



Supplement of

The complete 3-year dataset of 4STAR sky-scans from ORACLES 2016–2018

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Table S1: Spatiotemporal ranges for Selection 1 of each sky-scan dataset. Individual scan times range from 45 to 190 seconds, with an average length of 60 seconds. Flight time is the entire period spent airborne during research flights.

Dataset	Date Range	Latitude Range (°)	Longitude Range (°)	Altitude Range (m)	Scan Time (minutes)	Flight Time (hours)
R1_2016_5wl	31 Aug to 27 Sep	-22.98 to -9.76	-10.52 to 14.16	80 to 4525	86	115
T0_2016_4wl	31 Aug to 27 Sep	-22.98 to -9.32	-10.52 to 14.16	80 to 4532	90	115
R0_2017_4wl	09 Aug to 02 Sep	-14.01 to 0.00	-13.06 to 5.28	62 to 4003	168	114
R0_2018_4wl	30 Sep to 19 Oct	-12.95 to -2.01	5.00 to 10.50	65 to 4197	84	121

Table S2: The variables in the 4STAR datasets, as well as their long names, and respective units. All times are in UTC.

Variable Name	Long Name	Unit
Base Time	Base Time in Epoch	seconds since 01 Jan 1970 00:00:00
Time Offset	Time Offset from Base Time	seconds since research flight start time
Time	Time Offset from Midnight	seconds since research flight date 00:00:00
Wavelength	Wavelength	nm
Radius	Particle Radius	μm
PSD	Particle Size Distribution	dV/dlnR
Sphericity	Particle Sphericity	percent
PF Angle	Scattering Angle for Phase Function	degrees
Sca Angle	Scattering Angle for Radiance	degrees
n Real	Real Refractive Index	unitless
n Imag	Imaginary Refractive Index	unitless
SSA	Single Scattering Albedo	unitless
AOD Fit Total	Extinction AOD for Total PSD	unitless
AOD Fit Fine	Extinction AOD for Fine Mode	unitless
AOD Fit Coarse	Extinction AOD for Coarse Mode	unitless
AOD Meas	Extinction AOD from Measurement	unitless
AAOD	Absorption Aerosol Optical Depth	unitless
TOD Meas	Total Optical Depth from Measurement	unitless
TOD Fit	Total Optical Depth from Retrieval	unitless
TOD Meas Minus Fit	Measured - Retrieved Total Optical Depth	unitless
AGOD	Absorbing Gas Optical Depth	unitless
Sfc Alb	Spectral Surface Albedo	unitless
g Total	Asymmetry Parameter for Total PSD	unitless
g Fine	Asymmetry Parameter for Fine Mode	unitless
g Coarse	Asymmetry Parameter for Coarse Mode	unitless
PF Total	Phase Function for Total PSD	unitless
PF Fine	Phase Function for Fine Mode	unitless
PF Coarse	Phase Function for Coarse Mode	unitless
Normalized Sky Radiance	Sky Radiance divided by TOA Measurement	sr ⁻¹
Normalized Sky Radiance Fit	Sky Radiance divided by TOA Retrieval	sr ⁻¹
Sky Radiance Fit Error	Measured - Retrieved Sky Radiances	percent
Scan Tag	Sky Scan File Tag	unitless
Scan Type	Sky Scan Type	unitless (1 = ALM, 3 = PPL)
Lat	Latitude	degrees N
Lon	Longitude	degrees E
GPS Altitude	Aircraft Altitude	m above mean sea level
Heading	Aircraft Heading	degrees N, clockwise
Pitch	Aircraft Pitch	degrees, nose-up
Roll	Aircraft Roll	degrees, right-down
GPS Altitude Difference	Aircraft Altitude Difference	m above mean sea level
Pitch STD	Aircraft Pitch Standard Deviation	degrees, nose-up
Roll STD	Aircraft Roll Standard Deviation	degrees, right-down
T Static	Outside Air Temperature	degrees C
P Static	Ambient Pressure	mbar
SAZ	Solar Azimuth Angle	degrees, clockwise
SZA	Solar Zenith Angle	degrees from vertical
SEL	Solar Elevation Angle	degrees from horizon
m Ray	Rayleigh Airmass	unitless
PWV	Precipitable Water Vapor	cm
QC Alt LT 3000	Quality Control Test for Altitude < 3000 m	unitless (1 = Pass, 0 = Fail)
QC AOD 400 GT P4	Quality Control Test for AOD ₄₀₀ > 0.4	unitless (1 = Pass, 0 = Fail)

Table S3: Key metadata for the five-wavelength 4STAR sky-scan dataset from ORACLES 2016 (R1_2016_5wl). This includes the date, scan number (scan no.), scanning method, start time, latitude (lat.), longitude (lon.), altitude (alt.), AOD at 400 nm, SSA at 500 nm, QC level (QC lvl.), number of QC failures, and the count (ct.) for sky-scans meeting the four recommended selections. For QC level, 3 = sky-scans meet QC, altitude < 3 km, and AOD (400 nm) > 0.4, so they are in all four selections. 2a = sky-scans meet QC and altitude < 3 km, so they are in both S1 and S2. 2b = sky-scans meet QC and AOD (400 nm) > 0.4, so they are in both S1 and S3. 1 = sky-scans meet QC, so they are only in S1. Negative QC are sky-scans that do not meet QC, with the value being the number of criteria failed. Manual QC failures include AOD (400 nm) ≤ 0.2 (Low_AOD), altitude difference ≥ 50 m (Alt_Diff), mean sky radiance error ($|meas - fit| \geq 10\%$) (Sky_Err), scattering angles minimally span 3-50 ° (SA_Span), and inspection of sky error per scattering angle (SE_pr_SA). Summary statistics (sum.) are also provided for each of the four selections.

Date	Scan No.	Scanning Method	Start Time (UTC)	Lat. (°)	Lon. (°)	Alt. (m)	AOD (400 nm)	SSA (500 nm)	QC Lvl.	QC Failures	S1 Ct.	S2 Ct.	S3 Ct.	S4 Ct.
20160831	13	AVG	9:21	-19.78	9.71	2373	0.237	0.866	2a	0	1	1		
20160831	14	PPL	9:22	-19.72	9.65	2373	0.261	0.863	2a	0	2	2		
20160831	68	PPL	11:25	-13.17	3.01	3831	0.486	0.801	2b	0	3		1	
20160831	117	AVG	13:31	-17.11	6.99	1174	0.788	0.841	3	0	4	3	2	1
20160831	118	PPL	13:32	-17.05	6.93	1167	0.801	0.851	3	0	5	4	3	2
20160831	124	PPL	13:37	-17.07	6.87	1168	0.814	0.852	3	0	6	5	4	3
20160831	127	AVG	13:38	-17.13	6.93	1164	0.810	0.825	3	0	7	6	5	4
20160831	133	AVG	14:08	-18.26	8.09	1042	0.592	0.804	3	0	8	7	6	5
20160831	134	PPL	14:09	-18.32	8.15	1038	0.573	0.818	3	0	9	8	7	6
20160902	18	AVG	8:26	-18.76	10.00	895	0.601	0.839	3	0	10	9	8	7
20160902	19	PPL	8:27	-18.67	10.00	892	0.598	0.848	3	0	11	10	9	8
20160902	22	AVG	8:29	-18.52	10.00	893	0.560	0.825	3	0	12	11	10	9
20160902	23	PPL	8:31	-18.43	10.00	890	0.503	0.868	3	0	13	12	11	10
20160902	26	AVG	8:36	-17.94	10.00	944	0.438	0.807	3	0	14	13	12	11
20160902	27	PPL	8:38	-17.85	10.00	942	0.440	0.836	3	0	15	14	13	12
20160902	34	AVG	9:18	-14.73	10.00	1086	0.662	0.848	3	0	16	15	14	13
20160902	46	AVG	9:33	-14.58	10.01	1348	0.706	0.862	3	0	17	16	15	14
20160902	47	PPL	9:34	-14.66	10.00	1352	0.688	0.814	3	0	18	17	16	15
20160902	61	PPL	10:59	-15.68	9.13	978	0.594	0.833	3	0	19	18	17	16
20160902	72	AVG	12:28	-14.94	8.59	1040	0.655	0.815	3	0	20	19	18	17
20160902	73	PPL	12:30	-14.86	8.57	1041	0.689	0.833	3	0	21	20	19	18
20160902	82	PPL	12:31	-14.77	8.54	1042	0.700	0.828	3	0	22	21	20	19
20160902	93	PPL	14:49	-22.98	14.15	1301	0.504	0.845	3	0	23	22	21	20
20160904	19	AVG	9:05	-19.06	8.94	798	0.649	0.827	3	0	24	23	22	21
20160904	49	AVG	10:40	-14.01	3.82	1105	0.712	0.849	3	0	25	24	23	22
20160906	32	AVG	9:33	-16.16	9.00	869	0.405	0.845	3	0	26	25	24	23
20160906	33	PPL	9:34	-16.08	9.00	890	0.405	0.817	3	0	27	26	25	24
20160906	39	AVG	10:04	-13.79	9.00	920	0.548	0.843	3	0	28	27	26	25
20160906	40	PPL	10:06	-13.69	9.00	960	0.552	0.857	3	0	29	28	27	26
20160906	55	PPL	10:58	-9.79	9.00	1034	0.753	0.815	3	0	30	29	28	27
20160906	69	PPL	11:49	-12.98	9.51	2587	0.298	0.809	2a	0	31	30		
20160906	72	AVG	12:24	-15.71	10.48	2259	0.380	0.830	2a	0	32	31		
20160906	73	PPL	12:26	-15.80	10.51	2260	0.354	0.841	2a	0	33	32		
20160906	79	AVG	13:08	-18.48	11.49	656	0.592	0.838	3	0	34	33	29	28

20160906	80	PPL	13:09	-18.56	11.52	655	0.605	0.832	3	0	35	34	30	29
20160908	11	PPL	11:13	-10.92	0.93	1206	0.391	0.933	2a	0	36	35		
20160910	50	PPL	11:04	-14.38	4.50	1316	0.445	0.892	3	0	37	36	31	30
20160910	61	PPL	12:18	-14.23	4.21	1318	0.501	0.821	3	0	38	37	32	31
20160912	25	PPL	12:14	-12.32	2.36	1233	0.535	0.824	3	0	39	38	33	32
20160912	44	AVG	13:08	-15.34	5.34	1928	0.467	0.862	3	0	40	39	34	33
20160912	45	PPL	13:09	-15.41	5.41	1928	0.448	0.830	3	0	41	40	35	34
20160912	48	PPL	13:10	-15.47	5.46	1930	0.458	0.861	3	0	42	41	36	35
20160912	72	AVG	13:44	-17.15	7.14	1017	0.417	0.868	3	0	43	42	37	36
20160912	73	PPL	13:46	-17.19	7.19	1011	0.414	0.872	3	0	44	43	38	37
20160912	76	AVG	14:06	-18.03	8.03	79	0.454	0.865	3	0	45	44	39	38
20160912	77	PPL	14:07	-18.07	8.07	81	0.452	0.865	3	0	46	45	40	39
20160914	4	AVG	9:18	-19.31	9.78	779	0.409	0.858	3	0	47	46	41	40
20160914	5	PPL	9:19	-19.24	9.73	778	0.418	0.851	3	0	48	47	42	41
20160914	11	AVG	10:30	-17.80	9.00	813	0.477	0.845	3	0	49	48	43	42
20160914	14	AVG	10:37	-17.39	9.00	840	0.492	0.932	3	0	50	49	44	43
20160914	17	PPL	10:39	-17.27	9.00	848	0.501	0.902	3	0	51	50	45	44
20160914	43	AVG	13:54	-16.49	8.59	3513	0.396	0.842	1	0	52			
20160918	10	PPL	9:50	-10.80	11.50	1204	0.546	0.845	3	0	53	51	46	45
20160920	26	AVG	9:23	-16.62	10.50	625	0.693	0.848	3	0	54	52	47	46
20160920	27	PPL	9:24	-16.55	10.50	629	0.756	0.855	3	0	55	53	48	47
20160920	30	AVG	9:26	-16.43	10.50	627	0.728	0.856	3	0	56	54	49	48
20160920	33	PPL	9:28	-16.33	10.50	626	0.768	0.850	3	0	57	55	50	49
20160920	36	AVG	9:30	-16.19	10.50	626	0.788	0.848	3	0	58	56	51	50
20160920	39	PPL	9:32	-16.08	10.50	627	0.917	0.849	3	0	59	57	52	51
20160920	42	AVG	9:34	-15.99	10.50	628	0.864	0.858	3	0	60	58	53	52
20160920	62	PPL	11:00	-16.19	9.00	643	1.054	0.855	3	0	61	59	54	53
20160920	75	PPL	11:08	-15.75	9.00	726	1.236	0.862	3	0	62	60	55	54
20160920	143	AVG	12:39	-17.26	9.00	3699	0.560	0.797	2b	0	63		56	
20160920	149	PPL	12:41	-17.11	9.00	3697	0.545	0.834	2b	0	64		57	
20160920	152	PPL	12:44	-16.90	9.00	3697	0.527	0.834	2b	0	65		58	
20160920	170	PPL	13:14	-17.59	9.00	794	0.860	0.855	3	0	66	61	59	55
20160920	179	PPL	13:16	-17.72	9.00	790	0.860	0.849	3	0	67	62	60	56
20160920	182	PPL	13:18	-17.83	9.00	790	0.864	0.843	3	0	68	63	61	57
20160920	185	AVG	13:22	-18.08	9.06	792	0.813	0.848	3	0	69	64	62	58
20160924	31	PPL	9:41	-10.34	11.00	2085	0.804	0.883	3	0	70	65	63	59
20160924	35	PPL	9:48	-9.91	11.00	1412	0.848	0.855	3	0	71	66	64	60
20160924	89	PPL	11:54	-10.03	11.00	2095	0.807	0.850	3	0	72	67	65	61
20160925	20	AVG	9:47	-17.33	7.26	4526	0.302	0.949	1	0	73			
20160925	21	PPL	9:49	-17.27	7.21	4523	0.300	0.871	1	0	74			
20160925	34	PPL	11:44	-10.62	0.61	1375	0.709	0.839	3	0	75	68	66	62
20160925	59	AVG	13:53	-14.40	4.40	1114	0.479	0.815	3	0	76	69	67	63
20160925	62	AVG	13:57	-14.62	4.62	1216	0.463	0.819	3	0	77	70	68	64

