

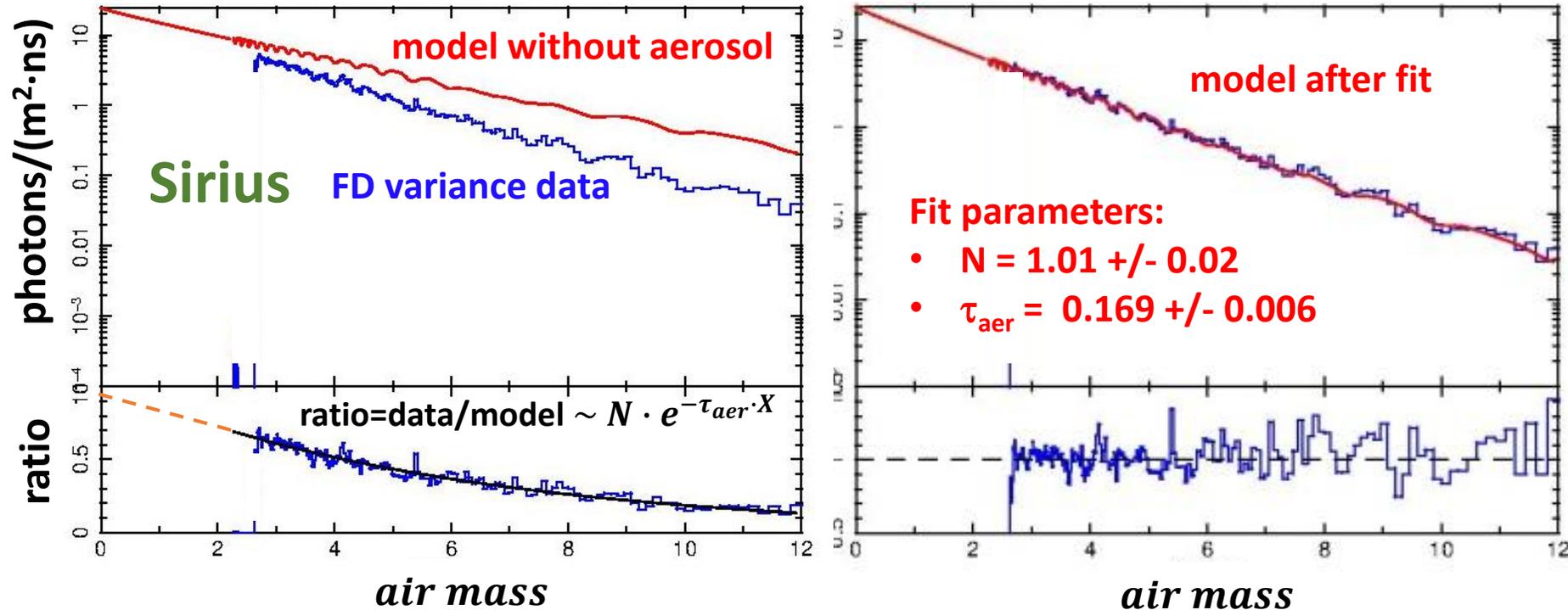
# Update on the long term FD monitoring using stars

