



# **A first glance to Hybrid Data Production v16r0**

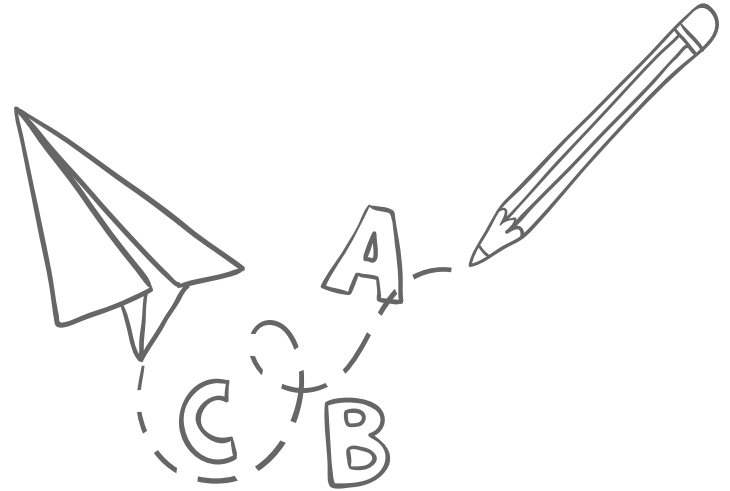
**Francesco Salamida  
with contributions from Alexey, Ioana, Jose, Lorenzo,  
Valerio**

**Auger General Meeting, 18 June 2020**

# Outline

---

- A. v16r0 production
- B. Hybrid cuts reminder
- C. dNdE
- D. Highest Energy events
- E.  $E_{FD}/E_{SD}$  vs time
- F. Xmax
- G. CO6 issue



# Hybrid Data Production v16r0

---

<https://web.i kp.kit.edu/augeroracle/doku.php?id=auger:observer>

## **/data/v16r0/**

Reconstructed data from 2018 and 2019 with updated bad periods and GOES data (status as of 20.05.2020)

This dataset augments the 2019-ICRC data set.

**SD** data set can be used until 2019-12-31

**Hybrid** data set can be used until 2018-12-01

**CAVEAT: no cloud/calibration/aerosol DB for 2019**

Pre-production from L. Perrone also available for cross-check

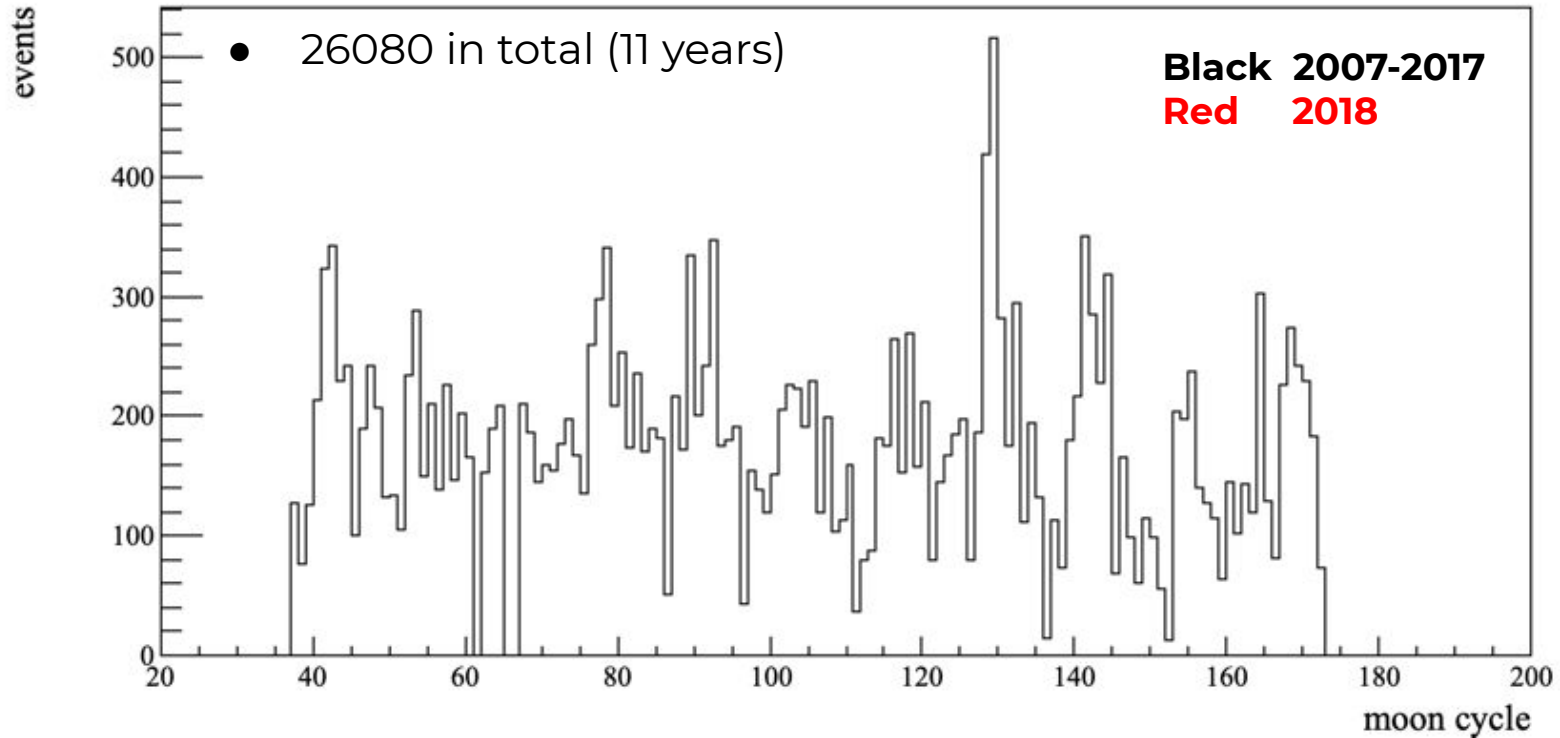
Thanks to people at KIT(Max Stadelmaier, Steffen Hahn) and Lecce (L. Perrone)

# Hybrid cuts

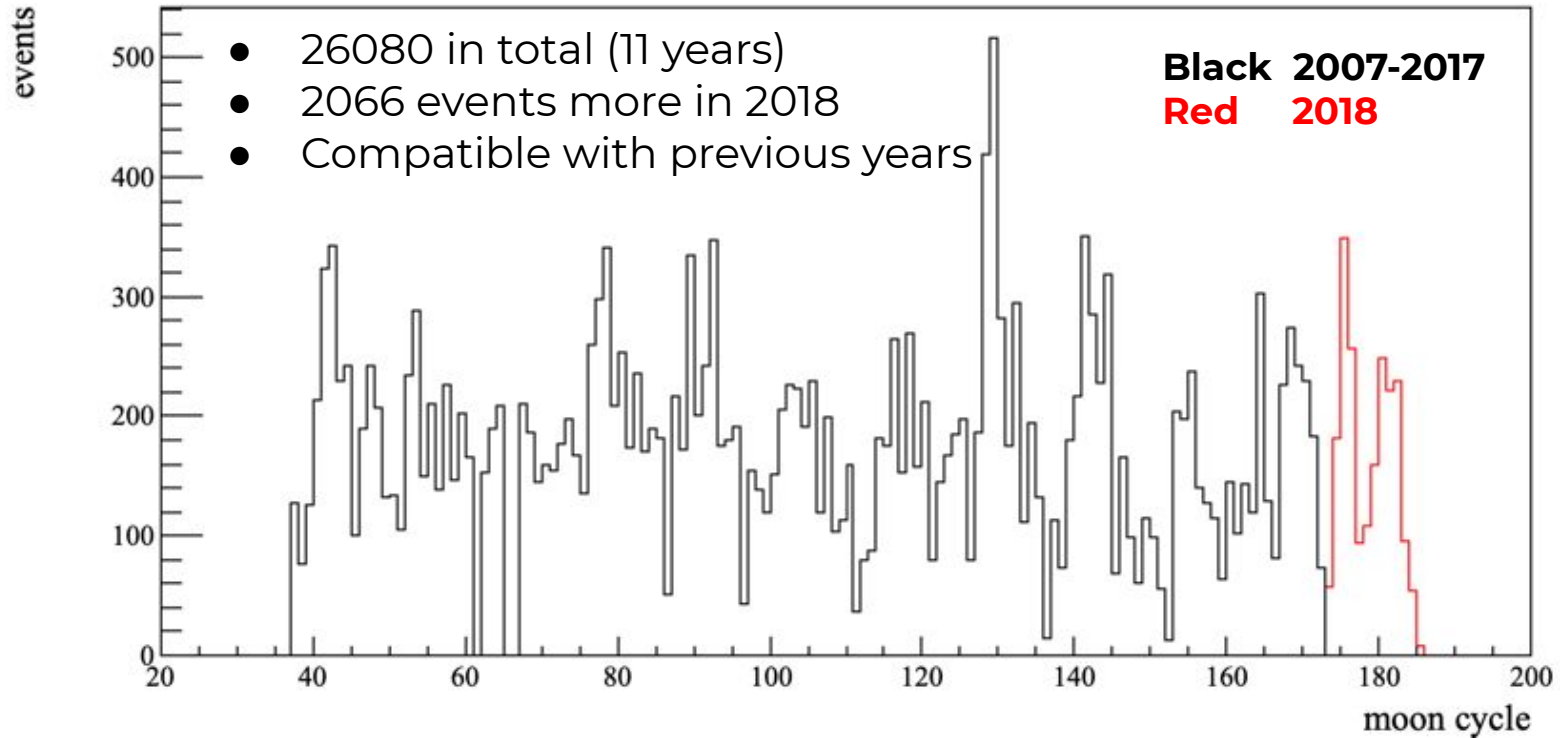
---

- skipSaturated
- T3TimeAtGround
- T3Class 1.
- badFDPeriodRejection
- noBadPixelsInPulse ( **substitute the cut !badPixels 1** )
- hasMieDatabase
- maxVAOD 0.1
- cloudCutXmaxPRD14 { params: 1 nMinusOne: 21 -10.5 10.5 }
- maxCoreTankDist 1500.
- maxZenithFD 60.
- xMaxObsInExpectedFOV { params: 40 20 }
- maxDepthHole 20.
- energyError .2
- profileChi2Sigma { params: 3 -1.1 nMinusOne: 400 -20 20 }
- maxDepthHole 20.
- HDSpectrumDistance 1
- FidFOVICRC13 40 20