20160925	63	PPL	13:59	-14.68	4.68	1211	0.460	0.837	3	0	78	71	69	65
20160925	66	AVG	14:03	-14.89	4.89	1275	0.444	0.835	3	0	79	72	70	66
20160925	67	PPL	14:04	-14.94	4.94	1278	0.441	0.852	3	0	80	73	71	67
20160925	80	AVG	15:18	-19.47	9.46	1222	0.440	0.856	3	0	81	74	72	68
20160927	25	PPL	17:03	-9.76	-10.52	1487	0.331	0.909	2a	0	82	75		
20160831	9	AVG	8:58	-20.84	10.85	1045	0.163	0.866	-1	Low_AOD;				
20160831	10	PPL	9:00	-20.78	10.79	1086	0.168	0.862	-1	Low_AOD;				
20160831	67	AVG	11:24	-13.24	3.07	3830	0.481	0.838	-1	SA_Span;				
20160831	75	AVG	12:11	-13.79	3.61	1262	0.991	0.913	-1	SA_Span;				
20160831	76	PPL	12:12	-13.85	3.66	1260	1.035	0.985	-1	Sky_Err;				
20160831	121	PPL	13:33	-16.99	6.86	1160	0.858	0.841	-2	Sky_Err; SA_Span;				
20160831	137	AVG	14:13	-18.52	8.36	1545	0.547	0.796	-1	Alt_Diff;				
20160902	13	PPL	7:42	-21.73	11.84	4616	0.102	0.968	-1	Low_AOD;				
20160902	30	AVG	9:13	-15.11	10.00	1448	0.602	0.813	-1	Alt_Diff;				
20160902	31	PPL	9:14	-15.02	10.00	1553	0.549	0.822	-1	SE_pr_SA;				
20160902	35	PPL	9:19	-14.65	10.00	1089	0.692	0.826	-1	SE_pr_SA;				
20160902	42	AVG	9:30	-14.38	10.01	1230	0.769	0.841	-2	Alt_Diff; SA_Span;				
20160902	43	PPL	9:32	-14.46	10.01	1358	0.700	0.858	-1	Sky_Err;				
20160902	53	PPL	10:32	-16.22	8.60	960	0.534	0.827	-1	SE_pr_SA;				
20160902	60	AVG	10:57	-15.74	9.07	982	0.581	0.853	-1	SA_Span;				
20160904	16	PPL	9:04	-19.14	9.02	778	0.637	0.880	-1	SE_pr_SA;				
20160904	22	AVG	9:07	-18.98	8.85	753	0.728	0.843	-1	Alt_Diff;				
20160904	46	PPL	10:39	-14.07	3.88	1079	0.744	0.847	-1	SE_pr_SA;				
20160906	28	AVG	9:19	-17.19	9.00	2589	0.188	0.994	-3	Low_AOD; Alt_Diff; Sky_Err;				
20160906	29	PPL	9:21	-17.11	9.00	2560	0.203	0.993	-2	Low_AOD; Sky_Err;				
20160906	52	AVG	10:56	-9.92	9.00	1037	0.731	0.844	-1	SA_Span;				
20160906	62	AVG	11:03	-9.78	8.99	1036	0.754	0.735	-1	SA_Span;				
20160906	68	AVG	11:48	-12.89	9.48	2587	0.214	0.993	-1	SA_Span;				
20160908	14	AVG	11:14	-11.00	1.01	1206	0.395	0.978	-1	SA_Span;				
20160908	49	AVG	11:38	-12.18	2.22	1124	0.485	0.904	-1	SA_Span;				
20160908	55	AVG	12:27	-15.10	5.10	1197	0.497	0.883	-1	SA_Span;				
20160908	85	AVG	13:09	-17.17	7.20	1128	0.369	0.906	-1	SE_pr_SA;				
20160910	44	AVG	11:00	-14.48	4.55	1320	0.479	0.979	-1	SA_Span;				
20160910	60	AVG	12:17	-14.17	4.15	1324	0.485	0.915	-1	SA_Span;				
20160910	78	PPL	12:52	-15.86	5.86	788	0.335	0.906	-1	Alt_Diff;				
20160912	28	AVG	12:15	-12.39	2.43	1231	0.501	0.879	-1	SA_Span;				
20160912	41	PPL	12:49	-14.27	4.28	4532	0.280	0.804	-1	SE_pr_SA;				
20160914	24	AVG	11:15	-17.13	9.00	778	0.476	0.992	-1	SA_Span;				
20160914	25	PPL	11:16	-17.19	9.00	777	0.483	0.880	-2	Sky_Err; SA_Span;				
20160914	44	PPL	13:55	-16.44	8.64	3514	0.375	0.858	-1	Sky_Err;				
20160918	9	AVG	9:49	-10.89	11.50	1193	0.548	0.851	-1	SA_Span;				

20160920	16	PPL	7:59	-19.76	11.15	5182	0.031	0.641	-1	Low_AOD;
20160920	53	AVG	10:43	-16.59	10.10	4349	0.318	0.826	-1	SA_Span;
20160920	56	PPL	10:45	-16.61	9.99	4321	0.318	0.849	-1	Alt_Diff;
20160920	59	AVG	10:59	-16.28	9.00	645	0.962	0.842	-1	SA_Span;
20160920	65	AVG	11:01	-16.11	9.00	656	1.058	0.814	-1	SA_Span;
20160920	66	PPL	11:03	-16.04	9.00	681	1.053	0.839	-1	SE_pr_SA;
20160920	69	AVG	11:04	-15.94	9.00	702	1.033	0.932	-1	SE_pr_SA;
20160920	72	AVG	11:06	-15.84	9.00	715	1.131	0.830	-1	SE_pr_SA;
20160920	86	PPL	11:24	-16.13	9.00	1244	1.060	0.854	-1	Sky_Err;
20160920	89	PPL	11:25	-16.23	9.00	1242	1.008	0.859	-1	Sky_Err;
20160920	92	AVG	11:27	-16.31	9.00	1241	0.998	0.949	-1	SA_Span;
20160920	104	PPL	11:35	-16.80	9.00	1241	0.913	0.867	-1	Sky_Err;
20160920	107	PPL	11:39	-17.03	9.00	1242	0.955	0.832	-1	Sky_Err;
20160920	129	AVG	12:20	-17.21	9.00	7087	0.107	0.608	-2	Low_AOD; Sky_Err;
20160920	130	PPL	12:22	-17.30	9.00	7088	0.086	0.624	-2	Low_AOD; Sky_Err;
20160920	155	AVG	12:46	-17.14	9.00	2395	0.513	0.767	-1	Alt_Diff;
20160920	200	AVG	13:56	-20.08	10.71	5815	0.084	0.583	-2	Low_AOD; Sky_Err;
20160920	203	PPL	13:58	-20.18	10.80	5815	0.082	0.647	-2	Low_AOD; Sky_Err;
20160924	26	PPL	9:18	-11.73	11.00	1094	1.272	0.986	-2	Alt_Diff; Sky_Err;
20160924	34	AVG	9:46	-9.98	11.00	1377	0.874	0.865	-1	SA_Span;
20160924	38	AVG	9:50	-9.80	11.00	1414	0.901	0.846	-1	SE_pr_SA;
20160924	39	PPL	9:51	-9.73	11.00	1355	0.863	0.859	-1	Alt_Diff;
20160924	73	PPL	11:39	-9.07	11.00	1147	0.927	0.962	-1	Alt_Diff;
20160924	77	PPL	11:43	-9.32	11.00	1288	0.937	0.946	-1	SE_pr_SA;
20160924	92	AVG	11:55	-10.12	11.00	2082	0.795	0.854	-1	SA_Span;
20160924	98	PPL	12:08	-11.05	11.00	4832	0.313	0.829	-1	Sky_Err;
20160924	101	AVG	12:09	-11.16	11.00	4831	0.315	0.823	-1	SA_Span;
20160925	13	AVG	9:00	-20.27	10.29	5792	0.032	0.849	-1	Low_AOD;
20160925	14	PPL	9:01	-20.20	10.21	5794	0.032	0.764	-1	Low_AOD;
20160925	33	AVG	11:43	-10.67	0.67	1359	0.715	0.885	-1	SA_Span;
20160925	37	PPL	11:57	-10.02	0.02	3696	0.338	0.844	-1	Alt_Diff;
20160925	43	AVG	12:39	-10.14	0.14	4510	0.204	0.770	-1	SA_Span;
20160925	44	PPL	12:40	-10.21	0.21	4509	0.210	0.797	-1	SE_pr_SA;
20160925	47	AVG	12:44	-10.43	0.43	4511	0.209	0.807	-1	SA_Span;
20160925	48	PPL	12:45	-10.51	0.51	4509	0.224	0.743	-1	SE_pr_SA;
20160925	51	AVG	12:56	-11.11	1.11	5804	0.092	0.601	-2	Low_AOD; SA_Span;
20160925	52	PPL	12:57	-11.18	1.18	5802	0.094	0.569	-2	Low_AOD; Sky_Err;
20160925	74	PPL	14:46	-17.49	7.49	5781	0.186	0.859	-1	Low_AOD;
20160925	77	PPL	15:17	-19.38	9.38	1320	0.434	0.896	-1	Alt_Diff;
20160925	85	PPL	15:37	-20.61	10.64	5783	0.046	0.871	-2	Low_AOD; Sky_Err;
20160925	88	AVG	15:39	-20.74	10.78	5782	0.046	0.716	-1	Low_AOD;

	20160927	11	AVG	11:59	-22.79	12.84	6407	0.044	0.698	-2	Low_AOD; Sky_Err;				
	20160927	12	PPL	12:01	-22.75	12.74	6407	0.045	0.867	-2	Low_AOD; Sky_Err;				
	20160927	17	PPL	14:39	-15.61	-0.63	6447	0.030	0.725	-2	Low_AOD; Sky_Err;				
	20160927	24	AVG	17:01	-9.80	-10.45	1509	0.330	0.955	-1	SE_pr_SA;				
	Median	Count	Mode	Mean	Mean	Mean	Mean	Mean	Mean						
S1 Sum.	20160912	N = 82	PPL = 48 (59%)	11:34	-16.01	8.13	1361	0.583	0.848						
S2 Sum.	20160912	N = 75	PPL = 44 (59%)	11:32	-15.96	8.18	1122	0.596	0.848						
S3 Sum.	20160912	N = 72	PPL = 42 (58%)	11:33	-16.07	8.38	1174	0.619	0.844						
S4 Sum.	20160912	N = 68	PPL = 39 (57%)	11:30	-16.07	8.44	1023	0.624	0.846						

Table S4: Key metadata for the four-wavelength 4STAR sky-scan dataset from ORACLES 2016 (T0_2016_4wl). This includes the date, scan number (scan no.), scanning method, start time, latitude (lat.), longitude (lon.), altitude (alt.), AOD at 400 nm, SSA at 500 nm, QC level (QC lvl.), number of QC failures, and the count (ct.) for sky-scans meeting the four recommended selections. For QC level, 3 = sky-scans meet QC, altitude < 3 km, and AOD (400 nm) > 0.4, so they are in all four selections. 2a = sky-scans meet QC and altitude < 3 km, so they are in both S1 and S2. 2b = sky-scans meet QC and AOD (400 nm) > 0.4, so they are in both S1 and S3. 1 = sky-scans meet QC, so they are only in S1. Negative QC are sky-scans that do not meet QC, with the value being the number of criteria failed. Automated QC failures include AOD (400 nm) ≤ 0.2 (Low_AOD), altitude difference ≥ 50 m (Alt_Diff), mean sky radiance error ($|meas - fit| \geq 10\%$ or covariance matrix sky error $\geq 10\%$ (Sky_Err), no minimum scattering angle $< 6^\circ$ (SA_Min), no maximum scattering angle $> 50^\circ$ (SA_Max), mean scattering angle difference $\geq 3^\circ$ (SA_Mean_Diff), maximum scattering angle difference $< 10^\circ$ (SA_Max_Diff), roll standard deviation $\geq 3^\circ$ (Roll_STD), and fails retrieval boundary test (Fails_RBT). Summary statistics (sum.) are also provided for each of the four selections.

	Date	Scan No.	Scanning Method	Start Time (UTC)	Lat. (°)	Lon. (°)	Alt. (m)	AOD (400 nm)	SSA (500 nm)	QC Lvl.	QC Failures	S1 Ct.	S2 Ct.	S3 Ct.	S4 Ct.
	20160831	13	ALM	9:21	-19.78	9.70	2374	0.229	0.873	2a	0	1	1		
	20160831	14	PPL	9:22	-19.72	9.64	2374	0.252	0.856	2a	0	2	2		
	20160831	68	PPL	11:26	-13.17	3.01	3830	0.467	0.785	2b	0	3		1	
	20160831	117	ALM	13:31	-17.10	6.99	1174	0.780	0.835	3	0	4	3	2	1
	20160831	133	ALM	14:08	-18.27	8.10	1036	0.586	0.800	3	0	5	4	3	2
	20160831	134	PPL	14:10	-18.32	8.15	1036	0.563	0.815	3	0	6	5	4	3
	20160902	18	ALM	8:26	-18.75	10.00	890	0.598	0.830	3	0	7	6	5	4
	20160902	19	PPL	8:28	-18.66	10.00	895	0.592	0.832	3	0	8	7	6	5
	20160902	22	ALM	8:29	-18.51	10.00	892	0.555	0.813	3	0	9	8	7	6
	20160902	23	PPL	8:31	-18.42	10.00	892	0.496	0.854	3	0	10	9	8	7
	20160902	26	ALM	8:37	-17.94	10.00	946	0.427	0.796	3	0	11	10	9	8
	20160902	27	PPL	8:38	-17.85	10.00	945	0.433	0.820	3	0	12	11	10	9
	20160902	31	PPL	9:14	-15.02	10.00	1551	0.541	0.820	3	0	13	12	11	10
	20160902	34	ALM	9:18	-14.73	10.00	1090	0.656	0.842	3	0	14	13	12	11
	20160902	35	PPL	9:19	-14.65	10.00	1090	0.681	0.814	3	0	15	14	13	12
	20160902	46	ALM	9:33	-14.59	10.01	1351	0.705	0.860	3	0	16	15	14	13
	20160902	53	PPL	10:32	-16.22	8.59	956	0.518	0.846	3	0	17	16	15	14
	20160902	61	PPL	10:59	-15.68	9.13	977	0.571	0.816	3	0	18	17	16	15
	20160902	73	PPL	12:30	-14.86	8.57	1043	0.676	0.818	3	0	19	18	17	16
	20160902	82	PPL	12:32	-14.76	8.54	1045	0.693	0.818	3	0	20	19	18	17
	20160902	93	PPL	14:49	-22.98	14.16	1283	0.485	0.843	3	0	21	20	19	18
	20160904	16	PPL	9:04	-19.14	9.02	811	0.633	0.891	3	0	22	21	20	19
	20160904	19	ALM	9:06	-19.06	8.93	798	0.652	0.823	3	0	23	22	21	20

