

SMART 1.5m M1 Reflectance and Scattering update 24012020.

This report shows the results obtained with the cleaning of M1 in January 24th. M2 wasn't washed.

Reflectance¹:

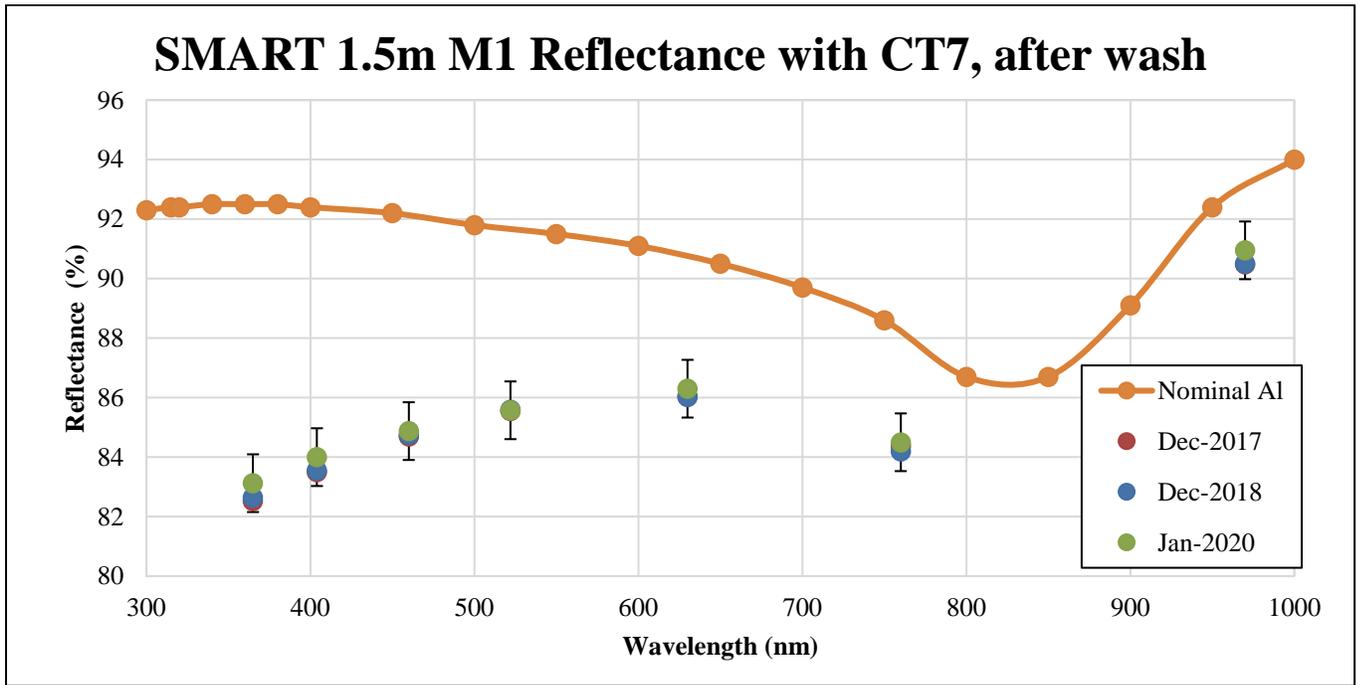


Figure 1: M1 reflectance after washing with CT7.

Date	Reflectance (%) Before							Reflectance (%) After						
	365nm	404nm	460nm	522nm	630nm	760nm	970nm	365nm	404nm	460nm	522nm	630nm	760nm	970nm
02-Feb-2016	79.83	80.88	82.80	82.98	83.58	82.33	88.50	81.55	82.75	84.95	85.13	85.50	84.23	90.53
08-Mar-2017	76.73	77.78	78.38	79.95	80.10	78.90	84.78	81.93	83.10	83.50	85.13	85.68	84.25	90.38
27-Dec-2017	80.33	81.38	82.58	83.38	84.15	82.58	88.80	82.53	83.50	84.70	85.55	86.05	84.38	90.48
20-Dec-2018	81.08	82.03	83.33	84.15	84.65	82.93	89.18	82.65	83.55	84.75	85.60	86.03	84.20	90.50
24-Jan-2020	77.00	78.00	79.23	79.95	80.90	79.28	85.60	83.13	84.00	84.88	85.58	86.30	84.50	90.95

Table 1: Reflectance before and after washing measured with CT7.

