

# Studies on Furbush decreases

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EEEmeeting@CentroFermi

# Outline

- Information useful for rate correction
- Database of good data for the search
- Attempts of rate corrections
- Some test on old well known Forbush
- What's next...

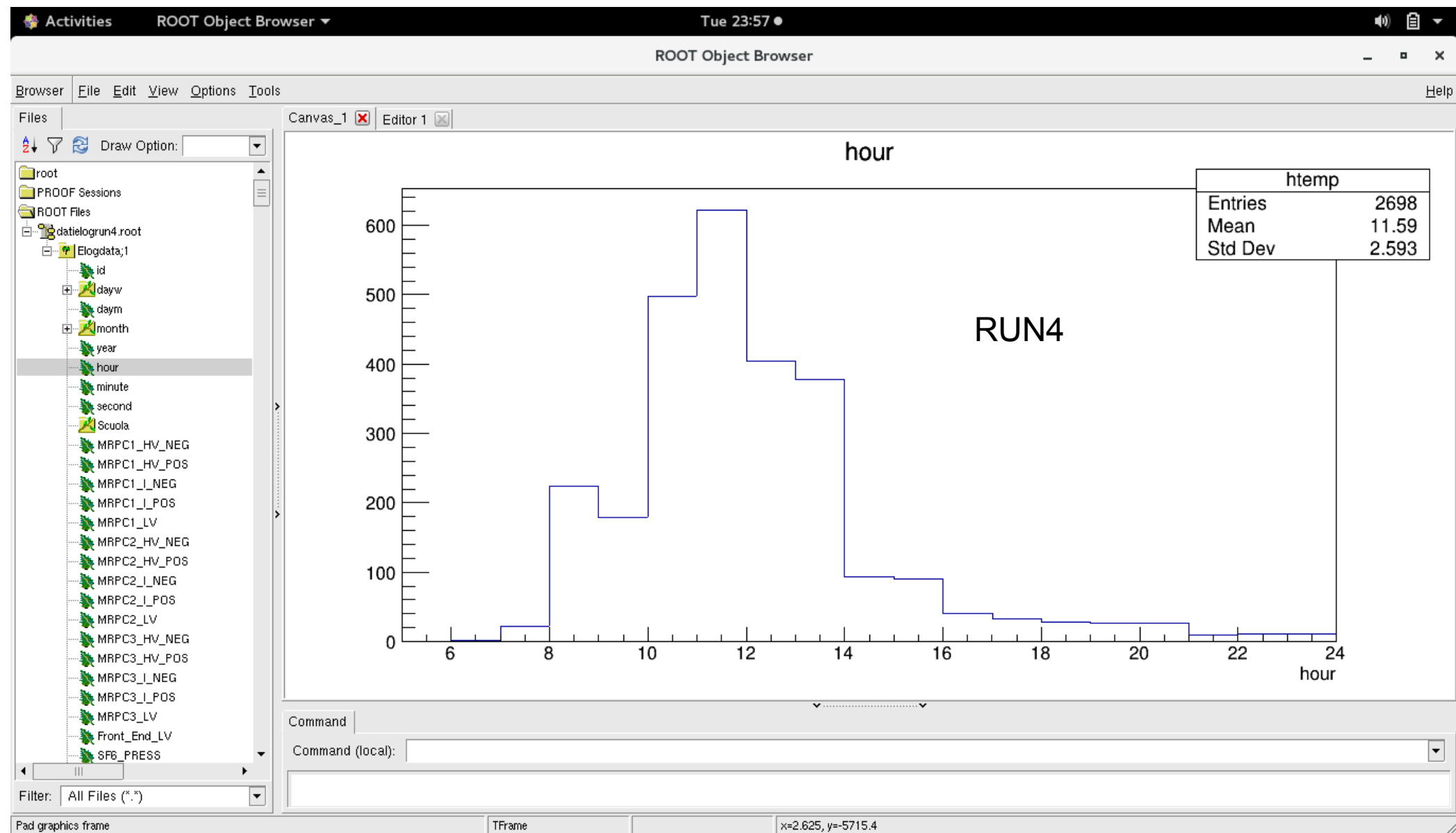
# Information useful for rate correction

We extract all data from logbook of run5 and run4 (thanks to Frabrizio C.) in srv format and we convert these information in a root, for each telescopes.

It could be very useful to avoid in the logbook any strange values, like negative quantity, or numbers written with commas instead dot.... This could simplify a lot the conversion process.

```
Elogdata.Branch("id",&id,"id/I");
Elogdata.Branch("dayw","string",&dayw);
Elogdata.Branch("daym",&daym,"daym/I");
Elogdata.Branch("month","string",&month);
Elogdata.Branch("year",&year,"year/I");
Elogdata.Branch("hour",&hour,"hour/I");
Elogdata.Branch("minute",&minute,"minute/I");
Elogdata.Branch("second",&second,"second/I");
Elogdata.Branch("Scuola","string",&Scuola);
Elogdata.Branch("MRPC1_HV_NEG",&MRPC1_HV_NEG,"MRPC1_HV_NEG/F");
Elogdata.Branch("MRPC1_HV_POS",&MRPC1_HV_POS,"MRPC1_HV_POS/F");
Elogdata.Branch("MRPC1_I_NEG",&MRPC1_I_NEG,"MRPC1_I_NEG/F");
Elogdata.Branch("MRPC1_I_POS",&MRPC1_I_POS,"MRPC1_I_POS/F");
Elogdata.Branch("MRPC1_LV",&MRPC1_LV,"MRPC1_LV/F");
Elogdata.Branch("MRPC2_HV_NEG",&MRPC2_HV_NEG,"MRPC2_HV_NEG/F");
Elogdata.Branch("MRPC2_HV_POS",&MRPC2_HV_POS,"MRPC2_HV_POS/F");
Elogdata.Branch("MRPC2_I_NEG",&MRPC2_I_NEG,"MRPC2_I_NEG/F");
Elogdata.Branch("MRPC2_I_POS",&MRPC2_I_POS,"MRPC2_I_POS/F");
Elogdata.Branch("MRPC2_LV",&MRPC2_LV,"MRPC2_LV/F");
Elogdata.Branch("MRPC3_HV_NEG",&MRPC3_HV_NEG,"MRPC3_HV_NEG/F");
Elogdata.Branch("MRPC3_HV_POS",&MRPC3_HV_POS,"MRPC3_HV_POS/F");
Elogdata.Branch("MRPC3_I_NEG",&MRPC3_I_NEG,"MRPC3_I_NEG/F");
Elogdata.Branch("MRPC3_I_POS",&MRPC3_I_POS,"MRPC3_I_POS/F");
Elogdata.Branch("MRPC3_LV",&MRPC3_LV,"MRPC3_LV/F");
Elogdata.Branch("Front_End_LV",&Front_End_LV,"Front_End_LV/F");
Elogdata.Branch("SF6_PRESS",&SF6_PRESS,"SF6_PRESS/F");
Elogdata.Branch("C2H2F4_PRESS",&C2H2F4_PRESS,"C2H2F4_PRESS/F");
Elogdata.Branch("SF6_TEMP",&SF6_TEMP,"SF6_TEMP/F");
Elogdata.Branch("C2H2F4_TEMP",&C2H2F4_TEMP,"C2H2F4_TEMP/F");
Elogdata.Branch("Temp",&Temp,"Temp/F");
Elogdata.Branch("Press",&Press,"Press/F");
Elogdata.Branch("Rate",&Rate,"Rate/F");
```

# Information useful for rate correction



# Database of good data for the seach

Strategy was to copy in a root-file for each run and for each telescopes the minimum information useful to look for a Forbush effect on rate.