20160904	46	PPL	10:39	-14.07	3.88	1050	0.743	0.840	3	0	24	23	22	21
20160904	49	ALM	10:40	-14.00	3.81	1100	0.710	0.851	3	0	25	24	23	22
20160906	32	ALM	9:33	-16.16	9.00	873	0.403	0.834	3	0	26	25	24	23
20160906	33	PPL	9:35	-16.07	9.00	895	0.402	0.809	3	0	27	26	25	24
20160906	39	ALM	10:05	-13.78	9.00	921	0.544	0.831	3	0	28	27	26	25
20160906	40	PPL	10:06	-13.69	9.00	962	0.560	0.847	3	0	29	28	27	26
20160906	55	PPL	10:58	-9.78	9.00	1033	0.756	0.806	3	0	30	29	28	27
20160906	69	PPL	11:50	-12.99	9.52	2589	0.294	0.810	2a	0	31	30		
20160906	72	ALM	12:25	-15.72	10.48	2260	0.373	0.830	2a	0	32	31		
20160906	73	PPL	12:26	-15.81	10.51	2262	0.344	0.859	2a	0	33	32		
20160906	79	ALM	13:08	-18.49	11.49	656	0.597	0.833	3	0	34	33	29	28
20160906	80	PPL	13:09	-18.56	11.52	653	0.610	0.831	3	0	35	34	30	29
20160908	11	PPL	11:13	-10.93	0.94	1206	0.388	0.918	2a	0	36	35		
20160908	85	ALM	13:09	-17.21	7.20	1126	0.362	0.934	2a	0	37	36		
20160910	50	PPL	11:04	-14.38	4.50	1317	0.443	0.874	3	0	38	37	31	30
20160910	61	PPL	12:18	-14.23	4.21	1318	0.492	0.826	3	0	39	38	32	31
20160912	25	PPL	12:14	-12.33	2.37	1231	0.525	0.826	3	0	40	39	33	32
20160912	41	PPL	12:49	-14.28	4.29	4532	0.264	0.818	1	0	41			
20160912	44	ALM	13:08	-15.35	5.35	1928	0.457	0.869	3	0	42	40	34	33
20160912	45	PPL	13:09	-15.41	5.41	1927	0.435	0.846	3	0	43	41	35	34
20160912	48	PPL	13:10	-15.47	5.47	1929	0.445	0.866	3	0	44	42	36	35
20160912	72	ALM	13:45	-17.15	7.15	1017	0.418	0.873	3	0	45	43	37	36
20160912	73	PPL	13:46	-17.20	7.19	1009	0.401	0.884	3	0	46	44	38	37
20160912	76	ALM	14:06	-18.03	8.03	80	0.447	0.859	3	0	47	45	39	38
20160912	77	PPL	14:08	-18.07	8.07	82	0.443	0.864	3	0	48	46	40	39
20160914	4	ALM	9:18	-19.31	9.78	778	0.417	0.852	3	0	49	47	41	40
20160914	5	PPL	9:19	-19.23	9.73	777	0.420	0.835	3	0	50	48	42	41
20160914	11	ALM	10:30	-17.79	9.00	815	0.479	0.846	3	0	51	49	43	42
20160914	14	ALM	10:37	-17.38	9.00	835	0.495	0.891	3	0	52	50	44	43
20160914	17	PPL	10:39	-17.26	9.00	848	0.497	0.877	3	0	53	51	45	44
20160914	43	ALM	13:54	-16.49	8.59	3515	0.383	0.839	1	0	54			
20160918	10	PPL	9:50	-10.80	11.50	1216	0.545	0.838	3	0	55	52	46	45
20160920	27	PPL	9:25	-16.54	10.50	625	0.767	0.845	3	0	56	53	47	46
20160920	30	ALM	9:27	-16.42	10.50	628	0.739	0.841	3	0	57	54	48	47
20160920	33	PPL	9:28	-16.33	10.50	627	0.779	0.840	3	0	58	55	49	48
20160920	36	ALM	9:31	-16.19	10.50	623	0.787	0.845	3	0	59	56	50	49
20160920	39	PPL	9:33	-16.07	10.50	626	0.923	0.837	3	0	60	57	51	50
20160920	42	ALM	9:34	-15.99	10.50	629	0.874	0.849	3	0	61	58	52	51
20160920	56	PPL	10:45	-16.61	9.98	4347	0.322	0.822	1	0	62			
20160920	62	PPL	11:01	-16.19	9.00	644	1.061	0.845	3	0	63	59	53	52
20160920	66	PPL	11:03	-16.03	9.00	668	1.061	0.831	3	0	64	60	54	53
20160920	75	PPL	11:08	-15.75	9.00	725	1.235	0.849	3	0	65	61	55	54
20160920	143	ALM	12:39	-17.26	9.00	3700	0.573	0.777	2b	0	66		56	

20160920	149	PPL	12:42	-17.10	9.00	3697	0.552	0.812	2b	0	67		57	
20160920	152	PPL	12:45	-16.90	9.00	3695	0.519	0.818	2b	0	68		58	
20160920	170	PPL	13:14	-17.60	9.00	767	0.858	0.846	3	0	69	62	59	55
20160920	179	PPL	13:17	-17.72	9.00	786	0.845	0.840	3	0	70	63	60	56
20160920	182	PPL	13:18	-17.83	9.00	787	0.868	0.828	3	0	71	64	61	57
20160924	31	PPL	9:42	-10.34	11.00	2084	0.781	0.883	3	0	72	65	62	58
20160924	35	PPL	9:48	-9.91	11.00	1424	0.840	0.849	3	0	73	66	63	59
20160924	77	PPL	11:43	-9.32	11.00	1288	0.912	0.866	3	0	74	67	64	60
20160924	89	PPL	11:55	-10.04	11.00	2102	0.796	0.842	3	0	75	68	65	61
20160925	20	ALM	9:48	-17.32	7.26	4525	0.293	0.931	1	0	76			
20160925	21	PPL	9:49	-17.26	7.20	4523	0.291	0.853	1	0	77			
20160925	34	PPL	11:45	-10.61	0.61	1376	0.696	0.828	3	0	78	69	66	62
20160925	44	PPL	12:41	-10.22	0.22	4508	0.201	0.785	1	0	79			
20160925	48	PPL	12:46	-10.51	0.51	4512	0.211	0.747	1	0	80			
20160925	59	ALM	13:54	-14.41	4.41	1113	0.475	0.802	3	0	81	70	67	63
20160925	62	ALM	13:58	-14.62	4.62	1213	0.457	0.811	3	0	82	71	68	64
20160925	63	PPL	13:59	-14.68	4.68	1210	0.452	0.826	3	0	83	72	69	65
20160925	66	ALM	14:03	-14.90	4.89	1272	0.434	0.831	3	0	84	73	70	66
20160925	67	PPL	14:05	-14.94	4.94	1272	0.437	0.855	3	0	85	74	71	67
20160925	80	ALM	15:18	-19.48	9.47	1229	0.439	0.849	3	0	86	75	72	68
20160927	24	ALM	17:01	-9.79	-10.45	1509	0.329	0.946	2a	0	87	76		
20160927	25	PPL	17:03	-9.76	-10.52	1513	0.325	0.902	2a	0	88	77		
20160831	9	ALM	8:59	-20.84	10.84	1092	0.157	0.865	-1	Low_AOD;				
20160831	10	PPL	9:00	-20.78	10.78	1087	0.161	0.851	-1	Low_AOD;				
20160831	67	ALM	11:24	-13.23	3.07	3831	0.469	0.835	-1	SA_Max;				
20160831	75	ALM	12:11	-13.80	3.61	1260	0.964	0.931	-4	SA_Min; SA_Max; SA_Mean_Diff; SA_Max_Diff;				
20160831	76	PPL	12:12	-13.85	3.66	1261	1.053	0.996	-2	Sky_Err; Fails_RBT;				
20160831	118	PPL	13:33	-17.05	6.92	1167	0.787	0.865	-1	Sky_Err;				
20160831	121	PPL	13:34	-16.99	6.85	1159	0.846	0.851	-3	Sky_Err; SA_Min; Roll_STD;				
20160831	124	PPL	13:37	-17.07	6.88	1169	0.792	0.840	-1	Sky_Err;				
20160831	127	ALM	13:38	-17.13	6.94	1164	0.798	0.829	-1	SA_Min;				
20160831	137	ALM	14:14	-18.53	8.37	1578	0.529	0.797	-1	Alt_Diff;				
20160902	9	ALM	7:05	-22.92	14.47	1754	0.428	0.760	-2	Alt_Diff; Sky_Err;				
20160902	10	PPL	7:07	-22.92	14.38	2229	0.390	0.798	-2	Alt_Diff; Sky_Err;				
20160902	13	PPL	7:42	-21.72	11.84	4616	0.093	0.970	-1	Low_AOD;				
20160902	30	ALM	9:13	-15.11	10.00	1513	0.589	0.809	-1	Alt_Diff;				
20160902	42	ALM	9:31	-14.38	10.01	1271	0.748	0.851	-3	Alt_Diff; SA_Min; Roll_STD;				
20160902	43	PPL	9:32	-14.47	10.01	1354	0.689	0.848	-1	Sky_Err;				
20160902	47	PPL	9:35	-14.67	10.00	1352	0.672	0.822	-1	Sky_Err;				
20160902	56	ALM	10:33	-16.30	8.52	997	0.518	0.931	-2	Alt_Diff; Roll_STD;				

20160902	60	ALM	10:58	-15.74	9.08	979	0.585	0.838	-1	SA_Max;
20160902	72	ALM	12:29	-14.93	8.59	1043	0.653	0.804	-1	SA_Min;
20160904	22	ALM	9:07	-18.98	8.85	747	0.726	0.840	-1	Alt_Diff;
20160906	28	ALM	9:20	-17.19	9.00	2596	0.182	0.995	-4	Low_AOD; Alt_Diff; Sky_Err; Fails_RBT;
20160906	29	PPL	9:21	-17.10	9.00	2555	0.199	0.993	-3	Low_AOD; Sky_Err; Fails_RBT;
20160906	52	ALM	10:56	-9.91	9.00	1039	0.732	0.849	-1	SA_Max;
20160906	62	ALM	11:04	-9.79	9.00	1036	0.751	0.757	-1	SA_Max;
20160906	68	ALM	11:48	-12.90	9.49	2587	0.206	0.994	-2	SA_Max; Fails_RBT;
20160908	14	ALM	11:14	-11.01	1.02	1206	0.392	0.966	-1	SA_Max;
20160908	49	ALM	11:39	-12.19	2.22	1121	0.485	0.894	-1	SA_Max;
20160908	55	ALM	12:28	-15.11	5.11	1196	0.489	0.892	-1	SA_Max;
20160910	44	ALM	11:00	-14.48	4.55	1320	0.481	0.978	-1	SA_Max;
20160910	60	ALM	12:17	-14.18	4.15	1319	0.482	0.921	-2	SA_Min; SA_Max;
20160910	78	PPL	12:52	-15.87	5.86	773	0.325	0.933	-1	Alt_Diff;
20160912	28	ALM	12:15	-12.39	2.44	1230	0.482	0.877	-1	SA_Max;
20160914	24	ALM	11:15	-17.14	9.00	779	0.467	0.995	-2	SA_Max; Fails_RBT;
20160914	25	PPL	11:16	-17.20	9.00	776	0.482	0.874	-2	Sky_Err; SA_Max_Diff;
20160914	44	PPL	13:56	-16.44	8.65	3515	0.373	0.850	-1	Sky_Err;
20160918	9	ALM	9:49	-10.88	11.50	1188	0.552	0.844	-1	SA_Max;
20160920	10	PPL	7:57	-19.98	11.23	5181	0.031	0.646	-1	Low_AOD;
20160920	16	PPL	8:00	-19.75	11.15	5182	0.031	0.641	-1	Low_AOD;
20160920	19	ALM	8:01	-19.63	11.10	5183	0.024	0.676	-1	Low_AOD;
20160920	53	ALM	10:43	-16.59	10.09	4351	0.320	0.822	-1	SA_Max;
20160920	59	ALM	10:59	-16.28	9.00	653	0.977	0.829	-3	SA_Min; SA_Max; SA_Mean_Diff;
20160920	65	ALM	11:02	-16.10	9.00	672	1.049	0.814	-2	SA_Max; SA_Mean_Diff;
20160920	86	PPL	11:24	-16.14	9.00	1244	1.051	0.860	-1	Sky_Err;
20160920	89	PPL	11:26	-16.23	9.00	1241	1.015	0.862	-1	Sky_Err;
20160920	92	ALM	11:27	-16.32	9.00	1242	0.998	0.949	-4	SA_Min; SA_Max; SA_Mean_Diff; SA_Max_Diff;
20160920	104	PPL	11:35	-16.80	9.00	1241	0.922	0.865	-1	Sky_Err;
20160920	107	PPL	11:39	-17.04	9.00	1243	0.959	0.841	-1	Sky_Err;
20160920	126	PPL	12:02	-16.72	8.97	3501	0.559	0.804	-2	Alt_Diff; Sky_Err;
20160920	129	ALM	12:20	-17.22	9.00	7086	0.107	0.608	-2	Low_AOD; Sky_Err;
20160920	130	PPL	12:22	-17.31	9.00	7087	0.105	0.518	-3	Low_AOD; Sky_Err; Fails_RBT;
20160920	185	ALM	13:23	-18.09	9.07	791	0.826	0.817	-2	SA_Min; SA_Mean_Diff;
20160920	200	ALM	13:56	-20.08	10.72	5816	0.090	0.542	-2	Low_AOD; Sky_Err;
20160920	203	PPL	13:58	-20.19	10.81	5812	0.093	0.583	-2	Low_AOD; Sky_Err;
20160924	26	PPL	9:18	-11.73	11.00	1104	1.267	0.993	-3	Alt_Diff; Sky_Err; Fails_RBT;
20160924	34	ALM	9:47	-9.97	11.00	1350	0.869	0.874	-2	SA_Min; SA_Max;

