

CCPR-K6.2010 Update March 2013

On 13 September 2012, I sent the following in an email to the task group:

Our decision is to continue monitoring the filters for a further 6 months, and accept the offer from CNAM to receive and monitor a further 4 sets from the previous comparison. Of the four sets we receive, we will clean two sets (a simple 'drop and drag' clean with alcohol and lens tissue) and keep two sets as received. In the meantime we are also doing some tests which we hope will give us clues as to what is causing the drift in the K6.2010 filters.

After 6 months, if the K6.2010 filters are sufficiently stable, we can use those. If not, we will hopefully have enough evidence of stability in the previous K6 filters to proceed with the comparison using those filters. We need to be aware that the filters from the previous comparison are also being considered for use in a regional comparison.

We did receive a further four filter sets from CNAM and cleaned two of them as indicated. The results of our measurements over the intervening months are shown in the figures attached.

Results

Shown on the figures are the relative changes in transmittance with time. The labelling of the filters is the same as that for the newly fabricated filters (Filter 1: nominal 0.90, filter 2: nominal 0.50, filter 3: nominal 0.10, filter 4: nominal 0.01, filter 5: nominal 0.001). Time 'zero' corresponds to measurements made after two of the filter sets were cleaned. The dotted lines on the figures are the median of the uncertainties submitted by participants in the previous comparison. The black trace is the set of CNAM filters that have been monitored, uncleaned, for over 18 months. The blue traces show measurements on two more sets of uncleaned filters received in November last year. The red traces show measurements on two sets of filters cleaned shortly after they were received – the first point is that of the uncleaned filters, and the remaining points are after cleaning.

The results show that all the filters, whether cleaned or uncleaned are stable over the time period monitored (except one of the cleaned BK7 filters, see Note below). The process of cleaning did show a step change in the transmittance for some filters, but the cleaned surfaces were then as stable as the uncleaned filters.

These filters are more stable than the newly fabricated filters (please see figures in the previous update to compare). Measurements made on the newly fabricated filters have not shown any improvement in stability over the past 6 months.

Note: As mentioned above, one of the CNAM BK7 filters has shown a step change (decrease) in transmittance between the second and third months of monitoring. It appeared to have stabilised at the new value. Recleaning the filter has resulted in a recovery of the transmittance. This shows that the cleaning must be carried out thoroughly to prevent recontamination of the surface.

Recommendations

We would therefore recommend that we use the CNAM filters from the previous comparison for this comparison. We have received confirmation that 29 of the original sets are available. From these we can select 11 complete, high quality sets. Although data relating to the transmittance of these filters has been published in the original report, the filters appeared to be drifting significantly at that time.

We don't believe that those published results will give any participant an advantage; the level of uncertainty that participants will be working at during this comparison is considerably less than the amount by which those filters have drifted.

In order to provide all participants with a set of high quality filters for this comparison, we will need to sort through all of the filter sets fabricated for the previous comparison and select those with best flatness and surface quality. We estimate that this will take two months after we receive the filters. We will then be in a position to start the comparison by making the first pilot measurements of the filters.

We also recommend that all the filters be cleaned at MSL with methanol and lens tissue, as part of the sorting process, before the comparison is commenced.

If we use the CNAM filters, there will no longer be a requirement for participants to buy the filter sets used for the comparison. The technical protocol will need to be changed to accordingly. This change also opens the possibility of a final measurement by the pilot at the end of the comparison when all of the filter sets are returned. This extra measurement will provide additional information should any drift be observed in the filter transmittances during the comparison. We are willing to carry this out if participants agree that it will be beneficial. An amended technical protocol to incorporate those changes has been attached.

Schedule

A tentative schedule for the comparison would then be:

March 2013	Agree on the final protocol, register amended protocol with BIPM
	Remaining filter sets sent to MSL for cleaning and selection
June 2013	Commence measurements at pilot laboratory
September 2013	Filters sent to participants' laboratories
December 2013	Filters returned to pilot laboratory
January 2014	Results of participants' first round measurements submitted to pilot
March 2014	Filters sent to participants' laboratories
June 2014	Filters returned to pilot laboratory
July 2014	Results of participants' second round measurements submitted to pilot
September 2014	Pre-draft A process starts
March 2015	Draft A comparison report circulated

Conclusion

In conclusion then, can each of the task group members please provide answers to the following questions:

1. Do you agree to use the CNAM filters for this comparison?
2. If so, do you agree that the filters be cleaned with methanol and lens tissue at MSL before commencing measurements?
3. Do you agree that the pilot laboratory complete a final (third) round of measurements on the filters?
4. Do you agree with the changes to the technical protocol?