¹ The reflectivities measured with CT7 have an error of +/-0.05% in all channels.

Scattering²:

Figure 2 shows the D values after washing, measured with CT7. D is a value proportional to the scattering. The clear diameter of the collecting lens of the dust channel collimator is 8 mm and it is at 35 mm from the sample. The incidence angle of the dust signal goes from $14^{\circ}-7.2^{\circ}$ to $14^{\circ}+7.2^{\circ}$.

CT7 is calibrated by measuring a Lambertian diffuser with 10% TIS (BRDF=3.18%/str) (SRS-10-020, Certified reflectance standard, Labsphere). So, if the scattering dust would be Lambertian, the dust index would be the TIS of the exposed mirror. Since the scattering dust is not a Lambertian diffuser, but probably sharper (less diffusing at large angles), the measured result will be slightly larger than the actual TIS [1].

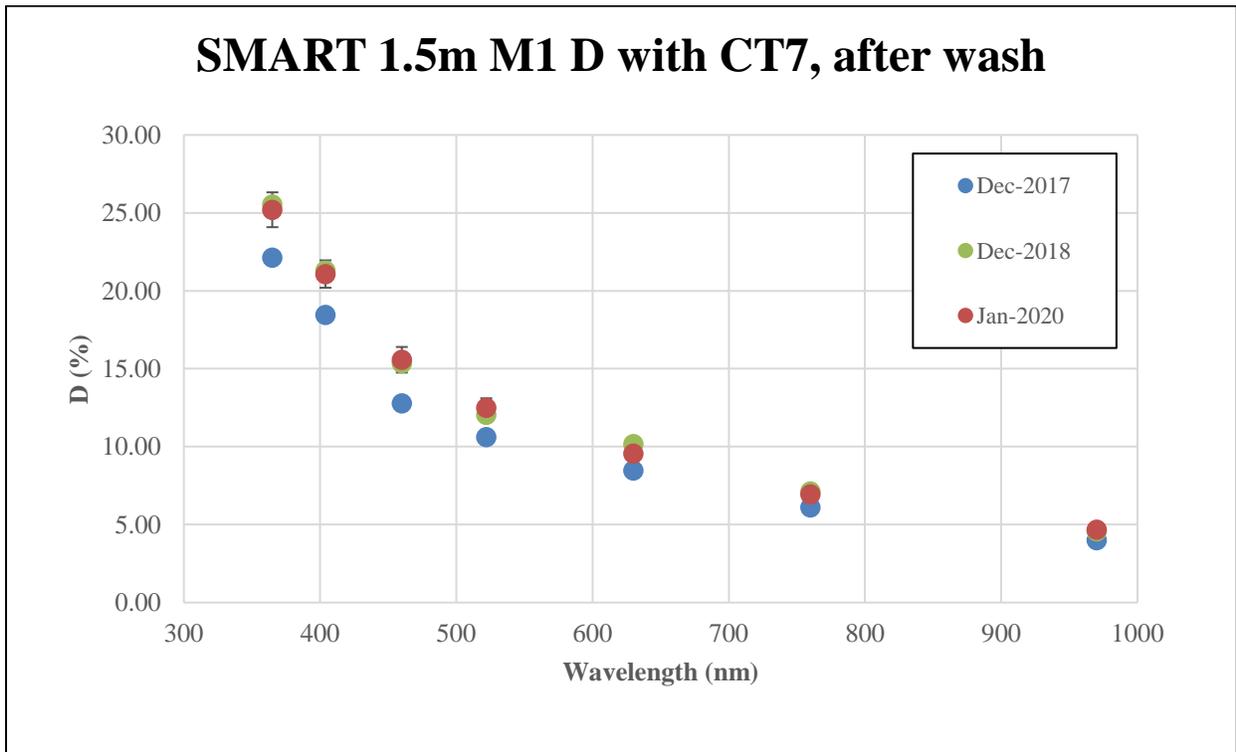


Figure 2: M1 D parameter after washing with CT7.