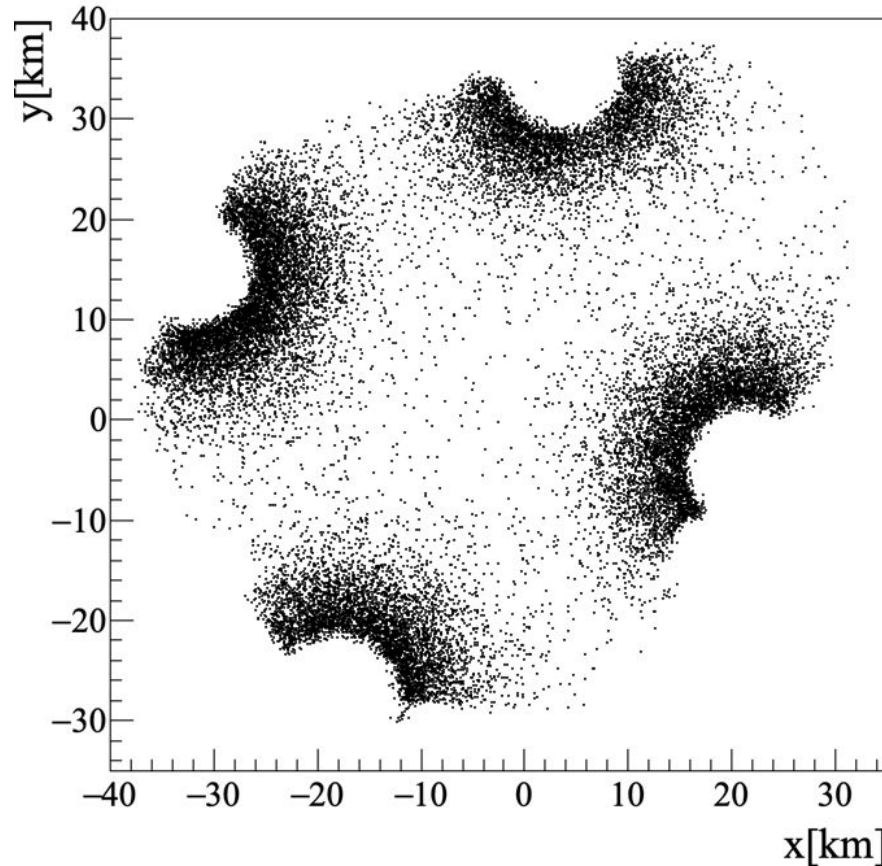
# Events for Hybrid Spectrum



# Events for Hybrid Spectrum

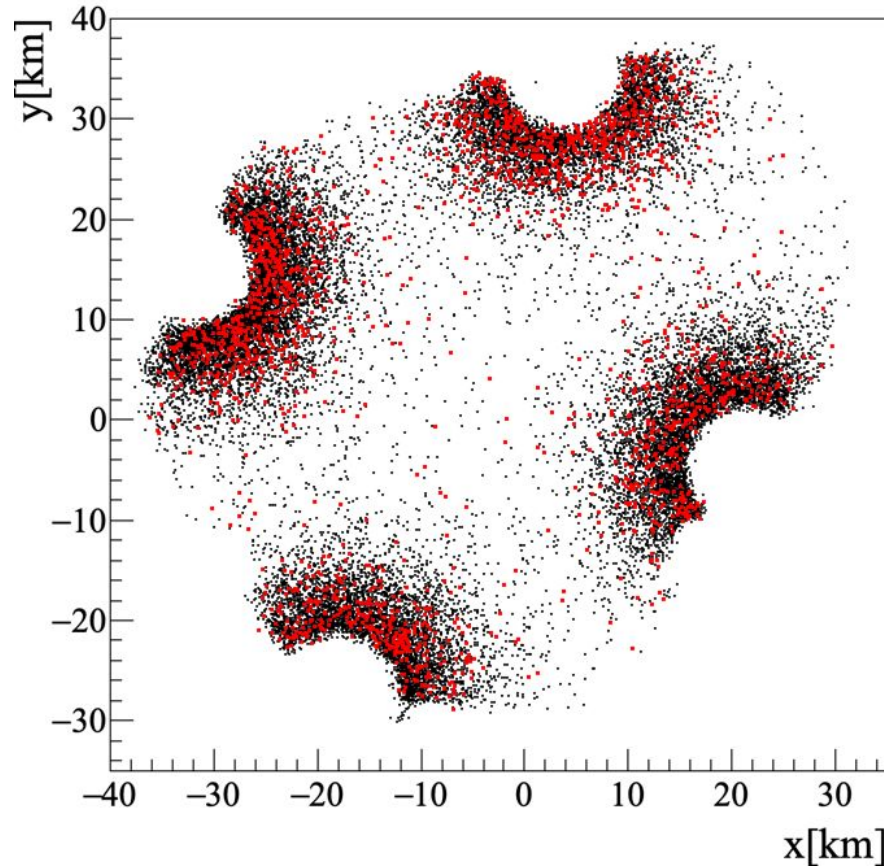


# Core distribution at ground



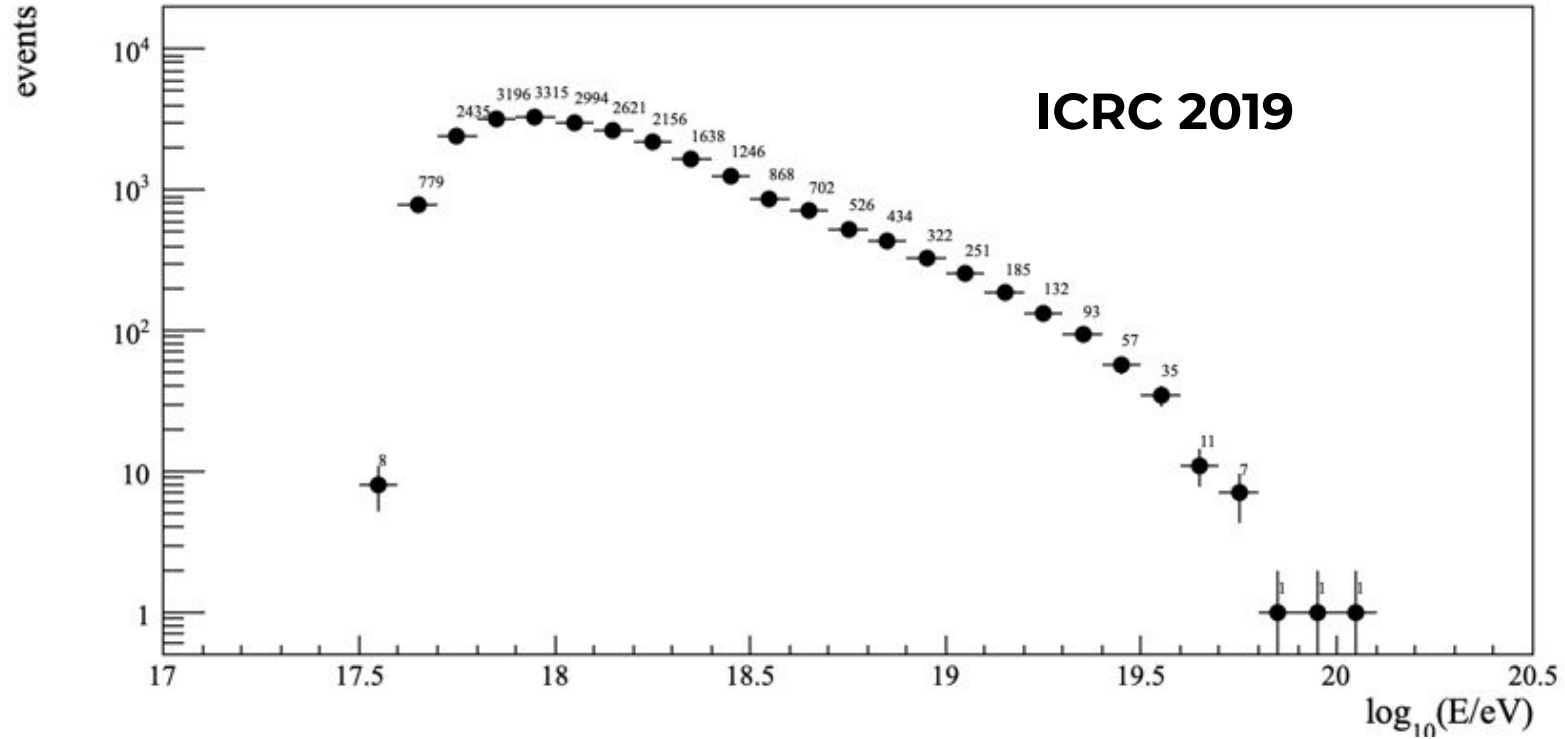
**ICRC 2019**

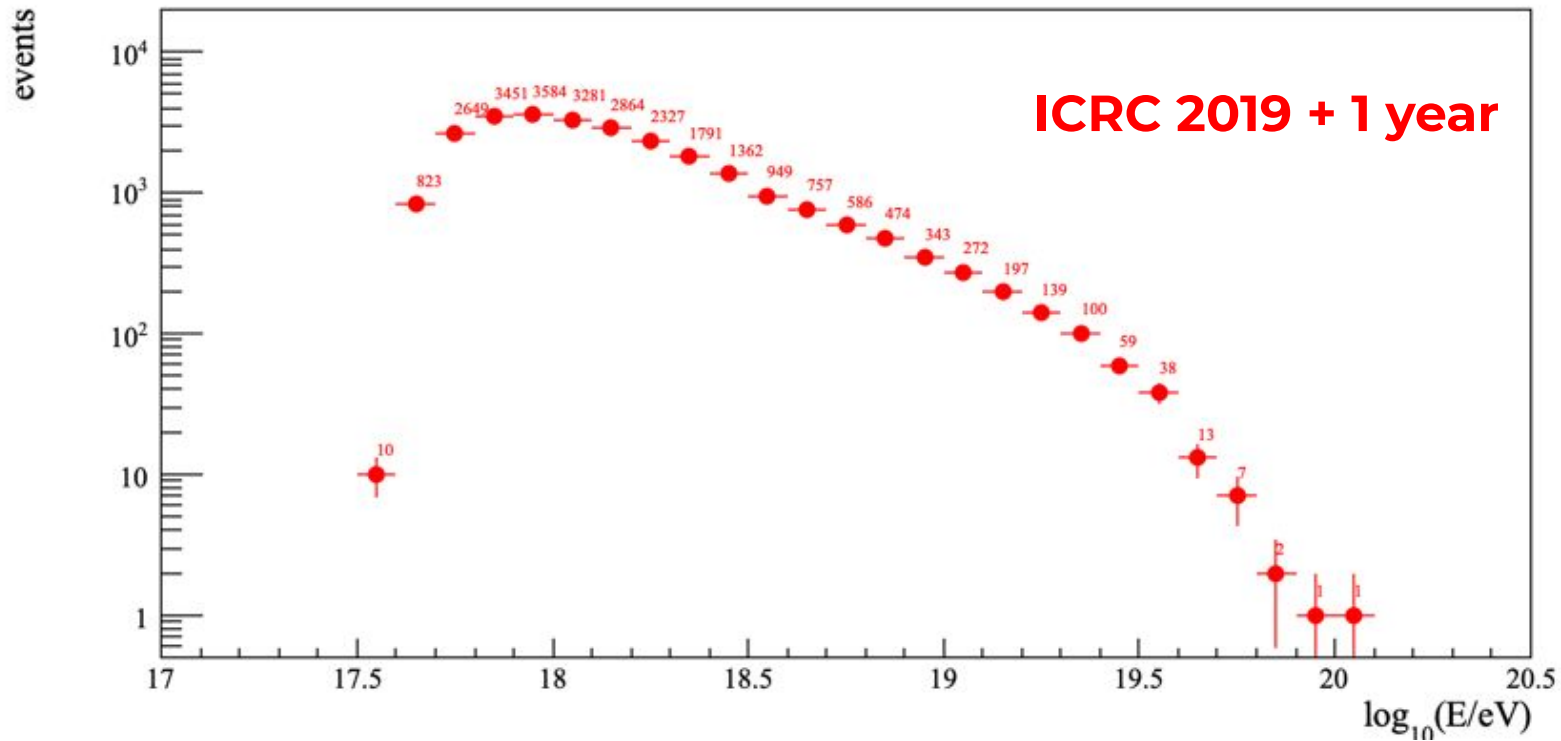
# Core distribution at ground



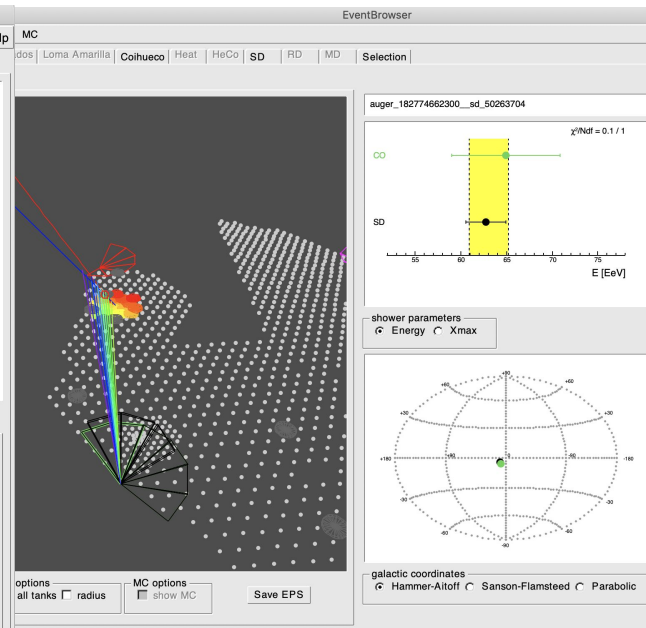