Please send your answers to these questions in an email to all of the task group by the 16th March 2013.

Appendix A.1

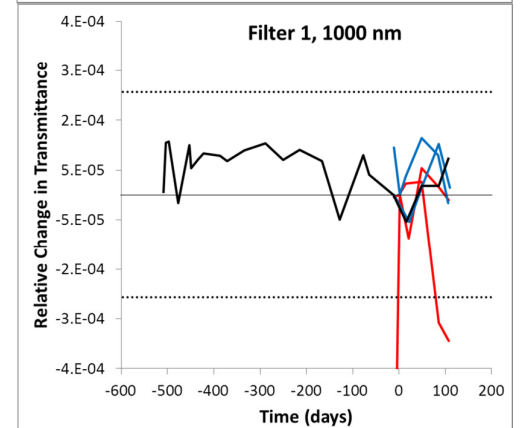
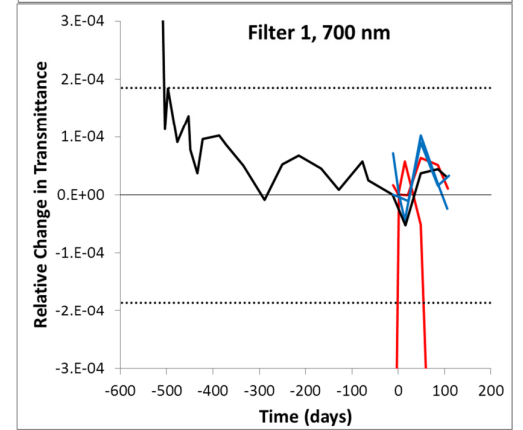
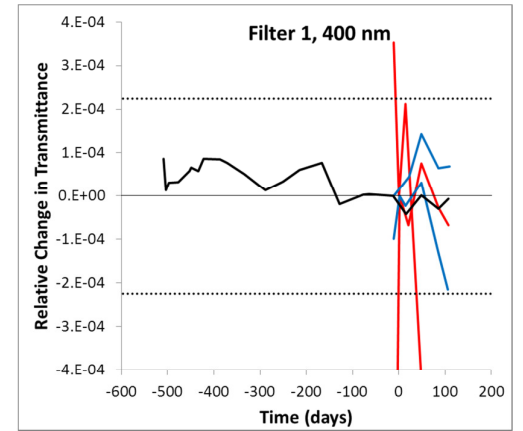
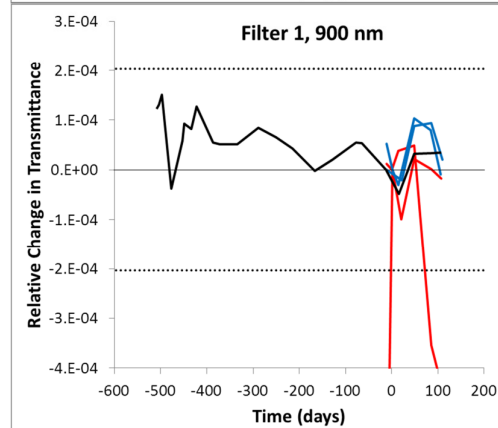
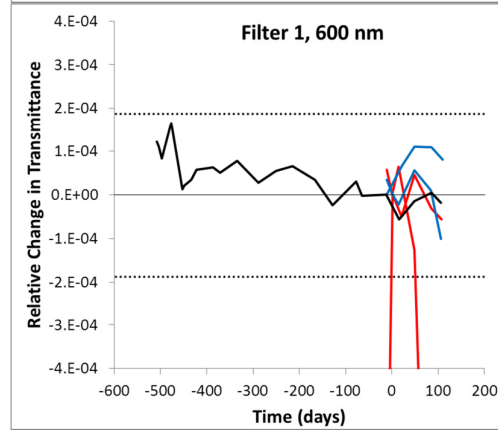
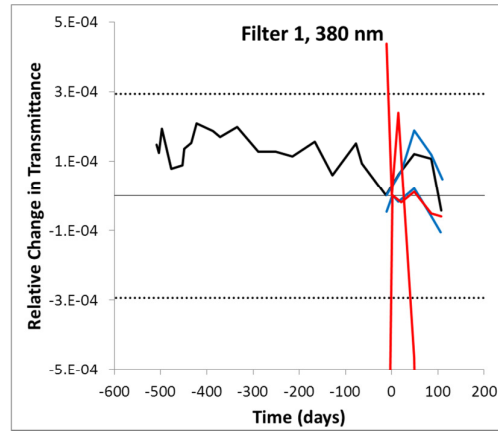
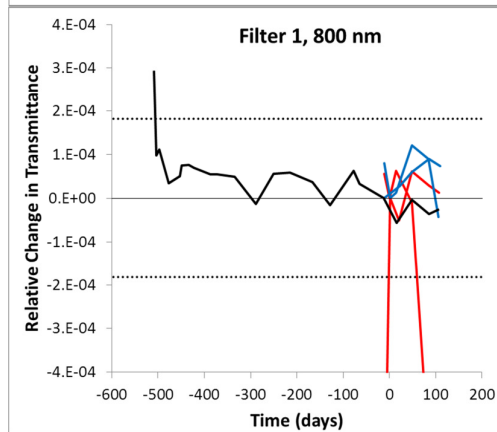
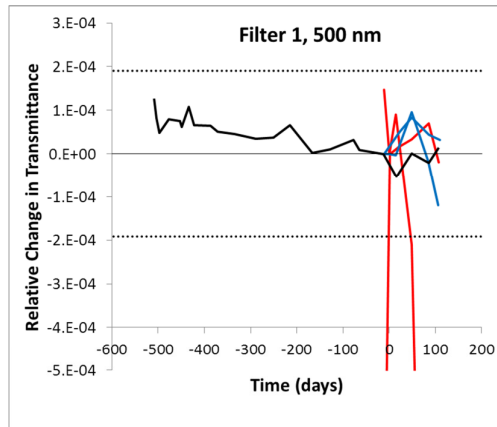
Relative change in transmittance of Filter 1.

