CDS Post-recovery Calibration

One of the questions in the analysis of the post-recovery burn-in calibration was whether the burn-in depended on the brightness of the line on the detector, as before the accident, or whether there was a general overall decline in sensitivity. Figure 1 demonstrates that the burn-in tracks the brightness of the line on the detector. Although there are changes in the overall spectrum from solar causes, it is quite evident that there is also significant burn-in where the brightness is high. this is particularly visible for the very strong He II 584 Å line. Similar behavior is seen for the short wavelength channel.

Figure 2 shows the average peak brightness in the 584 Å line as a function of time. These data are taken from a $4'' \times 2''$ area at disk center from the daily SYNOP runs. Also shown is the derived average quiet Sun behavior. Note that the data appears to be divided into two sections. The first section starts with the initial recovery in late October 1998, and goes through to the "mini-accident" in January 1999, when the last gyro failed. When the data picks up again in early February, the sensitivity appears to have gone up again. Both the loss of contact in the summer of 1998, and the less drastic event in January 1999, led to temperature excursions for the CDS instrument. It is possible that this caused volatiles to migrate from the instrument walls to the MCP, thus erasing part of the scrubbing of the detector. Thus, each of these events caused a partial reset of the burn-in pattern. The same behavior is seen in the independent NIMCP data.

Once the burn-in corrections shown in Figure 2 are applied to the data, there is still a discrepency in the brightness of the Mg IX 368 Å line between the pre-accident and post-recovery data. This is demonstrated in Figure 3. These data imply that a correction factor of 1.45 needs to be applied to the post-recovery NIS1 data to bring it back to the original sensitivity. No such corrections need to be applied to the first-order NIS2 data.

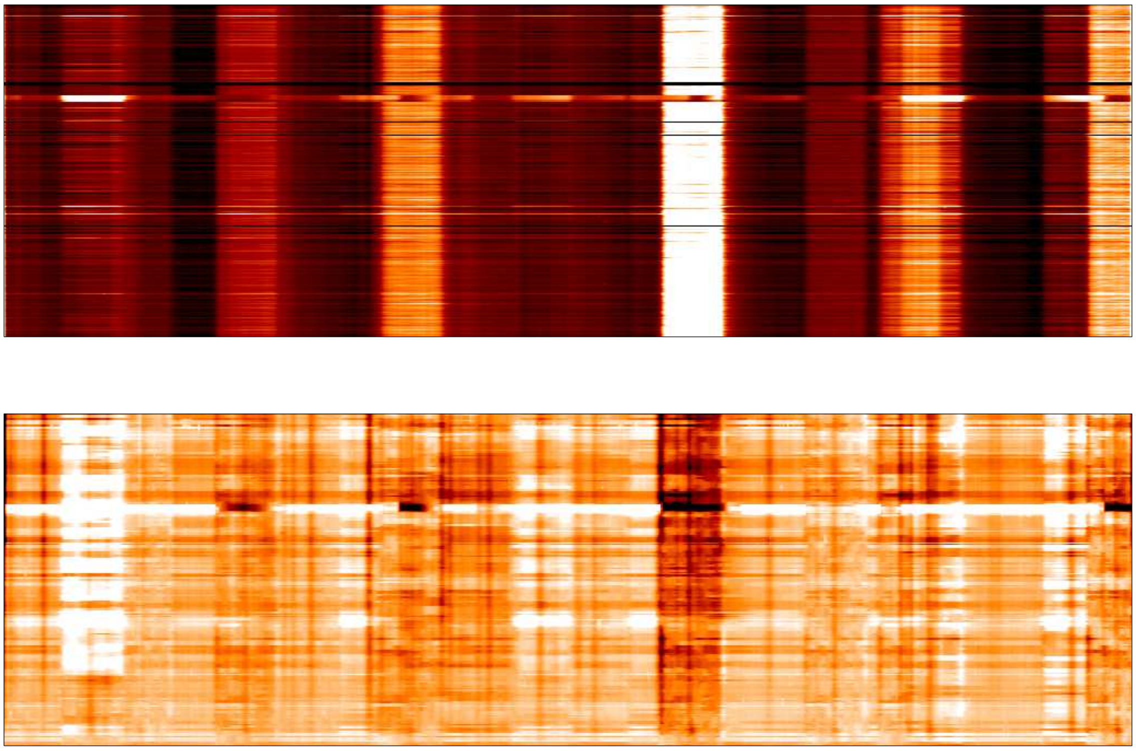

Figure 1: Demonstration that the burn-in follows line brightness. The top image shows the average brightness seen in NIMCP measurements, with time going from the bottom to the top. Only post-recovery data is shown. The bottom image shows the same data divided by an average of the first few spectra.

