Yearly mean of the difference between FD and SD energies

Telescope wise analysis and comparison with star analysis

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June 16, 2020

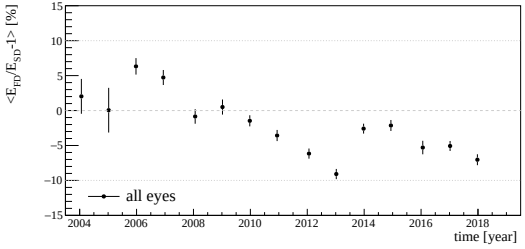
- Observer production: ICRC 2019+ v16r0 data
- energy calibration selection with and without the FidFOV

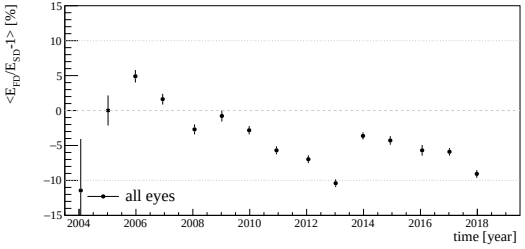
No significant impact of the fiducial FOV, nor threshold energy

with Fiducial FOV cut

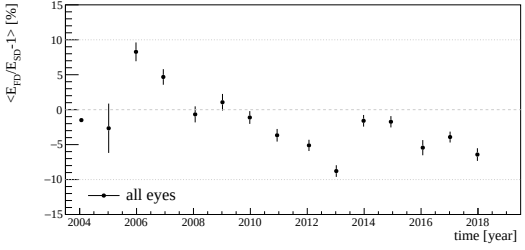
lg(E/eV)>18.4

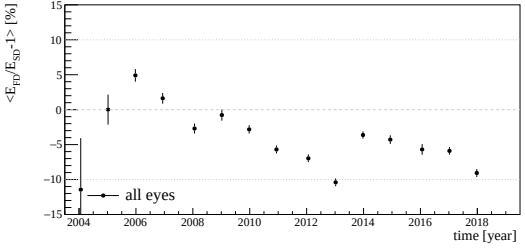
without fiducial FOV cut



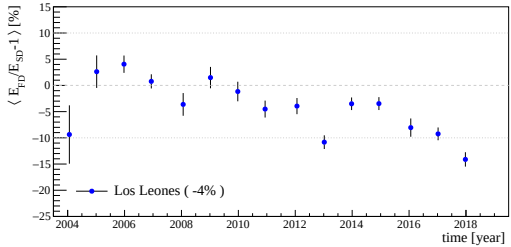