The implemented macro is also runnable at CNAF (thanks to Carmelo P. and Francesco N.) and is able to chain automatically all root files of a telescopes in (recon2), to sort chronologically and to perform the copy of the followign information:

```
Albero.Branch("RunDuration",&RunDuration,"RunDuration/F");
Albero.Branch("RunStart",&RunStart,"RunStart/F");
Albero.Branch("RunStop",&RunStop,"RunStop/F");
Albero.Branch("RunNumber",&RunNumber,"RunNumber/I");
Albero.Branch("ITemp",&ITemp,"ITemp/F");
Albero.Branch("Pressure",&Pressure,"Pressure/F");
Albero.Branch("NumHitEvents",&NumHitEvents,"NumHitEvents/F");
Albero.Branch("NumTrackEvents",&NumTrackEvents,"NumTrackEvents/F");
Albero.Branch("NumEvents", &NumEvents, "NumEvents/F");
Albero.Branch("year",&year,"year/I");
Albero.Branch("month",&month,"month/I");
Albero.Branch("day",&day,"day/I");
```

Maximum size of output root file ~12 Mb for older telescopes.

# Database of good data for the seach

## how to run the macro

To run the macro at CNAF you have to create a link to telescope in your home directory and then

you have to use the following commands

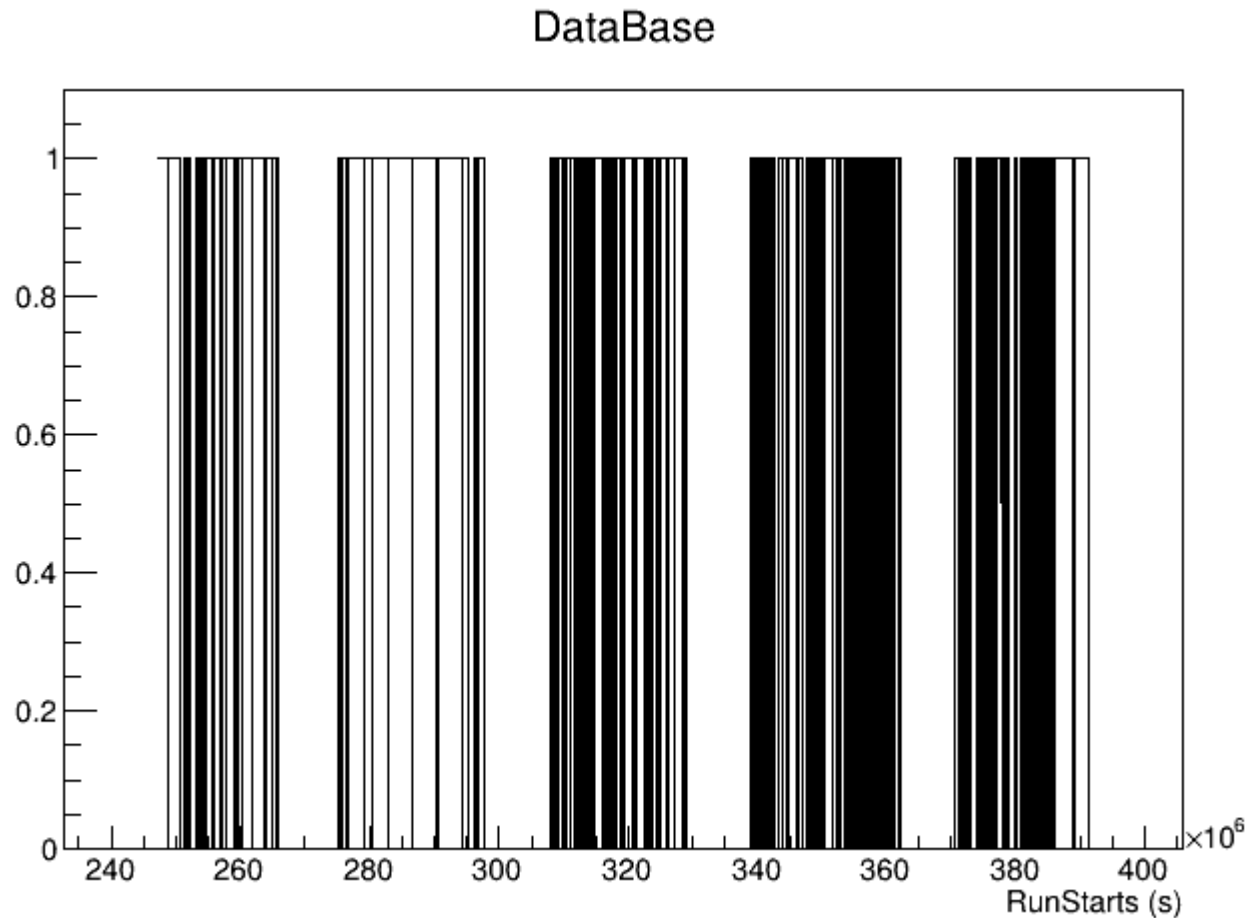
```
$ source scl_source enable devtoolset-6  
$ source /home/analisi/allcoinc/env.sh  
$ root -b -q -l cooldata2forbush.C++
```

The macro ask for the name of telescopes, and if you linked it correctly the macro will proceed up to the last registered run.

You can find root files produced for different **telescope** and the used code at <http://newcleo.unime.it/~gmandaglio75/>

If you find this work useful, I will load the code and the documentation on our area on github.

