

Reflectivity Report for INT Primary Mirror before and after soap & water washing, 5 October 2017

Washing was decided on because of extensive raindrop stains over about half of the surface, with dust over entire surface, accumulated in last 2 months.

CT7 measurements only. Some were affected by movement of instrument, particularly first 4 on dirty mirror, when base was covered with tissue.

Anomalously low values (visible in graph) highlighted in red, judged to be caused by this movement, are omitted from statistics.

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

Some marks were noticed on coating following measurements, caused by holding CT7 with force during measurement (horizontally, without tissue).

Washing removed all dust and rain stains but new marks or damage are apparent, plus oil stains near "top" edge.

Washing carried out by student intern Bram Lap and Neil O'Mahony, measurements, analysis and report by Neil 6/10/2017

				Tempr. °C	Reflectivity (%R) wavelength of band (nm)							"Dust Indices" (DI)						
					365	404	464	522	624	760	970	365	404	464	522	624	760	970
Measurements before wash:																		
1201	05/10/2017 09:41	3	INTM1 all	19.6	84.6	83.1	82.8	83.1	82.1	79.5	85.4	10.5	11.0	12.5	10.5	13.2	12.8	13.3
1202	05/10/2017 09:42	3	INTM1 all	19.8	83.7	82.8	82.8	83.8	81.6	80.6	85.5	11.6	11.9	12.7	10.4	13.9	11.3	13.2
1203	05/10/2017 09:43	3	INTM1 all	20.1	83.9	82.7	82.2	82.4	81.3	78.6	83.7	11.4	11.4	13.2	11.2	14.3	13.8	15.2
1204	05/10/2017 09:44	3	INTM1 all	20.4	84.2	83.1	82.6	79.7	82.0	76.4	82.4	11.7	13.6	14.0	15.5	14.1	17.3	18.4
1205	05/10/2017 09:46	3	INTM1 all	20.9	84.8	83.6	83.3	83.4	82.5	79.7	85.1	10.0	10.2	11.5	10.0	12.5	12.2	12.9
1206	05/10/2017 09:47	3	INTM1 all	21.2	84.5	83.5	83.2	83.6	82.5	80.2	85.5	12.1	11.7	12.9	11.7	14.1	12.9	14.4
averages					84.3	83.1	82.8	83.3	82.0	80.0	85.4	11.2	11.6	12.8	10.8	13.7	12.3	13.5
result from last cleaning CO2, 28 July					88.9	87.9	87.8	88.1	87.4	85.0	91.0	7.1	6.6	6.5	5.1	5.7	4.8	4.9
change during August-September					4.6	4.7	4.9	4.8	5.4	5.0	5.6	-4.1	-5.0	-6.3	-5.7	-8.0	-7.5	-8.5

Measurements after Water Wash:					365	404	464	522	624	760	970	365	404	464	522	624	760	970
1207	05/10/2017 11:57	3	INTM1 all	18.6	85.2	83.4	84.4	85.0	85.5	83.0	90.4	16.5	17.6	15.9	12.9	11.3	10.1	7.6
1208	05/10/2017 11:58	3	INTM1 all	19	87.9	86.3	86.3	86.6	87.0	83.9	90.9	10.5	11.3	11.2	9.1	7.9	7.9	6.3
1209	05/10/2017 12:00	3	INTM1 all	19.6	89.5	88.4	88.7	88.9	88.8	86.1	92.7	6.3	5.5	4.6	3.4	2.9	2.2	1.9
1210	05/10/2017 12:01	3	INTM1 all	20	89.7	88.9	88.9	89.4	88.7	86.4	92.8	7.1	5.8	5.0	3.4	3.5	2.3	2.2
1211	05/10/2017 12:02	3	INTM1 all	20.5	90.6	89.3	89.2	89.6	89.1	86.5	92.8	5.8	5.1	4.8	3.0	2.9	2.1	1.8
1212	05/10/2017 12:03	3	INTM1 all	21.1	90.7	89.5	89.3	89.8	89.1	86.6	92.9	4.4	3.7	3.5	2.2	2.4	1.6	1.7
1213	05/10/2017 12:04	3	INTM1 all	21.6	88.3	87.6	87.6	88.7	88.0	86.0	92.5	8.8	8.1	7.5	4.2	4.8	2.8	2.2
1214	05/10/2017 12:06	3	INTM1 all	22.1	88.4	87.2	87.4	88.2	87.8	85.3	91.9	8.9	8.8	8.3	5.6	5.8	4.7	3.7
averages (omitting first meas.)					89.3	88.2	88.2	88.7	88.4	85.8	92.4	7.4	6.9	6.4	4.4	4.3	3.4	2.8

				5.0	5.0	5.4	5.5	6.4	5.8	7.0	-3.8	-4.7	-6.4	-6.3	-9.4	-8.9	-10.6
				0.4	0.3	0.4	0.7	0.9	0.8	1.3	-0.3	-0.3	0.1	0.6	1.4	1.4	2.1
				89.8	88.8	89.0	89.4	88.8	86.3	92.7	5.0	4.5	3.9	2.7	2.6	1.9	1.8
				0.5	0.6	0.8	0.6	0.5	0.5	0.3	-2.4	-2.4	-2.5	-1.8	-1.7	-1.5	-1.0
1199	04/10/2017 10:06	New Alum	21.9	93.5	91.8	91.2	91.2	90.3	87.7	93.8	0.7	0.5	0.4	0.3	0.4	0.3	0.6
				-4.2	-3.6	-3.0	-2.5	-1.9	-1.9	-1.4	6.7	6.4	6.0	4.1	3.9	3.1	2.2

Check of reference mirror on following day

06/10/2017 11:48	Gauge	26.8	84.8	83.9	88.6	90.7	89.6	83.4	87.3	
04/10/2017 09:49	Gauge	20.8	84.8	83.8	88.5	90.7	89.6	83.4	87.1	Identical!

Discussion: the location of the lowest %R measurement after washing is just above the central hole. The second lowest is some distance away. All other values were much higher, but a check of the reference mirror shows the instrument has not drifted. Omit this unrepresentative data.

Conclusion: the cleaning was very successful, improving on the CO2 cleaning in July by 0.5 to 1% Reflectivity and reducing scattering by up to 2%.

After washing, Reflectivity was remarkably just 2-4% below fresh aluminium. The shortfall increases towards blue, as typical.

However since the previous wash in Feb 2017, ~0.5 % reflectivity has been lost (~uniform) and scattering is up by 1 to 2.5% , more towards blue.

Only aluminising can reverse this trend in accumulation of scattering. The oil leak should be fixed before aluminising to avoid spoiling it.



