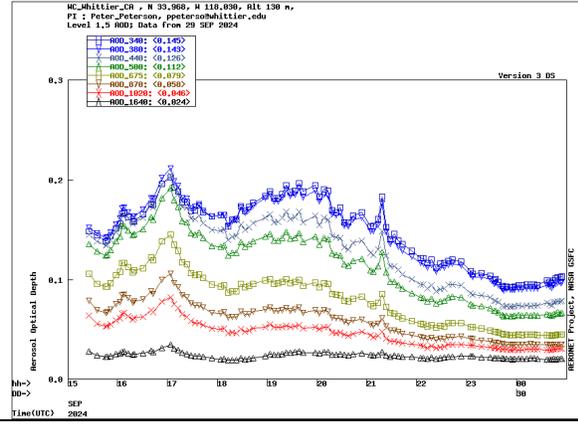
## USC\_SeaPRISM



## CalTech

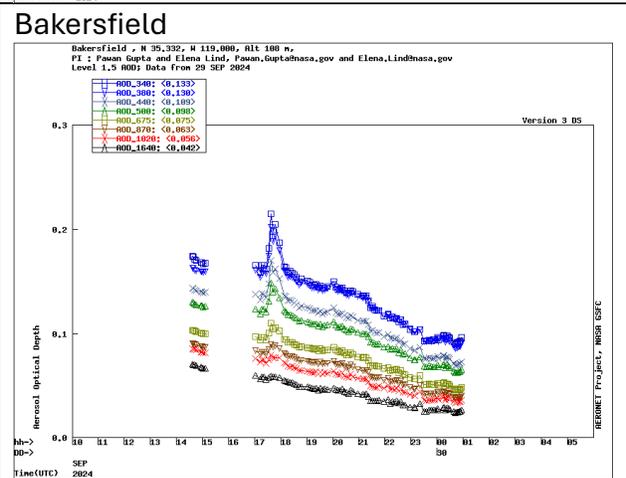
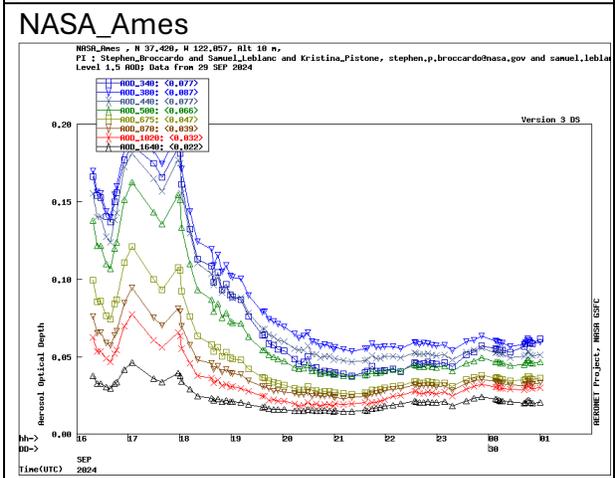
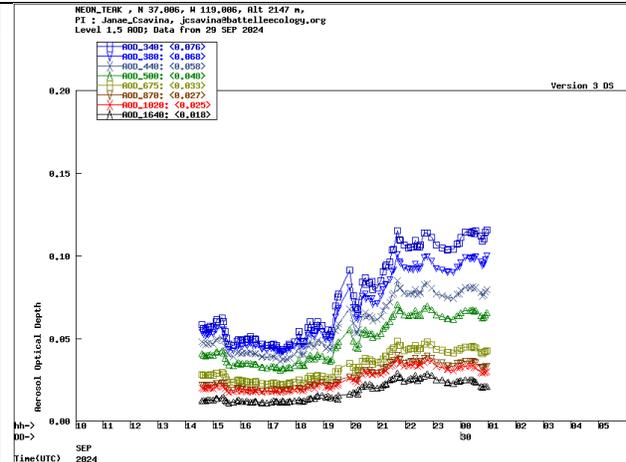
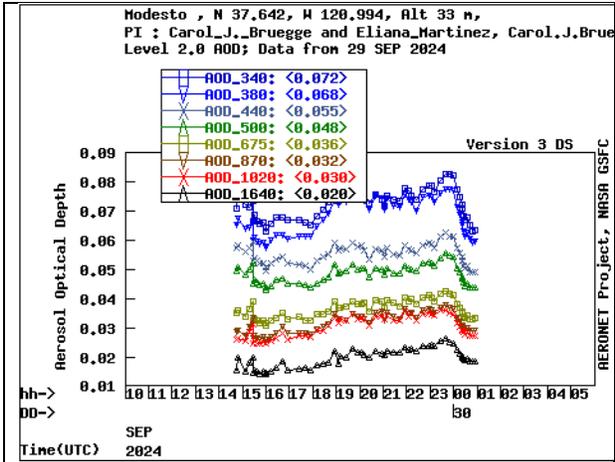


