Complementary note: DIMM (ELT-DS) calibration
21st July 2008

Context

After the discussion taken place in the July Nice Meeting, we have re-analyzed the data used in the calibration reported in the Doc N°. ELT-PLA-IAC-12200-0009 (Issue 1.2 – DRAFT). Find here the discussion and the conclusions of the re-analysis. Additional information (data files and plots) can be found at:

http://www.iac.es/site-testing/index.php?option=com_content&task=view&id=95

Main conclusions

Two main questions arise from the re-analysis:

1. As mentioned in the preceding document and also exposed during the meeting, the calibration database included some seeing values provided by both instruments <u>not observing the same star</u>. The comparison now has been constrained to seeing values corresponding to observation of the same star.

2. A <u>problem of synchronization</u> has been detected between IAC-DIMM and DIMM (ELT-DS). The time offset has been estimated to be 2min; see Figs. 2, 3 and 4.

These two questions have been considered and the resulting comparison plots are shown in Fig. 1.

Statistical values of the absolute differences between IAC-DIMM and DIMM (ELT-DS) seeing values considered simultaneously obtained ($\Delta t < \pm 30s$) before and after the correction of the detected 2min desynchronization are summarized in next table:

$\varepsilon_{DIMM(ELT-DS)} - \varepsilon_{IAC-DIMM}$	Before correction	After correction
Mean (arcsec)	0.035	0.035
Median (arcsec)	0.033	0.037
Standar deviation (arcsec)	0.126	0.099

The main result after re-analysis is that, as can be seeing, the correlation is good when considering both matters (same stars and synchronization) [*]. See big plot of Fig. 1.

On data analysis, the two final plots (Fig. 5) at the end of the document show the previous filter applied to the data ($FWHM_l/FWHM_t$ differing less than 20% from unity) for both instruments. In this regard, a detailed document will be provided by the IAC in a near future.

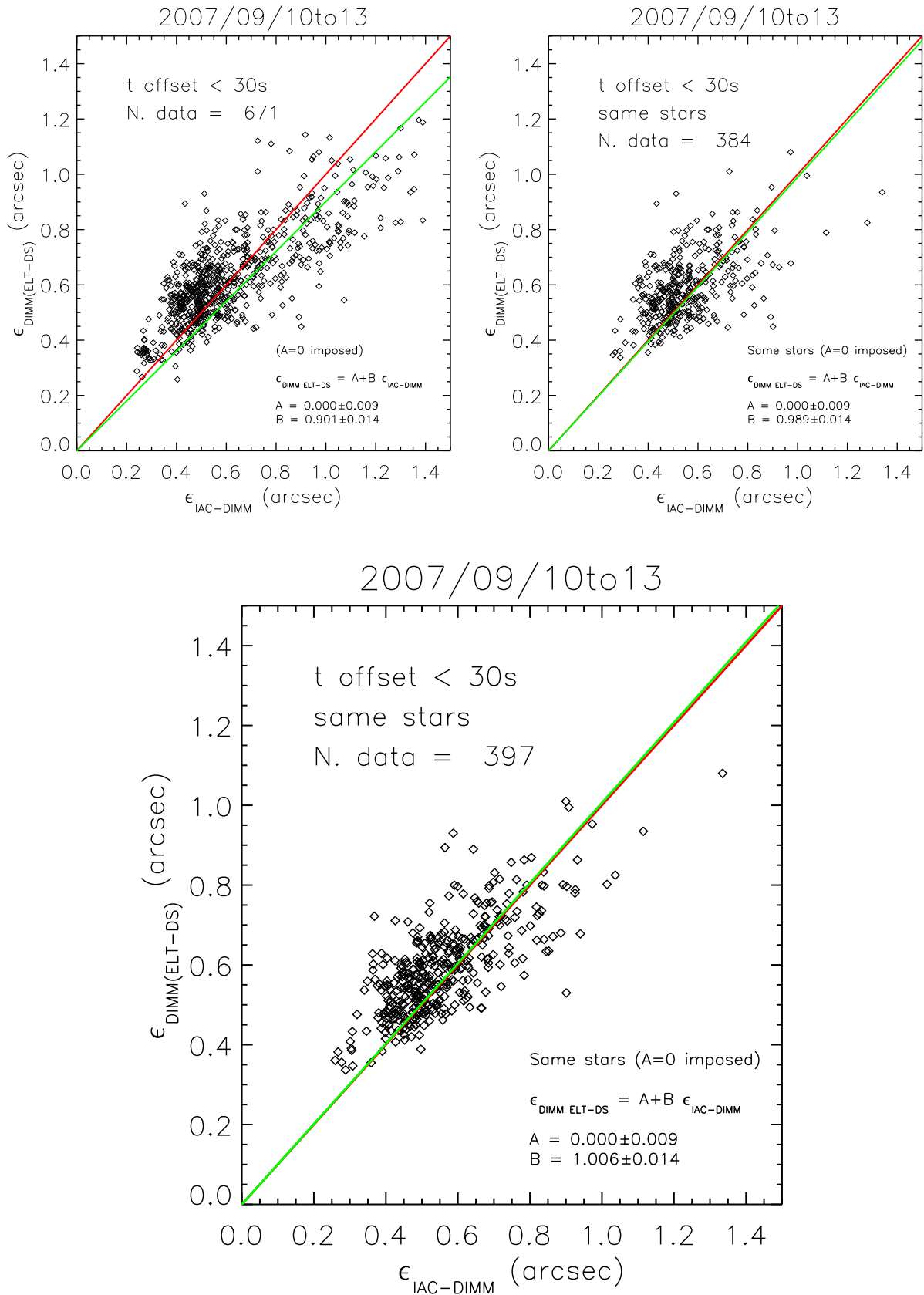[*] Unfortunately, bad seeing values (worse than 1arcsec) are not well sampled.