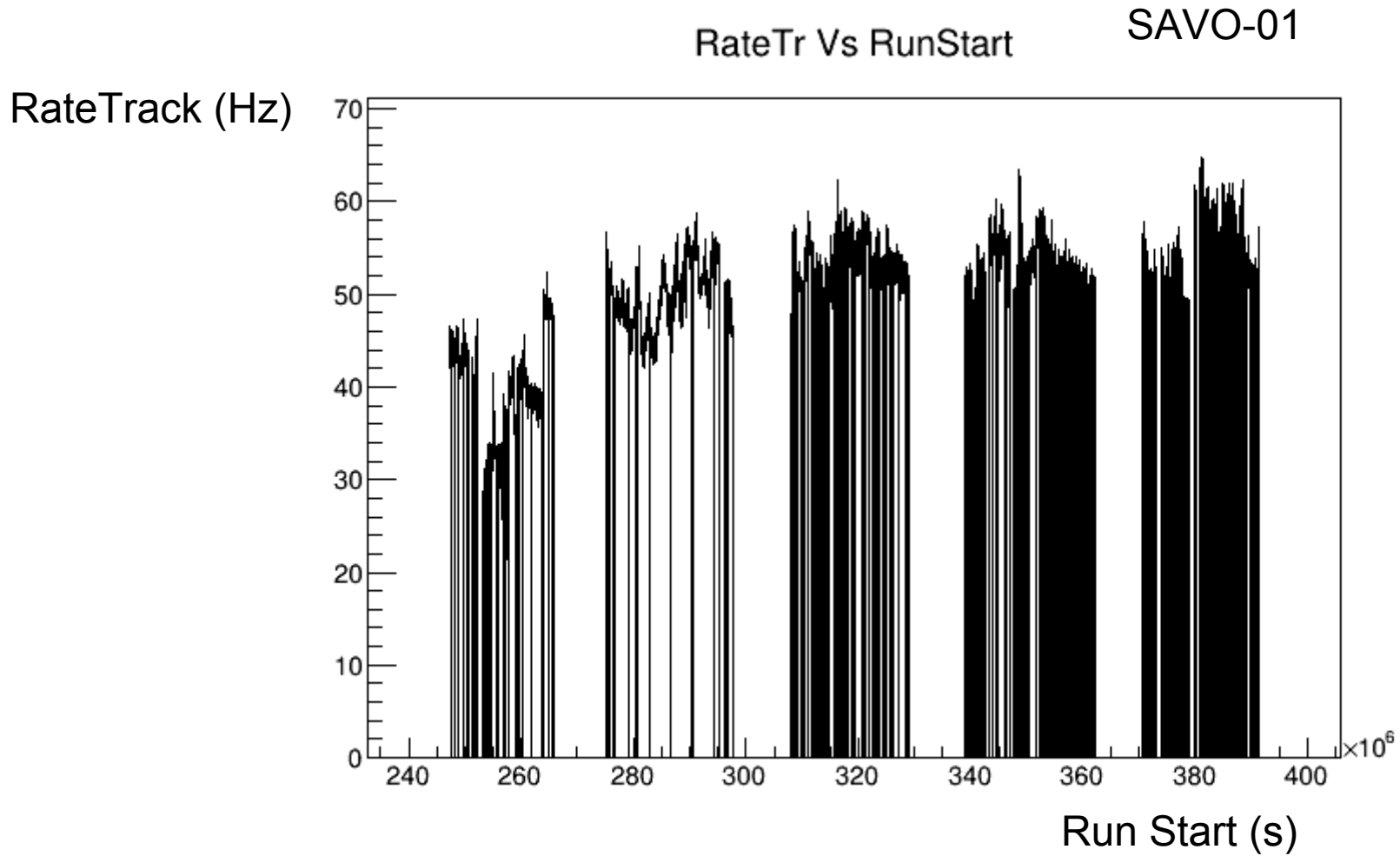
# Database of good data for the search



By using a simple TGraph, constructed assigned 1 in condition of continuous data-taking and assigned 0 when data-taking is stopped it is very easy to recover the information of telescopes active in a wished period.