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11/02/2020

# Checking the FD absolute calibration with reference stars

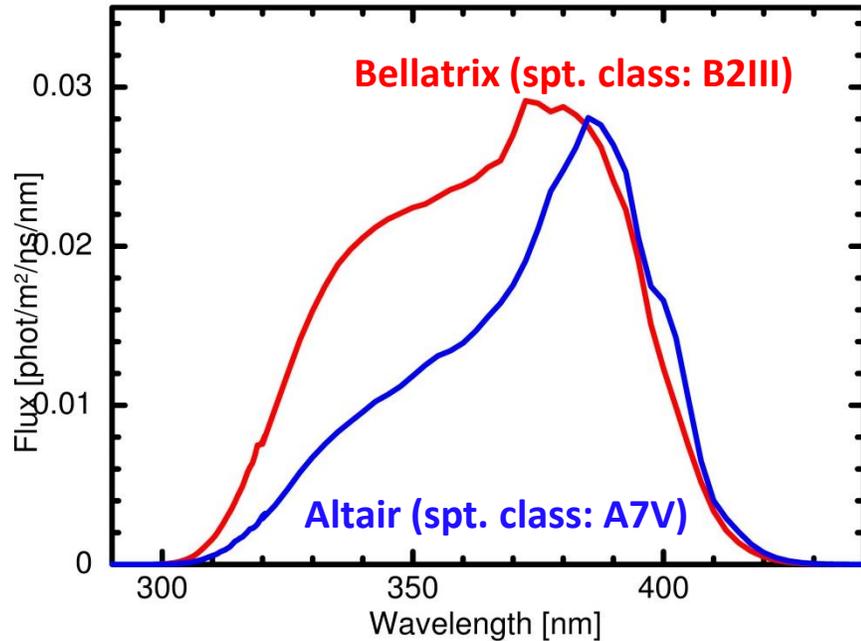
## Coihueco Bay 4



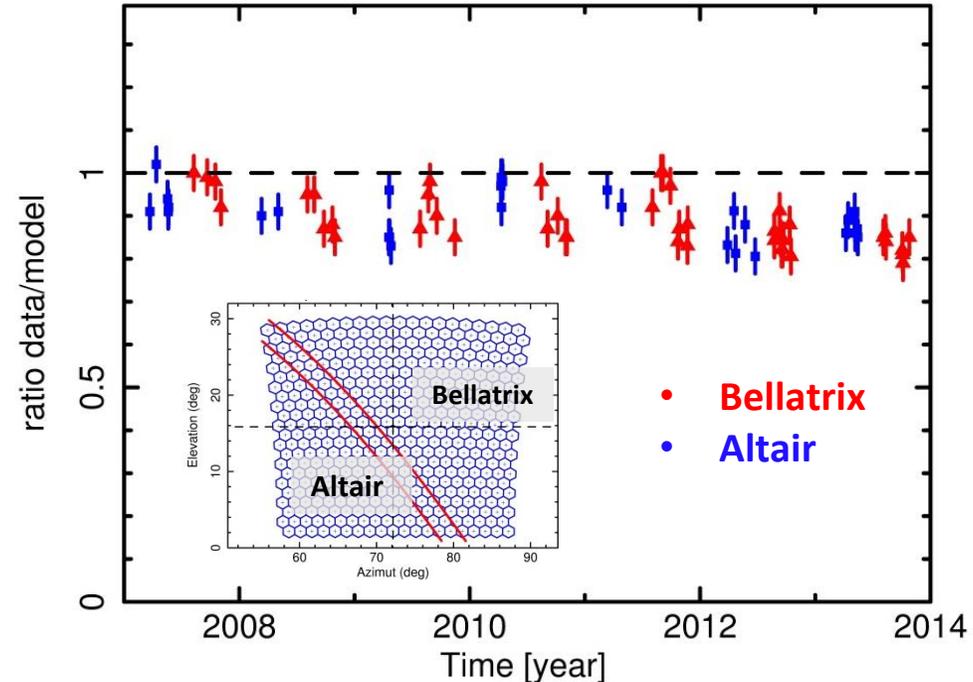
- ❑ An independent end-to-end verification of the calibration status of the FD telescopes can be obtained by comparing the observed star signal to the expected star flux vs. airmass
- ❑ The aerosol optical depth and a corrective normalization factor are obtained by fitting the simulated data to the star flux obtained from the variance data

# Monitoring by different stars

spectral distribution of detected photons  
(including atmosphere attenuation and FD spectral response)