Fig. 1 DIMM (ELT-DS) vs IAC-DIMM seeing values before (top left; same plot shown in Doc N°. ELT-PLA-IAC-12200-0009, Issue 1.2 − DRAFT) and after (top right) the constraint of the observation of the same star. Taking also into account the desynchronization yields the bottom big figure. In all plots the red line has a slope=1; the green one is a linear fit with the condition A=0 imposed. Fitting parameters are shown in each plot.
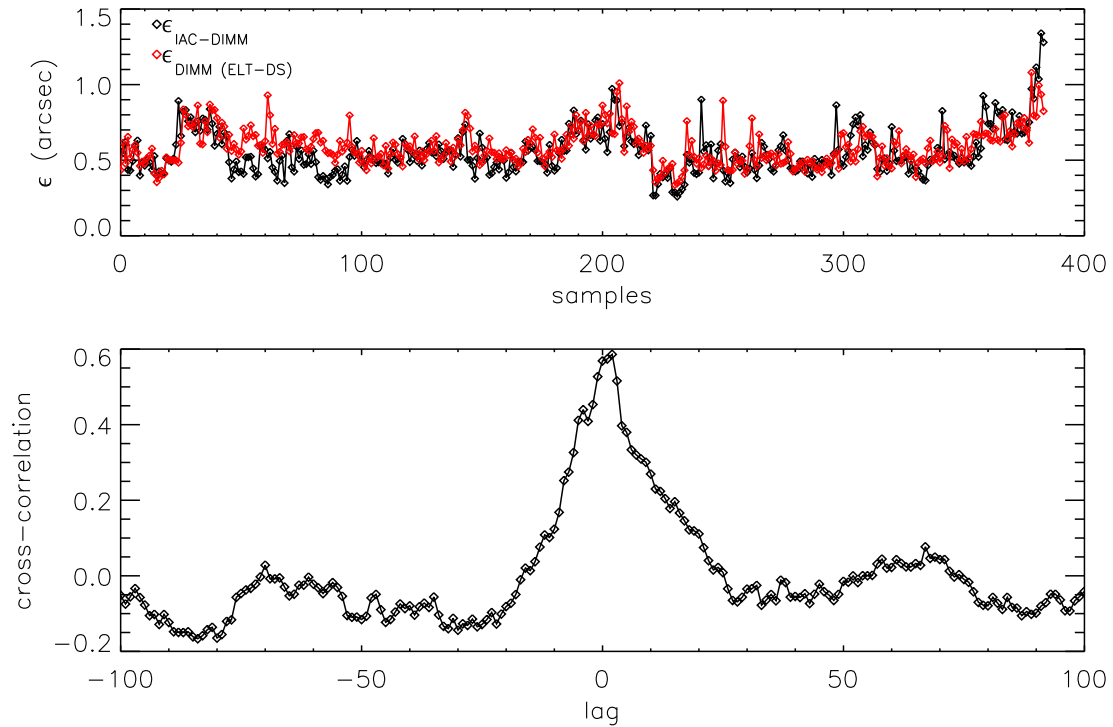
Fig. 2 Top: Seeing values obtained simultaneously (within Δt<±30s). IAC-DIMM in black and DIMM (ELT-DS) in red. Bottom: the cross-correlation function of both series, which is maximum at lag=2, corresponding to 2min desynchronization.
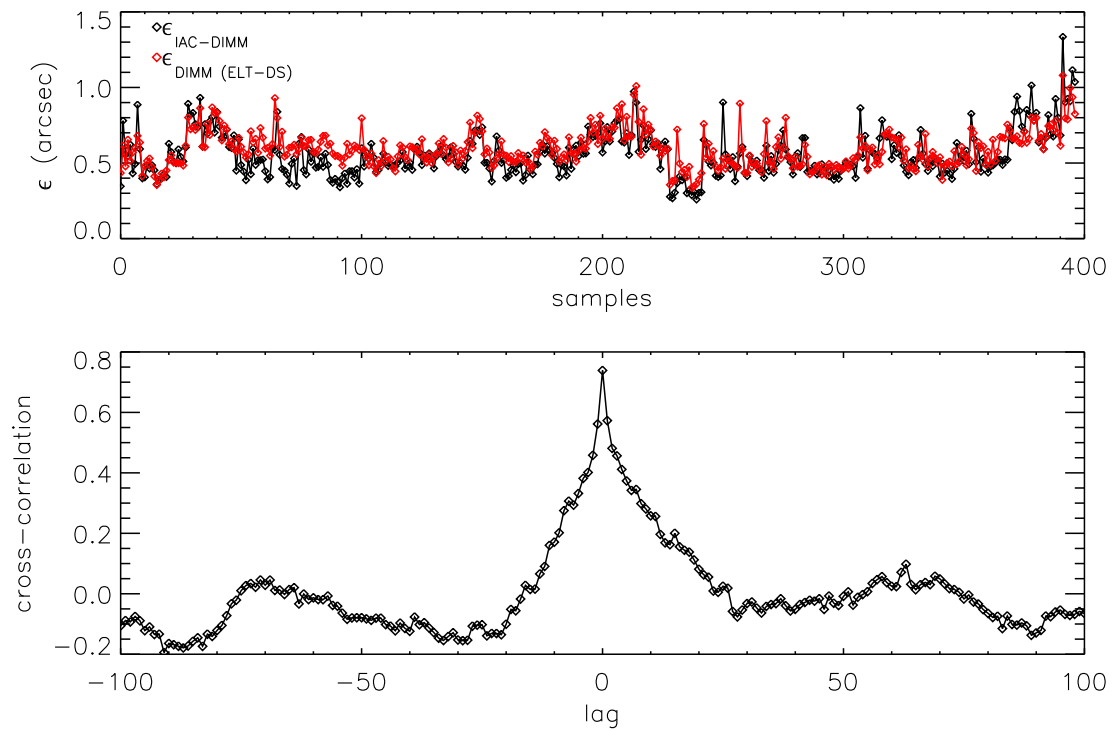

