

## Reflectivity Report for INT Primary Mirror before and after soap & water washing, 22 January 2019

Washing was agreed at Ops meeting, December, to recover reflectivity while waiting for aluminisation following installation of WEAVE CT7 measurements only, at 3 positions before and after washing, resp. Coating quality is highly non-uniform due to scratches and stains, so that a representative sample of the surface would require a very large number of measurements (perhaps 20). Data from 2 weeks later are better. Propanol was used to reduce 40 cm oily streak on right; sponges removed other stains. Improvement estimated at about 5%2-4% R, -8% scattering.

7 Feb: Measurements were taken, following 2 days of calima, showing a spontaneous improvement in 3 blue bands by up to 2% Net effect is 4% improvement in reflectivity, uniformly across wavelength, with mirror data now slightly better than after previous wash in 9/2017 Recoating would improve reflectivity by 2 to 5%, or reduce scattering by up to 8% with greatest effect in the blue, as usual.

|             |                  |   |           | Tempr.<br>°C | Reflectivity (%R)<br>wavelength of band (nm) |      |      |      |      |      |      | "Dust Indices" (DI)<br>(% Scattering) |      |      |      |      |      |      |
|-------------|------------------|---|-----------|--------------|--|------|------|------|------|------|------|---------------------------------------|------|------|------|------|------|------|
|             |                  |   |           |              | 365  | 404  | 464  | 522  | 624  | 760  | 970  | 365                                   | 404  | 464  | 522  | 624  | 760  | 970  |
| Before wash |                  |   |           |              |  |      |      |      |      |      |      |                                       |      |      |      |      |      |      |
| 1511        | 22/01/2019 09:46 | 3 | INTM1 all | 17.4         | 85.3   | 84.3 | 84.5 | 84.5 | 84.0 | 81.8 | 87.9 | 13.7                                  | 13.5 | 13.7 | 10.9 | 11.8 | 10.2 | 10.4 |
| 1512        | 22/01/2019 09:49 | 3 | INTM1 all | 17.4         | 83.3   | 82.6 | 82.3 | 83.4 | 82.2 | 80.3 | 86.0 | 15.7                                  | 15.0 | 16.2 | 12.0 | 15.2 | 13.1 | 13.3 |
| 1513        | 22/01/2019 09:50 | 3 | INTM1 all | 17.6         | 85.0   | 84.2 | 84.0 | 84.7 | 83.9 | 81.9 | 88.4 | 12.7                                  | 12.4 | 13.6 | 9.9  | 11.3 | 9.9  | 9.5  |
| average     |                  |   |           |              | 84.5   | 83.7 | 83.6 | 84.2 | 83.4 | 81.3 | 87.4 | 14.0                                  | 13.6 | 14.5 | 10.9 | 12.8 | 11.1 | 11.1 |

### After wash

|         |                  |   |           |      |      |      |      |      |      |      |      |      |      |       |      |       |       |       |
|---------|------------------|---|-----------|------|------|------|------|------|------|------|------|------|------|-------|------|-------|-------|-------|
| 1514    | 22/01/2019 11:46 | 3 | INTM1 all | 12.6 | 87.7 | 87.1 | 87.4 | 87.9 | 87.3 | 85.7 | 92.2 | 6.5  | 5.6  | 5.2   | 3.3  | 3.4   | 2.2   | 1.9   |
| 1515    | 22/01/2019 11:49 | 3 | INTM1 all | 12.9 | 85.6 | 85.1 | 85.5 | 87.0 | 86.4 | 84.8 | 91.7 | 14.9 | 13.4 | 12.4  | 7.6  | 7.8   | 5.0   | 4.5   |
| 1516    | 22/01/2019 11:50 | 3 | INTM1 all | 13.1 | 86.1 | 85.6 | 86.1 | 87.2 | 87.0 | 85.0 | 92.1 | 9.3  | 8.8  | 8.8   | 5.5  | 5.5   | 3.7   | 2.7   |
| average |                  |   |           |      | 86.5 | 85.9 | 86.3 | 87.4 | 86.9 | 85.2 | 92.0 | 10.2 | 9.3  | 8.8   | 5.5  | 5.6   | 3.6   | 3.0   |
| change  |                  |   |           |      | 1.9  | 2.2  | 2.7  | 3.2  | 3.5  | 3.8  | 4.6  | -3.8 | -4.4 | -5.7  | -5.5 | -7.2  | -7.4  | -8.0  |
| max-min |                  |   |           |      | 4.4  | 4.5  | 5.1  | 4.5  | 5.1  | 5.4  | 6.2  | -9.2 | -9.4 | -11.0 | -8.7 | -11.8 | -10.9 | -11.4 |

### Measurements 2 weeks later, following calima (graph overleaf)

|      |                  |   |           |      |      |      |      |      |      |      |      |      |     |     |     |     |     |     |
|------|------------------|---|-----------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|
| 1527 | 07/02/2019 15:16 | 3 | INTM1 all | 21.9 | 89.7 | 88.4 | 88.2 | 88.7 | 88.2 | 85.8 | 92.6 | 6.6  | 6.1 | 5.8 | 4.0 | 3.7 | 3.0 | 2.9 |
| 1528 | 07/02/2019 15:18 | 3 | INTM1 all | 22.1 | 88.1 | 87.4 | 87.6 | 88.1 | 87.8 | 85.5 | 92.2 | 9.4  | 8.0 | 7.0 | 4.7 | 4.6 | 3.3 | 3.2 |
| 1529 | 07/02/2019 15:19 | 3 | INTM1 all | 22.3 | 87.9 | 86.7 | 87.1 | 87.3 | 87.2 | 84.8 | 91.4 | 10.3 | 9.6 | 8.9 | 6.3 | 6.1 | 5.0 | 4.7 |

averages  
change, spontaneous or due to small sample  
change, net, since before cleaning 22 Jan

|           |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|           | 88.6 | 87.5 | 87.6 | 88.0 | 87.7 | 85.4 | 92.1 | 8.8  | 7.9  | 7.2  | 5.0  | 4.8  | 3.8  | 3.6  |
|           | 2.1  | 1.6  | 1.3  | 0.7  | 0.8  | 0.2  | 0.1  | -1.5 | -1.4 | -1.6 | -0.5 | -0.8 | 0.1  | 0.6  |
|           | 4.0  | 3.8  | 4.0  | 3.8  | 4.4  | 4.0  | 4.6  | -5.3 | -5.7 | -7.3 | -5.9 | -8.0 | -7.3 | -7.5 |
| $\lambda$ | 365  | 404  | 464  | 522  | 624  | 760  | 970  | 365  | 404  | 464  | 522  | 624  | 760  | 970  |

Changes since last Wash 5/10/17  
Shortfall w.r.t. new Aluminium coat

|  |     |     |     |     |     |     |     |      |      |      |      |      |      |      |
|--|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
|  | 0.7 | 0.7 | 0.6 | 0.7 | 0.6 | 0.5 | 0.3 | -1.4 | -1.0 | -0.8 | -0.6 | -0.5 | -0.4 | -0.8 |
|  | 4.9 | 4.3 | 3.6 | 3.2 | 2.6 | 2.3 | 1.7 | -8.1 | -7.4 | -6.8 | -4.7 | -4.4 | -3.5 | -3.0 |

INT Primary mirror: change in reflectivity measurements per  $\lambda$