	20160924	39	PPL	9:51	-9.73	11.00	1384	0.858	0.855	-1	Alt_Diff;				
	20160924	92	ALM	11:56	-10.13	11.00	2074	0.795	0.854	-2	SA_Min; SA_Max;				
	20160924	98	PPL	12:09	-11.06	11.00	4833	0.302	0.811	-2	Sky_Err; Fails_RBT;				
	20160924	101	ALM	12:10	-11.17	11.00	4830	0.304	0.820	-2	SA_Max; Fails_RBT;				
	20160925	13	ALM	9:00	-20.27	10.28	5792	0.032	0.849	-1	Low_AOD;				
	20160925	14	PPL	9:02	-20.19	10.20	5794	0.032	0.764	-1	Low_AOD;				
	20160925	33	ALM	11:43	-10.66	0.66	1359	0.715	0.885	-2	SA_Min; SA_Max;				
	20160925	37	PPL	11:58	-10.01	0.01	3732	0.322	0.806	-1	Alt_Diff;				
	20160925	43	ALM	12:39	-10.15	0.15	4510	0.204	0.770	-1	SA_Max;				
	20160925	47	ALM	12:44	-10.44	0.44	4508	0.209	0.807	-1	SA_Max;				
	20160925	51	ALM	12:56	-11.12	1.12	5804	0.092	0.601	-2	Low_AOD; SA_Max;				
	20160925	52	PPL	12:57	-11.19	1.19	5801	0.087	0.590	-3	Low_AOD; Sky_Err; Fails_RBT;				
	20160925	74	PPL	14:46	-17.49	7.49	5781	0.171	0.859	-1	Low_AOD;				
	20160925	77	PPL	15:17	-19.39	9.38	1288	0.431	0.890	-1	Alt_Diff;				
	20160925	85	PPL	15:37	-20.61	10.64	5780	0.040	0.894	-2	Low_AOD; Sky_Err;				
	20160925	88	ALM	15:39	-20.75	10.79	5783	0.040	0.767	-1	Low_AOD;				
	20160927	11	ALM	12:00	-22.79	12.83	6408	0.041	0.728	-2	Low_AOD; Sky_Err;				
	20160927	12	PPL	12:01	-22.75	12.73	6406	0.039	0.723	-2	Low_AOD; Sky_Err;				
	20160927	17	PPL	14:39	-15.61	-0.64	6445	0.030	0.725	-2	Low_AOD; Sky_Err;				
	Median	Count	Mode	Mean	Mean	Mean	Mean	Mean	Mean						
S1 Sum.	20160912	N = 88	PPL = 56 (64%)	11:31	-15.68	7.74	1503	0.557	0.841						
S2 Sum.	20160912	N = 77	PPL = 48 (62%)	11:27	-15.75	7.96	1128	0.584	0.845						
S3 Sum.	20160912	N = 72	PPL = 46 (64%)	11:22	-15.91	8.42	1175	0.613	0.838						
S4 Sum.	20160912	N = 68	PPL = 43 (63%)	11:18	-15.90	8.47	1025	0.618	0.840						

Table S5: Key metadata for the four-wavelength 4STAR sky-scan dataset from ORACLES 2017 (R0_2017_4wl). This includes the date, scan number (scan no.), scanning method, start time, latitude (lat.), longitude (lon.), altitude (alt.), AOD at 400 nm, SSA at 500 nm, QC level (QC lvl.), number of QC failures, and the count (ct.) for sky-scans meeting the four recommended selections. For QC level, 3 = sky-scans meet QC, altitude < 3 km, and AOD (400 nm) > 0.4, so they are in all four selections. 2a = sky-scans meet QC and altitude < 3 km, so they are in both S1 and S2. 2b = sky-scans meet QC and AOD (400 nm) > 0.4, so they are in both S1 and S3. 1 = sky-scans meet QC, so they are only in S1. Negative QC are sky-scans that do not meet QC, with the value being the number of criteria failed. Automated QC failures include AOD (400 nm) ≤ 0.2 (Low_AOD), altitude difference ≥ 50 m (Alt_Diff), mean sky radiance error (lmeas - fit) ≥ 10 % or covariance matrix sky error ≥ 10 % (Sky_Err), no minimum scattering angle $< 6^\circ$ (SA_Min), no maximum scattering angle $> 50^\circ$ (SA_Max), mean scattering angle difference $\geq 3^\circ$ (SA_Mean_Diff), maximum scattering angle difference $< 10^\circ$ (SA_Max_Diff), roll standard deviation $\geq 3^\circ$ (Roll_STD), and fails retrieval boundary test (Fails_RBT). Summary statistics (sum.) are also provided for each of the four selections.

	Date	Scan No.	Scanning Method	Start Time (UTC)	Lat. (°)	Lon. (°)	Alt. (m)	AOD (400 nm)	SSA (500 nm)	QC Lvl.	QC Failures	S1 Ct.	S2 Ct.	S3 Ct.	S4 Ct.
	20170809	58	PPL	13:57	-8.03	-1.63	74	0.718	0.842	3	0	1	1	1	1
	20170809	79	ALM	14:18	-8.02	-0.67	1272	0.483	0.829	3	0	2	2	2	2
	20170809	80	PPL	14:19	-8.02	-0.59	1267	0.496	0.823	3	0	3	3	3	3
	20170809	83	ALM	14:21	-8.02	-0.45	1270	0.496	0.852	3	0	4	4	4	4
	20170809	84	PPL	14:22	-8.02	-0.36	1270	0.493	0.819	3	0	5	5	5	5
	20170809	87	ALM	14:24	-8.01	-0.24	1269	0.468	0.832	3	0	6	6	6	6
	20170809	88	PPL	14:25	-8.01	-0.16	1268	0.449	0.813	3	0	7	7	7	7

20170809	98	ALM	16:22	-2.30	4.53	76	0.541	0.838	3	0	8	8	8	8
20170809	99	PPL	16:24	-2.36	4.49	75	0.548	0.871	3	0	9	9	9	9
20170809	102	PPL	16:25	-2.44	4.44	79	0.587	0.864	3	0	10	10	10	10
20170812	97	PPL	12:00	-11.09	5.00	1267	0.333	0.959	2a	0	11	11		
20170812	100	PPL	12:02	-10.92	5.00	1286	0.309	0.951	2a	0	12	12		
20170812	121	PPL	13:18	-5.86	5.00	62	0.442	0.945	3	0	13	13	11	11
20170812	124	PPL	13:19	-5.75	5.00	63	0.407	0.936	3	0	14	14	12	12
20170812	151	PPL	13:47	-3.71	5.00	1189	0.344	0.868	2a	0	15	15		
20170812	154	PPL	13:48	-3.62	5.00	1217	0.365	0.812	2a	0	16	16		
20170812	157	PPL	13:52	-3.40	5.00	1239	0.377	0.838	2a	0	17	17		
20170812	160	ALM	13:53	-3.29	5.00	1238	0.401	0.850	3	0	18	18	13	13
20170812	165	PPL	13:57	-2.98	5.00	1324	0.429	0.825	3	0	19	19	14	14
20170812	240	ALM	15:23	-0.77	5.00	2231	0.453	0.839	3	0	20	20	15	15
20170812	241	PPL	15:25	-0.69	5.00	2232	0.447	0.817	3	0	21	21	16	16
20170812	244	ALM	15:27	-0.48	5.00	2228	0.447	0.896	3	0	22	22	17	17
20170812	245	PPL	15:29	-0.40	5.00	2230	0.455	0.857	3	0	23	23	18	18
20170812	250	PPL	15:32	-0.19	5.00	2230	0.477	0.853	3	0	24	24	19	19
20170812	253	ALM	15:33	-0.05	5.00	2229	0.475	0.873	3	0	25	25	20	20
20170813	33	ALM	10:28	-8.82	4.85	1496	0.309	0.853	2a	0	26	26		
20170813	34	PPL	10:29	-8.74	4.84	1498	0.316	0.865	2a	0	27	27		
20170813	71	PPL	11:40	-9.08	4.91	1524	0.347	0.879	2a	0	28	28		
20170813	75	PPL	11:45	-8.67	4.82	1519	0.337	0.842	2a	0	29	29		
20170813	79	PPL	11:51	-8.23	4.73	1525	0.353	0.868	2a	0	30	30		
20170813	89	PPL	12:12	-6.74	4.40	1457	0.352	0.866	2a	0	31	31		
20170813	93	PPL	12:19	-6.25	4.30	1454	0.352	0.839	2a	0	32	32		
20170813	113	ALM	12:36	-6.58	4.37	74	0.608	0.972	3	0	33	33	21	21
20170813	120	PPL	12:48	-7.32	4.53	614	0.611	0.878	3	0	34	34	22	22
20170813	151	ALM	14:29	-7.95	4.66	1593	0.370	0.871	2a	0	35	35		
20170813	152	PPL	14:30	-8.02	4.68	1592	0.350	0.881	2a	0	36	36		
20170813	155	ALM	14:36	-8.41	4.77	1595	0.319	0.873	2a	0	37	37		
20170813	156	PPL	14:37	-8.49	4.78	1595	0.313	0.889	2a	0	38	38		
20170813	159	ALM	14:41	-8.74	4.84	1596	0.303	0.872	2a	0	39	39		
20170813	160	PPL	14:42	-8.82	4.85	1596	0.285	0.875	2a	0	40	40		
20170813	163	ALM	14:47	-8.86	4.86	1598	0.284	0.805	2a	0	41	41		
20170813	164	PPL	14:48	-8.78	4.85	1598	0.286	0.858	2a	0	42	42		
20170813	167	ALM	14:50	-8.67	4.82	1596	0.298	0.870	2a	0	43	43		
20170815	70	PPL	11:48	-13.63	5.00	909	0.595	0.909	3	0	44	44	23	23
20170815	96	PPL	12:05	-12.40	5.00	2079	0.557	0.912	3	0	45	45	24	24
20170815	99	PPL	12:07	-12.26	5.00	2077	0.578	0.911	3	0	46	46	25	25
20170815	102	PPL	12:10	-12.02	5.00	2078	0.604	0.883	3	0	47	47	26	26
20170815	103	PPL	12:12	-11.93	5.00	2076	0.618	0.884	3	0	48	48	27	27
20170815	104	PPL	12:14	-11.75	5.00	2078	0.602	0.870	3	0	49	49	28	28
20170815	105	PPL	12:17	-11.54	5.00	2077	0.609	0.893	3	0	50	50	29	29

20170815	106	PPL	12:19	-11.35	5.00	2075	0.620	0.846	3	0	51	51	30	30
20170815	110	PPL	12:25	-10.93	5.00	2643	0.448	0.895	3	0	52	52	31	31
20170815	113	PPL	12:28	-10.70	5.00	2639	0.504	0.848	3	0	53	53	32	32
20170815	114	PPL	12:30	-10.51	5.00	2637	0.488	0.843	3	0	54	54	33	33
20170815	117	PPL	12:33	-10.30	5.00	2636	0.470	0.848	3	0	55	55	34	34
20170815	120	ALM	12:36	-10.08	5.00	2632	0.460	0.880	3	0	56	56	35	35
20170815	124	PPL	12:44	-9.45	5.00	2630	0.292	0.835	2a	0	57	57		
20170815	127	ALM	12:47	-9.15	5.00	2630	0.285	0.851	2a	0	58	58		
20170815	220	ALM	15:26	-3.77	5.00	70	0.602	0.868	3	0	59	59	36	36
20170817	90	PPL	13:13	-5.73	-4.26	1254	0.303	0.872	2a	0	60	60		
20170817	94	PPL	13:16	-5.56	-4.10	1255	0.290	0.950	2a	0	61	61		
20170817	100	PPL	13:44	-4.35	-3.31	1736	0.233	0.961	2a	0	62	62		
20170817	103	ALM	13:51	-4.78	-3.51	1821	0.255	0.879	2a	0	63	63		
20170817	104	PPL	13:52	-4.86	-3.55	1821	0.218	0.902	2a	0	64	64		
20170818	135	PPL	15:54	-8.21	-10.87	65	0.414	0.940	3	0	65	65	37	37
20170821	68	PPL	13:32	-8.00	-7.50	1457	0.304	0.749	2a	0	66	66		
20170821	77	PPL	13:41	-8.00	-6.94	1604	0.335	0.782	2a	0	67	67		
20170821	80	ALM	13:43	-8.00	-6.80	1752	0.351	0.797	2a	0	68	68		
20170821	85	PPL	13:47	-8.00	-6.57	1751	0.369	0.789	2a	0	69	69		
20170821	89	PPL	14:00	-8.01	-5.61	2972	0.228	0.790	2a	0	70	70		
20170821	93	PPL	14:02	-8.01	-5.38	2970	0.233	0.681	2a	0	71	71		
20170821	105	ALM	16:09	-8.00	3.45	1302	0.913	0.814	3	0	72	72	38	38
20170821	106	PPL	16:11	-8.00	3.52	1305	0.931	0.865	3	0	73	73	39	39
20170821	110	PPL	16:19	-8.01	3.22	1443	0.898	0.858	3	0	74	74	40	40
20170821	114	PPL	16:22	-8.01	3.03	1445	0.878	0.846	3	0	75	75	41	41
20170821	150	ALM	16:46	-8.00	3.93	2862	0.408	0.805	3	0	76	76	42	42
20170821	151	PPL	16:47	-8.00	4.01	2862	0.356	0.835	2a	0	77	77		
20170821	154	ALM	16:48	-8.00	4.12	2864	0.355	0.833	2a	0	78	78		
20170821	155	PPL	16:50	-8.00	4.20	2864	0.360	0.840	2a	0	79	79		
20170821	158	ALM	16:51	-8.00	4.33	2863	0.339	0.800	2a	0	80	80		
20170821	159	PPL	16:53	-8.00	4.41	2863	0.337	0.838	2a	0	81	81		
20170821	162	ALM	16:54	-8.00	4.51	2861	0.304	0.816	2a	0	82	82		
20170821	163	PPL	16:56	-8.00	4.59	2860	0.288	0.847	2a	0	83	83		
20170824	13	PPL	11:46	-14.01	5.00	948	0.353	0.867	2a	0	84	84		
20170824	34	PPL	12:25	-11.45	5.00	1117	0.531	0.877	3	0	85	85	43	43
20170824	43	PPL	13:11	-8.49	5.00	2041	0.528	0.858	3	0	86	86	44	44
20170824	46	ALM	13:12	-8.37	5.00	2043	0.557	0.892	3	0	87	87	45	45
20170824	50	PPL	13:18	-7.99	5.00	2042	0.839	0.873	3	0	88	88	46	46
20170824	53	ALM	13:34	-7.76	5.00	3169	0.325	0.829	1	0	89			
20170824	54	PPL	13:36	-7.84	5.00	3173	0.303	0.809	1	0	90			
20170824	61	ALM	14:05	-7.85	5.00	3178	0.299	0.850	1	0	91			
20170824	62	PPL	14:06	-7.76	5.00	3175	0.324	0.868	1	0	92			
20170824	65	PPL	14:13	-7.16	5.00	3182	0.471	0.857	2b	0	93		47	