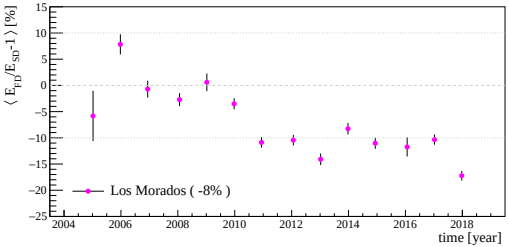
lg(E/eV) >18.5

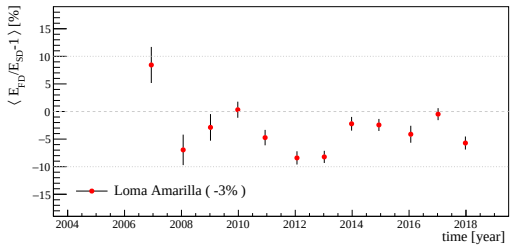


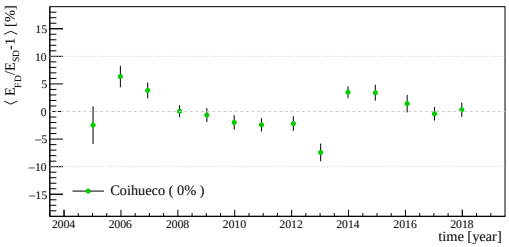


Differences of up to 17% $\lg(E/\mathrm{eV}) > 18.5$

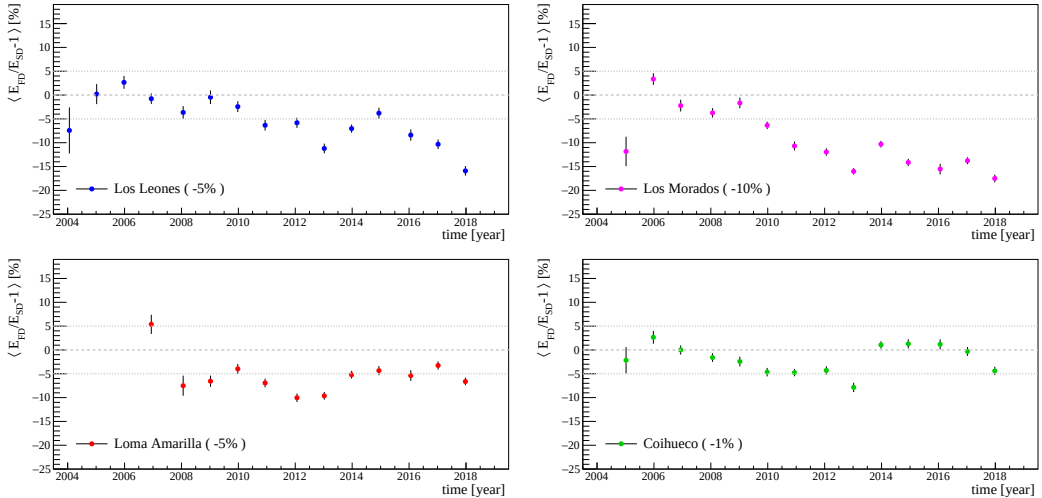








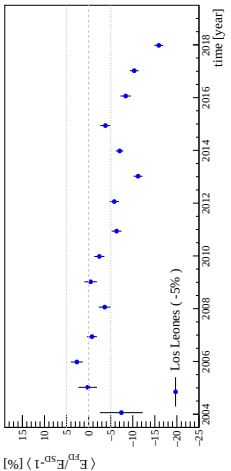
Increase statistics by including sub-threshold SD events



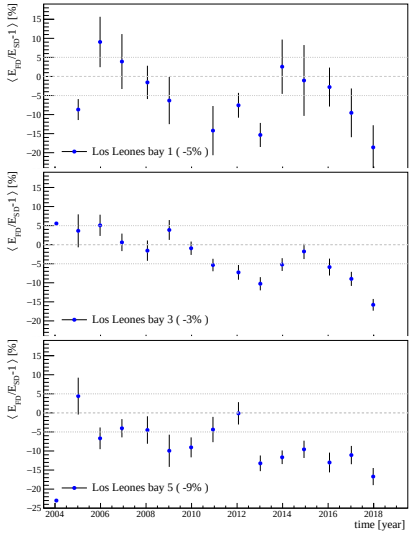
$\lg(E/\mathrm{eV}) > 18.2$, $\approx 2\%$ expected SD bias, trend and relative eye differences preserved

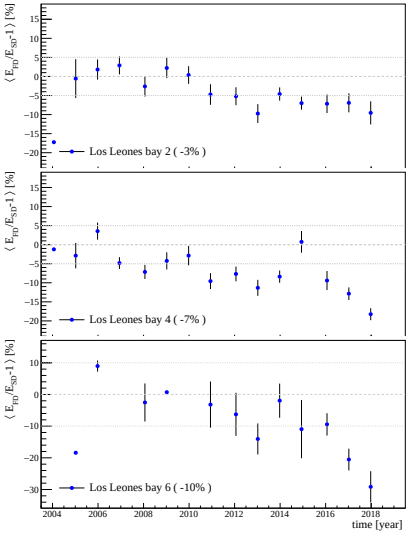
$\rightarrow$ separate data for different telescopes based on the position of $X_{\max}$