## Coihueco Bay 5



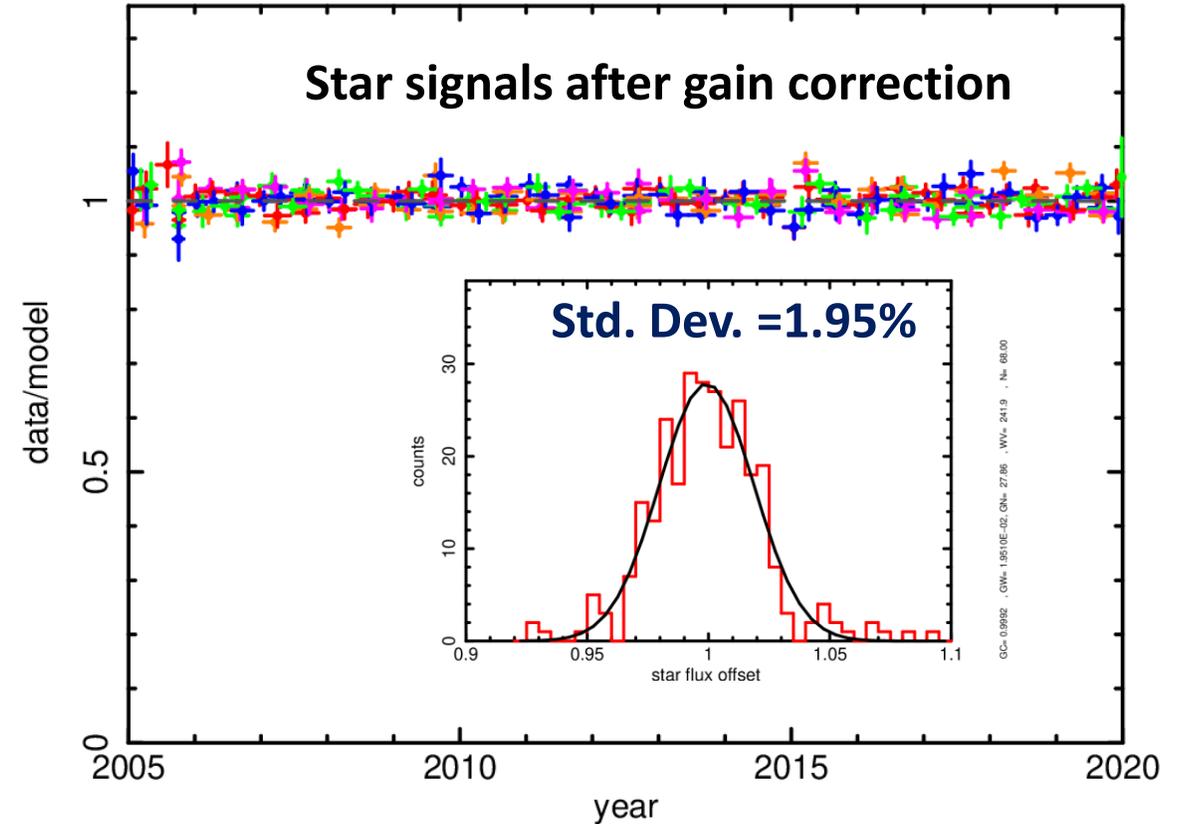
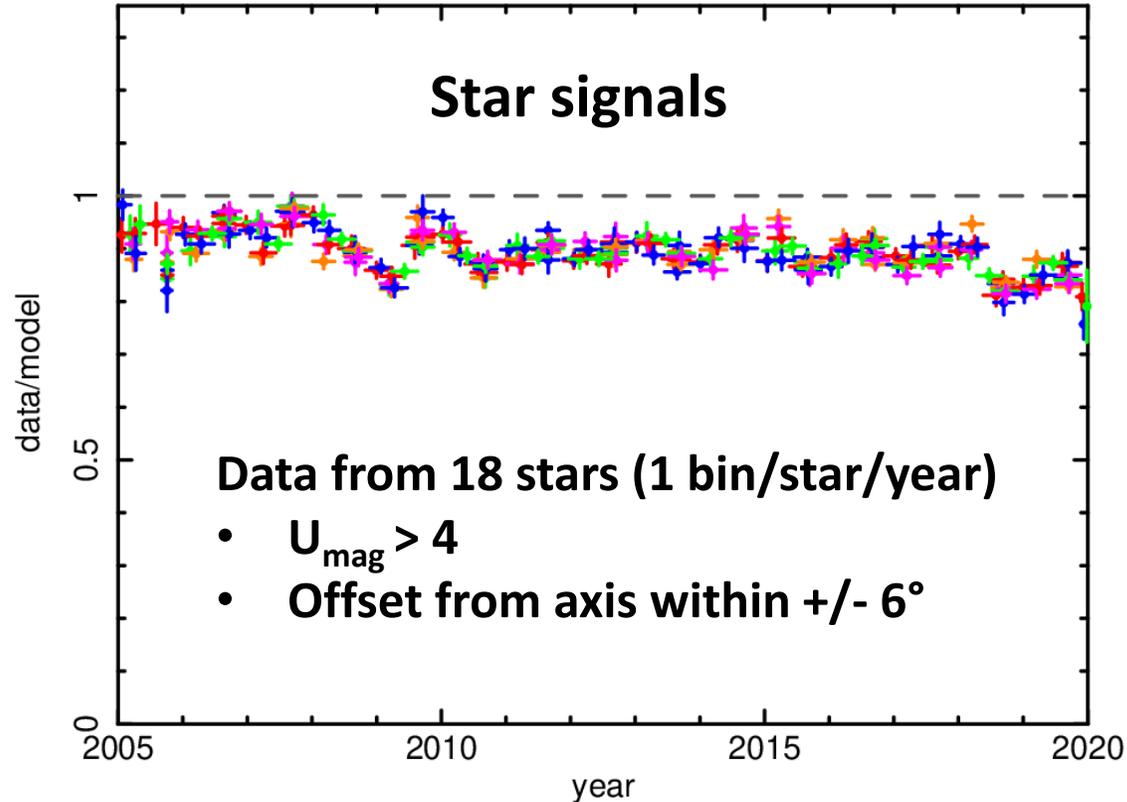
- ❑ Any star crosses nighttime the FD field of view only for a few months per year
- ❑ Data from different stars (different luminosity and different spectral class) can be combined to monitor the FD calibration status in different period of the year
- ❑ There are however not enough bright reference stars to monitor the FD calibration without temporal gaps