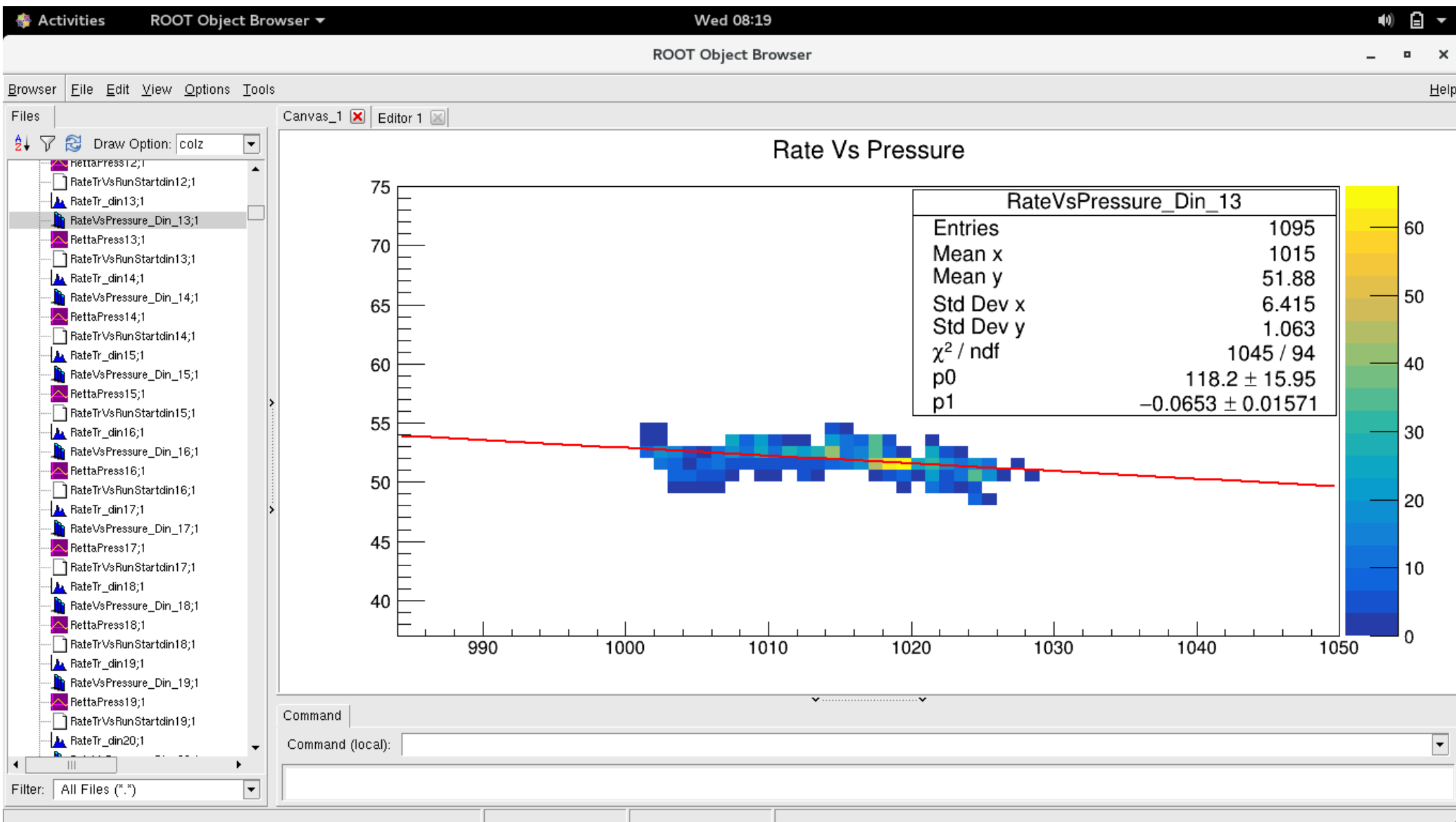
# Attempts of rate corrections

Rate of the track vesus run start / run

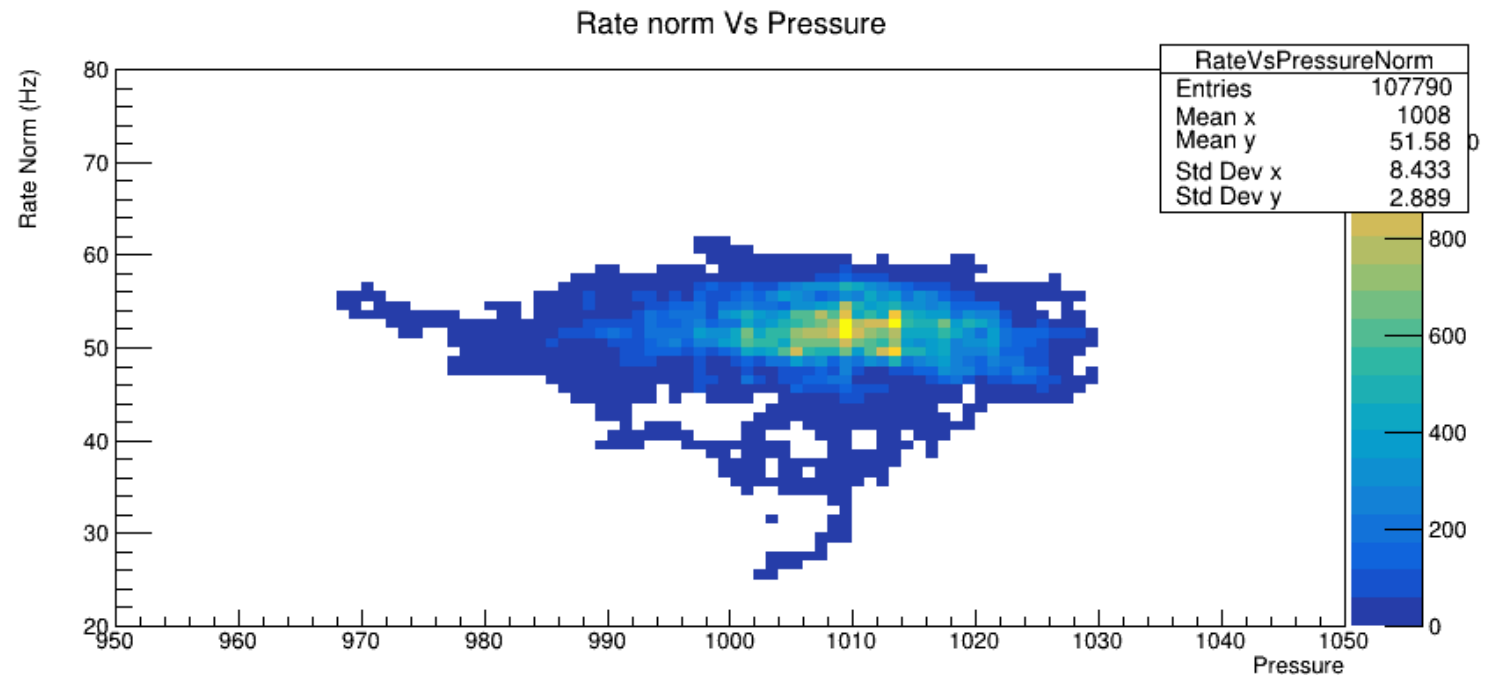
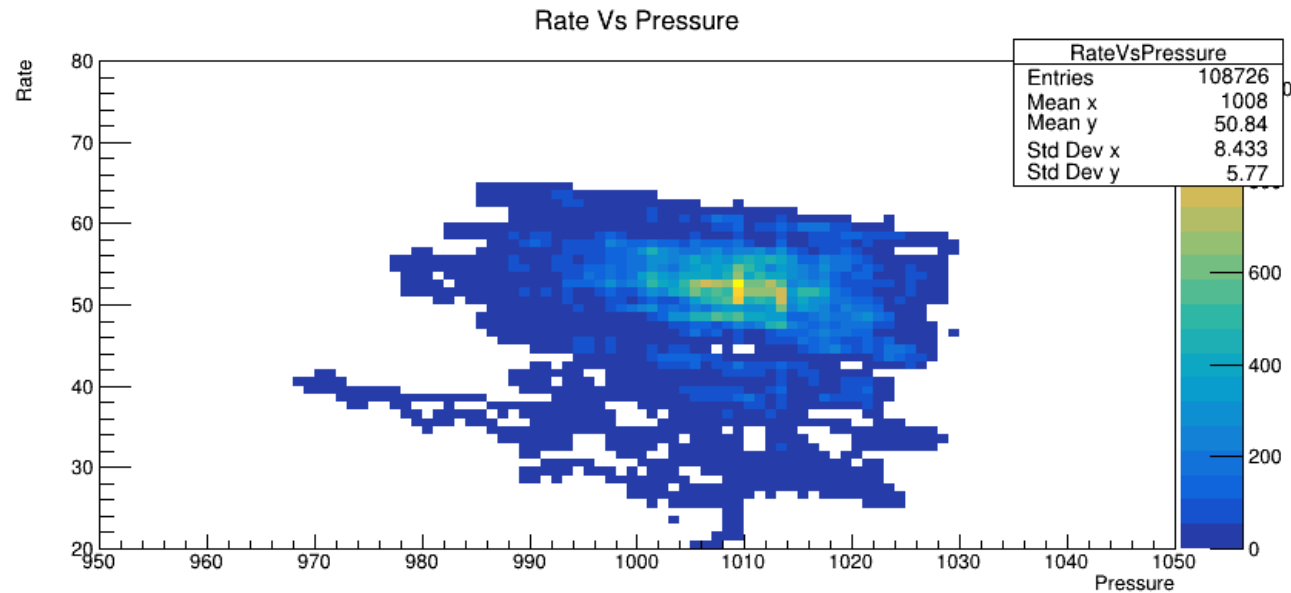
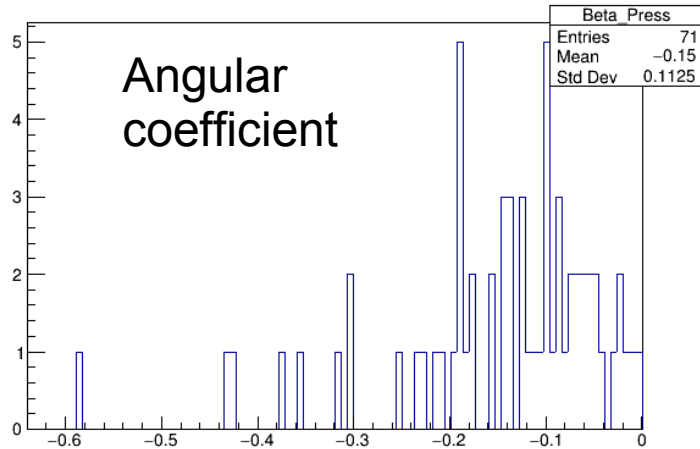




