DATA ANALYSIS, E.E.E. MASTERCLASS

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INTRODUCTION

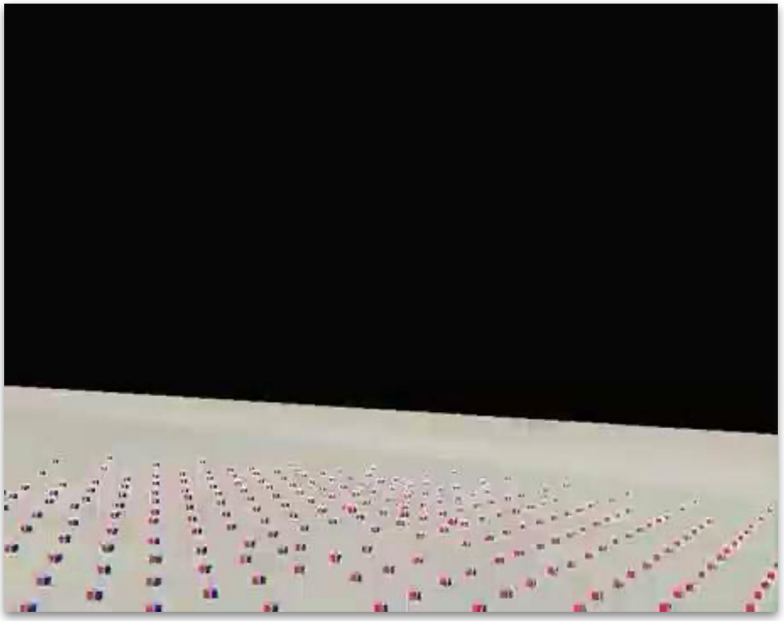
We selected these telescopes because the data they provided were the most reliable for our analysis. This reliability became evident when we observed that the detected cosmic ray rate was higher during periods of lower atmospheric pressure. This relationship highlights an inverse proportionality between atmospheric pressure and cosmic ray detection rates, which is consistent with the barometric effect.

AREZ-01

BOLO-01

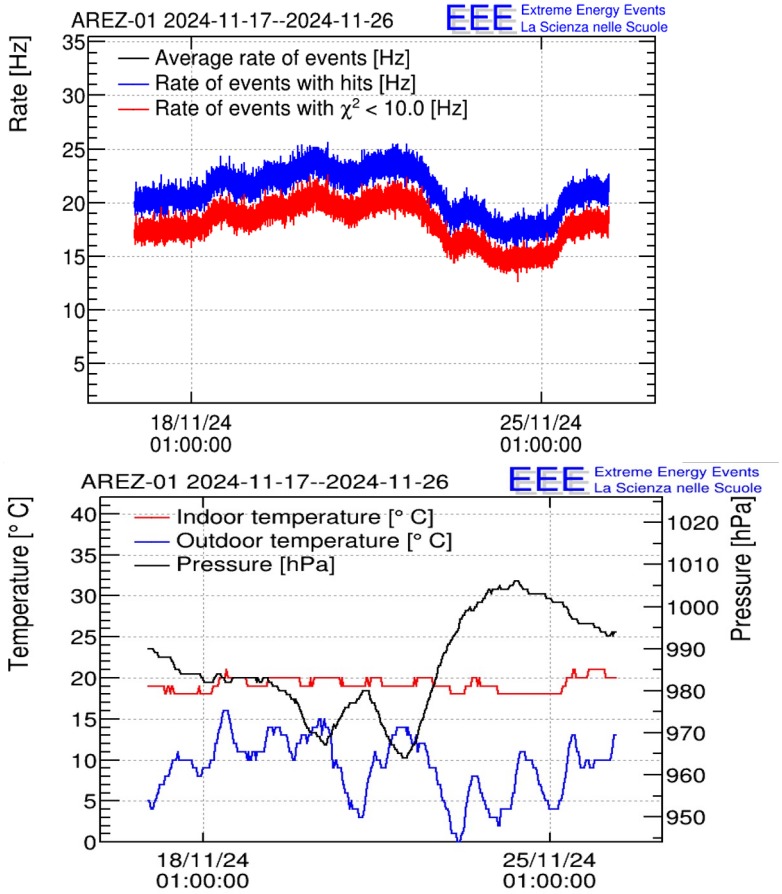
WHAT ARE COSMIC RAYS?