## Star selection in the FoV of Coihueco Bay 4

Name	Type	Offset[°]	Umag	R.A. [h]	Name	Type	Offset[°]	Umag	R.A. [h]
1) Pi Cet	B7IV	+4.9	3.7	2.7	10) Omi2 CMa	B3Iab	-5.1	2.1	7.1
2) Mu Lep	B9III	+2.6	2.8	5.2	11) Gienah	B8III	+1.2	2.1	12.3
3) Lam Lep	B0.5IV	+5.6	3.0	5.3	12) Algorab	B9.5V	+2.3	2.8	12.5
4) Nihal	G3III	-2.0	3.6	5.5	13) Zuben Elgenubi	A3IV	+2.7	3.0	14.8
5) Arneb	F0I	+0.9	3.0	5.5	14) Graffias	B1V	-1.0	1.7	16.1
6) Gam Lep	F6V	-3.7	4.1	5.7	15) Ome Sco	B1V	-1.9	3.1	16.1
7) Mirzam	B1III	+0.8	0.8	6.4	16) Sabik	A2V	+3.0	2.6	17.2
8) Ksi01 CMa	B0.7IV	-4.7	3.1	6.5	17) Polis	B8Iab(e)	-2.3	3.6	18.2
9) Sirius	A1V	+2.1	-1.5	6.8	18) Skat	A3Vp	+2.9	3.4	22.9

- ❑ To obtain a number of stars sufficient to continuously monitor the FD calibration status along the year we select stars with magnitude in the U band > 4 that cross the central part of FD field (+/- 6° from the telescope center)

