

Cleaning of WHT primary mirror with CO2 (Algal2) on 31 July 2017 following several calima episodes.

Anomalously low measurements are identified from the graph and confirmed by comparing subsequent values. Omitted from statistics.

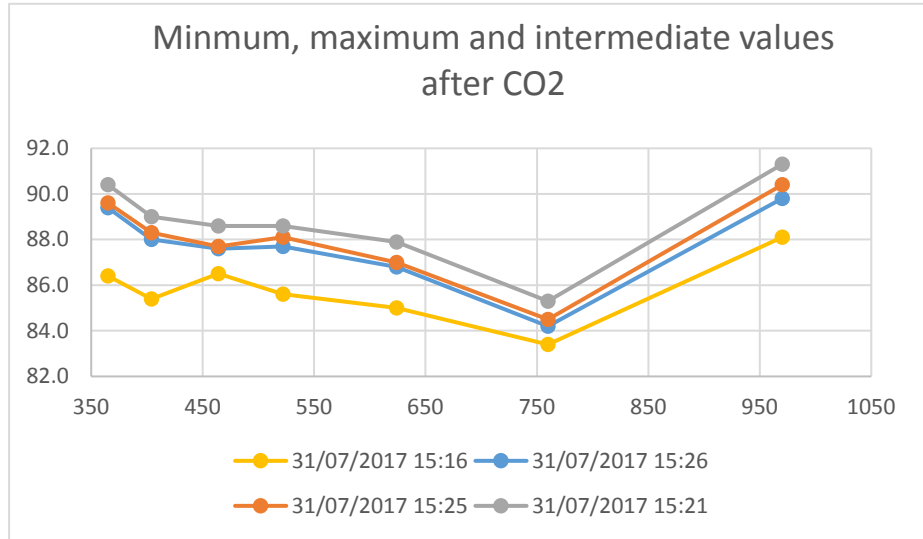
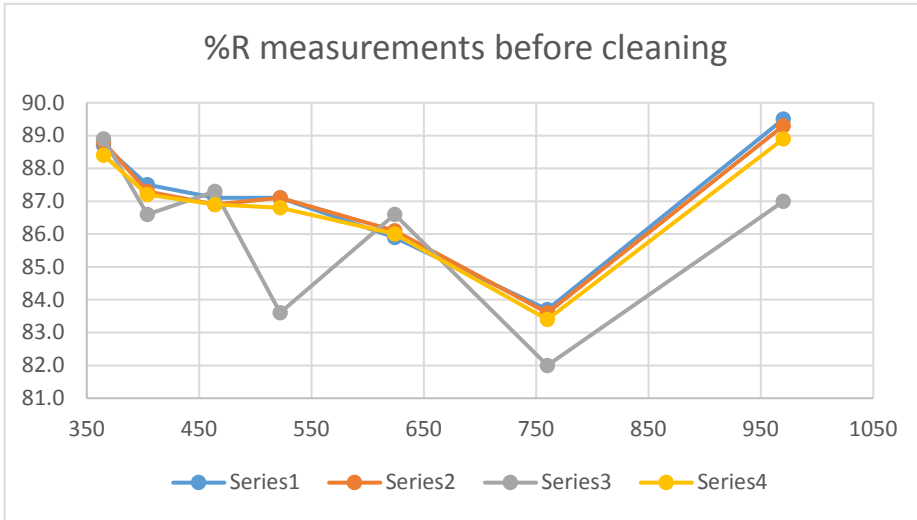
Maxima and minima highlighted in green & orange respectively, are valid and included.

				Tempr. °C	Reflectivity (%R)								"Dust Indices" (DI)						
					wavelength of band (nm)														
Measurements before CO2 cleaning					365	404	464	522	624	760	970	365	404	464	522	624	760	970	
1151	31/07/2017	11:17	3 WHTM1 all	17.8	88.7	87.5	87.1	87.1	85.9	83.7	89.5	8.0	7.5	8.0	6.7	8.9	7.4	8.0	
1152	31/07/2017	11:19	3 WHTM1 all	18.2	88.8	87.3	86.9	87.1	86.1	83.6	89.3	7.7	7.5	8.3	6.7	8.3	7.5	8.0	
1153	31/07/2017	11:21	1 WHTM1 all	18.8	88.9	86.6	87.3	83.6	86.6	82.0	87.0	7.5	8.0	7.8	9.3	7.4	8.2	9.0	
1154	31/07/2017	11:22	1 WHTM1 all	19.1	88.4	87.2	86.9	86.8	86.0	83.4	88.9	7.8	7.8	8.5	7.1	8.7	7.9	8.5	
					88.7	87.2	87.1	87.0	86.2	83.2	88.7	7.8	7.7	8.2	7.5	8.3	7.8	8.4	

measurements after CO2 cleaning. Note highlighted minimum is lower than any measurement before CO2. Probably a stain.