20170824	68	ALM	14:15	-7.00	5.00	3181	0.453	0.861	2b	0	94		48	
20170826	35	PPL	11:08	-5.25	5.06	1024	0.437	0.815	3	0	95	89	49	47
20170826	39	PPL	11:10	-5.16	4.93	1026	0.439	0.827	3	0	96	90	50	48
20170826	43	PPL	11:13	-5.07	4.79	1028	0.468	0.800	3	0	97	91	51	49
20170826	47	PPL	11:25	-5.11	4.85	2283	0.272	0.868	2a	0	98	92		
20170826	51	PPL	11:28	-5.22	5.01	2282	0.239	0.861	2a	0	99	93		
20170826	80	ALM	14:02	-4.48	5.28	1201	0.355	0.798	2a	0	100	94		
20170826	81	PPL	14:04	-4.44	5.22	1202	0.372	0.809	2a	0	101	95		
20170826	84	ALM	14:05	-4.37	5.12	1201	0.374	0.830	2a	0	102	96		
20170826	88	PPL	14:09	-4.24	4.91	1277	0.390	0.781	2a	0	103	97		
20170826	92	PPL	14:11	-4.15	4.78	1339	0.381	0.812	2a	0	104	98		
20170826	100	ALM	14:53	-4.27	4.96	2164	0.229	0.870	2a	0	105	99		
20170826	101	PPL	14:54	-4.22	4.89	2165	0.240	0.895	2a	0	106	100		
20170826	104	ALM	16:31	-2.42	5.00	1910	0.269	0.907	2a	0	107	101		
20170826	105	PPL	16:33	-2.33	5.00	1911	0.287	0.903	2a	0	108	102		
20170826	108	ALM	16:36	-2.01	5.00	1911	0.279	0.891	2a	0	109	103		
20170828	19	PPL	11:31	-10.38	5.00	1178	0.749	0.884	3	0	110	104	52	50
20170828	23	PPL	11:34	-10.59	5.00	1179	0.738	0.875	3	0	111	105	53	51
20170828	27	PPL	11:39	-10.87	5.00	1178	0.655	0.845	3	0	112	106	54	52
20170828	55	PPL	12:31	-7.97	5.00	1397	1.013	0.849	3	0	113	107	55	53
20170828	62	PPL	12:52	-8.81	5.00	1186	0.872	0.839	3	0	114	108	56	54
20170828	65	ALM	12:54	-8.91	5.00	1221	0.718	0.945	3	0	115	109	57	55
20170828	71	ALM	13:05	-9.62	5.00	1392	0.801	0.854	3	0	116	110	58	56
20170828	72	PPL	13:06	-9.69	5.00	1393	0.664	0.918	3	0	117	111	59	57
20170828	85	ALM	13:39	-8.55	5.00	4003	0.319	0.893	1	0	118			
20170828	86	PPL	13:40	-8.47	5.00	3999	0.496	0.758	2b	0	119		60	
20170828	89	ALM	13:45	-8.11	5.00	4003	0.286	0.879	1	0	120			
20170828	90	PPL	13:47	-8.04	5.00	4001	0.311	0.828	1	0	121			
20170828	93	ALM	13:51	-7.74	5.00	3998	0.277	0.848	1	0	122			
20170828	94	PPL	13:53	-7.67	5.00	3997	0.306	0.882	1	0	123			
20170828	97	ALM	14:50	-4.27	5.00	2858	0.656	0.834	3	0	124	112	61	58
20170828	98	PPL	14:51	-4.35	5.00	2857	0.588	0.846	3	0	125	113	62	59
20170828	101	ALM	14:59	-4.98	5.00	2858	0.647	0.840	3	0	126	114	63	60
20170828	102	PPL	15:00	-5.06	5.00	2857	0.628	0.876	3	0	127	115	64	61
20170828	105	ALM	15:06	-5.50	5.00	2858	0.524	0.861	3	0	128	116	65	62
20170828	106	PPL	15:07	-5.59	5.00	2858	0.589	0.880	3	0	129	117	66	63
20170830	20	PPL	10:35	-9.54	5.00	3504	0.989	0.742	2b	0	130		67	
20170830	68	ALM	14:20	-8.74	5.00	2556	1.216	0.842	3	0	131	118	68	64
20170830	69	PPL	14:22	-8.66	5.00	2556	1.211	0.822	3	0	132	119	69	65
20170830	72	ALM	14:28	-8.13	5.00	2552	1.050	0.835	3	0	133	120	70	66
20170830	73	PPL	14:30	-8.05	5.00	2552	1.137	0.821	3	0	134	121	71	67
20170830	76	ALM	14:46	-6.74	5.00	3198	0.561	0.772	2b	0	135		72	
20170830	77	PPL	14:48	-6.65	5.00	3199	0.536	0.804	2b	0	136		73	

20170831	17	ALM	10:34	-2.85	-0.94	2788	0.589	0.942	3	0	137	122	74	68
20170831	18	PPL	10:35	-2.93	-0.98	2789	0.590	0.877	3	0	138	123	75	69
20170831	22	PPL	10:42	-3.39	-1.25	2790	0.673	0.866	3	0	139	124	76	70
20170831	26	PPL	10:47	-3.74	-1.46	2790	0.744	0.921	3	0	140	125	77	71
20170831	30	PPL	10:58	-4.46	-1.88	2870	0.946	0.897	3	0	141	126	78	72
20170831	34	PPL	11:19	-5.90	-1.88	2934	1.011	0.856	3	0	142	127	79	73
20170831	38	PPL	11:27	-6.41	-1.69	2938	1.107	0.855	3	0	143	128	80	74
20170831	42	PPL	11:48	-7.94	-1.13	3100	0.899	0.854	2b	0	144		81	
20170831	46	PPL	12:17	-7.64	-1.24	2972	0.914	0.821	3	0	145	129	82	75
20170831	50	PPL	12:27	-6.86	-1.53	2968	0.943	0.830	3	0	146	130	83	76
20170831	54	PPL	12:39	-5.94	-1.86	2966	0.999	0.832	3	0	147	131	84	77
20170831	58	PPL	13:00	-4.41	-1.85	2560	1.079	0.811	3	0	148	132	85	78
20170831	62	PPL	13:15	-3.46	-1.29	1453	1.044	0.826	3	0	149	133	86	79
20170831	68	PPL	13:34	-2.26	-0.59	2566	0.805	0.824	3	0	150	134	87	80
20170831	76	PPL	14:28	-0.92	0.39	2879	0.471	0.813	3	0	151	135	88	81
20170902	12	PPL	11:37	0.00	-1.72	2275	0.305	0.808	2a	0	152	136		
20170902	40	ALM	15:10	-3.91	-12.14	2093	0.509	0.783	3	0	153	137	89	82
20170902	41	PPL	15:11	-3.98	-12.18	2094	0.498	0.804	3	0	154	138	90	83
20170902	44	ALM	15:13	-4.09	-12.24	2090	0.492	0.811	3	0	155	139	91	84
20170902	45	PPL	15:14	-4.16	-12.28	2088	0.505	0.803	3	0	156	140	92	85
20170902	60	PPL	16:28	-5.57	-13.06	2066	0.360	0.847	2a	0	157	141		
20170809	33	ALM	12:07	-8.06	-7.32	1651	0.179	0.892	-1	Low_AOD;				
20170809	34	PPL	12:09	-8.06	-7.24	1644	0.172	0.871	-1	Low_AOD;				
20170809	37	ALM	12:10	-8.06	-7.11	1643	0.171	0.927	-2	Low_AOD; SA_Min;				
20170809	38	PPL	12:12	-8.06	-7.04	1648	0.175	0.844	-1	Low_AOD;				
20170809	41	ALM	12:16	-8.06	-6.78	2062	0.120	0.976	-1	Low_AOD;				
20170809	42	PPL	12:17	-8.07	-6.70	2059	0.135	0.880	-1	Low_AOD;				
20170809	45	ALM	12:18	-8.06	-6.57	2059	0.133	0.995	-3	Low_AOD; SA_Max; Fails RBT;				
20170809	46	PPL	12:20	-8.06	-6.48	2059	0.137	0.964	-1	Low_AOD;				
20170809	54	ALM	13:54	-8.03	-1.48	74	0.776	0.856	-1	SA_Mean_Diff;				
20170809	61	ALM	13:58	-8.03	-1.72	163	0.710	0.838	-3	Alt_Diff; SA_Min; Roll STD;				
20170809	65	ALM	14:02	-8.03	-1.70	1214	0.549	0.947	-2	Alt_Diff; SA_Min;				
20170809	66	PPL	14:04	-8.03	-1.62	1392	0.508	0.836	-1	Alt_Diff;				
20170809	69	ALM	14:05	-8.03	-1.52	1381	0.468	0.876	-1	Alt_Diff;				
20170809	70	PPL	14:06	-8.03	-1.44	1197	0.509	0.965	-2	Alt_Diff; Sky_Err;				
20170809	91	PPL	14:32	-8.01	0.30	2152	0.266	0.751	-2	Alt_Diff; Sky_Err;				
20170809	94	ALM	14:57	-6.69	1.53	2226	0.142	0.839	-1	Low_AOD;				
20170809	95	PPL	14:59	-6.61	1.58	2226	0.148	0.865	-1	Low_AOD;				
20170809	108	ALM	16:46	-1.51	5.07	3398	0.262	0.723	-4	Alt_Diff; Sky_Err; SA_Mean_Diff; Fails RBT;				
20170809	109	PPL	16:47	-1.44	5.12	3719	0.189	0.905	-2	Low_AOD; Alt_Diff;				

20170812	34	ALM	8:57	-1.34	5.00	5173	0.015	0.698	-1	Low_AOD;
20170812	37	PPL	9:00	-1.53	5.00	5173	0.010	0.720	-2	Low_AOD; Sky_Err;
20170812	38	ALM	9:02	-1.72	5.00	5168	0.009	0.793	-1	Low_AOD;
20170812	45	PPL	9:10	-2.46	5.00	5163	0.014	0.622	-2	Low_AOD; Sky_Err;
20170812	56	ALM	11:00	-11.83	5.00	5816	0.027	0.801	-1	Low_AOD;
20170812	57	PPL	11:01	-11.92	5.00	5815	0.010	0.766	-2	Low_AOD; Sky_Err;
20170812	60	PPL	11:03	-12.07	5.00	5819	0.013	0.821	-2	Low_AOD; Sky_Err;
20170812	63	ALM	11:05	-12.25	5.00	5819	0.014	0.896	-1	Low_AOD;
20170812	66	PPL	11:27	-12.99	4.99	1449	0.257	0.878	-1	Alt_Diff;
20170812	111	ALM	12:42	-7.77	5.00	3796	0.021	0.989	-2	Low_AOD; Fails_RBT;
20170812	112	PPL	12:43	-7.67	5.00	3795	0.026	0.879	-3	Low_AOD; Sky_Err; Fails_RBT;
20170812	115	PPL	12:50	-7.15	5.00	3793	0.024	0.887	-3	Low_AOD; Sky_Err; Fails_RBT;
20170812	127	PPL	13:21	-5.64	5.00	63	0.404	0.966	-1	Fails_RBT;
20170812	145	PPL	13:41	-4.17	5.00	1180	0.394	0.852	-1	Alt_Diff;
20170812	188	PPL	14:10	-2.08	5.00	4639	0.018	0.767	-3	Low_AOD; Alt_Diff; Sky_Err;
20170812	191	ALM	14:11	-1.96	5.00	4826	0.016	0.684	-1	Low_AOD;
20170812	217	PPL	15:02	-2.32	5.00	1192	0.479	0.894	-1	Alt_Diff;
20170813	30	PPL	10:27	-8.91	4.90	1488	0.323	0.890	-2	Sky_Err; Roll_STD;
20170813	40	ALM	10:59	-7.02	4.46	1525	0.313	0.924	-1	SA_Min;
20170813	41	PPL	11:00	-7.08	4.48	1524	0.333	0.841	-1	Sky_Err;
20170813	56	ALM	11:16	-8.12	4.70	1491	0.306	0.991	-1	SA_Max;
20170813	57	PPL	11:18	-8.19	4.72	1488	0.325	0.877	-1	Sky_Err;
20170813	74	ALM	11:43	-8.78	4.85	1530	0.342	0.855	-1	SA_Max;
20170813	78	ALM	11:50	-8.31	4.74	1525	0.358	0.844	-1	SA_Max;
20170813	84	ALM	12:05	-7.25	4.51	1455	0.345	0.852	-1	SA_Max;
20170813	85	PPL	12:06	-7.17	4.50	1454	0.336	0.981	-2	Sky_Err; Fails_RBT;
20170813	88	ALM	12:11	-6.82	4.42	1456	0.351	0.845	-1	SA_Max;
20170813	92	ALM	12:18	-6.33	4.32	1452	0.353	0.841	-1	SA_Max;
20170813	96	ALM	12:22	-6.06	4.26	1453	0.340	0.855	-1	SA_Max;
20170813	97	PPL	12:23	-5.99	4.24	1449	0.333	0.997	-6	Sky_Err; SA_Min; SA_Mean_Diff; SA_Max_Diff; Roll_STD; Fails_RBT;
20170813	100	PPL	12:28	-6.00	4.25	117	0.574	0.960	-2	Alt_Diff; Sky_Err;
20170813	107	ALM	12:31	-6.25	4.30	69	0.647	0.976	-5	Sky_Err; SA_Min; SA_Max; SA_Mean_Diff; Fails_RBT;
20170813	110	ALM	12:34	-6.45	4.34	69	0.642	0.969	-3	SA_Min; SA_Max; SA_Mean_Diff;
20170813	123	PPL	12:51	-7.54	4.58	612	0.705	0.994	-2	Sky_Err; Fails_RBT;
20170813	136	PPL	13:08	-8.64	4.82	1727	0.350	0.857	-1	Alt_Diff;
20170813	140	PPL	14:10	-8.67	4.82	2719	0.122	0.834	-1	Low_AOD;
20170813	143	ALM	14:17	-8.10	4.70	2706	0.113	0.832	-1	Low_AOD;