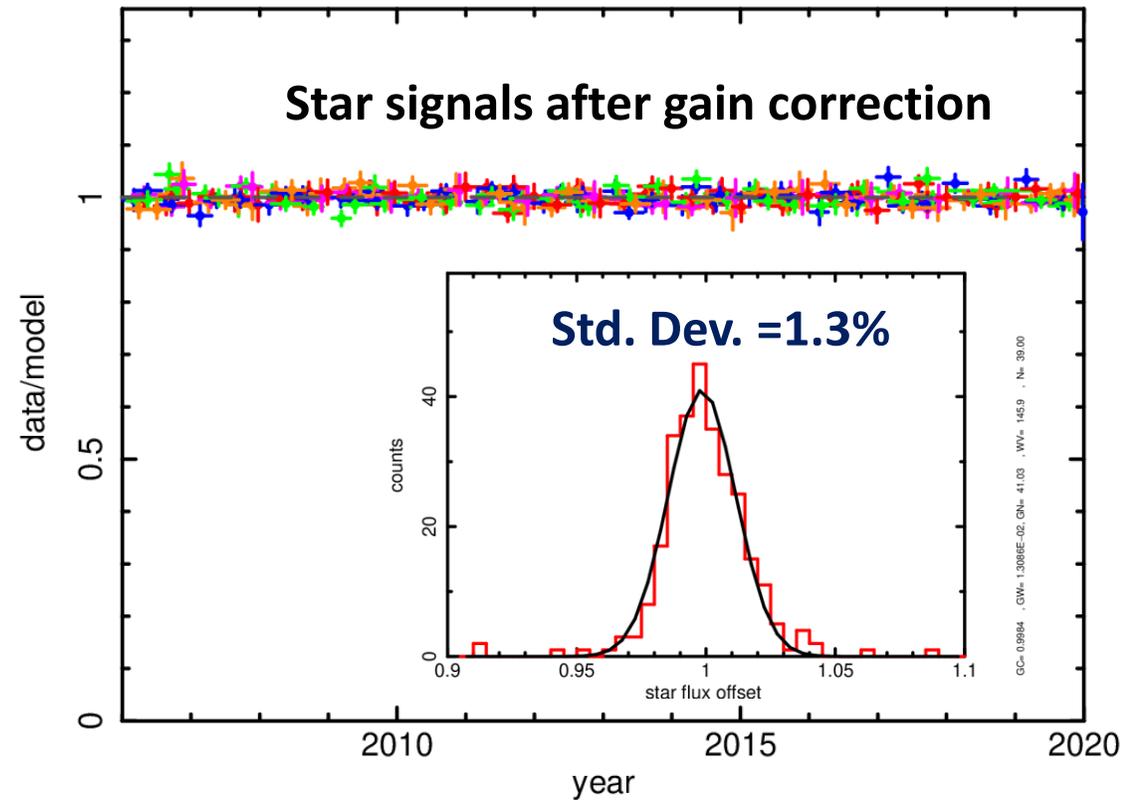
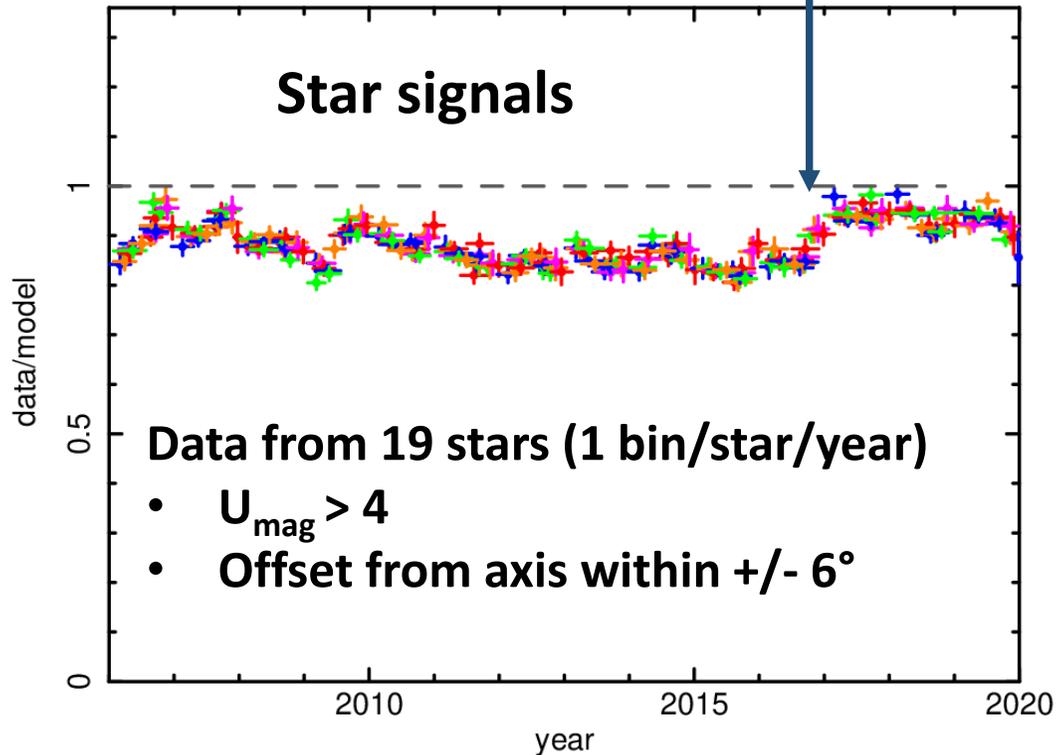
# Coihueco bay 4



- ❑ Stars of different spectral type and different luminosity show coherent temporal behavior (spread  $< 2\%$  std. dev.) along the 15 year of FD operation
- ❑ A few stars are used as absolute reference, the other are rescaled to match the reference stars