Los Leones: Bay 1,3,4 similar structures



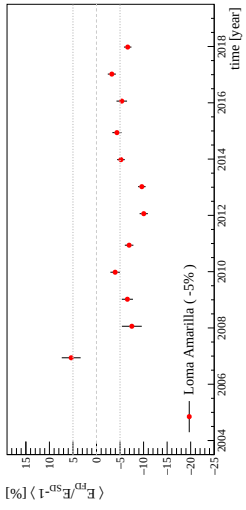
5% difference
between the bays

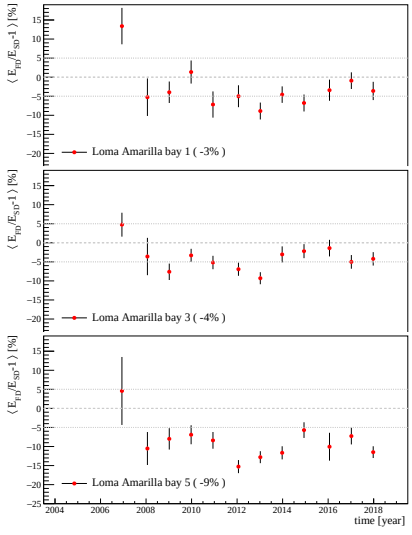


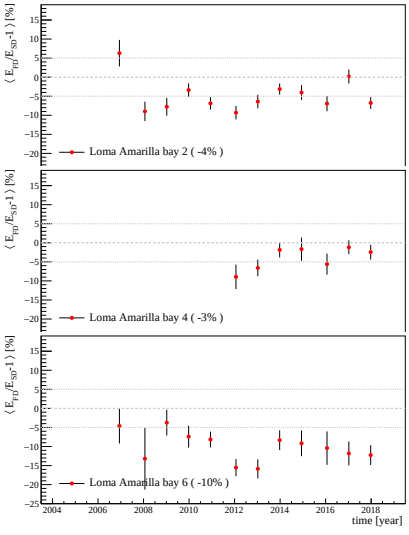


Large difference in 2018 in bay 6

Loma Amarilla: Almost constant differences with time

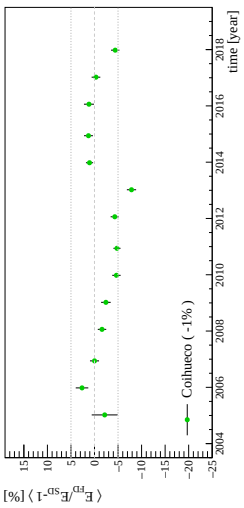


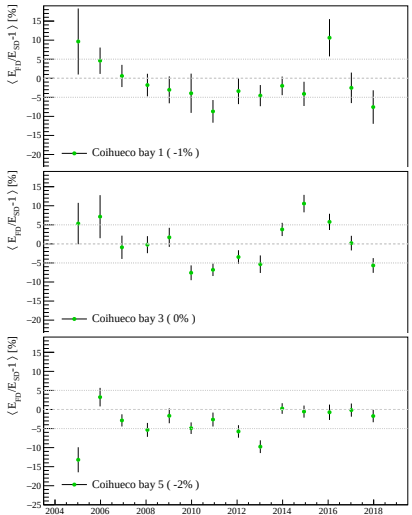


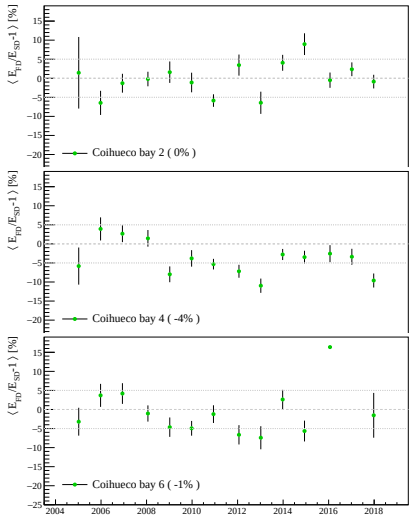


Largest difference for bay 6 (7%) and bay 5 (6%)