20170813	144	PPL	14:19	-8.01	4.68	2705	0.110	0.856	-1	Low_AOD;
20170815	10	PPL	10:10	-9.49	5.00	5152	0.019	0.609	-2	Low_AOD; Sky_Err;
20170815	13	ALM	10:11	-9.62	5.00	5152	0.019	0.693	-1	Low_AOD;
20170815	121	ALM	12:39	-9.75	5.00	2632	0.389	0.858	-2	SA_Mean_Diff; SA_Max_Diff;
20170815	163	ALM	13:55	-7.34	5.00	2052	0.174	0.805	-1	Low_AOD;
20170815	164	PPL	13:56	-7.25	5.00	2054	0.166	0.801	-1	Low_AOD;
20170815	191	ALM	14:26	-7.60	5.00	4332	0.039	0.564	-3	Low_AOD; Alt_Diff; SA_Min;
20170815	200	ALM	14:45	-5.97	5.00	4471	0.040	0.627	-1	Low_AOD;
20170815	203	ALM	14:55	-5.09	5.00	4471	0.040	0.688	-3	Low_AOD; Sky_Err; Fails_RBT;
20170815	204	PPL	14:58	-4.89	5.00	4470	0.040	0.931	-3	Low_AOD; Sky_Err; Fails_RBT;
20170815	221	PPL	15:30	-3.60	5.00	71	0.657	0.884	-1	Sky_Err;
20170815	226	PPL	15:33	-3.35	5.00	71	0.738	0.886	-1	Sky_Err;
20170817	46	ALM	12:16	-8.69	-6.71	1769	0.063	0.926	-2	Low_AOD; SA_Max;
20170817	47	PPL	12:17	-8.63	-6.67	1772	0.080	0.883	-1	Low_AOD;
20170817	50	ALM	12:29	-7.97	-6.26	1773	0.155	0.816	-2	Low_AOD; SA_Max;
20170817	51	PPL	12:31	-7.91	-6.23	1774	0.146	0.868	-1	Low_AOD;
20170817	55	ALM	12:40	-7.43	-5.82	73	0.391	0.978	-3	SA_Min; SA_Max; SA_Mean_Diff;
20170817	66	PPL	12:44	-7.25	-5.66	623	0.337	0.894	-1	Alt_Diff;
20170817	73	PPL	12:50	-6.95	-5.38	1799	0.152	0.894	-1	Low_AOD;
20170817	76	PPL	12:51	-6.88	-5.32	1796	0.152	0.895	-1	Low_AOD;
20170817	79	PPL	12:55	-6.70	-5.15	1795	0.172	0.896	-1	Low_AOD;
20170817	82	ALM	12:58	-6.49	-4.96	1794	0.182	0.864	-2	Low_AOD; SA_Max;
20170817	83	PPL	13:00	-6.43	-4.90	1791	0.181	0.892	-1	Low_AOD;
20170817	86	PPL	13:07	-6.06	-4.56	1767	0.204	0.898	-1	Alt_Diff;
20170817	97	PPL	13:24	-5.19	-3.77	1804	0.207	0.989	-1	Alt_Diff;
20170817	107	PPL	14:08	-5.77	-4.29	1817	0.191	0.975	-1	Low_AOD;
20170817	110	ALM	14:17	-6.32	-4.80	1820	0.194	0.916	-1	Low_AOD;
20170817	111	PPL	14:18	-6.38	-4.86	1819	0.189	0.925	-1	Low_AOD;
20170817	114	ALM	14:27	-6.90	-5.34	1670	0.183	0.910	-1	Low_AOD;
20170817	115	PPL	14:28	-6.97	-5.40	1671	0.181	0.904	-1	Low_AOD;
20170817	118	ALM	14:36	-7.48	-5.87	1673	0.155	0.913	-1	Low_AOD;
20170817	119	PPL	14:38	-7.55	-5.93	1671	0.149	0.992	-1	Low_AOD;
20170817	122	ALM	15:07	-8.01	-8.01	67	0.331	0.888	-1	SA_Min;
20170817	123	PPL	15:08	-8.01	-8.07	80	0.307	0.990	-1	Fails_RBT;
20170817	132	ALM	15:21	-8.01	-9.02	2230	0.093	0.936	-4	Low_AOD; Sky_Err; SA_Min; Fails_RBT;
20170817	136	PPL	15:36	-8.01	-10.09	72	0.266	0.978	-2	Sky_Err; Fails_RBT;
20170817	139	ALM	15:37	-8.01	-10.17	98	0.403	0.772	-3	Alt_Diff; SA_Min; SA_Mean_Diff;
20170817	142	PPL	15:43	-8.00	-10.57	850	0.195	0.974	-3	Low_AOD; Sky_Err; Fails_RBT;

20170817	145	ALM	15:46	-8.00	-10.82	850	0.189	0.938	-5	Low_AOD; Sky_Err; SA_Min; SA_Mean_Diff; Fails_RBT;
20170817	149	PPL	15:54	-8.00	-11.37	855	0.191	0.919	-3	Low_AOD; Sky_Err; Fails_RBT;
20170817	152	PPL	15:59	-8.00	-11.78	252	0.265	0.986	-3	Alt_Diff; Sky_Err; Fails_RBT;
20170817	155	ALM	16:03	-7.99	-12.10	1209	0.174	0.945	-5	Low_AOD; Sky_Err; SA_Min; SA_Mean_Diff; Fails_RBT;
20170817	156	PPL	16:05	-7.99	-12.18	1209	0.176	0.988	-3	Low_AOD; Sky_Err; Fails_RBT;
20170818	31	PPL	13:40	-9.00	-14.27	319	0.158	0.904	-1	Low_AOD;
20170818	41	PPL	14:02	-9.00	-13.38	1734	0.068	0.992	-4	Low_AOD; Sky_Err; SA_Max_Diff; Fails_RBT;
20170818	56	PPL	14:22	-9.00	-14.27	2203	0.040	0.654	-1	Low_AOD;
20170818	59	PPL	14:25	-9.00	-14.51	1720	0.051	0.922	-2	Low_AOD; Sky_Err;
20170818	62	PPL	14:29	-9.00	-14.78	1720	0.057	0.902	-1	Low_AOD;
20170818	71	PPL	14:41	-8.74	-15.52	1182	0.115	0.931	-2	Low_AOD; Alt_Diff;
20170818	80	PPL	14:44	-8.56	-15.52	2025	0.057	0.832	-1	Low_AOD;
20170818	83	PPL	14:46	-8.50	-15.35	2009	0.064	0.989	-3	Low_AOD; Sky_Err; Fails_RBT;
20170818	91	PPL	14:55	-8.51	-14.75	433	0.167	0.989	-4	Low_AOD; Alt_Diff; Sky_Err; Fails_RBT;
20170818	124	PPL	15:42	-8.50	-11.42	2026	0.070	0.934	-1	Low_AOD;
20170818	138	PPL	15:57	-8.03	-10.94	77	0.398	0.995	-2	Sky_Err; Fails_RBT;
20170818	161	ALM	17:32	-7.97	-14.40	88	0.187	0.942	-3	Low_AOD; SA_Mean_Diff; Fails_RBT;
20170821	31	PPL	11:25	-8.00	-13.54	3351	0.108	0.496	-4	Low_AOD; Alt_Diff; Sky_Err; Fails_RBT;
20170821	34	PPL	11:28	-8.00	-13.33	3748	0.112	0.473	-3	Low_AOD; Alt_Diff; Fails_RBT;
20170821	57	PPL	13:24	-8.00	-8.00	1780	0.221	0.690	-2	Alt_Diff; Sky_Err;
20170821	67	ALM	13:30	-8.00	-7.57	1457	0.294	0.833	-1	Fails_RBT;
20170821	71	PPL	13:33	-8.00	-7.42	1421	0.297	0.750	-1	Alt_Diff;
20170821	81	PPL	13:44	-8.00	-6.73	1748	0.387	0.717	-1	Sky_Err;
20170821	84	ALM	13:45	-8.00	-6.64	1752	0.373	0.794	-1	Fails_RBT;
20170821	88	ALM	13:58	-8.01	-5.69	2969	0.235	0.742	-1	Fails_RBT;
20170821	92	ALM	14:01	-8.01	-5.46	2970	0.223	0.687	-1	Fails_RBT;
20170821	96	ALM	15:04	-8.00	0.08	5447	0.061	0.413	-1	Low_AOD;
20170821	97	PPL	15:06	-8.00	0.18	5447	0.056	0.486	-2	Low_AOD; Sky_Err;
20170821	109	ALM	16:18	-8.01	3.30	1443	0.872	0.834	-1	Roll_STD;
20170824	16	ALM	11:47	-13.91	5.00	1074	0.358	0.853	-1	Alt_Diff;
20170824	37	ALM	12:26	-11.35	5.00	1058	0.527	0.841	-2	Alt_Diff; SA_Max;
20170824	57	ALM	13:43	-8.39	5.00	3174	0.180	0.794	-1	Low_AOD;
20170824	58	PPL	13:45	-8.47	5.00	3173	0.187	0.791	-1	Low_AOD;
20170826	17	ALM	8:57	-2.68	5.00	5798	0.033	0.726	-2	Low_AOD; Sky_Err;

20170826	18	PPL	8:59	-2.78	5.00	5795	0.028	0.606	-2	Low_AOD; Sky_Err;
20170826	23	PPL	10:43	-5.18	4.95	72	0.710	0.993	-2	Sky_Err; Fails_RBT;
20170826	34	ALM	11:06	-5.29	5.12	1021	0.431	0.866	-1	SA_Max;
20170826	38	ALM	11:09	-5.20	4.99	1025	0.421	0.889	-1	SA_Max;
20170826	42	ALM	11:11	-5.11	4.85	1026	0.460	0.878	-1	SA_Max;
20170826	46	ALM	11:23	-5.07	4.78	2281	0.265	0.994	-1	SA_Max;
20170826	50	ALM	11:26	-5.17	4.94	2282	0.252	0.988	-1	SA_Max;
20170826	87	ALM	14:08	-4.28	4.98	1237	0.387	0.794	-1	Alt_Diff;
20170826	91	ALM	14:10	-4.19	4.84	1301	0.381	0.792	-1	Alt_Diff;
20170826	109	PPL	16:38	-1.92	5.00	1909	0.328	0.909	-1	Sky_Err;
20170828	14	ALM	11:27	-10.13	5.00	1179	0.797	0.928	-1	SA_Max;
20170828	15	PPL	11:29	-10.20	5.00	1180	0.768	0.884	-1	Sky_Err;
20170828	18	ALM	11:30	-10.31	5.00	1177	0.804	0.946	-1	SA_Max;
20170828	22	ALM	11:33	-10.52	5.00	1176	0.778	0.957	-1	SA_Max;
20170828	26	ALM	11:37	-10.79	5.00	1176	0.670	0.954	-1	SA_Max;
20170828	38	PPL	11:59	-10.08	5.00	992	1.510	0.894	-2	Alt_Diff; Sky_Err;
20170828	43	ALM	12:10	-9.30	5.00	1301	0.816	0.851	-1	SA_Max;
20170828	44	PPL	12:12	-9.22	5.00	1261	0.793	0.846	-1	Alt_Diff;
20170828	50	ALM	12:27	-8.22	5.00	1332	0.940	0.876	-2	SA_Max; Fails_RBT;
20170828	51	PPL	12:28	-8.15	5.00	1359	0.994	0.862	-1	Alt_Diff;
20170828	54	ALM	12:30	-8.04	5.00	1397	0.967	0.907	-1	SA_Max;
20170828	79	PPL	13:22	-9.68	5.00	3333	0.511	0.842	-1	Alt_Diff;
20170828	110	PPL	15:18	-6.42	5.00	2858	0.706	0.906	-1	Sky_Err;
20170830	15	ALM	9:36	-4.67	5.00	3503	0.190	0.879	-5	Low_AOD; SA_Min; SA_Mean_Diff; SA_Max_Diff; Fails_RBT;
20170830	16	PPL	9:37	-4.76	5.00	3502	0.238	0.769	-1	Sky_Err;
20170830	19	ALM	10:34	-9.45	5.00	3503	1.000	0.771	-1	SA_Min;
20170830	23	ALM	10:37	-9.69	5.00	3504	1.006	0.775	-2	SA_Min; SA_Mean_Diff;
20170830	24	PPL	10:38	-9.78	5.00	3504	1.006	0.739	-1	Sky_Err;
20170830	27	ALM	10:59	-10.18	5.00	5497	0.522	0.504	-3	SA_Max; SA_Mean_Diff; SA_Max_Diff;
20170830	28	PPL	11:00	-10.27	5.00	5499	0.521	0.478	-2	Sky_Err; Fails_RBT;
20170830	31	ALM	11:42	-12.68	5.00	4471	0.664	0.542	-1	SA_Max;
20170830	32	PPL	11:43	-12.59	5.00	4471	0.639	0.619	-1	Sky_Err;
20170830	35	ALM	12:17	-9.62	5.00	4474	0.765	0.589	-2	Alt_Diff; SA_Max;
20170830	36	PPL	12:18	-9.52	5.00	4571	0.734	0.584	-1	Alt_Diff;
20170830	39	ALM	12:27	-8.74	5.00	5478	0.548	0.449	-1	SA_Max;
20170830	40	PPL	12:28	-8.65	5.00	5477	0.548	0.481	-2	Sky_Err; Fails_RBT;
20170830	46	ALM	12:34	-8.12	5.00	5477	0.542	0.450	-1	SA_Max;
20170830	47	PPL	12:36	-8.03	5.00	5478	0.536	0.486	-2	Sky_Err; Fails_RBT;
20170830	59	ALM	13:43	-8.27	5.00	1415	1.846	0.834	-2	SA_Mean_Diff; SA_Max_Diff;
20170830	60	PPL	13:45	-8.19	5.00	1415	1.825	0.836	-1	Sky_Err;

20170830	63	ALM	13:47	-8.03	5.00	1412	1.733	0.841	-2	SA_Mean_Diff; SA_Max_Diff;				
20170830	80	ALM	14:59	-5.67	5.00	3192	0.599	0.762	-1	SA_Min;				
20170830	81	PPL	15:01	-5.59	5.00	3192	0.561	0.862	-1	Sky_Err;				
20170830	84	ALM	15:10	-4.86	5.00	3191	0.492	0.788	-1	Sky_Err;				
20170830	85	PPL	15:11	-4.78	5.00	3191	0.462	0.858	-1	Sky_Err;				
20170830	89	PPL	15:22	-3.94	5.00	3194	0.806	0.875	-2	Sky_Err; Fails_RBT;				
20170831	21	ALM	10:41	-3.31	-1.21	2790	0.657	0.956	-1	SA_Max;				
20170831	25	ALM	10:46	-3.67	-1.42	2791	0.734	0.976	-1	SA_Max;				
20170831	29	ALM	10:57	-4.39	-1.84	2871	0.897	0.986	-4	SA_Min; SA_Max; SA_Mean_Diff; SA_Max_Diff;				
20170831	41	ALM	11:47	-7.87	-1.16	3098	0.937	0.885	-2	SA_Min; SA_Max;				
20170831	45	ALM	12:16	-7.73	-1.21	2972	0.908	0.826	-2	SA_Min; SA_Max;				
20170831	49	ALM	12:26	-6.94	-1.50	2967	0.941	0.817	-2	SA_Min; SA_Max;				
20170831	53	ALM	12:38	-6.02	-1.83	2966	0.959	0.828	-2	SA_Min; SA_Max;				
20170831	61	ALM	13:14	-3.52	-1.33	1453	1.112	0.813	-2	SA_Min; SA_Max;				
20170831	67	ALM	13:33	-2.33	-0.64	2564	0.794	0.787	-2	SA_Min; SA_Mean_Diff;				
20170831	71	ALM	13:56	-1.35	-0.15	2721	0.575	0.755	-2	SA_Mean_Diff; SA_Max_Diff;				
20170831	72	PPL	13:58	-1.43	-0.19	2717	0.592	0.787	-1	Fails_RBT;				
20170831	75	ALM	14:27	-0.94	0.30	2879	0.473	0.805	-1	SA_Mean_Diff;				
20170902	8	ALM	11:35	0.00	-1.58	2275	0.319	0.891	-1	SA_Max;				
20170902	16	ALM	11:50	0.00	-2.68	2209	0.364	0.933	-2	Alt_Diff; SA_Max;				
20170902	20	ALM	11:53	0.00	-2.87	2238	0.383	0.935	-1	SA_Max;				
	Median	Count	Mode	Mean	Mean	Mean	Mean	Mean	Mean					
S1 Sum.	20170821	N = 157	PPL = 109 (69%)	13:45	-6.84	2.61	2007	0.510	0.853					
S2 Sum.	20170821	N = 141	PPL = 100 (71%)	13:46	-6.73	2.38	1838	0.517	0.855					
S3 Sum.	20170824	N = 92	PPL = 66 (72%)	13:35	-6.76	2.51	1952	0.649	0.854					
S4 Sum.	20170824	N = 85	PPL = 61 (72%)	13:36	-6.69	2.38	1838	0.651	0.858					