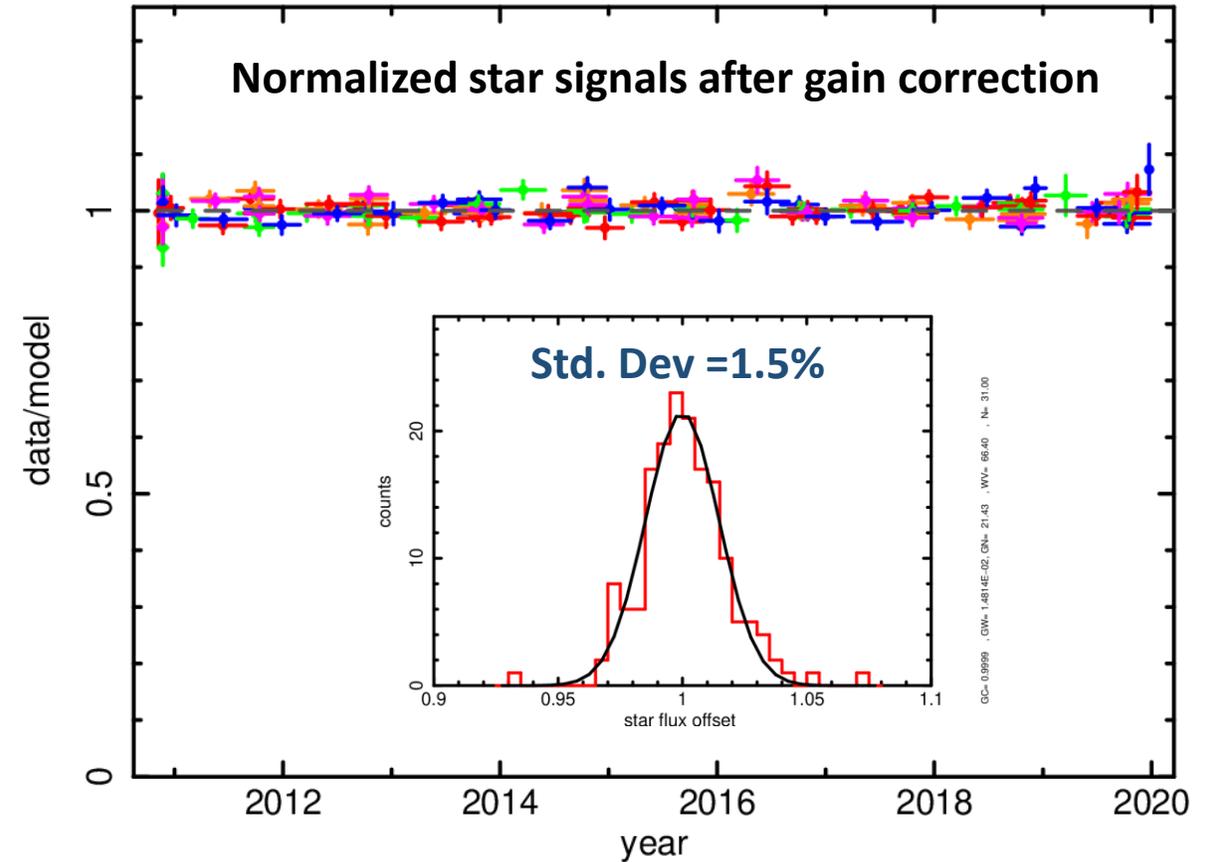
