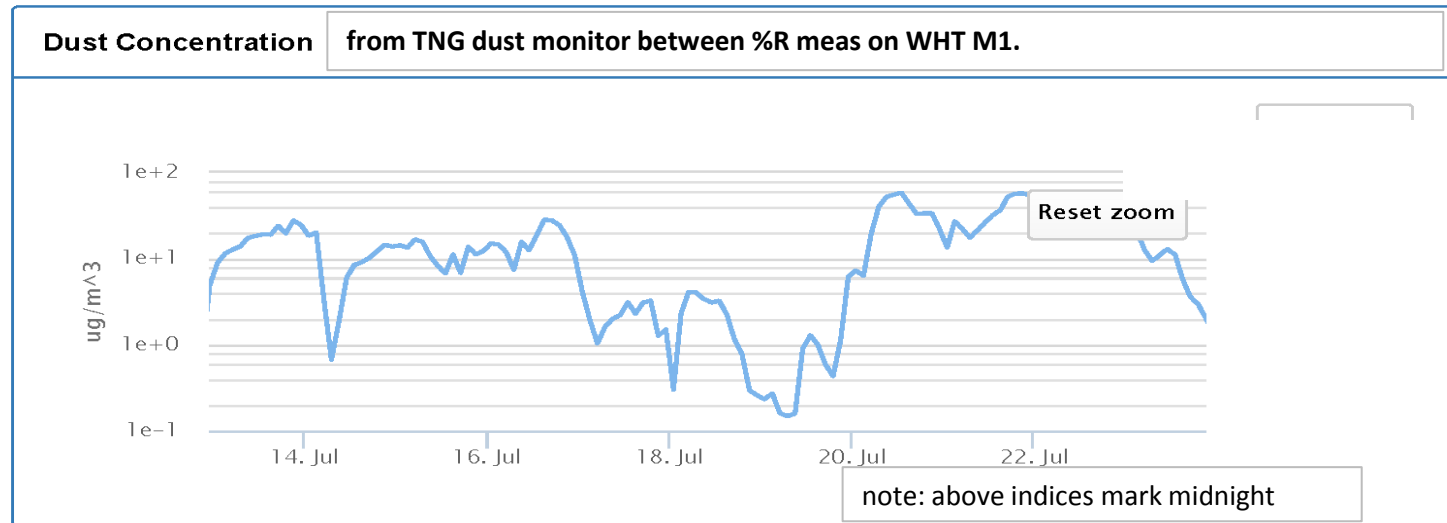


**Mirror reflectivity report for CO2 cleaning on 27 July, prompted by >1% loss of Reflectivity following two Calima events.**

First data since CO2 cleaning on 27/6

Index	date/time	Temp. °C	Reflectivity (%R) wavelength of band (nm)							"Dust Indices" (DI)							
			365	404	464	522	624	760	970	365	404	464	522	624	760	970	
742	13/07/2016 15:28	0 Normal	23.7	46.2	90.7	90.2	90.3	89.4	86.7	92.8	2.6	2.5	2.5	2	2.2	1.9	2
743	13/07/2016 15:29	1 WHTM1 all	23.8	92.3	90.5	90.2	90.1	89.3	86.5	92.5	2.7	2.6	2.6	2.2	2.4	2.1	2.4
744	13/07/2016 15:31	1 WHTM1 all	23.9	92.2	90.5	90.1	90.2	89.4	86.6	92.6	2.8	2.7	2.7	2.1	2.2	1.9	1.9
745	13/07/2016 15:32	1 WHTM1 all	24	92.3	90.5	90.1	90.1	89.3	86.6	92.5	2.6	2.5	2.5	1.9	2.2	1.8	2
746	13/07/2016 15:34	1 null	24.2	5.8	7.8	14.5	6.3	19.9	21.2	5.5	30.9	38.3	45.3	30.5	27	22.3	23.3
747	13/07/2016 15:35	1 WHTM1 all	24.4	92.4	90.8	90.3	90.4	89.4	86.8	92.7	2.6	2.5	2.5	1.8	2.2	1.7	1.8
748	13/07/2016 15:35	1 WHTM1 all	24.6	92.4	90.8	90.4	90.4	89.5	86.8	92.7	2.5	2.3	2.3	1.8	1.9	1.5	1.6
749	13/07/2016 15:37	1 WHTM1 all	24.8	92.3	90.6	90	90.2	89.2	86.5	92.5	2.6	2.5	2.6	2	2.2	1.9	1.9
750	13/07/2016 15:38	1 WHTM1 all	24.8	92.2	90.6	90.1	90.3	89.3	86.7	92.5	2.7	2.5	2.6	1.9	2.2	1.7	1.8
averages				92.3	90.6	90.2	90.3	89.4	86.7	92.6	2.64	2.5	2.5	2.0	2.2	1.8	1.9
change since 27/6				-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	0.25	0.3	0.3	0.3	0.4	0.4	0.5