1155	31/07/2017	15:14	1 WHTM1 all	20.3	89.4	88.0	87.7	87.5	86.9	84.3	90.2	7.4	7.2	7.7	6.5	7.3	6.6	7.0
1156	31/07/2017	15:15	1 WHTM1 all	20.3	90.3	88.8	88.4	88.5	87.8	85.2	91.4	6.2	6.3	6.5	5.3	5.8	5.0	4.8
1157	31/07/2017	15:15	1 WHTM1 all	20.4	90.0	88.6	88.3	88.4	87.5	85.0	90.9	7.0	6.6	6.8	5.4	6.3	5.5	5.6
1158	31/07/2017	15:16	1 WHTM1 all	20.6	86.4	85.4	86.5	85.6	85.0	83.4	88.1	12.1	11.6	11.6	10.0	11.5	9.3	10.8
1159	31/07/2017	15:17	1 WHTM1 all	20.9	90.3	88.8	88.4	88.5	87.8	85.2	91.2	6.5	6.3	6.7	5.2	5.8	5.1	5.0
1160	31/07/2017	15:18	1 WHTM1 all	21.1	90.4	89.0	88.6	88.8	88.1	85.5	91.7	6.7	6.3	6.4	4.8	5.3	4.3	4.1
1161	31/07/2017	15:19	1 WHTM1 all	21.3	90.1	88.7	88.4	88.5	87.8	85.2	91.2	6.7	6.3	6.5	5.1	5.7	4.8	4.9
1162	31/07/2017	15:20	1 WHTM1 all	21.4	89.9	88.5	88.1	88.4	87.5	85.1	91.0	7.4	7.0	7.4	5.6	6.4	5.2	5.2
1163	31/07/2017	15:21	1 WHTM1 all	21.8	90.4	89.0	88.6	88.6	87.9	85.3	91.3	6.3	6.3	6.5	5.1	5.5	4.6	4.8
1164	31/07/2017	15:22	1 WHTM1 all	21.9	90.0	88.6	88.2	88.2	87.4	84.8	90.7	6.8	6.6	6.9	5.6	6.5	5.6	5.8
1165	31/07/2017	15:23	1 WHTM1 all	22.3	90.3	88.9	88.6	88.7	87.8	85.3	91.1	6.5	6.3	6.3	5.1	5.7	4.7	5.0
1166	31/07/2017	15:24	1 WHTM1 all	22.4	90.2	88.8	88.3	88.6	87.7	85.1	91.2	6.6	6.4	6.7	5.1	5.9	5.1	4.8
1167	31/07/2017	15:25	1 WHTM1 all	22.6	90.3	88.9	88.5	88.7	87.9	85.3	91.2	6.1	5.9	6.1	4.7	5.4	4.5	4.7
1168	31/07/2017	15:25	1 WHTM1 all	22.9	89.6	88.3	87.7	88.1	87.0	84.5	90.4	8.3	7.1	7.4	5.9	7.2	6.0	6.4
1169	31/07/2017	15:26	1 WHTM1 all	23.1	89.4	88.0	87.6	87.7	86.8	84.2	89.8	7.4	7.4	8.7	6.2	8.4	6.5	6.8
average, omitting minimum					90.0	88.6	88.2	88.4	87.6	85.0	91.0	6.9	6.6	6.9	5.4	6.2	5.3	5.4
max					90.4	89.0	88.6	88.8	88.1	85.5	91.7	8.3	7.4	8.7	6.5	8.4	6.6	7.0

min (omitting 1158)	89.4	88.0	87.6	87.5	86.8	84.2	89.8	6.1	5.9	6.1	4.7	5.3	4.3	4.1
range	1.0	1.0	1.0	1.3	1.3	1.3	1.9	2.2	1.5	2.6	1.8	3.1	2.3	2.9
change due to CO2 cleaning	1.3	1.5	1.2	1.4	1.4	1.8	2.3	-0.9	-1.1	-1.3	-2.1	-2.1	-2.5	-3.0



WHTM1 measurements 12 days later

1170	11/08/2017	13:15	0	Normal	24.8	89.0	87.2	86.1	86.5	86.2	82.7	89.3		8.1	10.1	8.0	8.5	9.2	8.5
1171	11/08/2017	13:16	0	Normal	24.8	88.7	87.3	86.6	86.8	86.0	83.2	89.2	8.0	7.8	8.7	7.2	8.7	8.2	8.6
1172	11/08/2017	13:18	0	Normal	24.9	89.1	87.7	87.2	87.3	86.5	84.0	89.8	7.8	7.7	8.1	6.5	7.7	6.8	7.2
1173	11/08/2017	13:19	0	Normal	25.1	88.9	87.3	86.8	86.7	86.0	83.3	89.0	7.4	7.7	8.5	7.3	8.7	8.1	8.4
1174	11/08/2017	13:20	0	Normal	25.3	89.0	87.5	87.0	86.9	86.2	83.4	89.1	7.6	7.5	8.3	7.1	8.1	7.8	8.2
1175	11/08/2017	13:21	0	Normal	25.5	89.1	87.7	87.1	87.3	86.4	83.9	89.5	8.0	7.8	8.4	6.8	7.5	7.0	7.6
averages						89.0	87.5	86.8	86.9	86.2	83.4	89.3	7.8	7.8	8.7	7.2	8.2	7.9	8.1
change since CO2 cleaning						-1.1	-1.2	-1.4	-1.5	-1.3	-1.6	-1.6	0.9	1.2	1.8	1.8	2.0	2.6	2.7

**Conclusions: the average improvement from CO2 (Algal2) was small (1.2 to 2.3%) and the range in measurements is almost as large. After 12 days calima caused most of this improvement to be lost again, particularly in blue wavebands**