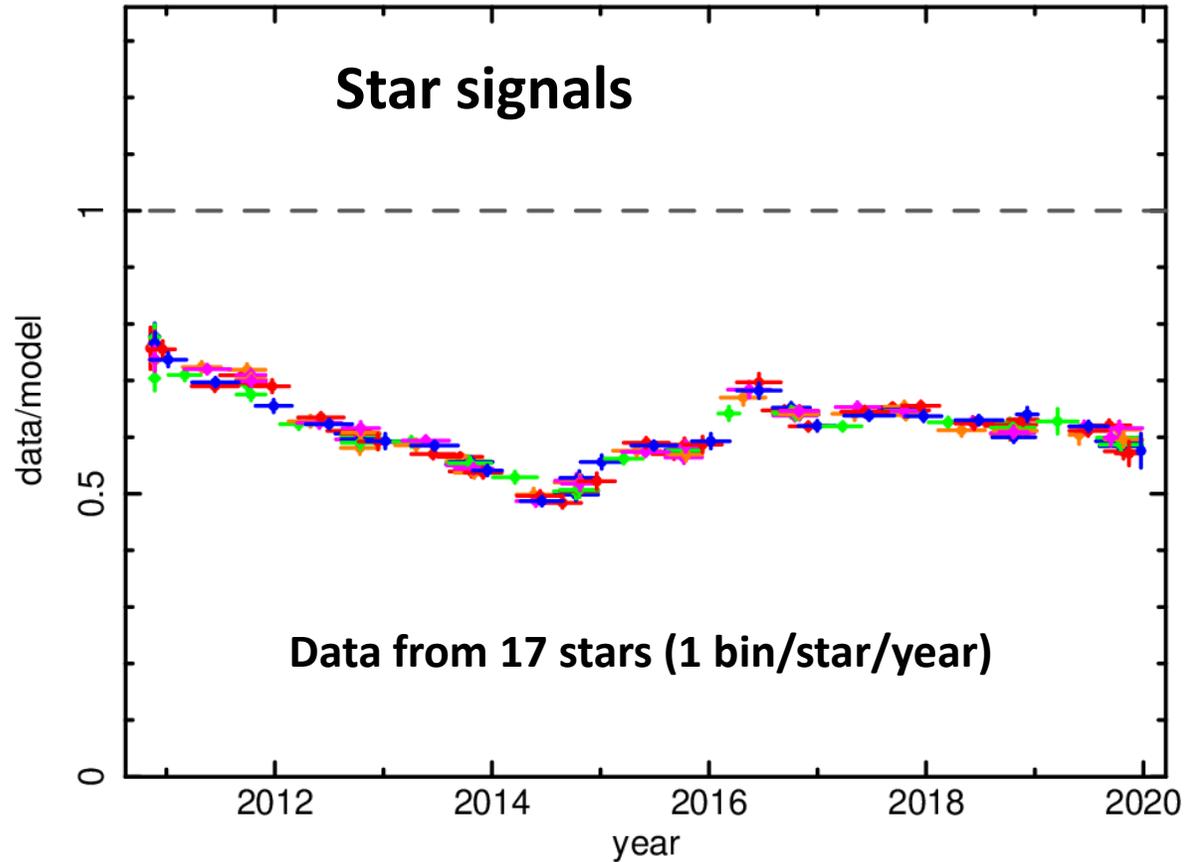
# Coihueco bay 5

