

## LYRA status after 1500 days

*IED 14 Mar 2014, 06 Jun 2014, 06 Oct 2014*

Presented here is an analysis of the calibration campaigns after Nov 2012. Preliminary results are below. We have received a good set of data by using unit 1 for quite short, but regular, campaigns, i.e. without losing any significant signal from unit 1. So it was a good decision to proceed like this: Approx 10 additional hours of exposure for a comparison with units 2 and 3, but no "cost".

This is a comparison of the current status relative to my last report, 15 months ago, see here:

[http://solwww.oma.be/users/dammasch/IED\\_20121218\\_DegradationUpdate.pdf](http://solwww.oma.be/users/dammasch/IED_20121218_DegradationUpdate.pdf)

Values are in counts/ms. Percentages say what is **\*left\*** from the original signal on First Light Day. Solar variations in the short-wavelength channels 3 (Aluminium) and 4 (Zirconium) are corrected by ch1-4 which is assumed to be constant. (The Sun is approx twice as active in these channels now as compared to Jan 2010.)

ch1-1	53% (1300 -> 690)	same as last report
ch1-2	77% (613.4 -> 470)	same as last report
ch1-3	100% (17.2 -> 17)	same as last report
ch1-4	100% (30.3 -> 30)	same as last report
... after 100 <b>*hours*</b> of exposure (10 hours more)		

ch2-1	<0.5% (492 -> 1.5)	same as last report
ch2-2	<0.5% (703.5 -> 2.5)	same as last report
ch2-3	7% (16.6 -> 1.2)	same as last report
ch2-4	45% (37.5 -> 17)	loss <b>[updated to 53% (37.5 -&gt; 20), explanation see below]</b>
... after 1500 <b>*days*</b> of exposure (~450 days more)		

ch3-1	63% (920 -> 575)	small loss
ch3-2	19% (545.5 -> 106)	loss
ch3-3	29% (273.6 -> 80)	loss
ch3-4	80% (30.0 -> 24)	small loss
... after 1500 <b>*hours*</b> of exposure (~500 hours more)		

### Update (06 Jun 2014):

Some things have changed since March. The main difference is that we discovered that the dark currents in unit 2 have become weaker and cannot be estimated as we have done since mid-2011. Thus, a new algorithm was developed to estimate the dark currents not only depending on temperature, but also depending on the number of days after first light. Then, the degradation was re-calculated.

As for the degradation, the results stay basically as they were, except that ch2-4 degraded **\*less\***, which of course is good news: From 37.5, it did not go down to 17 but rather to 20, so 53% instead of 45% are still there. This was due to the over-estimation of the dark current.

The LYRA calibration software "calib\_lev2.pro" was changed accordingly (new DC estimate, new degradation estimate, up to day 2000 instead of day 1500). It was tested with examples from 01 Feb 2010, 01 Jul 2010, 01 Jan 2011, ..., 01 Jan 2014, 06 Jun 2014, thus ten examples, approx half a year apart. The percentage changes can be seen at the bottom, after the plots with the calibration campaigns. The changes are negligible for ch2-1 and ch2-2. They are small (in the order of 5%) for ch2-3, and they are significant (in the order of 5% to 20%) for ch2-4, after Jul 2011. The overall appearance of the LYRA curves will hardly change, because the solar variability is much higher.







