

3.2 Direct imaging of the ice contaminant on Gaia's M3B mirror

Shortly before the decontamination campaign #4 the calibration group at SOC delivered a command sequence (POR 01042015) to MOC which allows to directly image the ice contaminant on Gaia's M3B mirror. The POR was executed one hour before the mirror heating of decontamination campaign #4 started, and once again exactly 12 hours later. Its basic idea is to refocus the WFS2 optics such that the WFS2 lenslet array is no longer imaged onto the output pupil of Gaia's telescope 2, but on the M3 mirror. This is possible because the M3 mirror is the last non-flat mirror in the telescope's light path, and because it is located not far from the exit pupil.

The data processing required much manual work because the operational WFS software is not capable of treating this peculiar data set. This is why the results can be shown only now, about half a year after the data taking. Figure 3 shows part of the frame taken just before the decontamination. Data from only one element of the WFS2 lenslet array were processed up to now.

The partly hexagonal, partly needle-shaped structures revealed on the mirror surface give another clear proof that the contaminant indeed is water ice (the original proof being the expected evaporation temperature and evaporation rate consistently observed in all four decontamination campaigns). Note that the image shows only a tiny spot of the mirror surface. Insofar the experiment was lucky in actually catching a patch of contaminated surface. The image was taken at the spin phase of maximum solar straylight in order to maximise the achievable contrast.

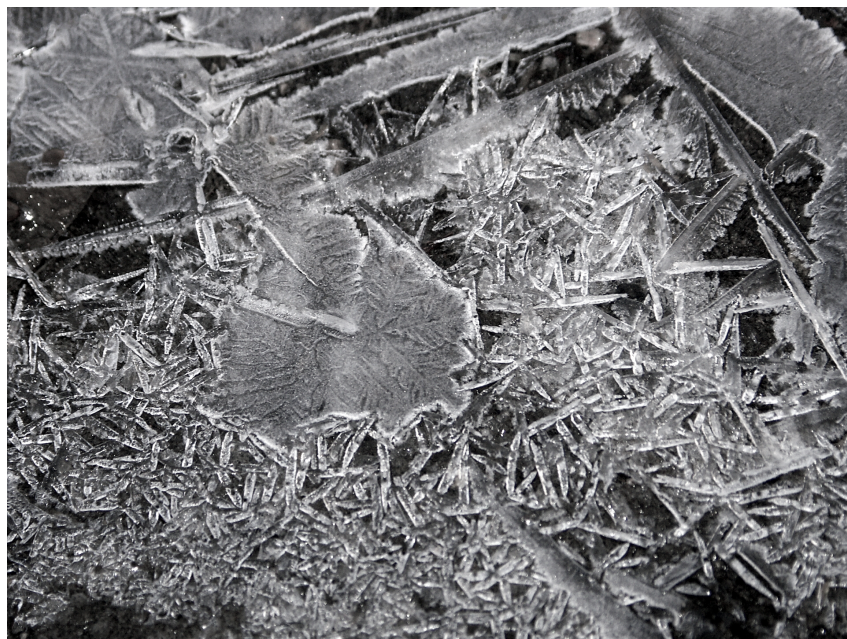


Figure 3: A small patch of the M3B surface just before the start of decontamination campaign #4, imaged via the refocussed WFS2 optics. See text.

Figure 4 shows the same setting and the same patch of the M3B surface exactly 12 hours later, i.e. under identical illumination conditions, and after the heat-up of the mirror was largely completed. The success of the decontamination is obvious.

In the future, the experiment is planned to be repeated only once, namely during decontamination campaign #7, presently envisaged for 01-04-2017.

Mantis issue 150401 is further being maintained for all follow-up activities on the contamination problem.

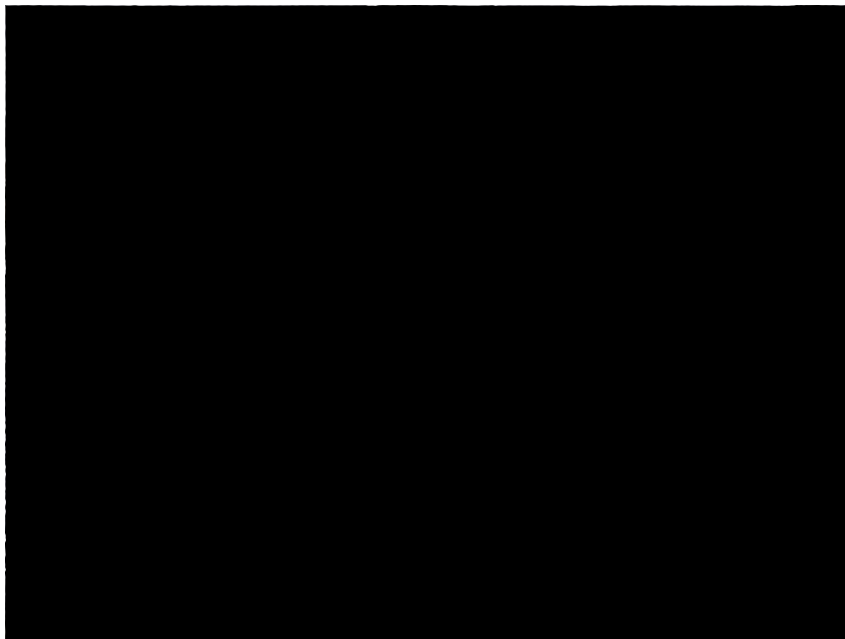


Figure 4: The same patch of the M3B surface 12 hours later, showing the success of decontamination campaign #4.