## Fit in a sub-(continuous)sample

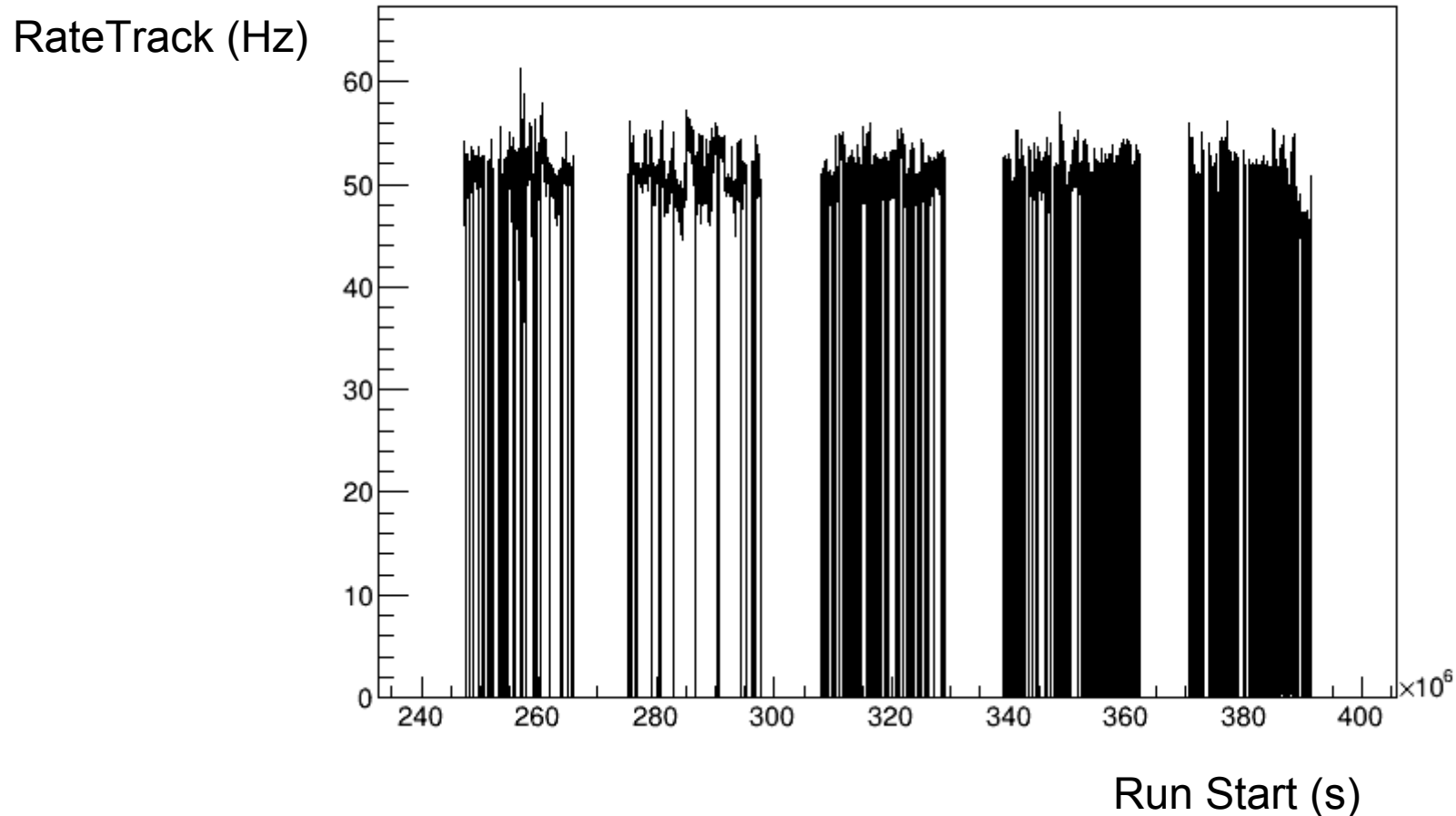
**SAVO-01**

# Effect of double corrections on rate vs pressure (normalization and barometric)



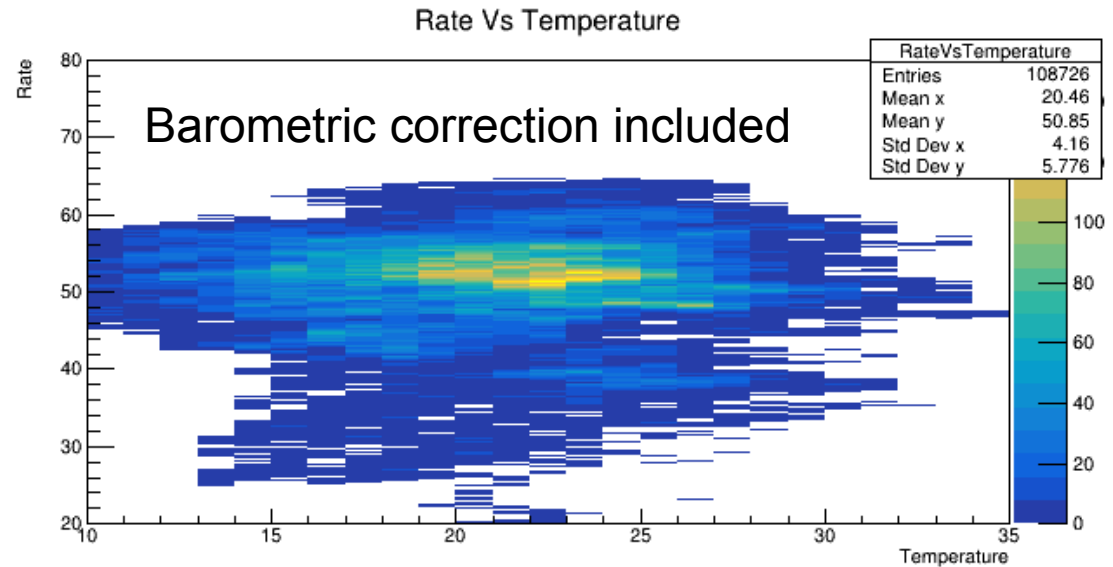
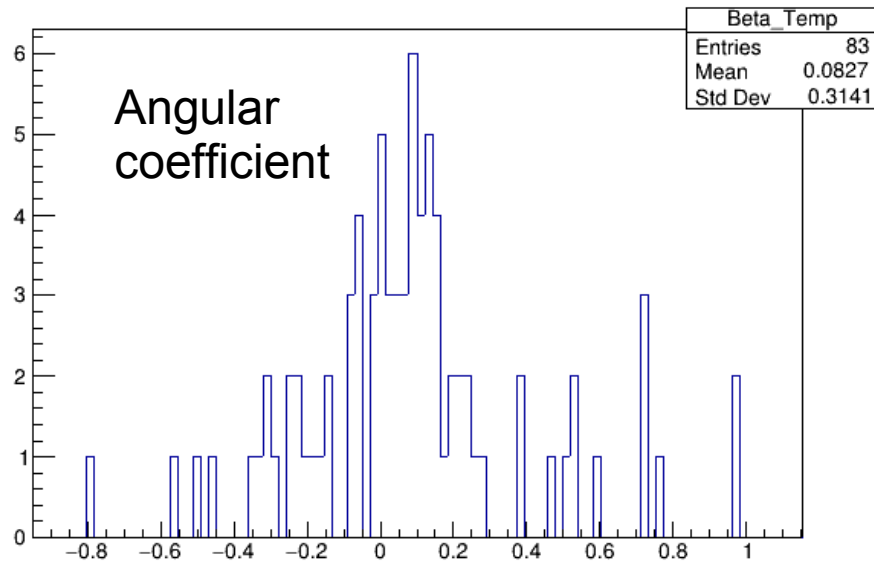
# Effect of double corrections on rate vs run start (normalization and barometric)