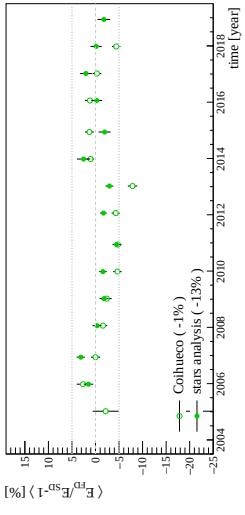
Coihueco: Telescopes quite different, bay 4 and 5 similar

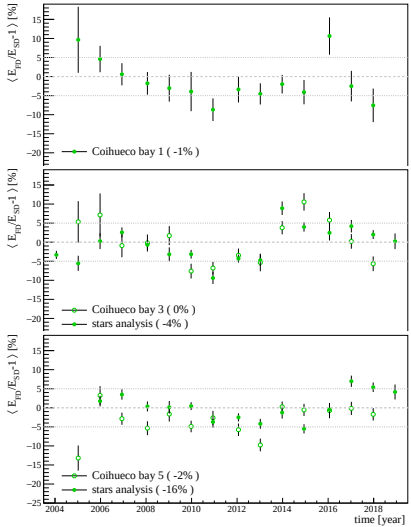


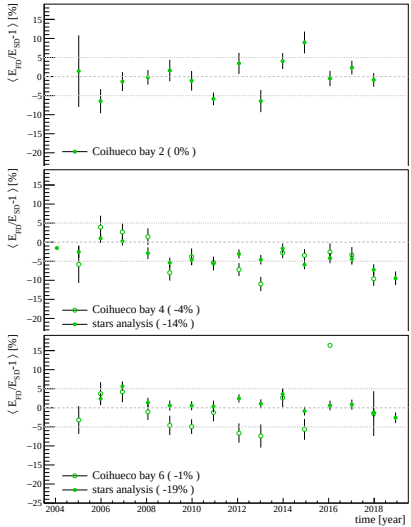




Coihueco: In general much more stable

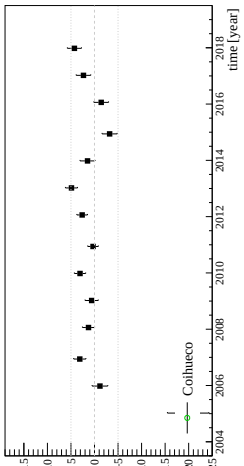


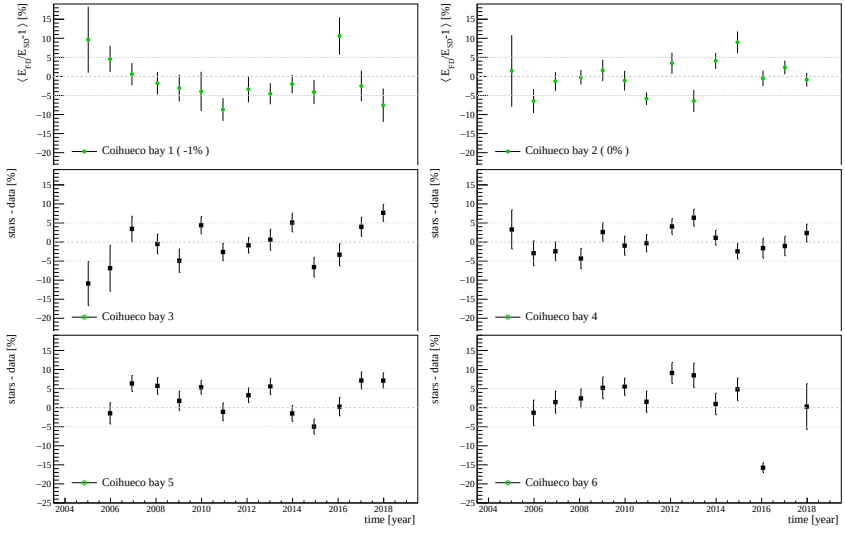




Stars numbers scaled with a constant factor to have the same mean as data

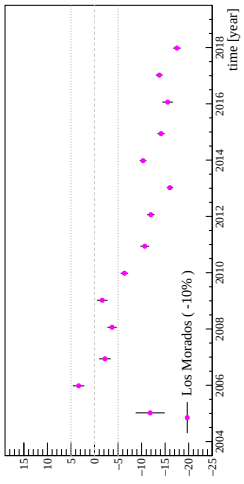
Coihueco: Agreement at 5% at the eye level