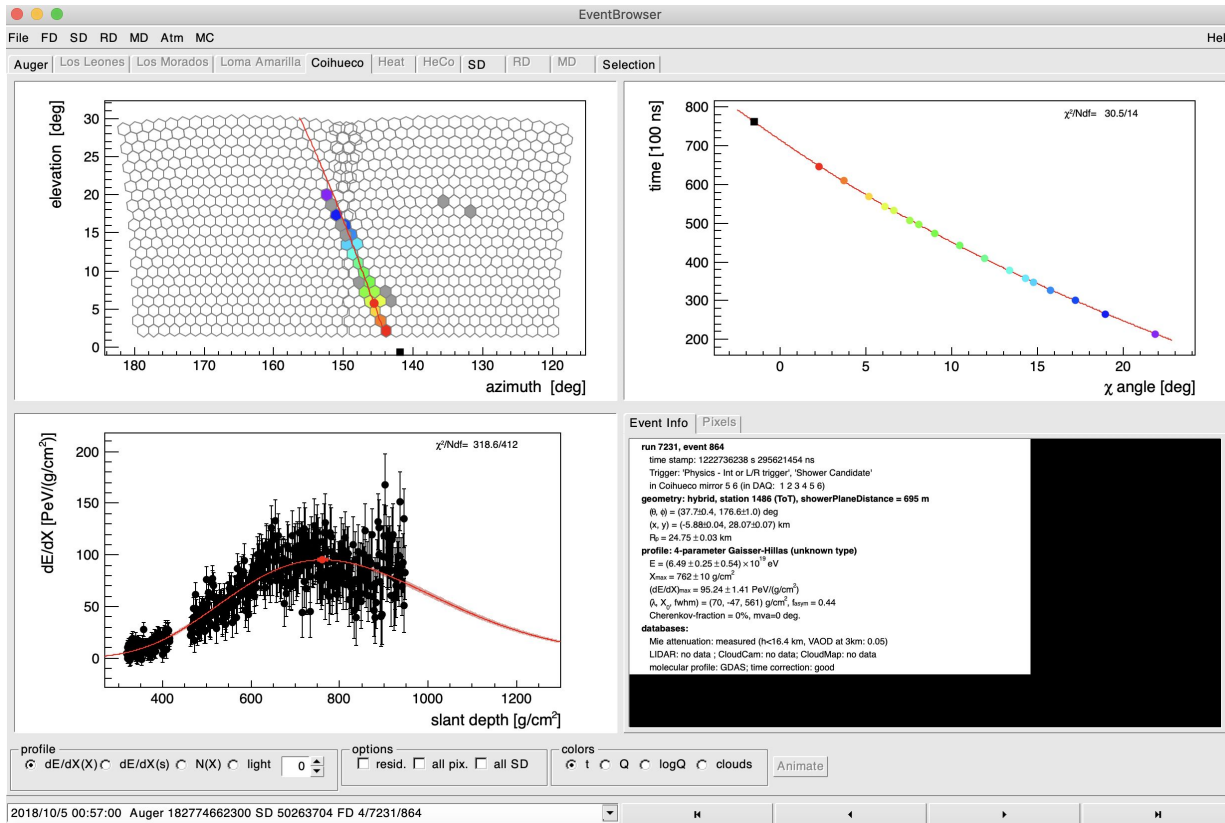
**2018 events**







# The highest energy event of 2018



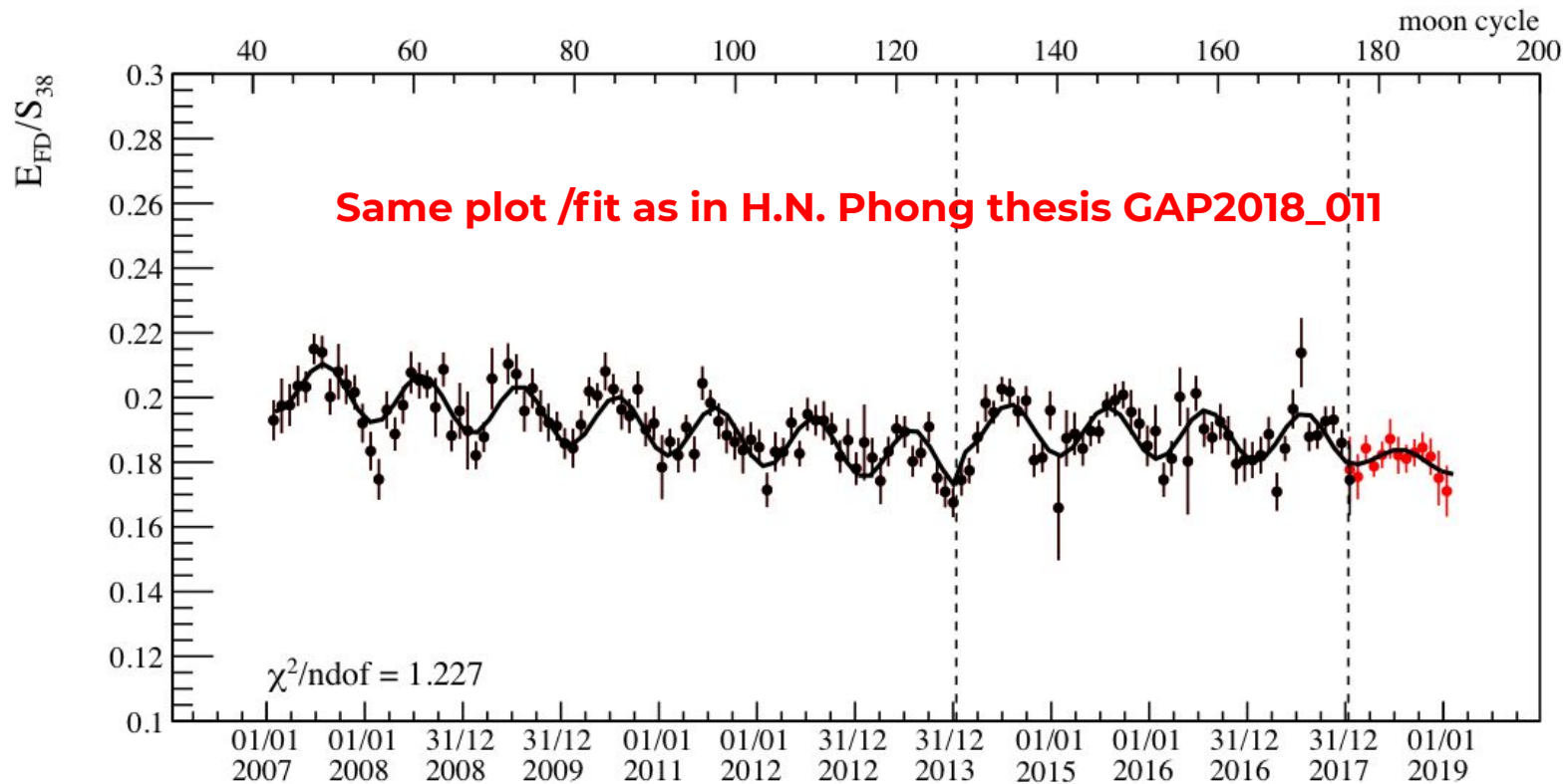
5 Oct 2018 CO 5(hottest)-6

$E_{FD}$  [EeV] = 64.93 +/- 5.94

$E_{SD}$  [EeV] = 62.75 +/- 2.21

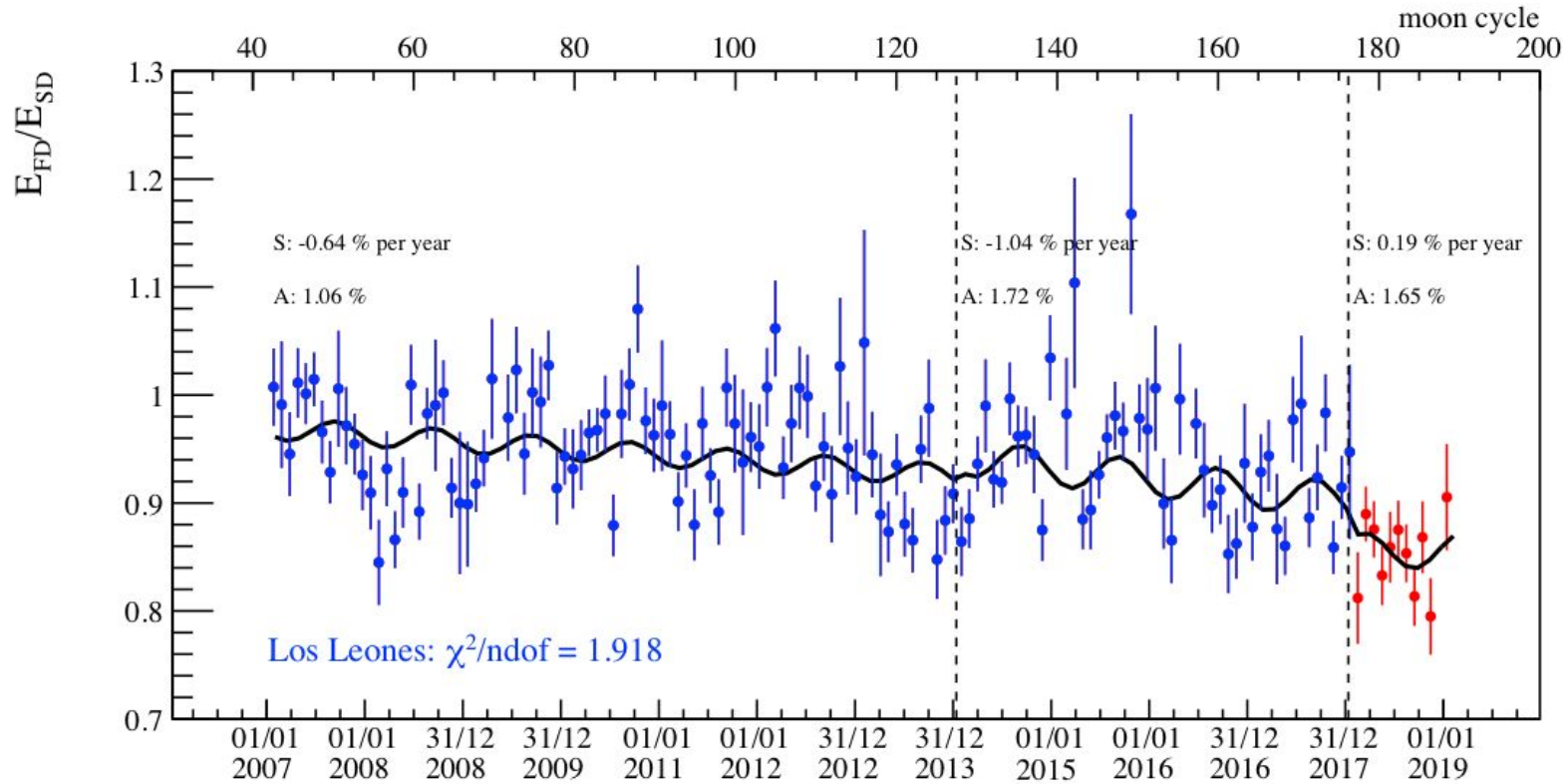
$X_{max}$  [g/cm<sup>2</sup>] = 761.7 +/- 9.5