Blue traces – filters from sets received from CNAM and not cleaned

Red traces – filters from sets received from CNAM and cleaned

Black trace – filter from Set #19, previous CCPR-K6 comparison

Dotted lines – median total uncertainty reported for previous CCPR-K6 comparison



Appendix A.2

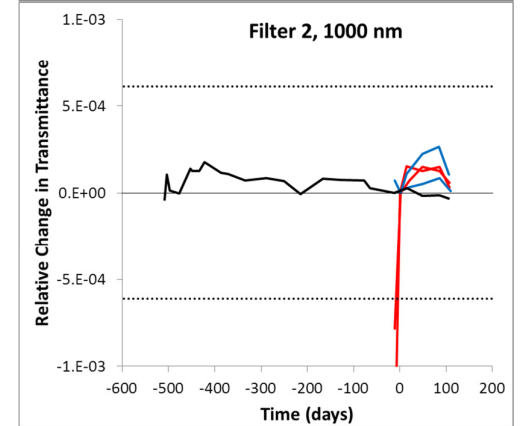
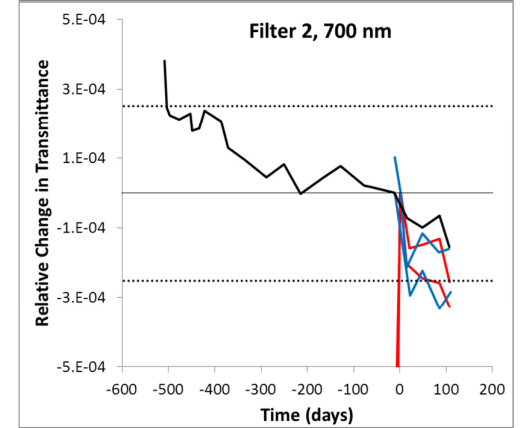
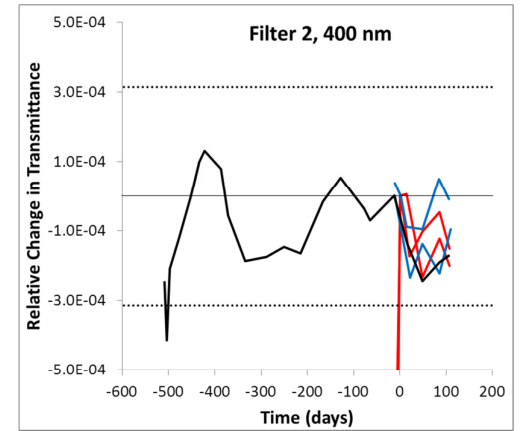
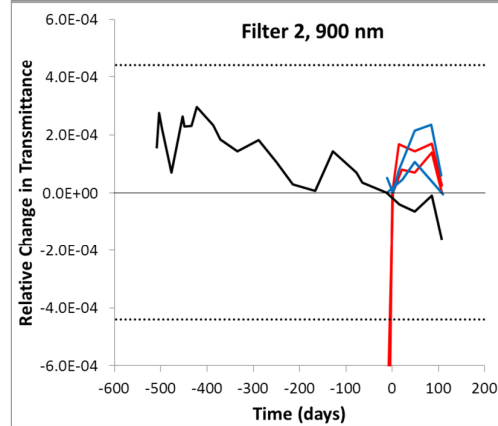
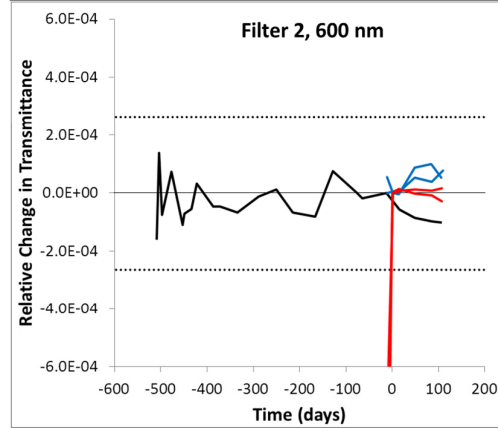
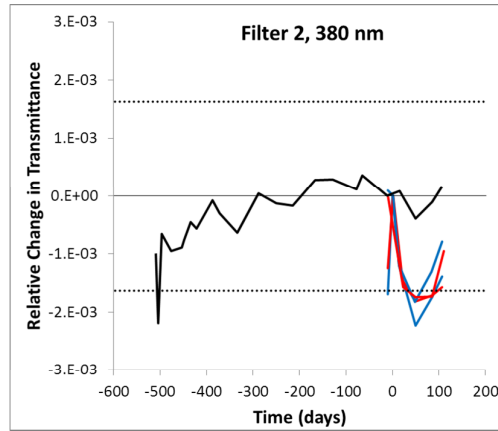
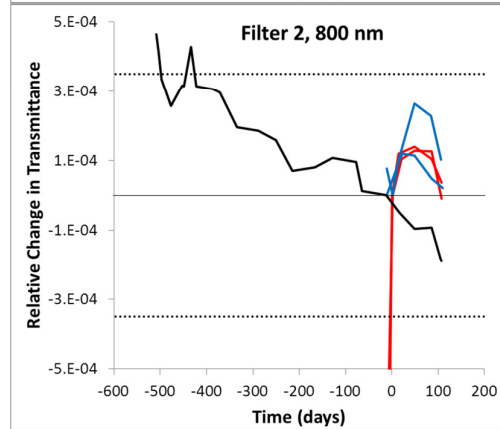
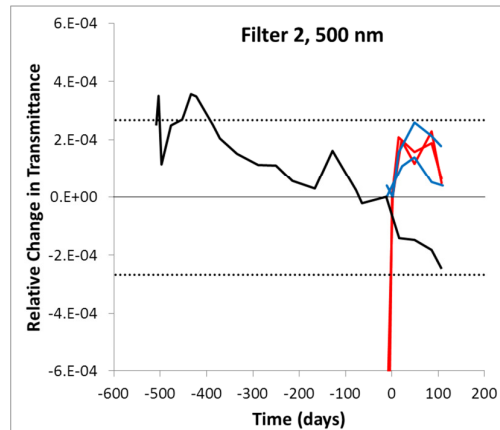
Relative change in transmittance of Filter 2.