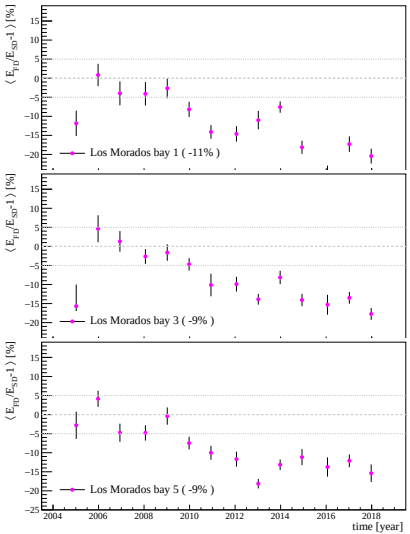


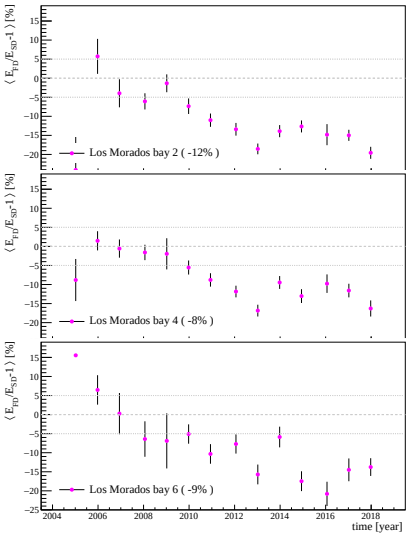


Spread in individual telescopes caused by data or stars?

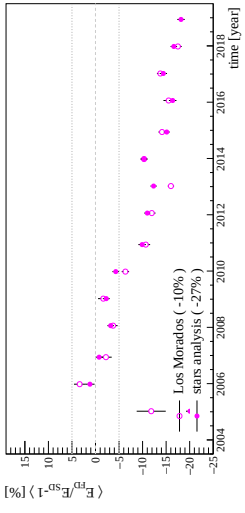
Los Morados similar trend in all telescopes