# Energy drift: EFD/S38

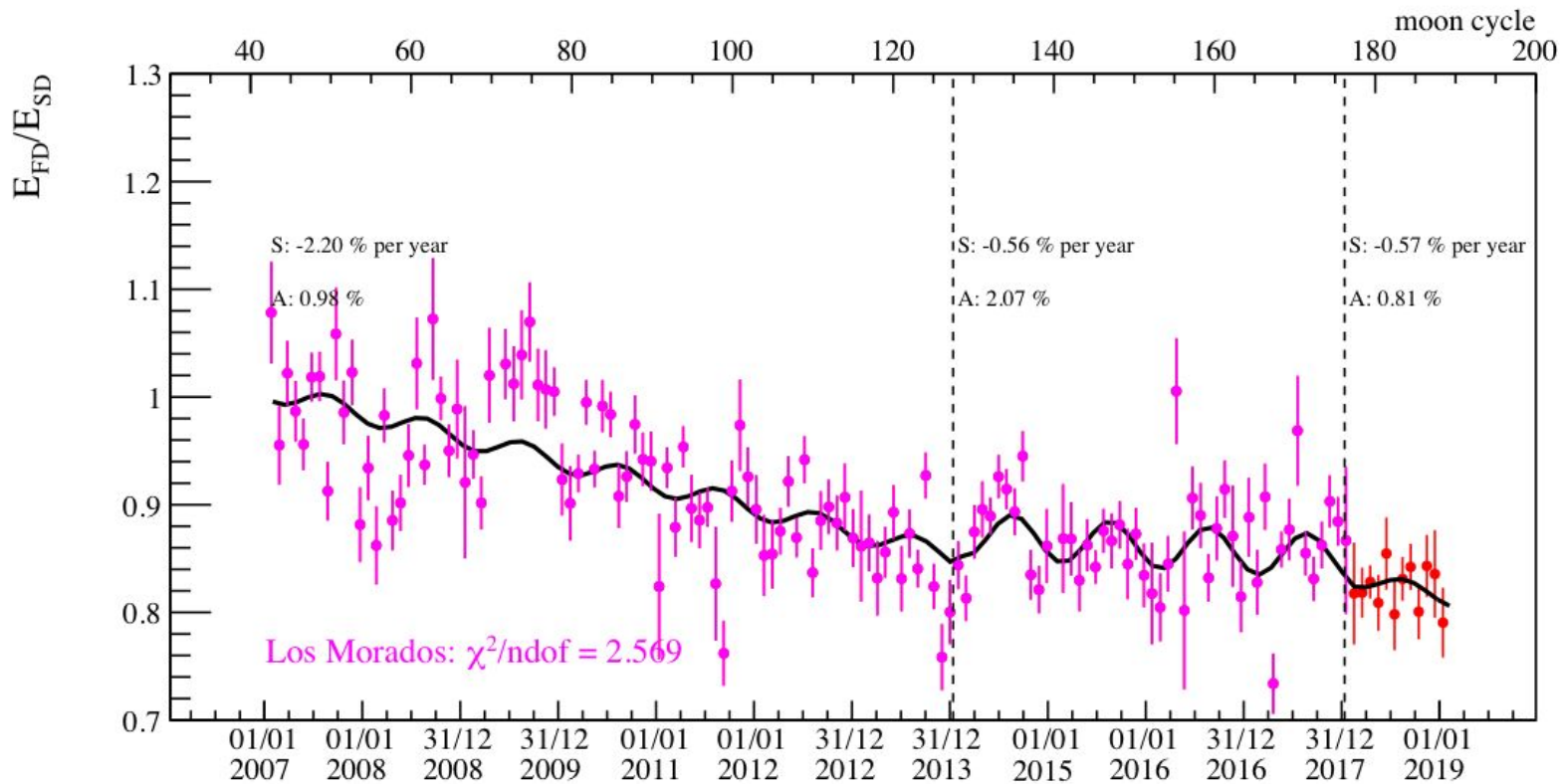




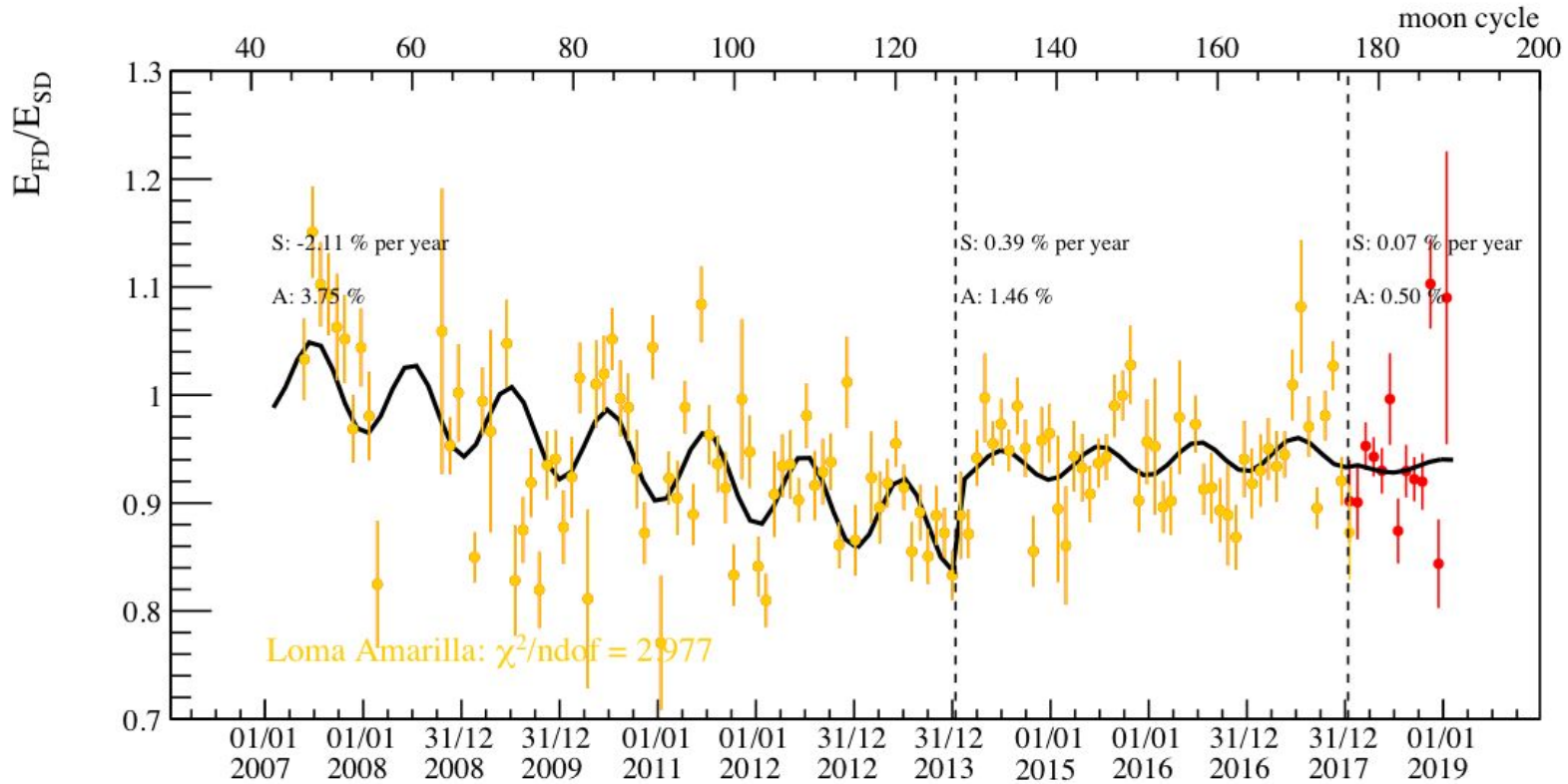
# Energy drift: Los Leones



# Energy drift: Los Morados

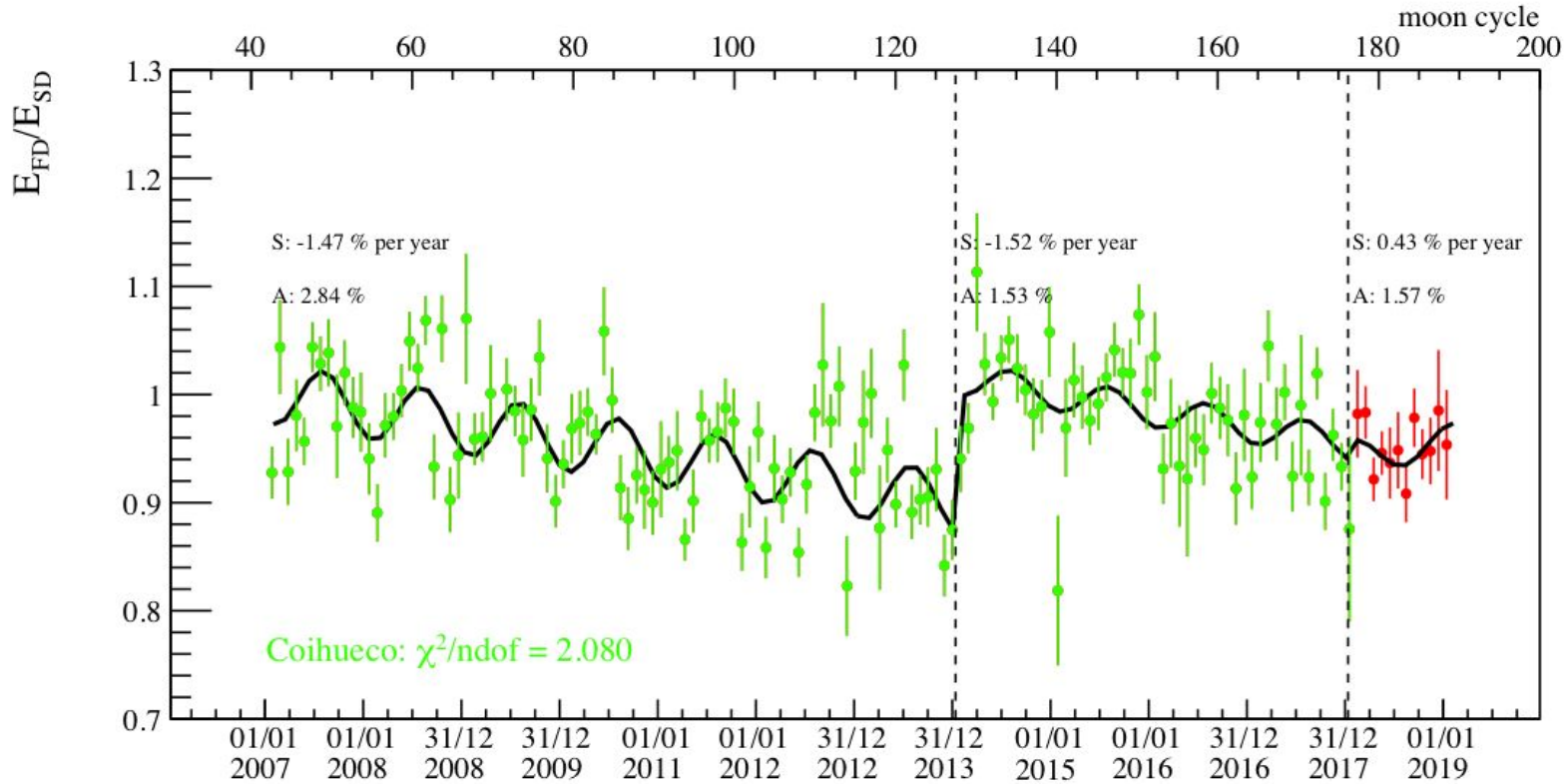


# Energy drift: Loma Amarilla



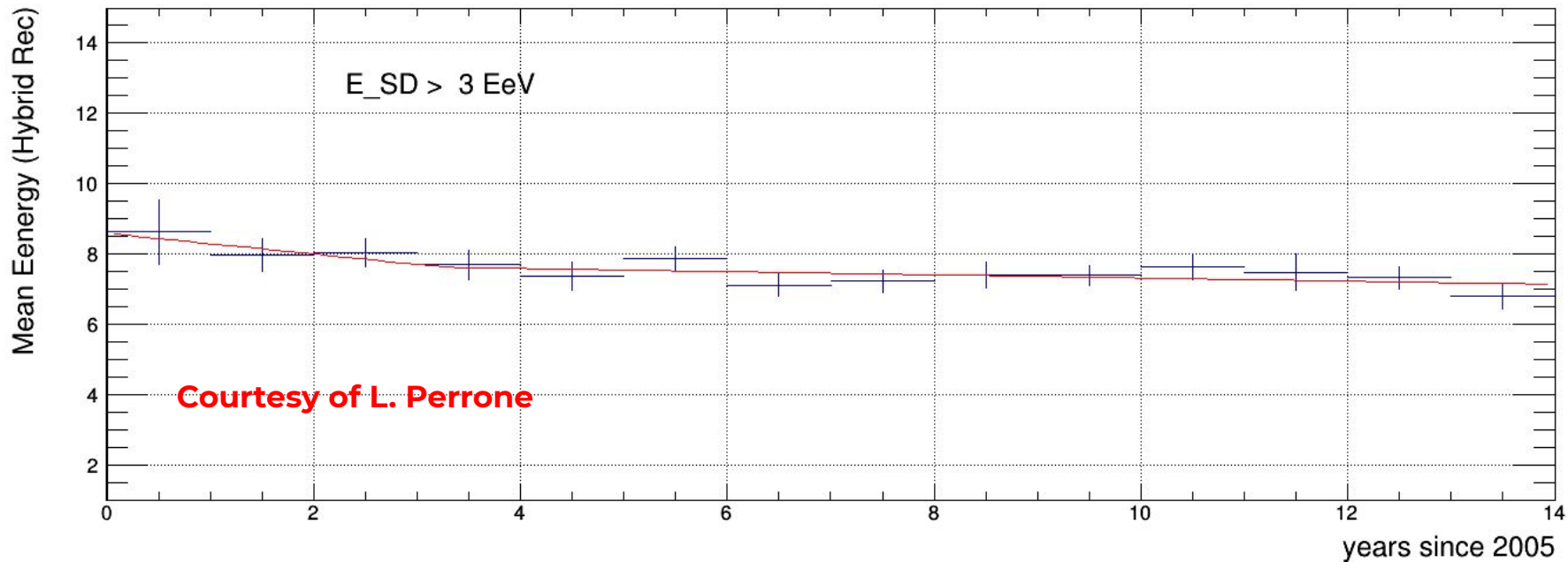