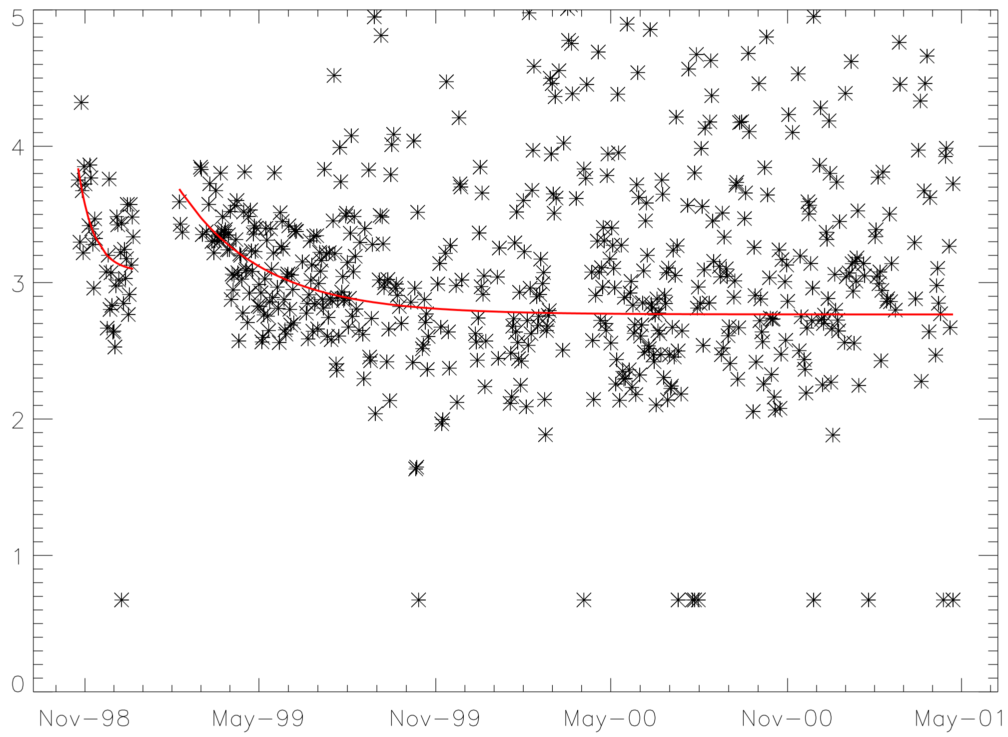

Figure 2: Average peak brightness of 584 Å line from SYNOP data. The red lines show the derived average quiet-Sun behavior.

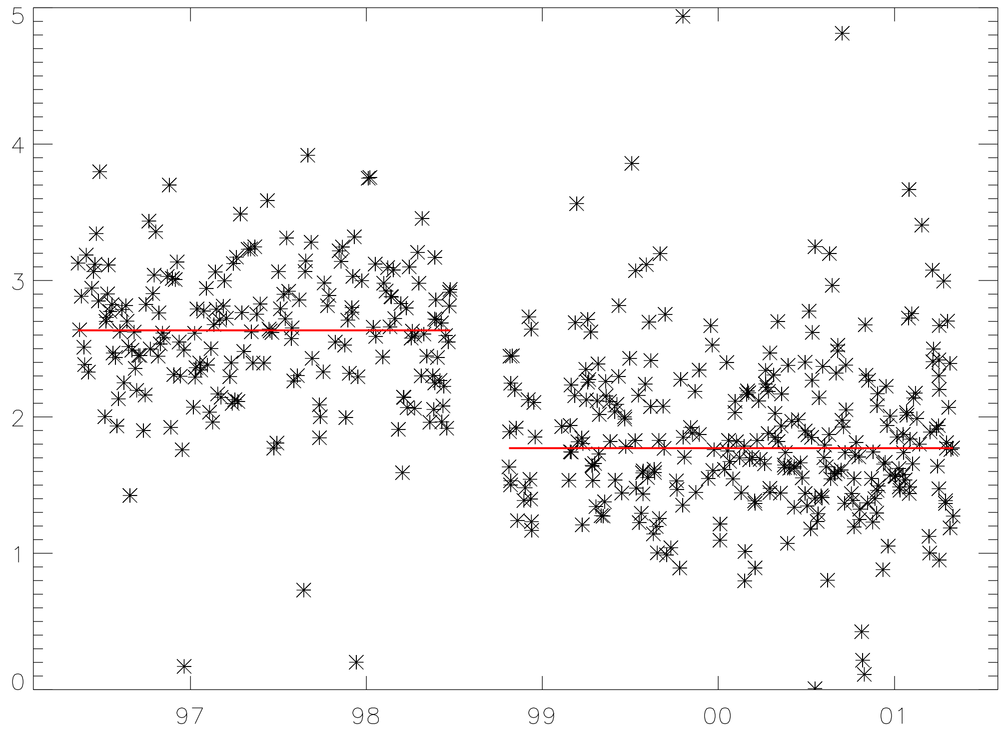

Figure 3: Average intensity at 368 Å from NIMCP data. The red lines show the average behavior before and after the accident.