RateTr Vs RunStart Norm SAVO-01

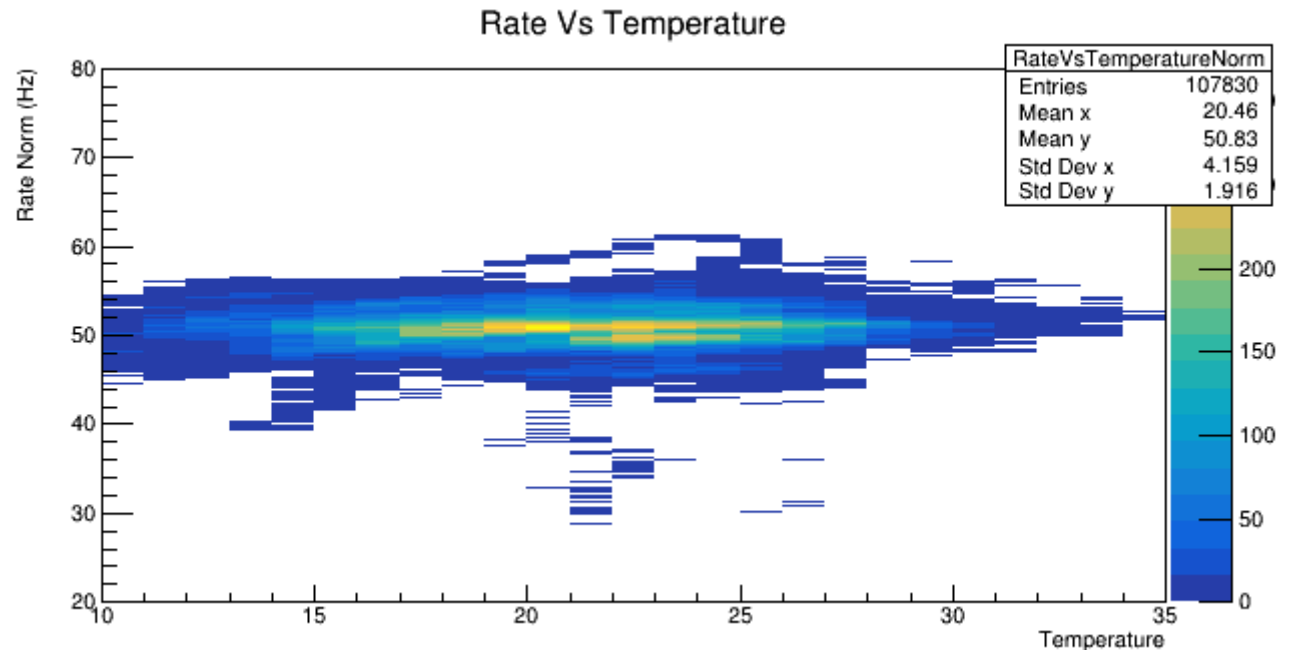


Normalization to average and barometric  
correction applied only if angular coefficient  
was negative

# Effect of double corrections on rate vs temperature (normalization and barometric)



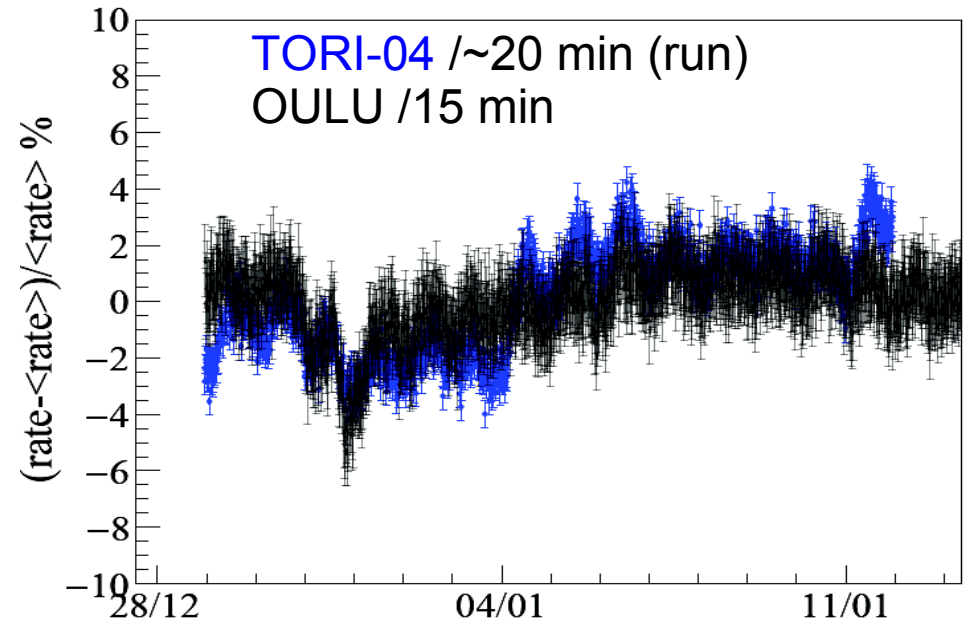
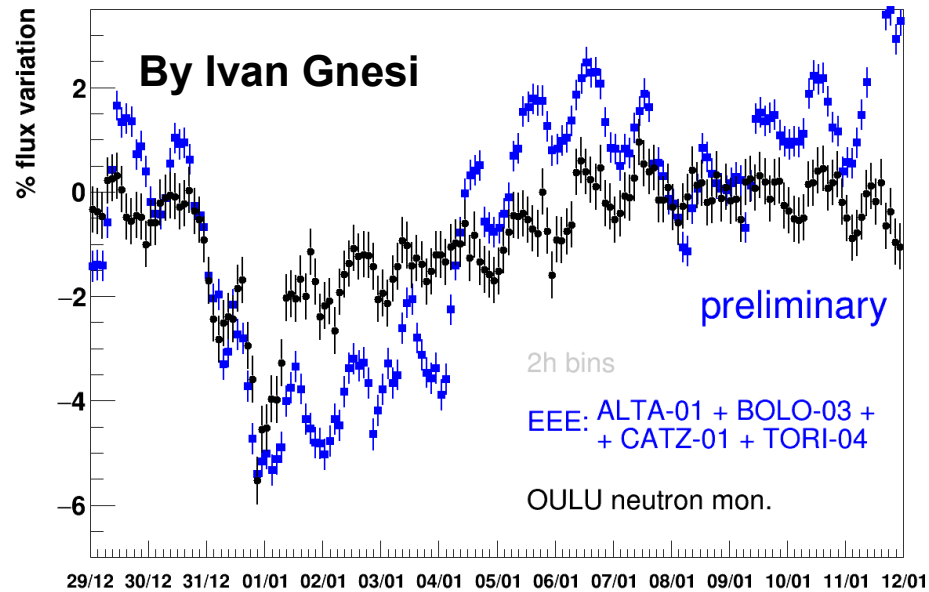
Fit performed in the same interval of ratevspressure, on samples after the previous described corrections.