# Energy drift: Coihueco



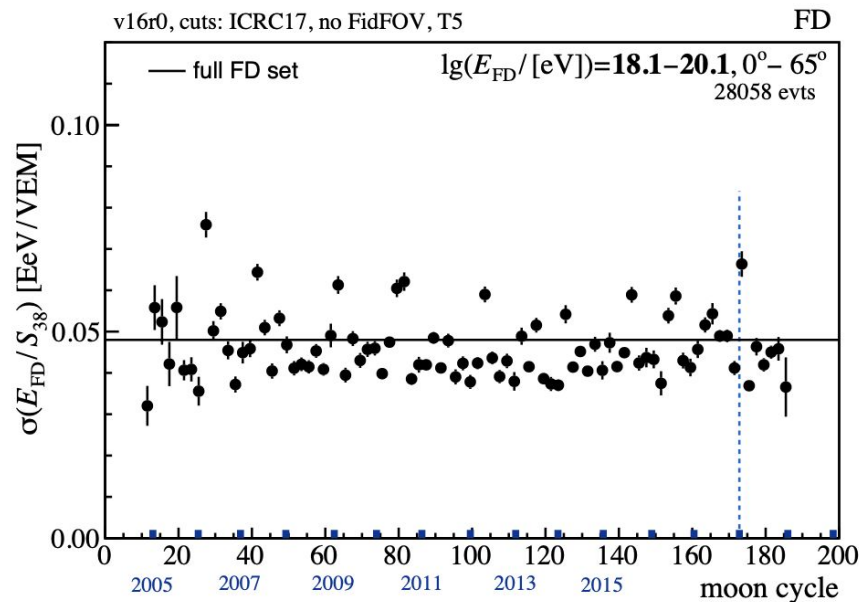
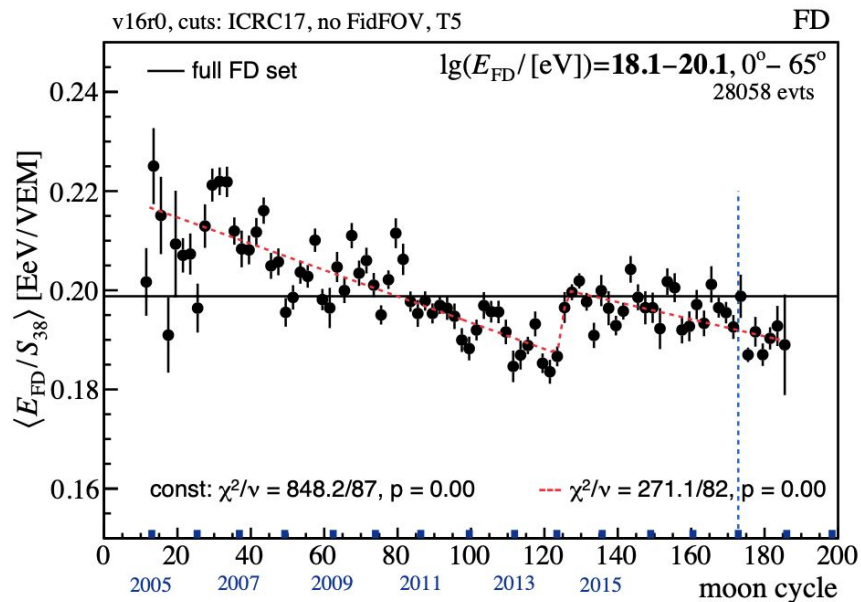
# Energy drift

Same plot as before but on a yearly basis, done with Lecce pre-production



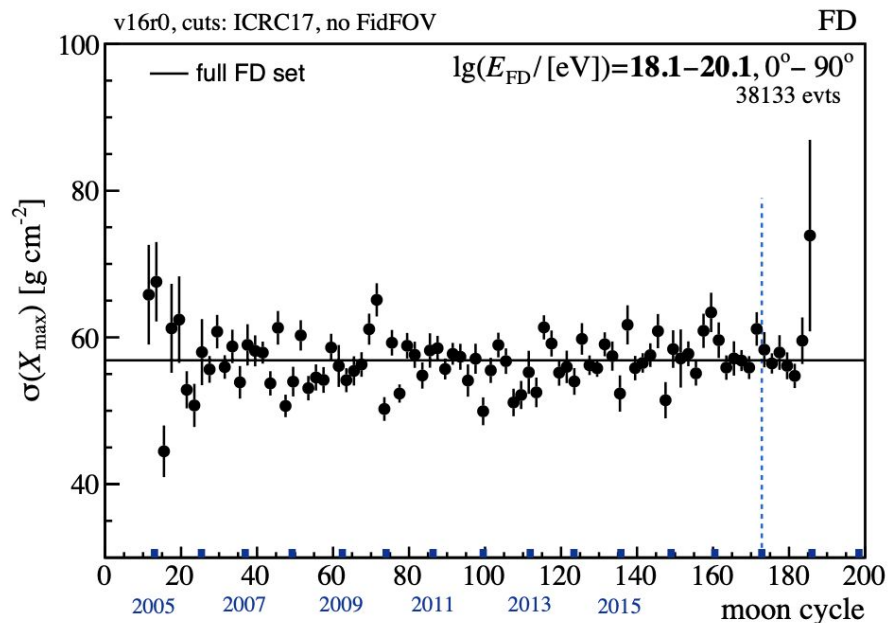
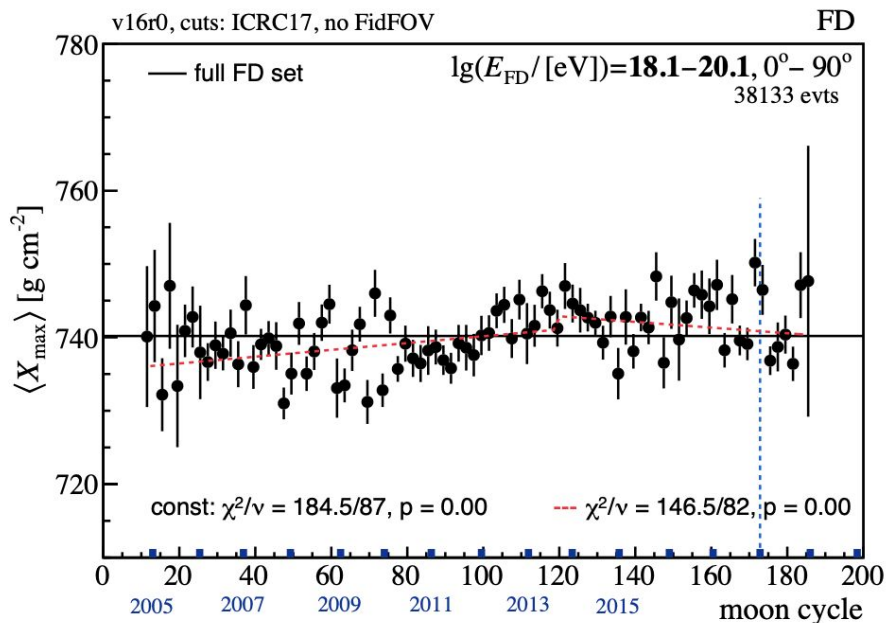
# Energy drift