Table S6: Key metadata for the four-wavelength 4STAR sky-scan dataset from ORACLES 2018 (R0_2018_4wl). Sky-scans from the transit flight on 25 October 2018 located outside of the Southeast Atlantic study area (north of 1 °N) are excluded. This includes the date, scan number (scan no.), scanning method, start time, latitude (lat.), longitude (lon.), altitude (alt.), AOD at 400 nm, SSA at 500 nm, QC level (QC lvl.), number of QC failures, and the count (ct.) for sky-scans meeting the four recommended selections. For QC level, 3 = sky-scans meet QC, altitude < 3 km, and AOD (400 nm) > 0.4, so they are in all four selections. 2a = sky-scans meet QC and altitude < 3 km, so they are in both S1 and S2. 2b = sky-scans meet QC and AOD (400 nm) > 0.4, so they are in both S1 and S3. 1 = sky-scans meet QC, so they are only in S1. Negative QC are sky-scans that do not meet QC, with the value being the number of criteria failed. Automated QC failures include AOD (400 nm) ≤ 0.2 (Low_AOD), altitude difference ≥ 50 m (Alt_Diff), mean sky radiance error (|meas - fit|) ≥ 10 % or covariance matrix sky error ≥ 10 % (Sky_Err), no minimum scattering angle < 6 ° (SA_Min), no maximum scattering angle > 50 ° (SA_Max), mean scattering angle difference ≥ 3 ° (SA_Mean_Diff), maximum scattering angle difference < 10 ° (SA_Max_Diff), roll standard deviation ≥ 3 ° (Roll_STD), and fails retrieval boundary test (Fails_RBT). Summary statistics (sum.) are also provided for each of the four selections.

Date	Scan No.	Scanning Method	Start Time (UTC)	Lat. (°)	Lon. (°)	Alt. (m)	AOD (400 nm)	SSA (500 nm)	QC Lvl.	QC Failures	S1 Ct.	S2 Ct.	S3 Ct.	S4 Ct.
20180930	22	PPL	10:07	-7.82	5.00	893	0.433	0.913	3	0	1	1	1	1
20180930	26	PPL	10:10	-7.65	5.00	894	0.435	0.896	3	0	2	2	2	2
20180930	30	PPL	10:13	-7.46	5.00	896	0.467	0.919	3	0	3	3	3	3
20180930	34	PPL	10:16	-7.26	5.00	895	0.502	0.935	3	0	4	4	4	4

20181005	10	PPL	7:33	-9.51	6.50	984	0.420	0.872	3	0	5	5	5	5
20181005	17	PPL	7:38	-9.50	6.23	942	0.403	0.867	3	0	6	6	6	6
20181005	18	ALM	7:39	-9.50	6.16	942	0.407	0.873	3	0	7	7	7	7
20181005	21	PPL	7:40	-9.50	6.06	943	0.402	0.867	3	0	8	8	8	8
20181005	22	ALM	7:41	-9.50	5.99	943	0.391	0.918	2a	0	9	9		
20181005	25	PPL	7:43	-9.50	5.91	942	0.398	0.934	2a	0	10	10		
20181005	28	PPL	7:45	-9.50	5.76	944	0.372	0.949	2a	0	11	11		
20181005	45	PPL	8:16	-9.50	6.07	377	0.503	0.941	3	0	12	12	9	9
20181005	48	PPL	8:19	-9.50	5.93	378	0.501	0.934	3	0	13	13	10	10
20181005	54	PPL	8:25	-9.50	5.87	888	0.423	0.915	3	0	14	14	11	11
20181005	55	ALM	8:26	-9.50	5.94	886	0.420	0.933	3	0	15	15	12	12
20181005	58	PPL	8:30	-9.50	6.16	1416	0.391	0.860	2a	0	16	16		
20181005	59	ALM	8:31	-9.50	6.24	1415	0.373	0.914	2a	0	17	17		
20181005	63	ALM	8:33	-9.50	6.43	1414	0.379	0.937	2a	0	18	18		
20181005	66	PPL	8:37	-9.50	6.71	1412	0.399	0.912	2a	0	19	19		
20181005	67	ALM	8:38	-9.51	6.79	1412	0.399	0.959	2a	0	20	20		
20181005	70	PPL	8:50	-9.50	6.52	2228	0.265	0.888	2a	0	21	21		
20181005	74	PPL	8:53	-9.50	6.23	2228	0.267	0.792	2a	0	22	22		
20181005	89	PPL	10:19	-9.54	5.84	548	0.436	0.945	3	0	23	23	13	13
20181007	33	PPL	11:14	-11.03	5.00	949	0.586	0.879	3	0	24	24	14	14
20181007	36	PPL	11:16	-10.96	5.00	950	0.609	0.886	3	0	25	25	15	15
20181007	39	PPL	11:17	-10.86	5.00	952	0.577	0.845	3	0	26	26	16	16
20181007	48	PPL	11:45	-8.94	5.00	2445	0.266	0.851	2a	0	27	27		
20181007	51	PPL	11:46	-8.84	5.00	2445	0.230	0.847	2a	0	28	28		
20181007	54	PPL	11:48	-8.73	5.00	2442	0.296	0.799	2a	0	29	29		
20181007	57	PPL	11:49	-8.62	5.00	2440	0.267	0.819	2a	0	30	30		
20181007	60	PPL	11:51	-8.51	5.00	2438	0.252	0.832	2a	0	31	31		
20181007	63	PPL	11:52	-8.42	5.00	2438	0.256	0.827	2a	0	32	32		
20181007	66	PPL	11:53	-8.32	5.00	2436	0.254	0.794	2a	0	33	33		
20181007	69	PPL	11:55	-8.22	5.00	2436	0.250	0.789	2a	0	34	34		
20181007	72	PPL	11:56	-8.13	5.00	2435	0.240	0.752	2a	0	35	35		
20181007	75	PPL	11:57	-8.04	5.00	2435	0.221	0.747	2a	0	36	36		
20181007	82	PPL	12:49	-9.01	5.00	66	0.476	0.873	3	0	37	37	17	17
20181010	28	PPL	10:27	-12.95	5.00	1109	0.612	0.911	3	0	38	38	18	18
20181010	31	PPL	10:28	-12.87	5.00	1114	0.656	0.904	3	0	39	39	19	19
20181010	34	PPL	10:29	-12.79	5.00	1117	0.654	0.893	3	0	40	40	20	20
20181010	37	PPL	10:31	-12.68	5.00	1110	0.655	0.918	3	0	41	41	21	21
20181010	67	PPL	11:34	-9.75	5.00	1397	0.462	0.893	3	0	42	42	22	22
20181010	76	PPL	11:37	-9.57	5.00	1397	0.434	0.884	3	0	43	43	23	23
20181010	79	PPL	11:39	-9.44	5.00	1397	0.428	0.888	3	0	44	44	24	24
20181010	83	PPL	11:42	-9.23	5.00	1396	0.385	0.887	2a	0	45	45		
20181010	95	PPL	11:58	-8.17	5.00	1198	0.393	0.920	2a	0	46	46		
20181010	98	PPL	12:05	-7.72	5.00	159	0.576	0.899	3	0	47	47	25	25

20181010	107	PPL	12:33	-5.83	5.00	1125	0.450	0.879	3	0	48	48	26	26
20181010	125	PPL	14:01	-2.51	5.00	573	0.542	0.908	3	0	49	49	27	27
20181010	128	PPL	14:02	-2.40	5.00	568	0.535	0.896	3	0	50	50	28	28
20181012	43	ALM	14:07	-2.01	6.51	1635	0.257	0.882	2a	0	51	51		
20181012	52	PPL	16:01	-3.83	5.50	1570	0.421	0.933	3	0	52	52	29	29
20181012	53	ALM	16:02	-3.75	5.50	1594	0.421	0.894	3	0	53	53	30	30
20181015	44	PPL	11:00	-12.37	5.00	1198	0.413	0.837	3	0	54	54	31	31
20181015	53	PPL	11:11	-11.64	5.00	1306	0.427	0.830	3	0	55	55	32	32
20181015	56	PPL	11:13	-11.49	5.00	1305	0.427	0.859	3	0	56	56	33	33
20181015	60	PPL	11:17	-11.29	5.00	1307	0.401	0.840	3	0	57	57	34	34
20181015	64	PPL	11:22	-10.96	5.00	1731	0.259	0.847	2a	0	58	58		
20181015	71	PPL	11:30	-10.44	5.00	1723	0.256	0.834	2a	0	59	59		
20181015	86	PPL	11:51	-9.50	5.00	1196	0.310	0.851	2a	0	60	60		
20181015	109	PPL	12:22	-7.58	5.00	1185	0.355	0.875	2a	0	61	61		
20181015	113	PPL	12:29	-7.15	5.00	2247	0.249	0.876	2a	0	62	62		
20181015	117	PPL	12:34	-6.75	5.00	2246	0.213	0.828	2a	0	63	63		
20181017	58	PPL	9:44	-7.12	10.50	4195	0.249	0.908	1	0	64			
20181017	61	PPL	9:45	-7.22	10.50	4195	0.259	0.929	1	0	65			
20181017	70	PPL	9:49	-7.52	10.50	4197	0.256	0.913	1	0	66			
20181017	74	PPL	9:57	-7.51	10.50	2003	0.542	0.870	3	0	67	64	35	35
20181017	77	PPL	9:59	-7.43	10.50	2004	0.519	0.914	3	0	68	65	36	36
20181017	80	PPL	10:00	-7.33	10.50	2001	0.585	0.924	3	0	69	66	37	37
20181017	83	PPL	10:02	-7.22	10.50	2003	0.506	0.924	3	0	70	67	38	38
20181017	86	PPL	10:03	-7.13	10.50	2003	0.581	0.915	3	0	71	68	39	39
20181017	90	PPL	10:10	-7.06	10.50	1604	1.001	0.931	3	0	72	69	40	40
20181017	93	PPL	10:11	-7.17	10.50	1600	0.809	0.952	3	0	73	70	41	41
20181017	96	PPL	10:13	-7.26	10.50	1600	0.762	0.959	3	0	74	71	42	42
20181017	99	PPL	10:14	-7.36	10.50	1601	0.827	0.913	3	0	75	72	43	43
20181017	102	PPL	10:16	-7.44	10.50	1600	0.681	0.893	3	0	76	73	44	44
20181017	120	PPL	10:56	-7.17	10.50	1363	0.803	0.880	3	0	77	74	45	45
20181017	123	PPL	10:57	-7.08	10.50	1361	0.850	0.929	3	0	78	75	46	46
20181017	149	PPL	11:54	-7.00	9.99	4170	0.310	0.913	1	0	79			
20181019	44	PPL	9:36	-7.78	9.00	71	0.440	0.866	3	0	80	76	47	47
20181019	48	PPL	9:39	-7.58	9.00	65	0.410	0.887	3	0	81	77	48	48
20181019	51	PPL	9:40	-7.50	9.00	70	0.415	0.897	3	0	82	78	49	49
20181019	59	PPL	9:50	-7.31	9.00	628	0.354	0.933	2a	0	83	79		
20181019	62	PPL	9:51	-7.40	9.00	626	0.346	0.932	2a	0	84	80		
20181019	65	PPL	9:53	-7.51	9.00	690	0.345	0.914	2a	0	85	81		
20181019	68	PPL	9:54	-7.59	9.00	682	0.352	0.921	2a	0	86	82		
20181019	72	PPL	9:57	-7.78	9.00	685	0.363	0.924	2a	0	87	83		
20181019	75	PPL	9:59	-7.88	9.00	683	0.380	0.906	2a	0	88	84		
20181019	78	PPL	10:10	-8.02	9.00	2544	0.352	0.789	2a	0	89	85		
20181019	81	PPL	10:12	-7.90	9.00	2543	0.323	0.888	2a	0	90	86		