Blue traces – filters from sets received from CNAM and not cleaned

Red traces – filters from sets received from CNAM and cleaned

Black trace – filter from Set #19, previous CCPR-K6 comparison

Dotted lines – median total uncertainty reported for previous CCPR-K6 comparison



Appendix A.3

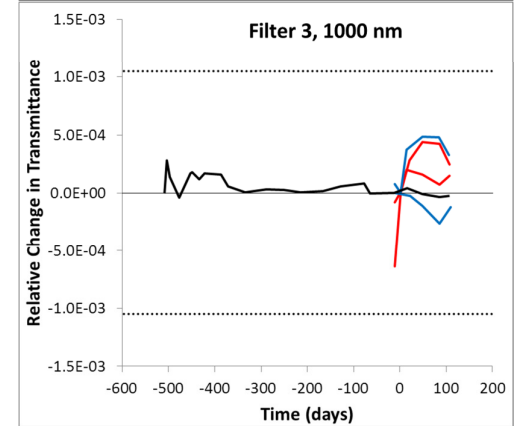
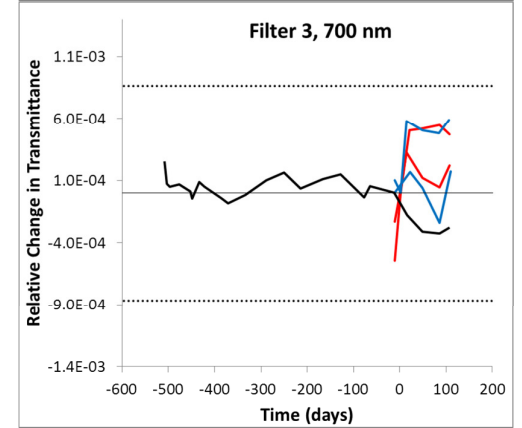
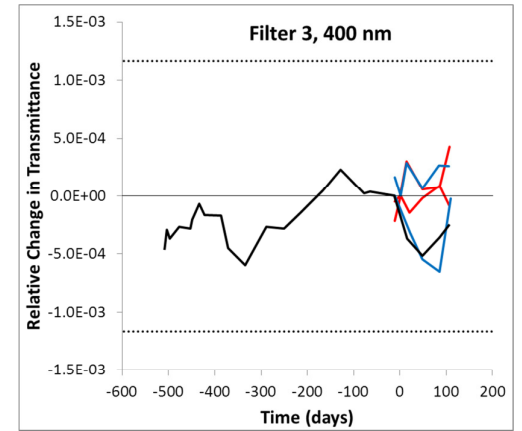
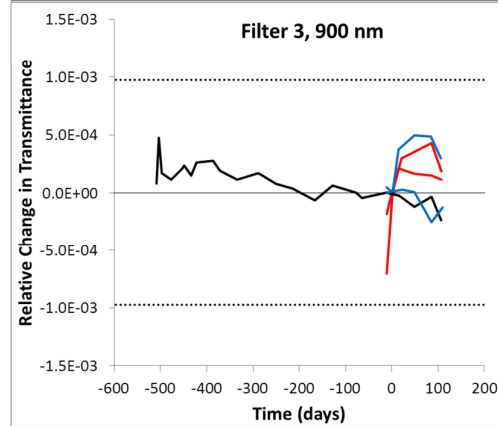
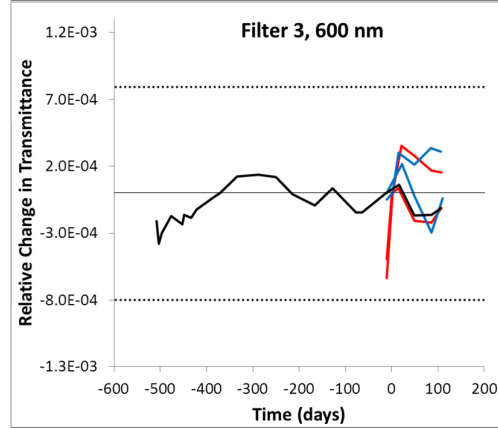
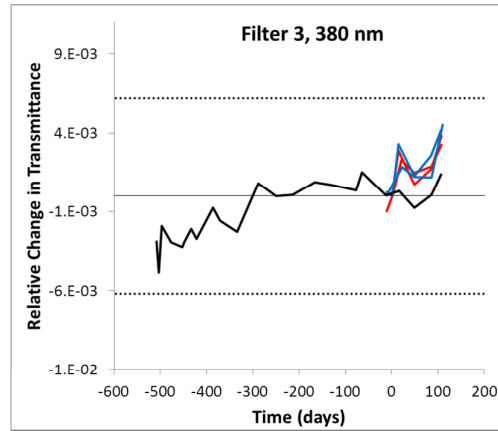
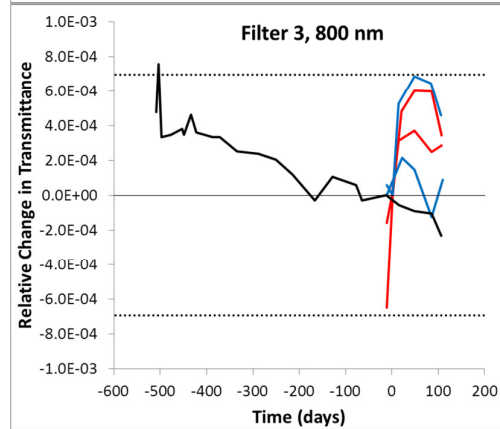
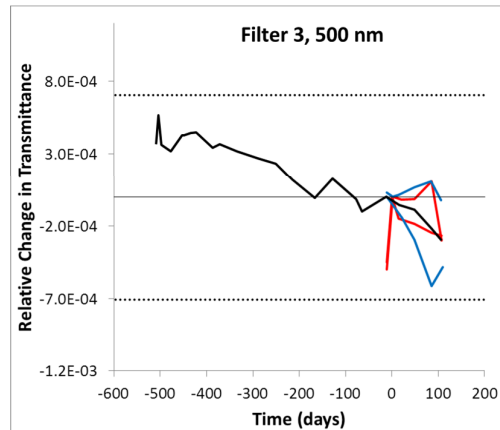
Relative change in transmittance of Filter 3.