Similar plots done by Alexey show same trend

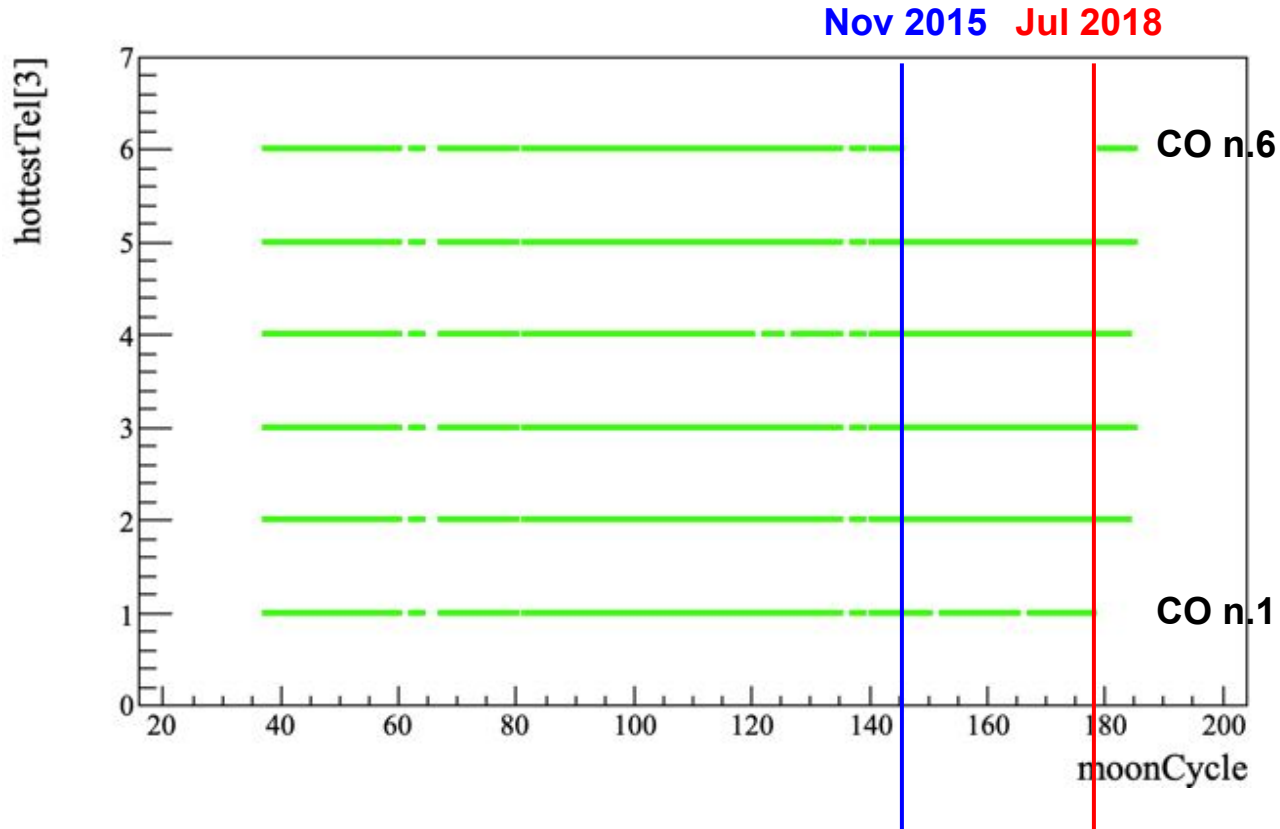


# Xmax drift

similar trend in Xmax seen by Alexey



# CO SLT module issue

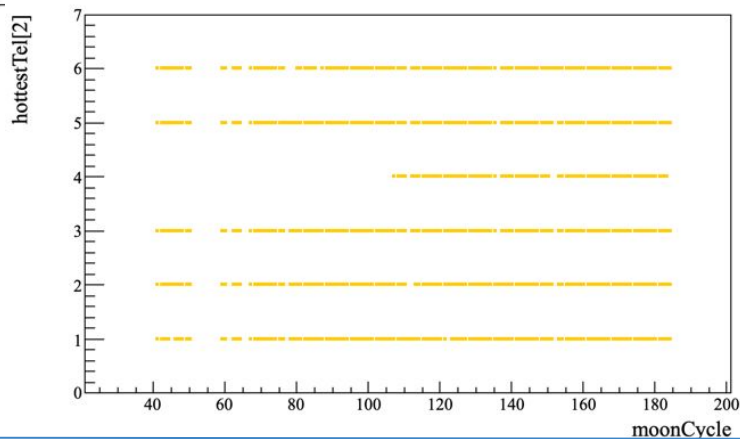
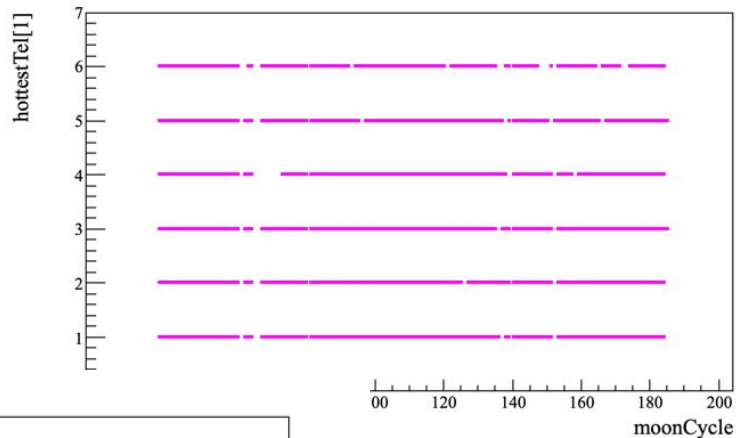
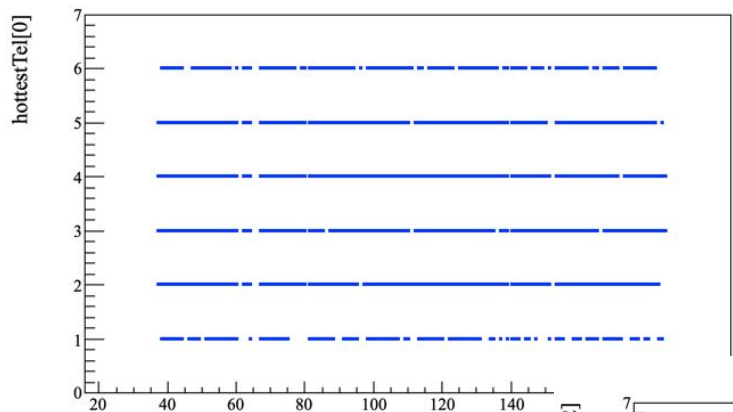


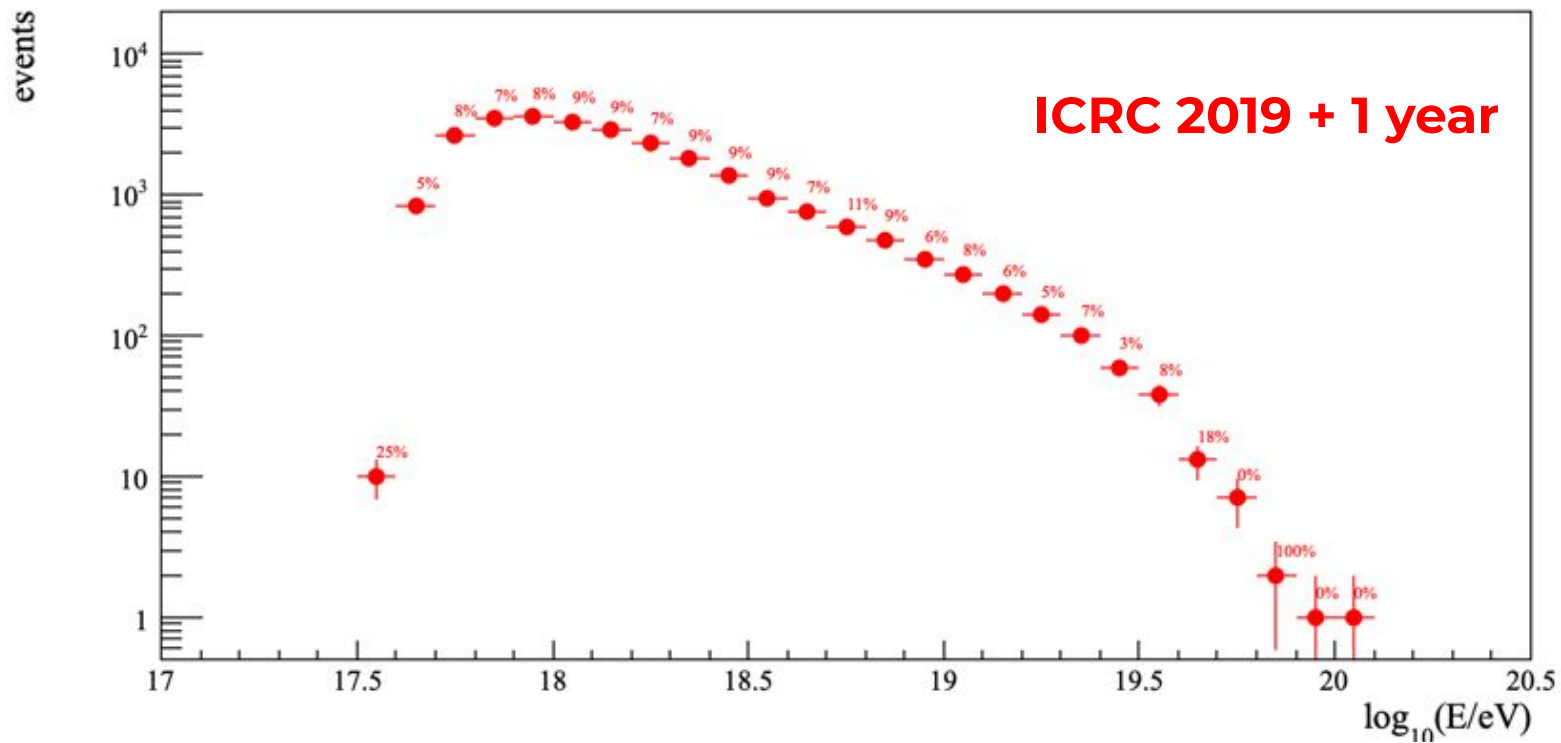
# Summary

---

- A. v16r0 production available
- B. Hybrid data available till Dec 2018
- C. 1 new highest energy event in Hybrid data,  
E= 65 EeV
- D.  $E_{FD}/E_{SD}$  vs time shows a possible issue in  
2018 data. To be investigated
- E. CO6 issue: correct on-time calculation from  
monitoring DB