Fig. 3 Top: Seeing values obtained simultaneously (within Δt<±30s) <u>after the correction of the 2min</u>. IAC-DIMM in black and DIMM (ELT-DS) in red. Bottom: the cross-correlation function of both series. Now its maximum is at lag=0.
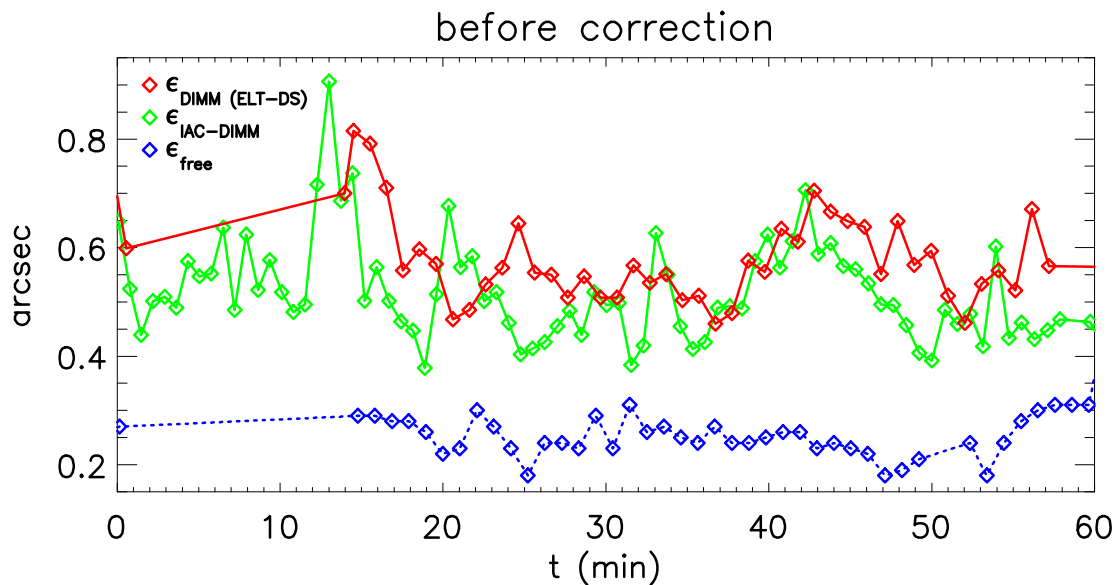
Fig. 4 Plot illustrating the desynchronization between IAC-DIMM and DIMM (ELT-DS) seeing values