# Some test on old well known Forbush

GCRD 2015-12-31: EEE-OULU fluxes

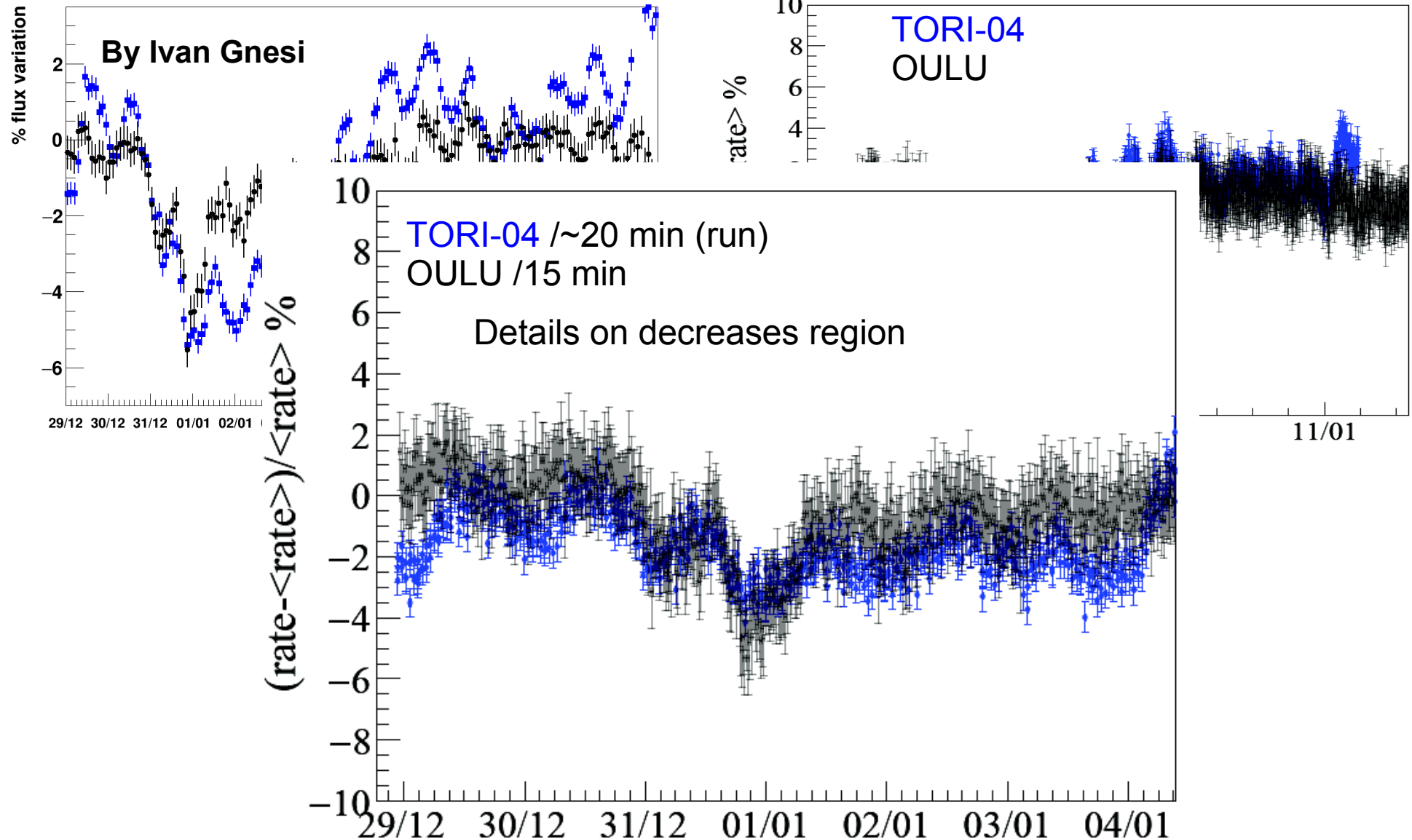
EEE Extreme Energy Events  
La Scienza nelle Scuole



# Some test on old well known Forbush

GCRD 2015-12-31: EEE-OULU fluxes

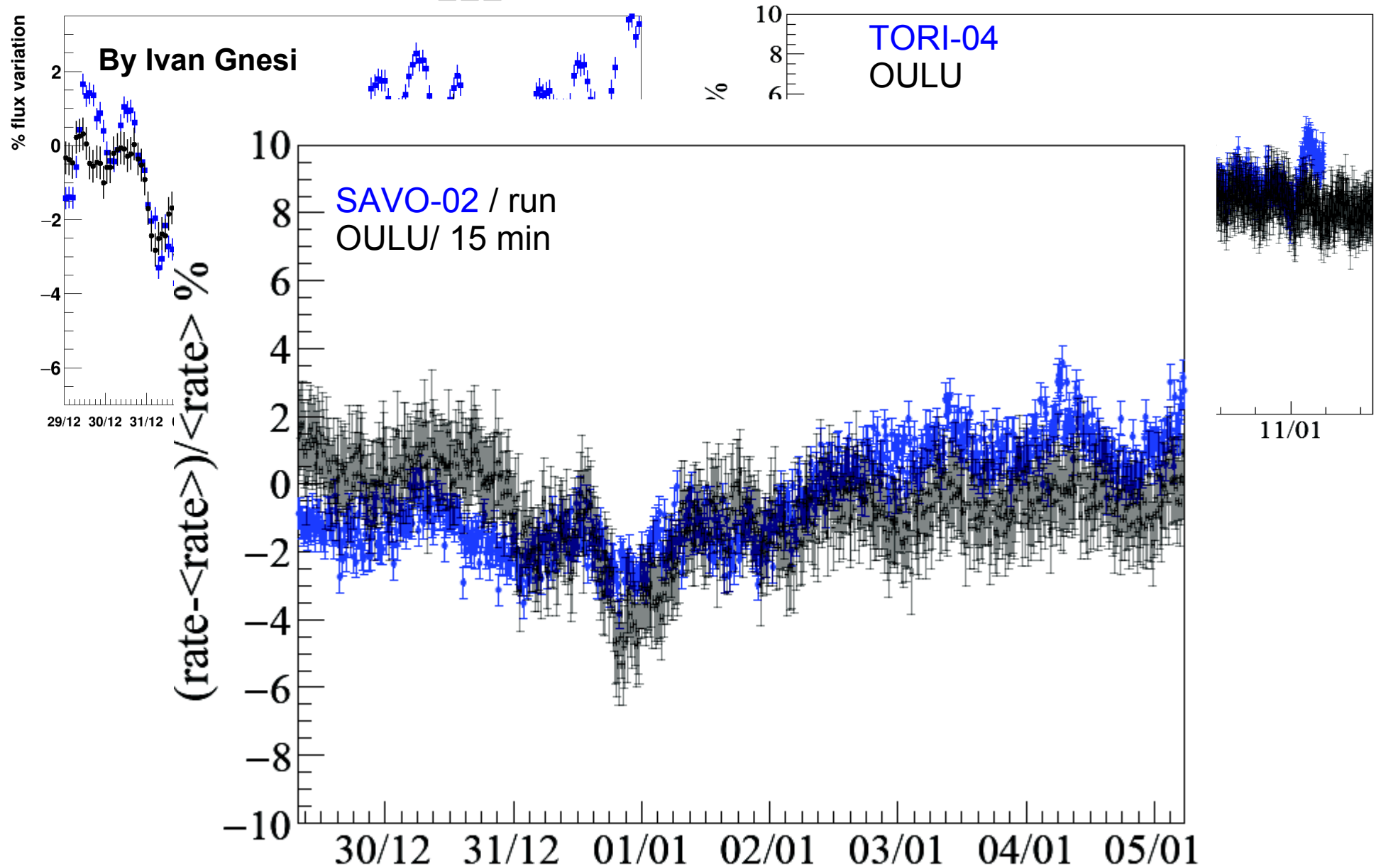
EEE Extreme Energy Events  
La Scienza nelle Scuole