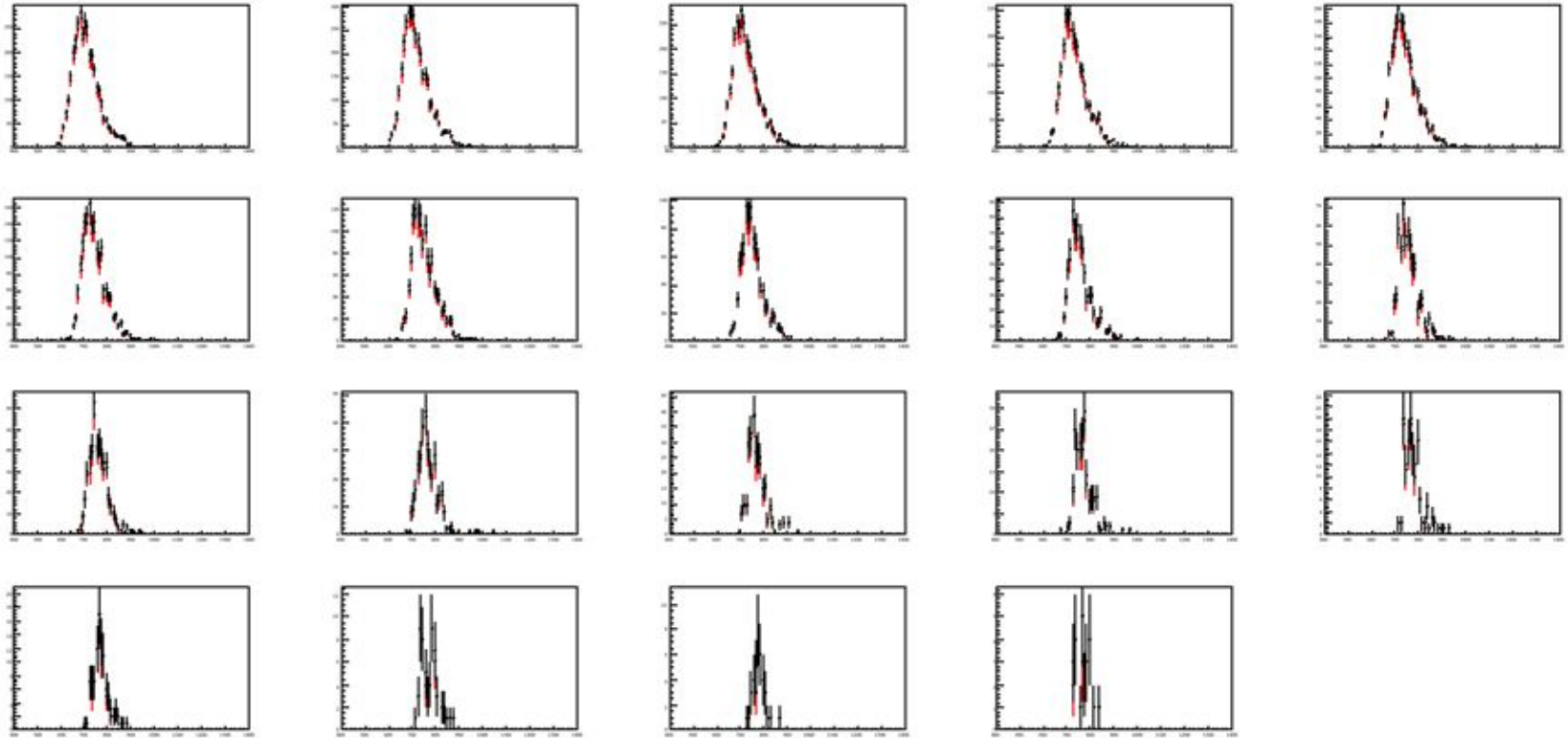
# SLT module issue (other FD sites)