Two minor calima events followed in the 9 days between measurements, with peaks > 20 and > 50 ug/m3 respectively



Measurements taken during the second peak of calima (see graph on previous page)

				%R vs waveband (nm)							Dust Index						
				365	404	464	522	624	760	970	365	404	464	522	624	760	970
751	22/07/2016 12:48	1 null	22.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	-0.1
752	22/07/2016 12:49	1 WHTM1 all	23	91.4	90.0	89.3	89.6	88.3	86.0	91.8	3.4	3.2	3.7	2.8	3.7	3.3	3.4
753	22/07/2016 12:50	1 WHTM1 all	23.2	45.8	89.9	89.5	89.6	88.7	86.0	91.8	3.3	3.4	3.6	3.0	3.6	3.2	3.7
754	22/07/2016 12:51	1 WHTM1 all	23.4	91.8	90.1	89.8	89.6	88.8	86.1	91.7	3.1	3.0	3.3	2.8	3.3	3.1	3.4
755	22/07/2016 12:52	1 WHTM1 all	23.7	91.7	90.1	89.6	89.7	88.7	86.1	91.9	3.2	3.1	3.4	2.7	3.4	3.1	3.3
756	22/07/2016 12:53	1 WHTM1 all	23.9	91.3	89.8	89.5	89.4	88.7	86.0	91.7	3.4	3.3	3.4	2.9	3.3	3.1	3.4
757	22/07/2016 12:55	1 WHTM1 all	24.1	91.4	89.6	89.0	89.2	88.1	85.6	91.5	3.5	3.5	4.0	3.2	3.9	3.7	3.9
758	22/07/2016 12:56	1 WHTM1 all	24.4	91.3	89.7	89.2	89.3	88.3	85.6	91.4	3.6	3.5	3.8	3.1	4.0	3.6	4.1
759	22/07/2016 12:57	1 WHTM1 all	24.6	91.6	89.9	89.5	89.6	88.6	86.0	91.6	3.5	3.4	3.6	2.9	3.6	3.1	3.6
760	22/07/2016 12:58	1 WHTM1 all	24.8	91.8	90.0	89.6	89.4	88.8	85.9	91.6	3.2	3.1	3.4	2.8	3.4	3.1	3.4
averages				91.5	89.9	89.4	89.5	88.6	85.9	91.7	3.4	3.3	3.6	2.9	3.6	3.3	3.6
change due to calima				-0.8	-0.7	-0.7	-0.8	-0.8	-0.7	-0.9	0.7	0.8	1.0	0.9	1.4	1.4	1.7
change since CO2 on 27/6				-1.2	-1.1	-1.2	-1.2	-1.2	-1.1	-1.2	1.0	1.0	1.3	1.2	1.8	1.8	2.1

The previous cleaning was shown to have improved reflectivity by 1.2%, therefore this change warrants a new CO2 cleaning. On 27th July there was an opportunity to do CO2 cleaning and the Aligal2, previously tested on INT M1, was used.

Measurements before cleaning

762	27/07/2016 10:35	1 WHTM1 all	25.7	91	89.3	88.8	88.8	87.8	85.2	90.9	3.9	3.9	4.4	3.8	4.8	4.4	5
763	27/07/2016 10:36	1 WHTM1 all	25.6	91.1	89.4	88.9	88.9	88	85.3	91	3.6	3.7	4.2	3.9	4.4	4.2	4.9
764	27/07/2016 10:37	1 WHTM1 all	25.7	91.2	89.5	89	89	88	85.4	91	3.7	3.8	4.2	3.6	4.4	4.1	4.6
765	27/07/2016 10:39	1 WHTM1 all	25.8	90.6	89.2	88.7	88.8	87.7	85.2	90.8	4.3	3.9	4.3	3.6	4.5	4.1	4.7
766	27/07/2016 10:40	1 WHTM1 all	25.8	91.1	89.3	88.7	88.8	87.8	85	90.8	3.8	3.9	4.4	3.7	4.7	4.5	4.8
767	27/07/2016 10:41	1 WHTM1 all	25.9	91	89.3	88.8	88.8	87.8	85.1	90.7	3.6	3.8	4.3	3.6	4.5	4.3	4.6
768	27/07/2016 10:41	1 WHTM1 all	25.9	91.1	89.5	88.9	89	88	85.3	90.8	3.9	3.8	4.3	3.6	4.6	4.2	4.7
769	27/07/2016 10:42	1 WHTM1 all	26	91	89.2	88.7	88.8	87.7	85.1	90.7	3.9	3.9	4.4	3.7	4.6	4.1	4.5
averages				91.0	89.3	88.8	88.9	87.9	85.2	90.8	3.8	3.8	4.3	3.7	4.6	4.2	4.7
ranges				0.6	0.3	0.3	0.2	0.3	0.4	0.3	0.7	0.2	0.2	0.3	0.4	0.4	0.5
change since CO2 on 27/6				-1.7	-1.7	-1.8	-1.8	-1.9	-1.8	-2.1	1.5	1.6	2.1	2.0	2.8	2.8	3.3
				365	404	464	522	624	760	970	365	404	464	522	624	760	970