## WC\_Whittier\_CA

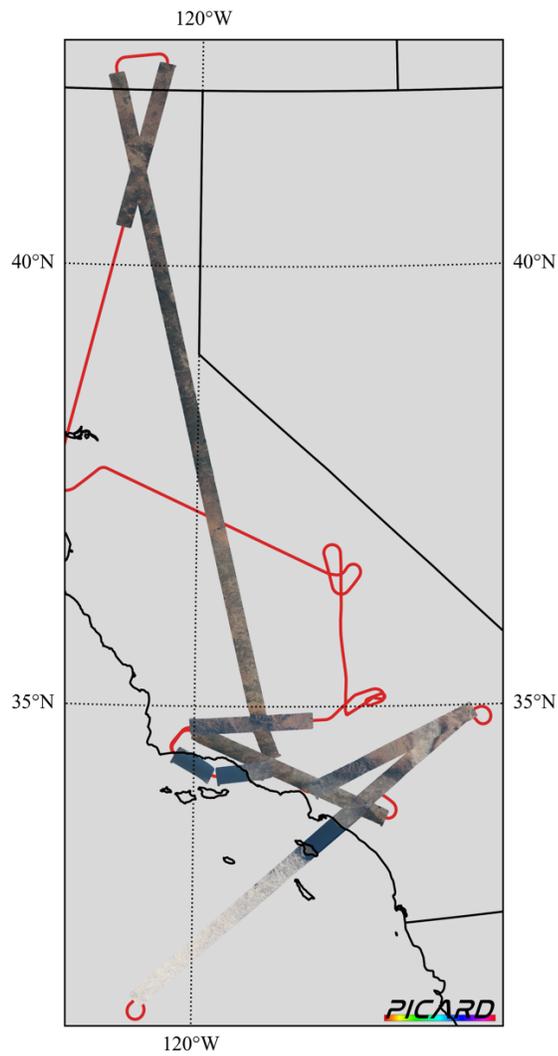


## Modesto

## NEON\_Teak

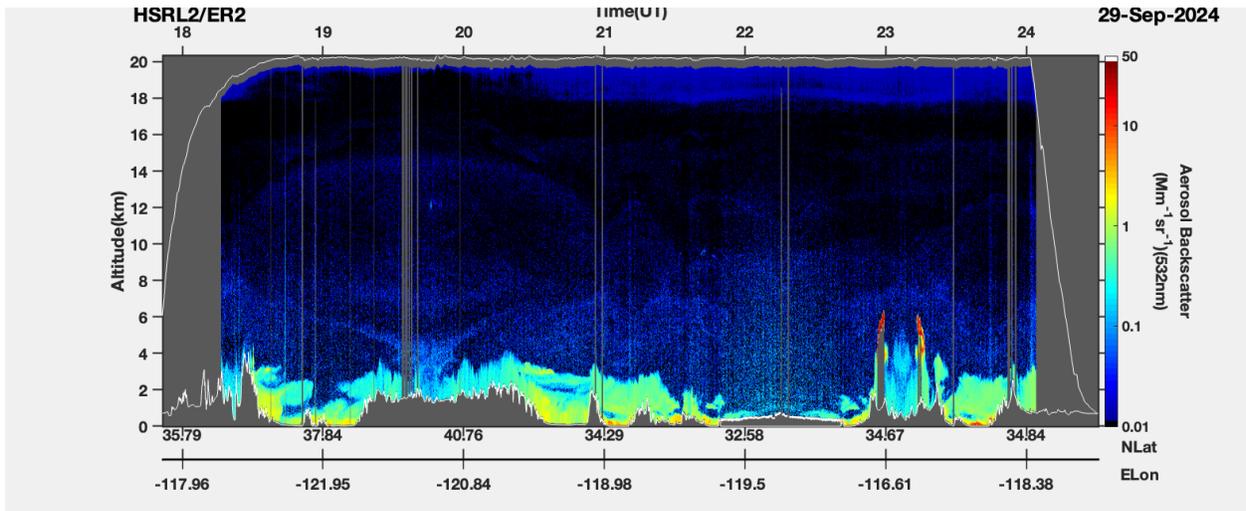


## PICARD quicklooks



***Pushbroom Imager for Cloud and Aerosol Research and Development***  
PACE-PAX, NASA Armstrong Flight Research Center  
29 September 2024

# HSRL quicklooks



# PACE quicklooks