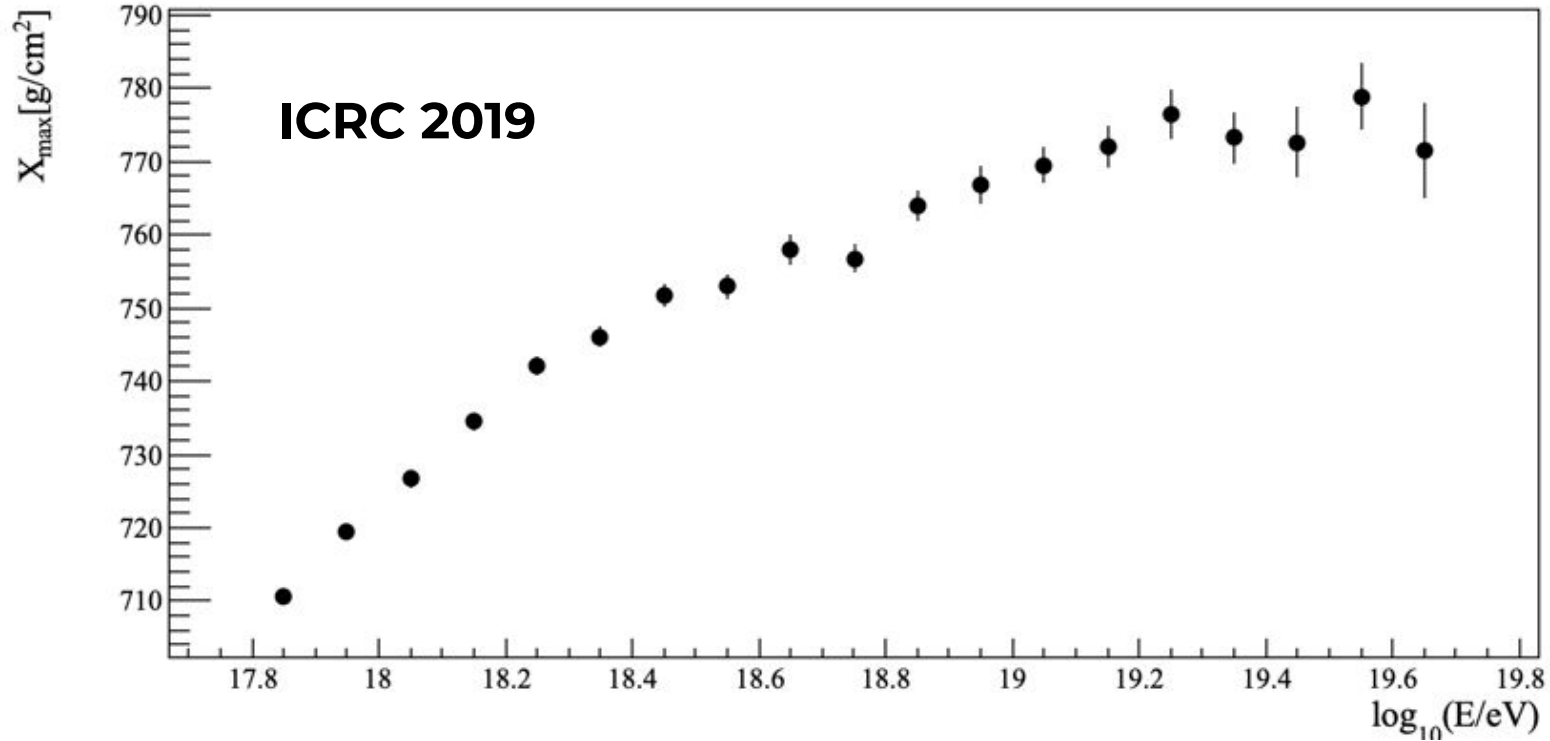




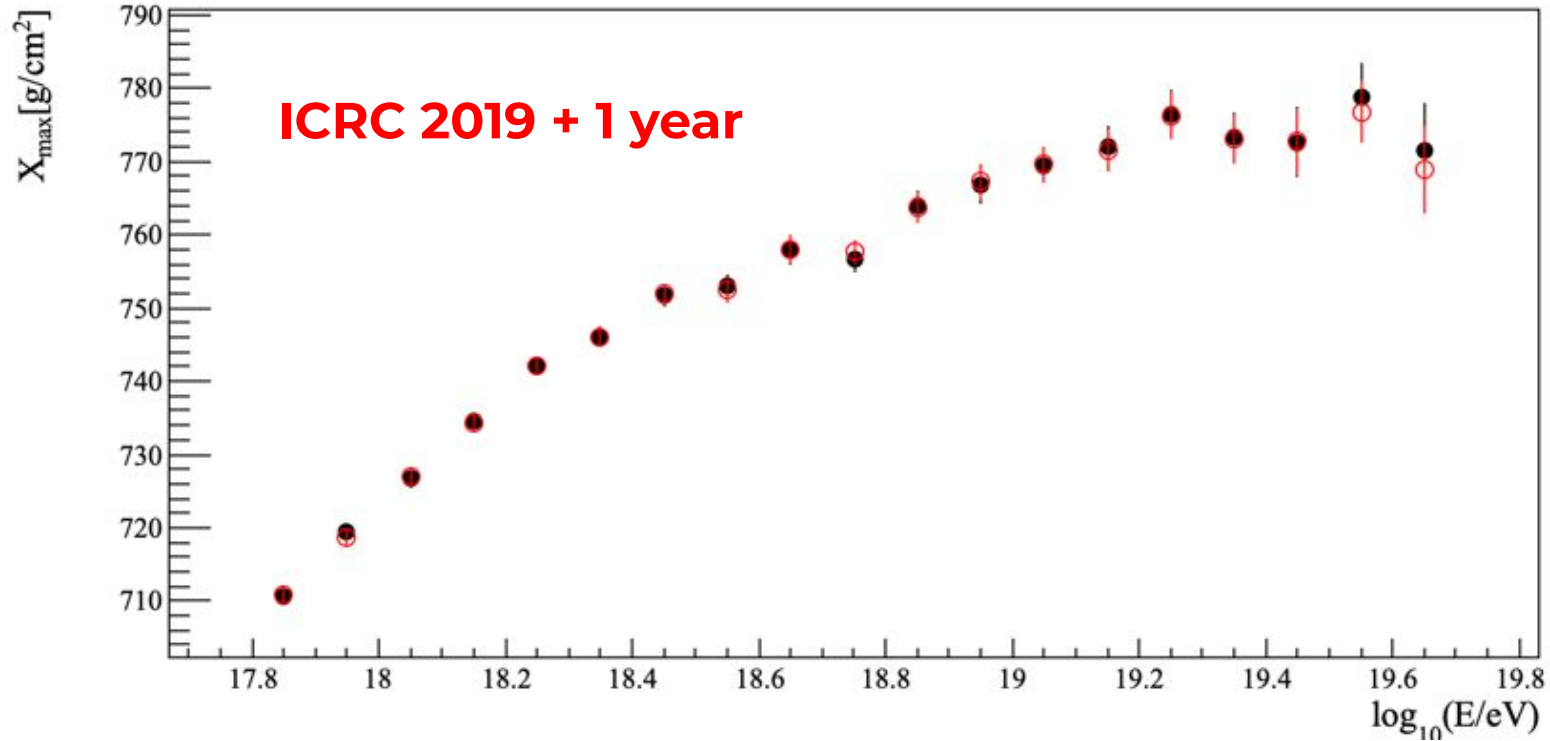
# Xmax



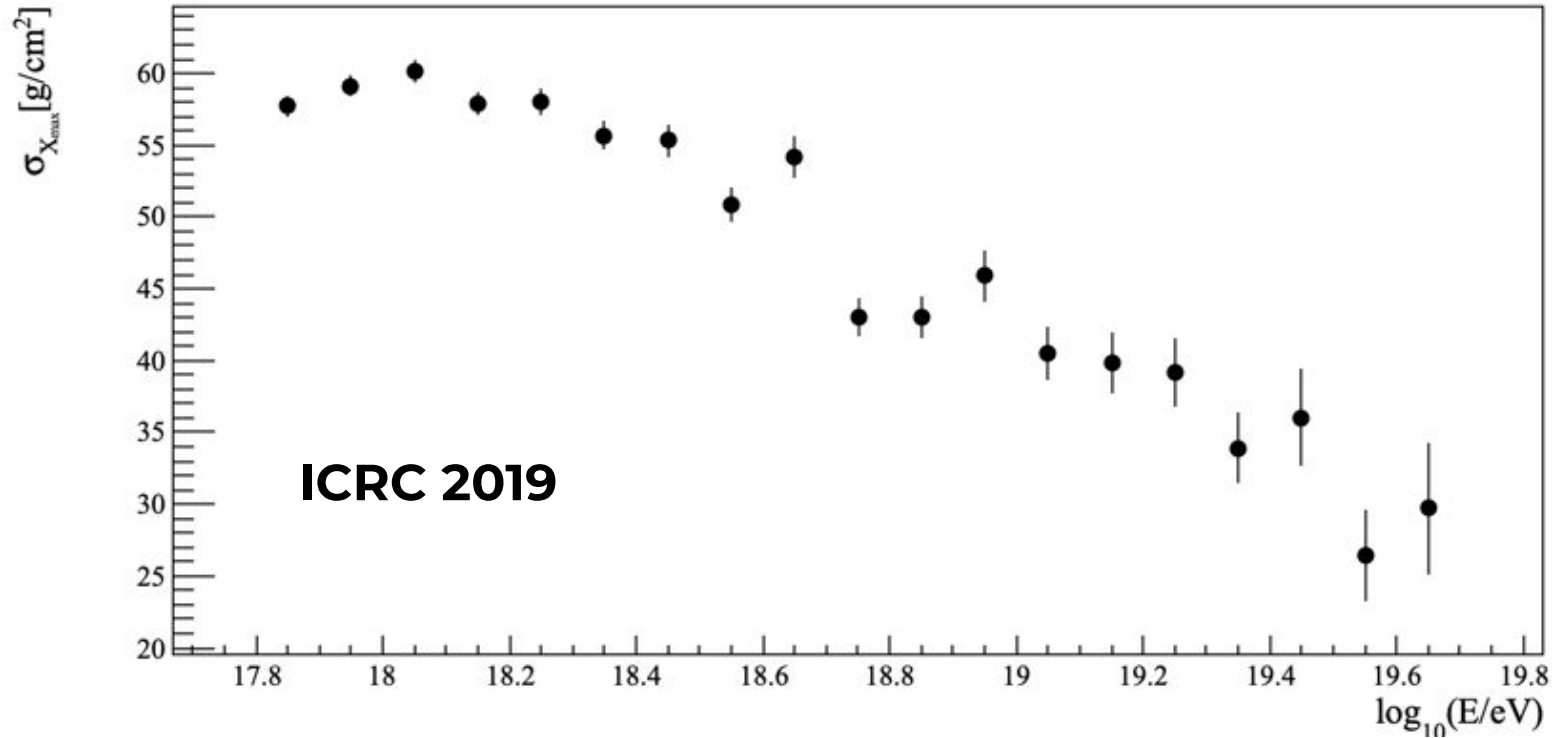
# X<sub>max</sub> (just a consistency check)



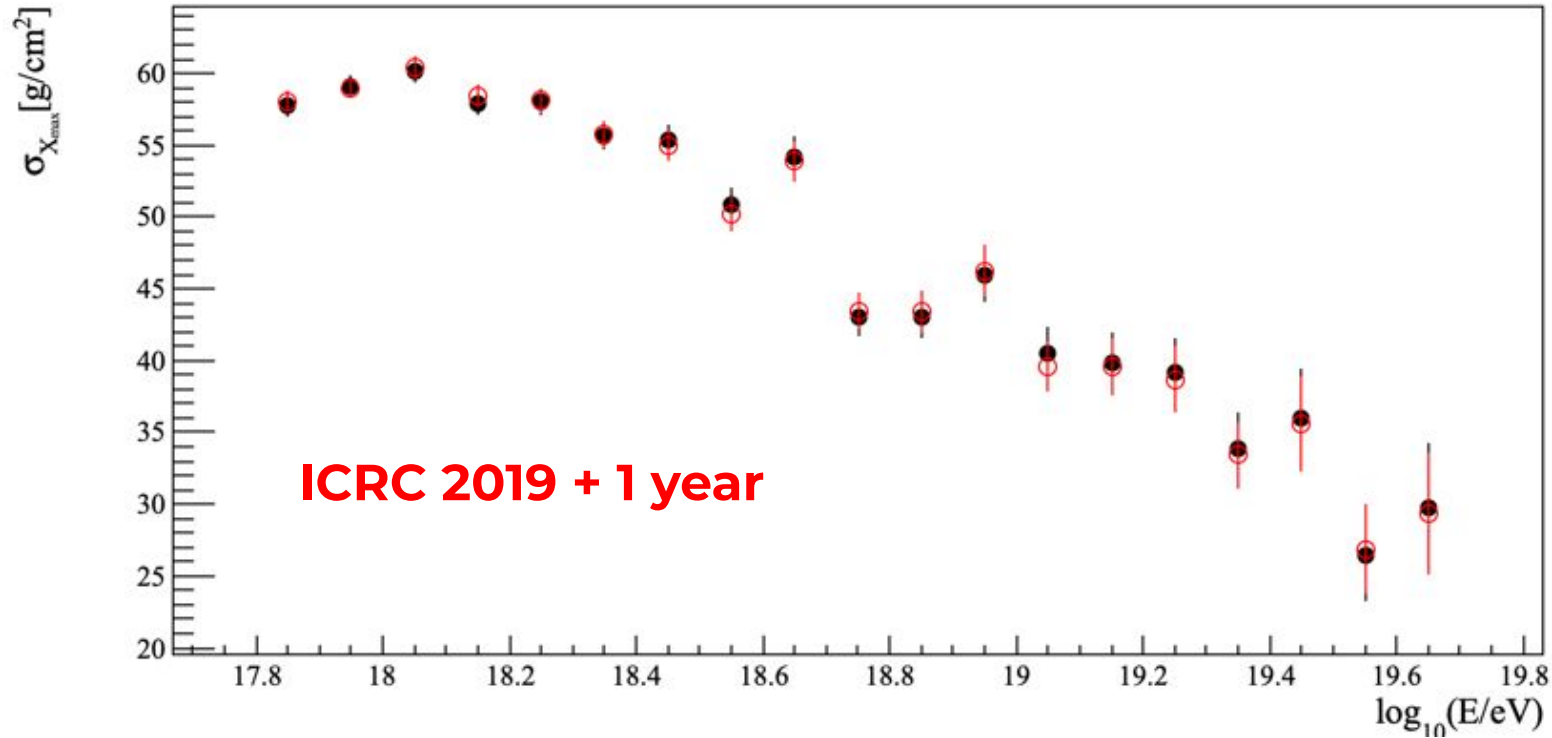
# X<sub>max</sub> (just a consistency check)



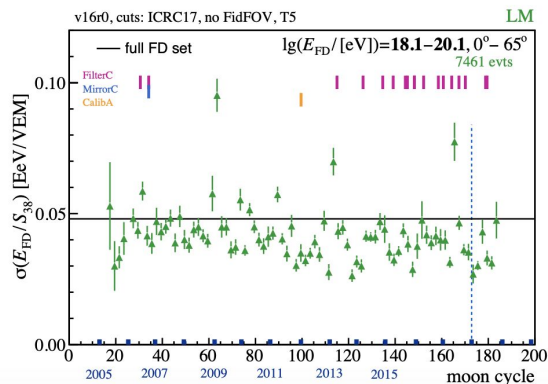
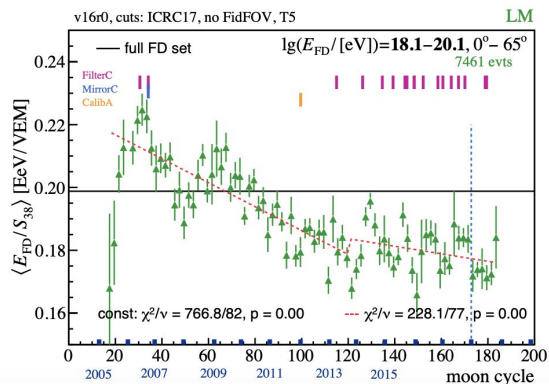
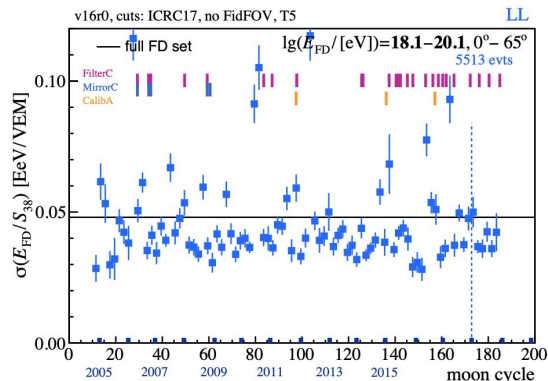
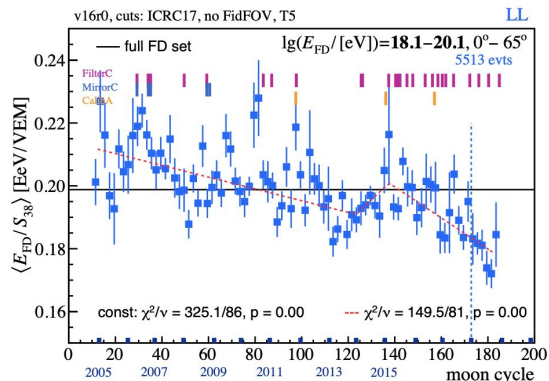
# Xmax RMS (just a consistency check)



# Xmax RMS (just a consistency check)



# Xmax Alexey



# Xmax Alexey