time series (before any correction). This particular range corresponds to the night of 11/09/2007.
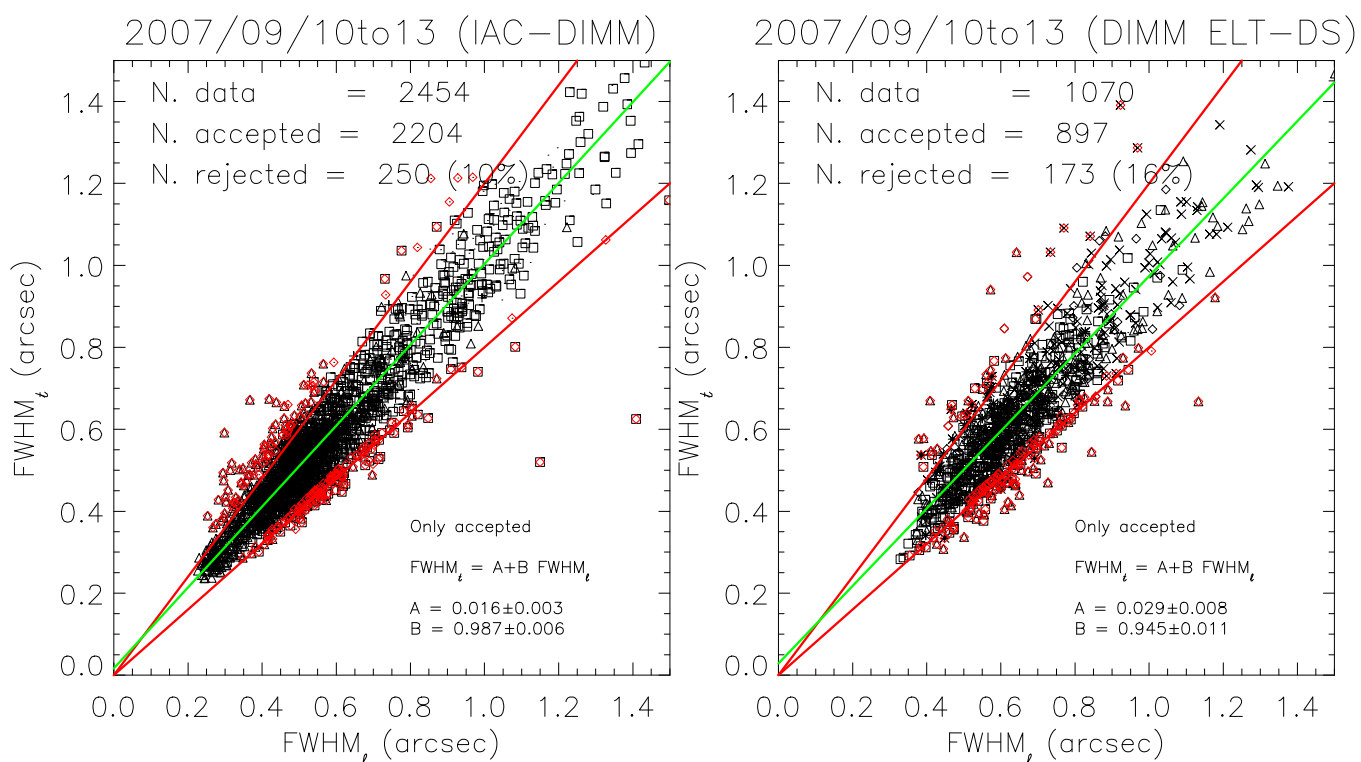

Fig. 5 Plots of DIMM data quality. Longitudinal and transverse FWHM ratio differing more than 20% from unity (condition represented by the red lines) were discarded (red symbols) and not taken into account for the final analysis.