Blue traces – filters from sets received from CNAM and not cleaned

Red traces – filters from sets received from CNAM and cleaned

Black trace – filter from Set #19, previous CCPR-K6 comparison

Dotted lines – median total uncertainty reported for previous CCPR-K6 comparison



Appendix A.4

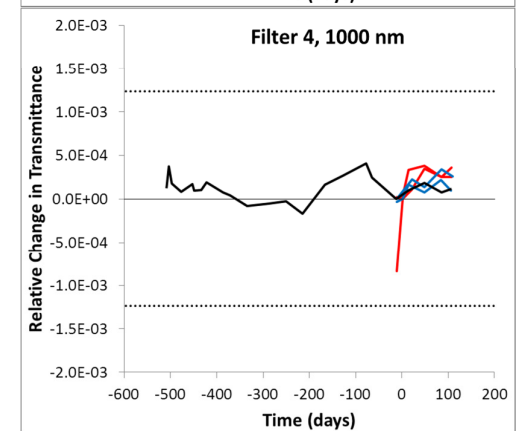
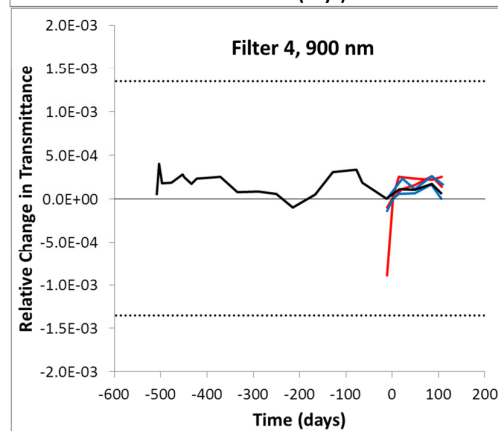
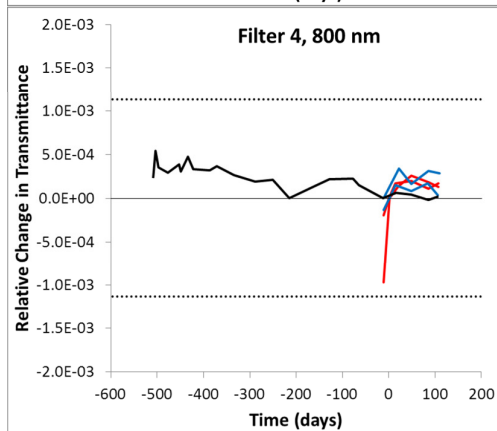
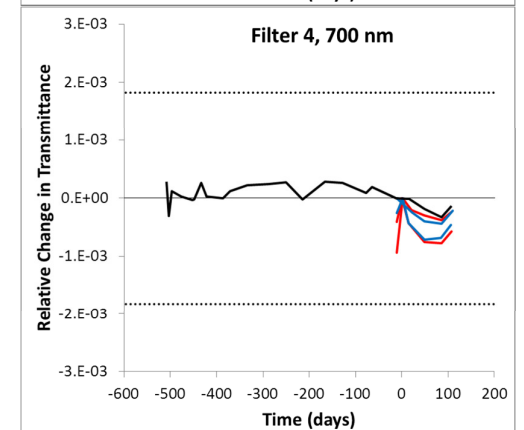
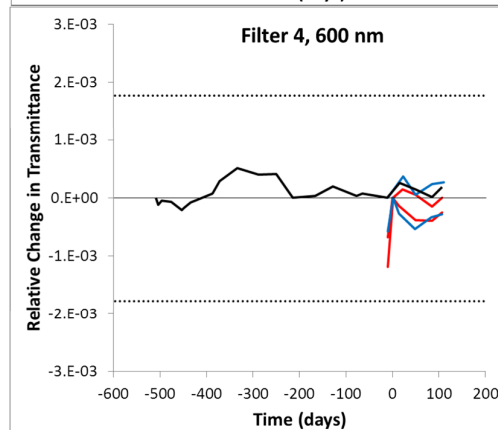
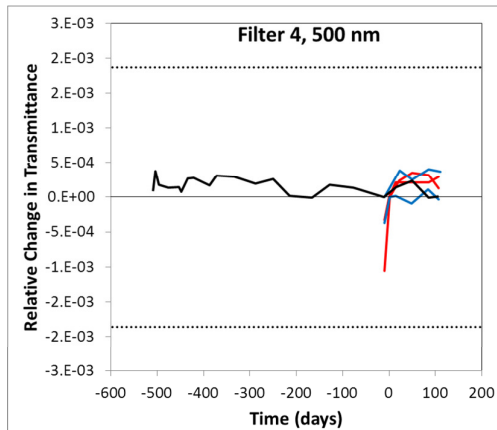
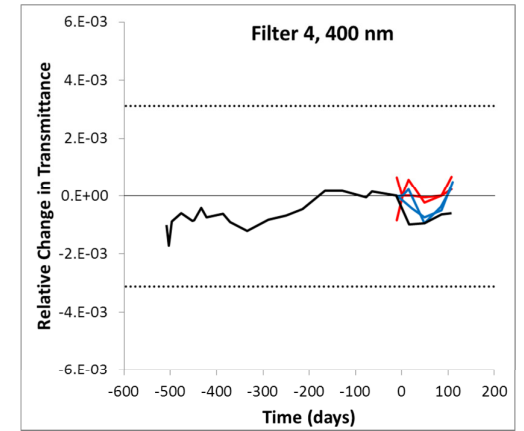
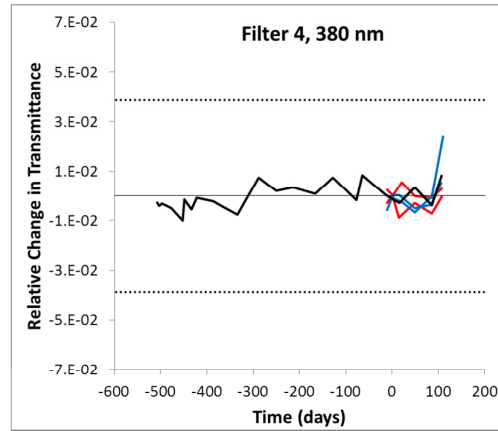
Relative change in transmittance of Filter 4.

Blue traces – filters from sets received from CNAM and not cleaned

Red traces – filters from sets received from CNAM and cleaned

Black trace – filter from Set #19, previous CCPR-K6 comparison

Dotted lines – median total uncertainty reported for previous CCPR-K6 comparison



Appendix A.5

Relative change in transmittance of Filter 5.

Blue traces – filters from sets received from CNAM and not cleaned

Red traces – filters from sets received from CNAM and cleaned

Black trace – filter from Set #19, previous CCPR-K6 comparison

Dotted lines – median total uncertainty reported for previous CCPR-K6 comparison