² CT7 was sent to Belgium on April 2017. Some baffles were added to the Dust channel, to remove some stray light contamination.

Date	D (%) Before							D (%) After						
	365nm	404nm	460nm	522nm	630nm	760nm	970nm	365nm	404nm	460nm	522nm	630nm	760nm	970nm
02-Feb-2016	27.65	22.90	19.05	17.03	14.80	12.75	10.53	26.63	22.15	17.18	14.15	11.35	8.73	6.63
08-Mar-2017	31.98	23.53	23.08	21.23	19.33	17.53	15.18	21.60	18.18	13.38	11.48	9.13	7.15	5.83
27-Dec-2017	29.15	24.25	18.20	15.85	13.95	10.80	7.88	22.13	18.45	12.78	10.63	8.48	6.10	4.00
20-Dec-2018	25.65	22.13	16.55	13.95	12.23	9.65	7.40	25.55	21.30	15.35	12.05	10.18	7.13	4.58
24-Jan-2020	42.60	29.68	29.95	26.33	23.98	20.63	16.63	25.20	21.08	15.58	12.50	9.55	6.95	4.68

Table 2: Decrease in the values of D measured with CT7.

Comments¬es:

Date	Comment
28/08/2014	<ul style="list-style-type: none"> M1 had a 3% gain in reflectance and 2% reduction of the TIS (almost 9 months without cleaning). From now on the washing schedule is every 4 months. Reflectance M2 data isn't reliable due to mirror curvature, IRIS908RS fails in measuring reflectance in curved surfaces. Absolute values may not be true but relative values should be reliable. Nevertheless, the difference between before and after wash is less than the measurement error so the improvement is imperceptible. TIS data is more reliable in curved surfaces, since TIS is calculated over all the space; however, there isn't much previous data for M2. Actual data shows an improvement of 0.5% in TIS reduction. From now on M2 is going to be washed every two M1 washings.
14/01/2015	<ul style="list-style-type: none"> M1 had a 1.38% gain in reflectance and 1.13% reduction of the TIS. M2 wasn't washed this time.
15/06/2015	<ul style="list-style-type: none"> M1 had a 1% gain in reflectance and 1.25% reduction of the TIS. M2 wasn't washed this time.
13/10/2015	<ul style="list-style-type: none"> M1 had a 0.32% gain in reflectance and 0.12% reduction of the TIS. M2 wasn't washed this time.
02/02/2016	<ul style="list-style-type: none"> There was a 1.96% reflectivity gain after washing, measured with IRIS908RS. TIS was reduced in 1.25% after washing, measured with IRIS908RS. There was a 1.96% reflectivity gain after washing, measured with CT7.
08/03/2017	<ul style="list-style-type: none"> Reflectivity increased in 5.34% (average) after washing, measured with CT7. D was reduced in 9.30% (average) after washing, measured with CT7.
27/12/2017	<ul style="list-style-type: none"> Reflectivity increased in 2.00% (average) after washing, measured with CT7. D was reduced in 5.36% (average) after washing, measured with CT7.
20/12/2018	<ul style="list-style-type: none"> Reflectivity increased in 1.42% (average) after washing, measured with CT7. D was reduced in 1.63% (average) after washing, measured with CT7. Another wash was done in July 12 (this year), but the data was lost.
24/01/2020	<ul style="list-style-type: none"> Reflectivity increased in 5.63% (average) after washing, measured with CT7. D was reduced in 13.46% (average) after washing, measured with CT7.

References:

[1] NOTE on Dust index CT7, Daniel Malaise.

[2] Reflectometer_comparison_13072017.xls, N. David, July 2017.