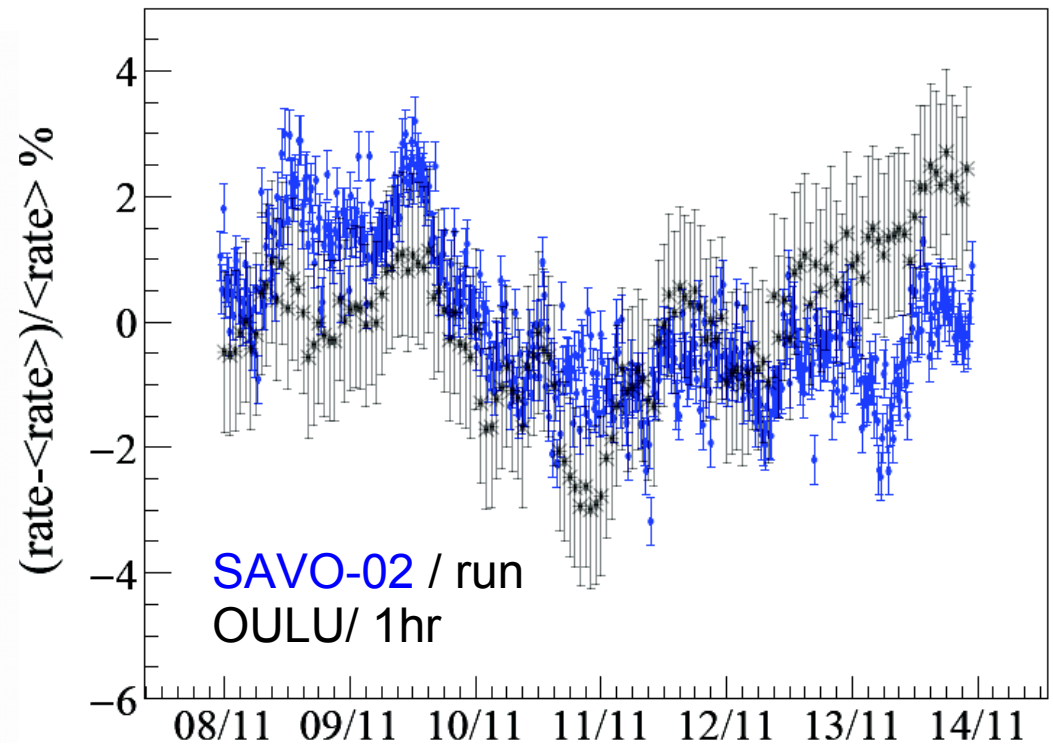
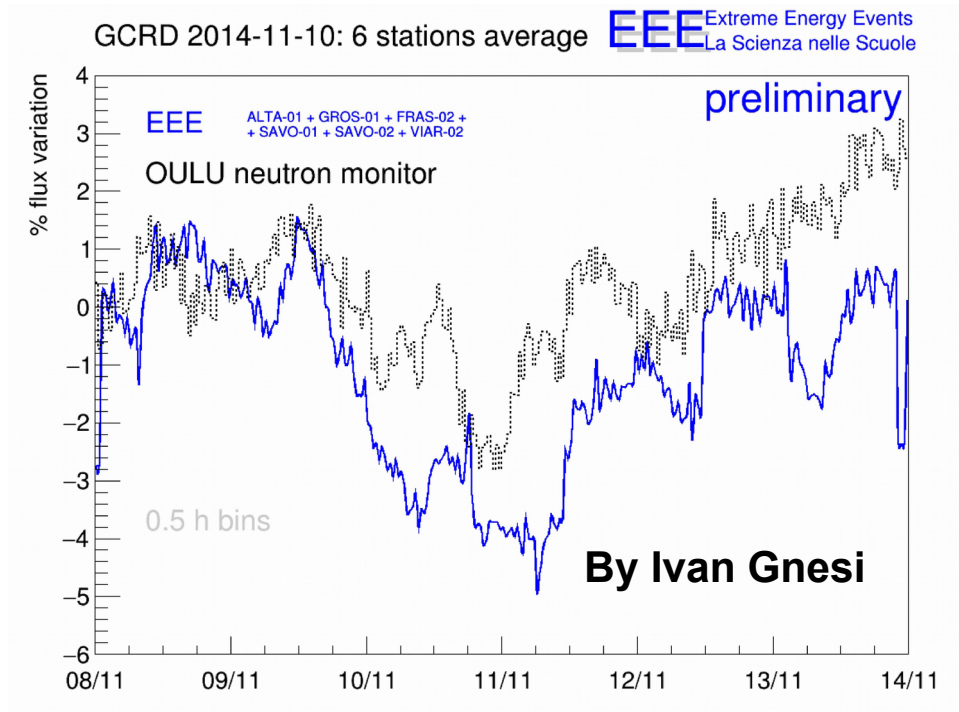
# Some test on old well known Forbush

GCRD 2015-12-31: EEE-OULU fluxs

EEE Extreme Energy Events  
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# Some test on old well known Forbush





## What's next

- Collect the elogdata from RUN1, RUN2, and RUN3
- Merge in the same root file information coming from data-taking and elogdata
- Check and improve the normalization and barometric corrections
- Study the possibility to correct with respect the temperature or other sensitive parameters
- Study the effect of run conditions on the rate

Thanks for attention!

Thanks to Frabrizio, Carmelo, Francesco,  
Stefano and Paola for their help.