20181019	85	PPL	10:15	-7.67	9.00	2543	0.319	0.836	2a	0	91	87	
20181019	88	PPL	10:17	-7.58	9.00	2543	0.302	0.887	2a	0	92	88	
20181019	113	PPL	12:08	-7.78	9.00	848	0.368	0.954	2a	0	93	89	
20181019	119	PPL	12:10	-7.63	9.00	982	0.348	0.894	2a	0	94	90	
20181019	122	PPL	12:12	-7.53	9.00	1051	0.341	0.884	2a	0	95	91	
20181019	128	PPL	12:38	-7.29	9.00	1122	0.329	0.898	2a	0	96	92	
20180930	7	PPL	9:18	-7.81	5.00	6459	0.041	0.855	-1	Low_AOD;			
20180930	23	ALM	10:08	-7.74	5.00	891	0.419	0.939	-1	SA_Max;			
20180930	31	ALM	10:14	-7.39	5.00	896	0.471	0.925	-1	SA_Max;			
20180930	35	ALM	10:17	-7.19	5.00	896	0.503	0.944	-1	SA_Max;			
20180930	38	PPL	10:19	-7.05	5.00	897	0.474	0.968	-1	Sky_Err;			
20180930	51	PPL	11:03	-6.97	5.00	841	0.434	0.993	-1	Roll_STD;			
20180930	60	PPL	11:19	-7.99	5.00	1533	0.395	0.822	-1	Sky_Err;			
20181005	11	ALM	7:34	-9.51	6.42	936	0.401	0.851	-2	SA_Min; Roll_STD;			
20181005	62	PPL	8:32	-9.50	6.35	1415	0.375	0.977	-1	Sky_Err;			
20181005	71	ALM	8:50	-9.50	6.43	2228	0.256	0.948	-4	Sky_Err; SA_Mean_Diff; SA_Max_Diff; Fails_RBT;			
20181005	75	ALM	8:54	-9.50	6.14	2228	0.249	0.984	-2	SA_Mean_Diff; SA_Max_Diff;			
20181005	78	PPL	9:06	-9.50	5.71	3248	0.184	0.747	-1	Low_AOD;			
20181005	86	PPL	10:14	-9.50	5.97	71	0.496	0.873	-1	Sky_Err;			
20181007	11	PPL	10:35	-13.96	5.00	4226	0.367	0.984	-2	Sky_Err; Fails_RBT;			
20181007	19	PPL	10:56	-12.33	5.00	2438	0.487	0.719	-2	Sky_Err; Fails_RBT;			
20181007	45	PPL	11:34	-9.70	5.00	915	0.594	0.886	-2	Sky_Err; Fails_RBT;			
20181007	85	PPL	12:51	-8.93	5.00	72	0.481	0.874	-1	Sky_Err;			
20181010	43	PPL	11:11	-11.47	5.00	4177	0.213	0.907	-1	Sky_Err;			
20181010	44	ALM	11:12	-11.37	5.00	4176	0.222	0.825	-1	SA_Max;			
20181010	47	PPL	11:15	-11.22	5.00	4174	0.161	0.830	-2	Low_AOD; Sky_Err;			
20181010	51	PPL	11:16	-11.10	5.00	4174	0.158	0.853	-2	Low_AOD; Sky_Err;			
20181010	52	ALM	11:17	-11.00	5.00	4176	0.179	0.757	-2	Low_AOD; SA_Max;			
20181010	55	PPL	11:19	-10.87	5.00	4176	0.185	0.853	-2	Low_AOD; Sky_Err;			
20181010	56	ALM	11:20	-10.77	5.00	4175	0.185	0.756	-2	Low_AOD; SA_Max;			
20181010	59	PPL	11:22	-10.62	5.00	4174	0.171	0.880	-3	Low_AOD; Sky_Err; Fails_RBT;			
20181010	60	ALM	11:23	-10.52	5.00	4174	0.165	0.612	-3	Low_AOD; SA_Max; Fails_RBT;			
20181010	80	ALM	11:40	-9.35	5.00	1396	0.413	0.884	-1	SA_Max;			
20181010	88	PPL	11:51	-8.65	5.00	960	0.391	0.874	-1	Fails_RBT;			
20181010	110	PPL	12:35	-5.75	5.00	1164	0.463	0.884	-1	Alt_Diff;			
20181010	113	PPL	12:45	-5.06	5.00	3683	0.131	0.901	-2	Low_AOD; Sky_Err;			
20181010	114	ALM	12:45	-4.97	5.00	3674	0.135	0.866	-2	Low_AOD; SA_Max;			
20181010	135	PPL	14:16	-1.34	5.00	3514	0.222	0.890	-2	Sky_Err; Fails_RBT;			
20181012	42	PPL	14:06	-1.94	6.54	1631	0.248	0.975	-1	Sky_Err;			
20181015	15	PPL	8:03	-3.41	5.00	5814	0.050	0.923	-1	Low_AOD;			

20181015	19	PPL	8:16	-4.61	5.00	5816	0.047	0.750	-1	Low_AOD;
20181015	20	ALM	8:17	-4.72	5.00	5815	0.049	0.784	-1	Low_AOD;
20181015	23	PPL	9:11	-9.42	5.00	5822	0.058	0.804	-1	Low_AOD;
20181015	24	ALM	9:11	-9.53	5.00	5820	0.057	0.811	-1	Low_AOD;
20181015	34	PPL	10:40	-13.72	5.00	896	0.329	0.942	-2	Sky_Err; Fails_RBT;
20181015	47	PPL	11:01	-12.29	5.00	1200	0.402	0.849	-2	Sky_Err; Fails_RBT;
20181015	61	ALM	11:18	-11.21	5.00	1308	0.384	0.788	-1	SA_Max;
20181015	65	ALM	11:23	-10.88	5.00	1732	0.254	0.852	-1	SA_Max;
20181015	68	PPL	11:27	-10.63	5.00	1732	0.308	0.696	-2	Sky_Err; Fails_RBT;
20181015	83	PPL	11:33	-10.25	5.00	1736	0.249	0.808	-1	Roll_STD;
20181015	110	ALM	12:23	-7.50	5.00	1191	0.358	0.957	-2	Alt_Diff; SA_Max;
20181015	114	ALM	12:29	-7.06	5.00	2250	0.233	0.894	-1	SA_Max;
20181015	118	ALM	12:35	-6.67	5.00	2248	0.226	0.874	-1	SA_Max;
20181017	12	PPL	7:26	-2.02	7.00	5497	0.050	0.840	-1	Low_AOD;
20181017	13	ALM	7:27	-2.13	7.00	5497	0.050	0.793	-1	Low_AOD;
20181017	16	PPL	7:30	-2.32	7.00	5497	0.049	0.915	-1	Low_AOD;
20181017	17	ALM	7:30	-2.42	7.00	5497	0.053	0.904	-1	Low_AOD;
20181017	20	PPL	7:40	-3.23	7.00	5500	0.047	0.804	-1	Low_AOD;
20181017	21	ALM	7:41	-3.34	7.00	5499	0.051	0.822	-1	Low_AOD;
20181017	25	ALM	7:44	-3.59	7.00	5500	0.053	0.838	-1	Low_AOD;
20181017	28	PPL	7:52	-4.28	7.00	5802	0.047	0.842	-2	Low_AOD; Sky_Err;
20181017	29	ALM	7:53	-4.38	7.00	5803	0.051	0.835	-1	Low_AOD;
20181017	32	PPL	7:55	-4.54	7.00	5803	0.052	0.914	-1	Low_AOD;
20181017	36	PPL	8:13	-6.10	7.00	5804	0.057	0.752	-1	Low_AOD;
20181017	40	PPL	8:16	-6.39	7.00	5805	0.062	0.913	-2	Low_AOD; Sky_Err;
20181017	44	PPL	8:31	-7.00	7.68	5984	0.060	0.791	-2	Low_AOD; Fails_RBT;
20181017	45	ALM	8:32	-7.00	7.78	5985	0.071	0.839	-1	Low_AOD;
20181017	64	PPL	9:47	-7.35	10.50	4197	0.319	0.987	-2	Sky_Err; Fails_RBT;
20181017	146	PPL	11:52	-7.00	10.15	4171	0.355	0.840	-1	Sky_Err;
20181017	167	PPL	12:08	-7.01	8.68	5326	0.124	0.788	-2	Low_AOD; Sky_Err;
20181017	170	ALM	12:09	-7.01	8.54	5308	0.115	0.633	-3	Low_AOD; Alt_Diff; SA_Max;
20181017	179	PPL	12:53	-6.54	5.00	6363	0.100	0.574	-3	Low_AOD; Alt_Diff; Sky_Err;
20181017	180	ALM	12:54	-6.44	5.00	6444	0.101	0.581	-2	Low_AOD; SA_Max;
20181017	183	PPL	12:56	-6.28	5.00	6439	0.086	0.673	-1	Low_AOD;
20181017	187	PPL	14:05	-3.74	5.00	6431	0.086	0.673	-1	Low_AOD;
20181017	188	ALM	14:06	-3.62	5.00	6430	0.085	0.622	-1	Low_AOD;
20181017	191	PPL	14:24	-1.93	5.00	6431	0.076	0.618	-1	Low_AOD;
20181017	192	ALM	14:25	-1.81	5.00	6428	0.078	0.527	-1	Low_AOD;
20181017	195	PPL	14:30	-1.28	5.00	6426	0.073	0.576	-2	Low_AOD; Sky_Err;
20181017	196	ALM	14:31	-1.16	5.00	6427	0.069	0.557	-1	Low_AOD;
20181017	199	PPL	14:42	-0.13	5.00	6424	0.068	0.718	-1	Low_AOD;

20181017	204	PPL	14:45	0.00	5.18	6426	0.070	0.616	-2	Low_AOD; Sky_Err;
20181019	23	PPL	7:15	-1.03	7.00	5162	0.052	0.989	-3	Low_AOD; Sky_Err; Fails_RBT;
20181019	24	ALM	7:16	-1.14	7.00	5161	0.050	0.847	-1	Low_AOD;
20181019	27	PPL	7:58	-4.76	7.00	5815	0.049	0.897	-2	Low_AOD; Sky_Err;
20181019	31	PPL	8:16	-6.16	7.32	5815	0.049	0.980	-2	Low_AOD; Sky_Err;
20181019	32	ALM	8:16	-6.21	7.41	5815	0.046	0.756	-1	Low_AOD;
20181019	35	PPL	8:31	-6.71	8.54	5817	0.049	0.971	-2	Low_AOD; Sky_Err;
20181019	36	ALM	8:32	-6.74	8.63	5817	0.053	0.792	-1	Low_AOD;
20181019	39	PPL	8:43	-7.39	9.00	6463	0.053	0.763	-2	Low_AOD; Sky_Err;
20181019	45	ALM	9:37	-7.69	9.00	77	0.443	0.924	-3	SA_Min; SA_Max; SA_Mean_Diff;
20181019	54	PPL	9:42	-7.41	9.00	87	0.412	0.895	-1	Sky_Err;
20181019	69	ALM	9:55	-7.67	9.00	687	0.360	0.905	-1	SA_Max;
20181019	82	ALM	10:13	-7.82	9.00	2543	0.321	0.869	-1	SA_Max;
20181019	116	PPL	12:09	-7.71	9.00	884	0.363	0.959	-1	Alt_Diff;
20181019	131	PPL	12:39	-7.22	9.00	1127	0.334	0.993	-2	Sky_Err; Fails_RBT;
20181019	138	PPL	13:10	-6.23	7.46	767	0.365	0.929	-1	Sky_Err;
20181019	141	PPL	13:11	-6.20	7.39	741	0.367	0.951	-1	Sky_Err;
20181019	146	PPL	13:59	-2.76	7.00	6447	0.084	0.738	-1	Low_AOD;
20181019	147	ALM	14:00	-2.65	7.00	6447	0.089	0.695	-1	Low_AOD;
20181019	150	PPL	14:10	-1.73	7.00	6454	0.083	0.762	-1	Low_AOD;
20181019	151	ALM	14:11	-1.61	7.00	6454	0.076	0.662	-1	Low_AOD;
20181021	18	PPL	8:17	-5.07	5.00	6450	0.055	0.727	-2	Low_AOD; Sky_Err;
20181021	19	ALM	8:18	-5.17	5.00	6450	0.052	0.710	-1	Low_AOD;
20181021	22	PPL	8:25	-5.80	5.00	6450	0.049	0.703	-1	Low_AOD;
20181021	26	PPL	8:35	-6.68	5.00	6451	0.051	0.675	-1	Low_AOD;
20181021	27	ALM	8:36	-6.78	5.00	6453	0.050	0.642	-1	Low_AOD;
20181021	30	PPL	8:45	-7.50	5.00	6450	0.048	0.622	-1	Low_AOD;
20181021	34	PPL	8:54	-8.32	5.00	6455	0.046	0.630	-1	Low_AOD;
20181021	38	PPL	9:07	-9.47	5.00	6454	0.051	0.618	-1	Low_AOD;
20181021	39	ALM	9:08	-9.58	5.00	6454	0.051	0.673	-1	Low_AOD;
20181021	42	PPL	9:22	-10.86	5.00	6451	0.051	0.672	-1	Low_AOD;
20181021	43	ALM	9:23	-10.97	5.00	6451	0.052	0.569	-1	Low_AOD;
20181021	46	PPL	9:42	-12.66	5.00	6453	0.053	0.617	-1	Low_AOD;
20181021	55	PPL	10:46	-12.24	5.00	883	0.362	0.883	-1	Fails_RBT;
20181021	58	PPL	10:48	-12.14	5.00	881	0.377	0.796	-2	Sky_Err; Fails_RBT;
20181021	81	PPL	13:47	-2.23	5.00	2609	0.112	0.875	-3	Low_AOD; Alt_Diff; Sky_Err;
20181021	85	PPL	13:49	-2.07	5.00	2695	0.114	0.923	-1	Low_AOD;
20181021	88	PPL	13:50	-1.98	5.00	2696	0.110	0.866	-1	Low_AOD;
20181021	91	PPL	13:51	-1.89	5.00	2773	0.109	0.852	-2	Low_AOD; Alt_Diff;
20181021	92	ALM	13:52	-1.79	5.00	2836	0.106	0.852	-1	Low_AOD;

	20181023	12	PPL	8:21	-5.00	4.18	5327	0.049	0.808	-1	Low_AOD;			
	20181023	13	ALM	8:22	-5.01	4.06	5328	0.053	0.706	-1	Low_AOD;			
	20181023	16	PPL	8:34	-5.01	2.96	5329	0.053	0.714	-1	Low_AOD;			
	20181023	17	ALM	8:35	-5.01	2.84	5328	0.047	0.650	-1	Low_AOD;			
	20181023	20	PPL	8:50	-5.01	1.39	5329	0.050	0.632	-1	Low_AOD;			
	20181023	21	ALM	8:51	-5.01	1.29	5329	0.052	0.690	-1	Low_AOD;			
	20181023	24	PPL	9:07	-5.01	-0.15	5333	0.053	0.608	-1	Low_AOD;			
	20181023	28	PPL	9:23	-5.01	-1.60	5333	0.054	0.594	-1	Low_AOD;			
	20181023	29	ALM	9:24	-5.01	-1.70	5331	0.053	0.593	-1	Low_AOD;			
	20181023	41	PPL	11:03	-5.01	-0.46	1124	0.179	0.831	-2	Low_AOD; Sky_Err;			
	20181023	44	PPL	11:05	-5.01	-0.36	1126	0.166	0.862	-2	Low_AOD; Sky_Err;			
	20181023	47	PPL	11:06	-5.01	-0.27	1207	0.157	0.983	-3	Low_AOD; Sky_Err; Fails_RBT;			
	20181023	50	PPL	11:08	-5.01	-0.18	1203	0.153	0.903	-2	Low_AOD; Sky_Err;			
	20181025	24	PPL	9:46	0.74	-8.64	5809	0.045	0.793	-2	Low_AOD; Sky_Err;			
	20181025	25	ALM	9:47	0.82	-8.71	5808	0.048	0.728	-1	Low_AOD;			
	Median	Count	Mode	Mean	Mean	Mean	Mean	Mean	Mean					
S1 Sum.	20181010	N = 96	PPL = 88 (92%)	10:39	-8.41	6.88	1478	0.427	0.887					
S2 Sum.	20181010	N = 92	PPL = 84 (91%)	10:39	-8.47	6.73	1360	0.434	0.886					
S3 Sum.	20181010	N = 49	PPL = 46 (94%)	10:36	-8.58	6.81	1095	0.536	0.898					
S4 Sum.	20181010	N = 49	PPL = 46 (94%)	10:36	-8.58	6.81	1095	0.536	0.898					