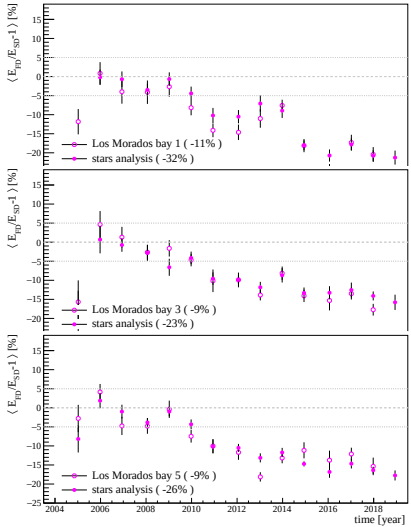


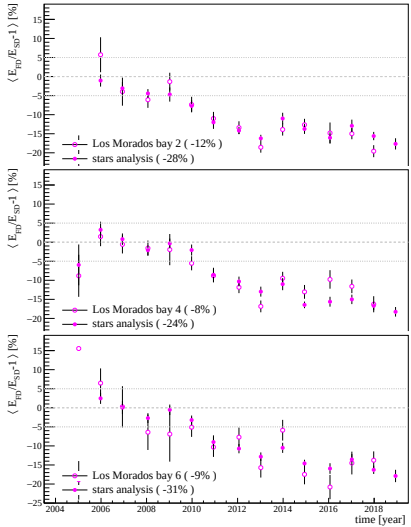




Amazing agreement with the star analysis







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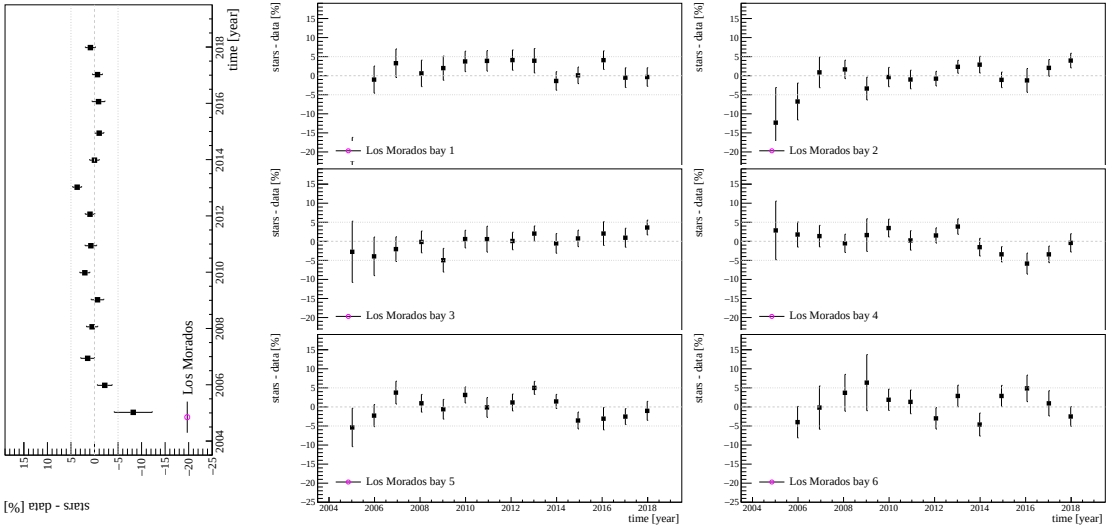
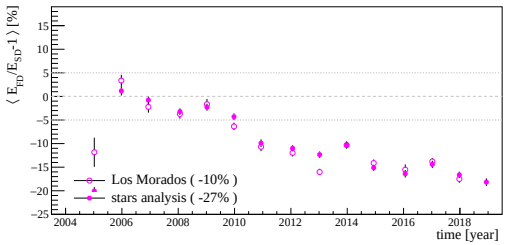
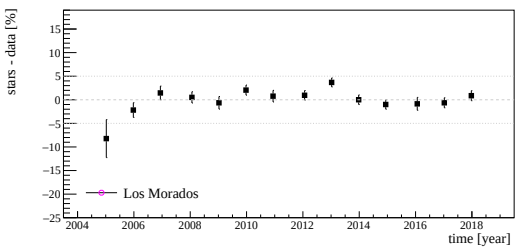
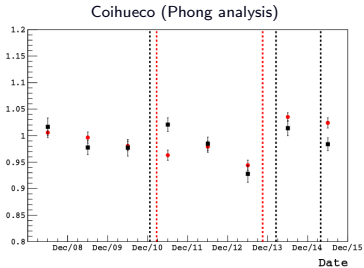


Long term drift caused by FD → Expected performance better than 5%

Summary of the comparison with star analysis







- A telescope rescaling from stars can accommodate the long term behavior
- Expected performance of better than 5%
- Long term drift of LM can be solely attributed to FD
- Star analysis cannot provide a good absolute scale $\rightarrow$ a decision on the choice of reference: time period, telescope is needed

Conclusions and outlook

2018 new data, from the E_{FD}/E_{SD} ratio:

- separated data on telescope basis
- LL (1,3,4,6), Co (3,4), LM (all) show a drop in FD energies
- LM follows its general drift trend

How to proceed with the rescaling from star analysis

- Shall we apply this correction? Discussion should happen after results are finished and should involve a broader audience (personal invitations to the long term meetings to relevant people/tasks/etc)
- How to chose the normalization? For example we could choose the average energy scale (average over all eyes) immediately after a drum calibration
- Working group has been already formed, please let Alberto know if you want to join!