### Measurements after cleaning with new CO2 (Algal2)

CO2 cleaning aborted due to appearance of marks left on mirror by unusually sticky snowflakes, seem to be made of bunched up dust. Right hand side of the mirror affected (about one third).

left porthole first (not cleaned)

				365	404	464	522	624	760	970	365	404	464	522	624	760	970
770	27/07/2016 13:42	1 WHTM1 all	24.9	91.1	89.5	89.1	89	88	85.4	90.9	3.6	3.6	4	3.5	4.3	4.2	4.4
771	27/07/2016 13:43	1 WHTM1 all	25	91.2	89.5	89	89	87.9	85.3	91	3.7	3.6	4.3	3.5	4.6	4.1	4.4

These are consistent with previous measurements i.e. before cleaning.

Top of mirror (porthole 4)

772	27/07/2016 13:44	1 WHTM1 all	25.1	92.4	90.8	90.4	90.5	89.6	87	92.9	2.7	2.5	2.4	1.8	2	1.5	1.6
773	27/07/2016 13:45	1 WHTM1 all	25.3	92.3	90.7	90.2	90.3	89.4	86.8	92.6	3.1	2.9	2.9	2.2	2.5	2.1	2.1
774	27/07/2016 13:46	1 WHTM1 all	25.4	92.4	90.8	90.4	90.5	89.6	86.9	92.7	2.7	2.6	2.5	2	2.1	1.7	1.8
775	27/07/2016 13:47	1 WHTM1 all	25.5	92.2	90.6	90	90.2	89.3	86.5	92.4	3.1	2.9	3.1	2.4	2.7	2.3	2.3
776	27/07/2016 13:47	1 WHTM1 all	25.6	92.3	90.6	90.1	90.3	89.3	86.6	92.4	3.1	2.9	3.1	2.3	2.8	2.2	2.3
average top porthole				92.3	90.7	90.2	90.4	89.4	86.8	92.6	2.9	2.8	2.8	2.1	2.4	2.0	2.0

Right of mirror (porthole 3)

777	27/07/2016 13:49	1 WHTM1 all	25.9	92.1	90.5	90	90.1	89.2	86.4	92.2	2.9	2.9	3.1	2.5	2.8	2.5	2.7
778	27/07/2016 13:49	1 WHTM1 all	25.9	91.9	90.4	89.9	90	88.9	86.3	92	3.2	3	3.1	2.6	3.2	2.6	2.9
779	27/07/2016 13:50	1 WHTM1 all	26.1	92.4	90.7	90.2	90.3	89.4	86.6	92.4	2.6	2.5	2.6	2.1	2.3	2	2.1
780	27/07/2016 13:51	1 WHTM1 all	26.3	92.5	90.8	90.3	90.4	89.5	86.7	92.5	2.6	2.5	2.6	2	2.2	1.8	1.8
781	27/07/2016 13:52	1 WHTM1 all	26.3	92.1	90.4	89.8	89.9	89	86.2	92	3.2	3.2	3.4	2.7	3.2	2.8	2.7
average right porthole				92.2	90.6	90.0	90.1	89.2	86.4	92.2	2.9	2.8	3.0	2.4	2.7	2.3	2.4
difference top - right				-0.1	-0.1	-0.2	-0.2	-0.2	-0.3	-0.4	0.0	0.1	0.2	0.2	0.3	0.4	0.4
global range in affected area				0.6	0.4	0.6	0.6	0.7	0.8	0.9	0.6	0.7	1	0.9	1.2	1.3	1.3
difference before/after				1.2	1.3	1.2	1.3	1.4	1.3	1.5	-0.7	-1.0	-1.3	-1.2	-1.8	-2.0	-2.2
				365	404	464	522	624	760	970	365	404	464	522	624	760	970

**Conclusion: the CO2 has cleaned the mirror but leaves a non-uniformity in reflectivity of about 0.5% more than usual**

**Note the dust marks could not be removed by blowing with dry air pistol at 5 bar, suggesting they are bound by condensed water to the surface.**