11/06/2016: mirrors were dismantled, cleaned with deionized water and compressed nitrogen, mounted back and aligned.



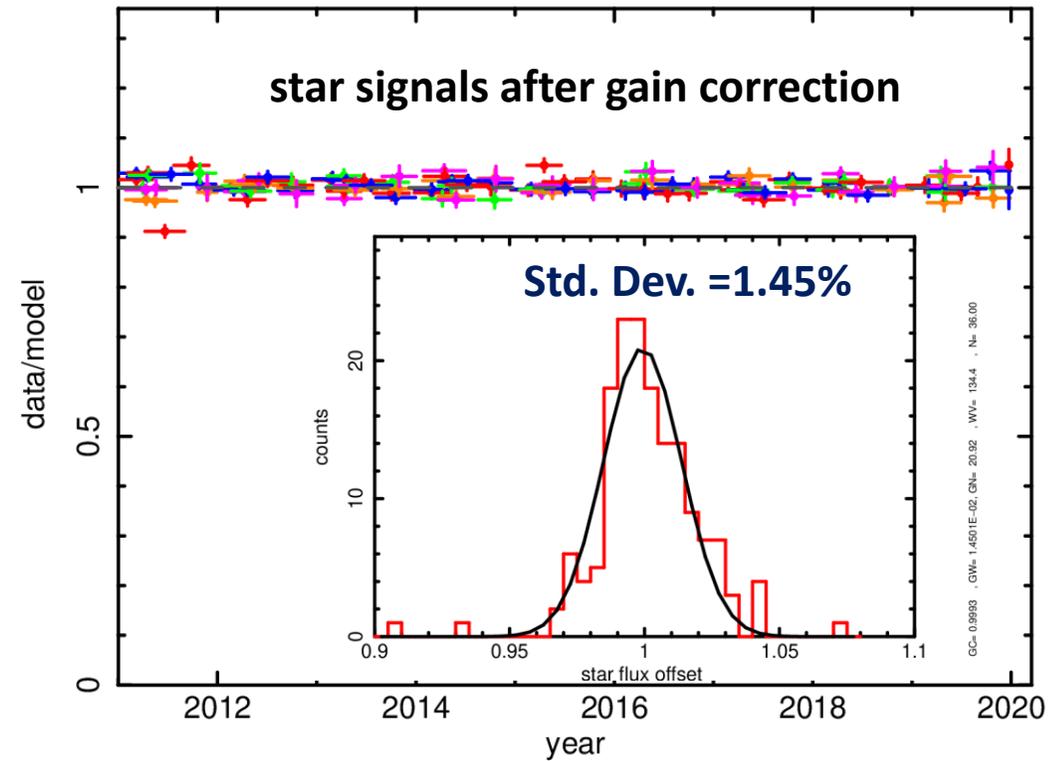
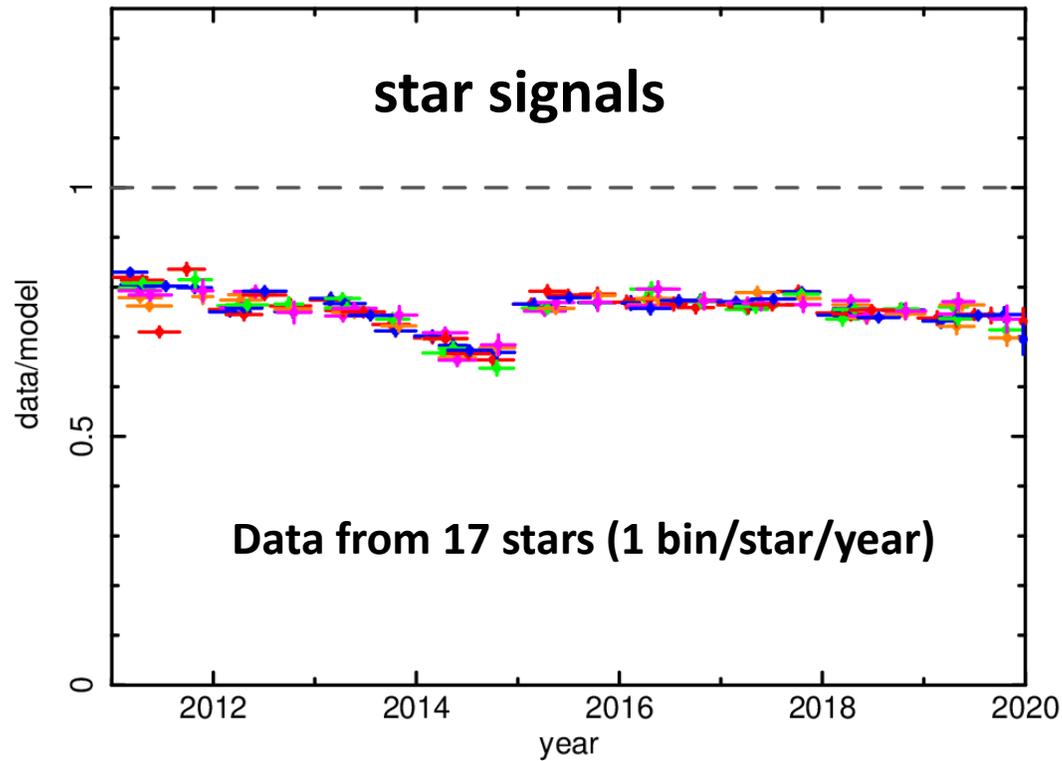
☐ Long term evolution of Coihueco bay 5 calibration monitored by 19 stars. A significant increase in efficiency is detected after the dismount, clean and realignment of the mirrors

# Heat bay 3



☐ Long term evolution of HEAT bay 3 calibration, monitored by 17 stars

# Heat bay 2



☐ Long term evolution of HEAT bay 2 calibration monitored by 17 stars

# Summary

- We have analyzed FD signals from several stars of different spectral type and different luminosity ( $U_{\text{mag}} > 4$ ) and found they show coherent ( $< 2\%$  std. dev.) long term evolution across the 15 year of FD operation.
- Results obtained show that by the combined analysis of several stars it is possible to monitor the calibration status of individual FD telescopes continuously along the year and correct for any long-term drift not monitored by the Cal A.