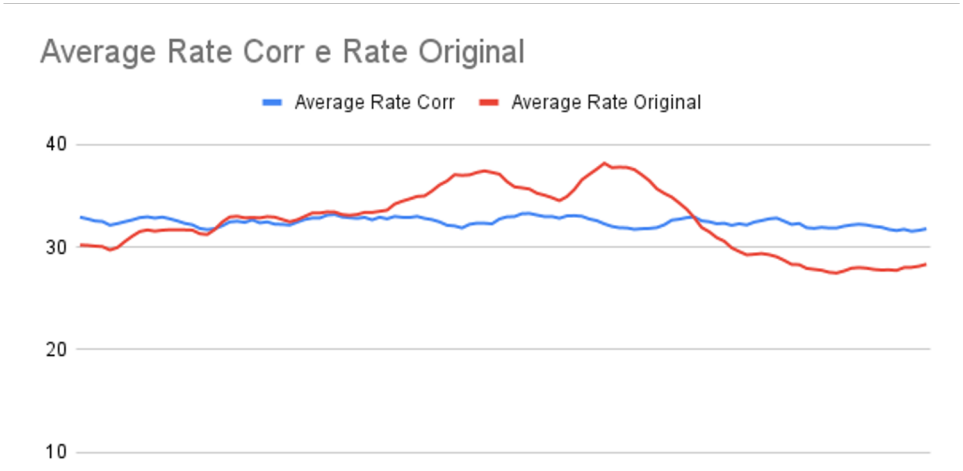
- High-energy particles that, moving almost at the speed of light.
- Hit the Earth from every direction.
- Discovered by Victor Hess at the beginning of the 20th century.
- 1912, experiment with balloon and leaf electroscope.
    - The amount of charged particles increased with altitude.

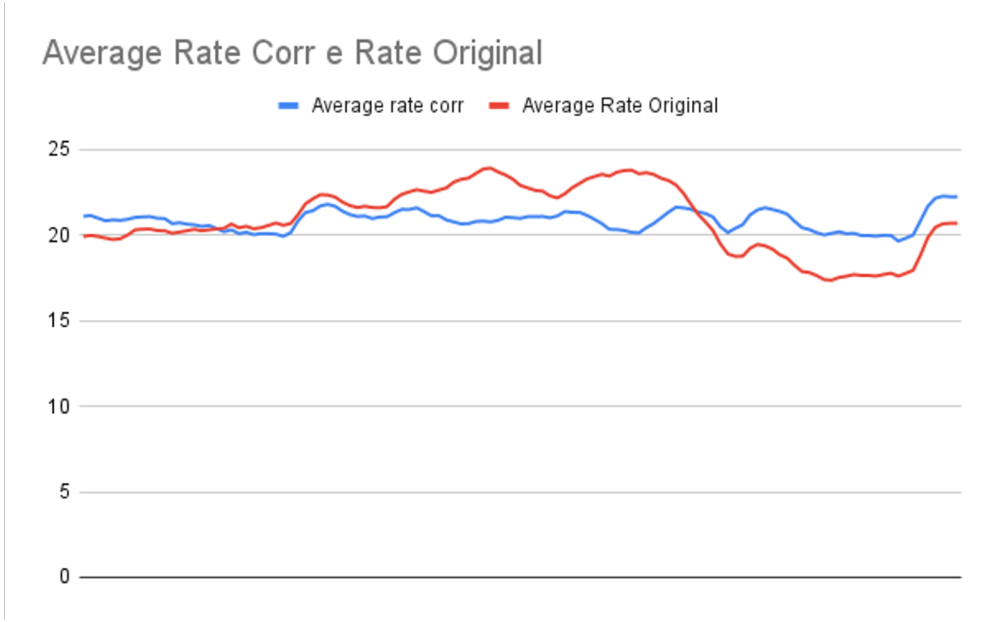


HOW THE PRESSURE AFFECTS THEM?

- Higher atmospheric pressure = denser atmosphere
- More cosmic ray particles interact with air molecules before reaching the surface.
- Decrease in the number of cosmic rays detected at ground-based observatories during periods of high atmospheric pressure.
- This is called the barometric effect.







Analysis

- adjusted the dates format to a more suitable one
- found the barometric coefficient
- corrected the hit events using the barometric coefficient
- Found the graphs that shows us the differences between the average rate corr and the average rate original

Data of the first graph: Average ang/Barometric coeff

5	15	25	35	45	55
8.87E-03	8.69E-03	8.10E-03	6.79E-03	4.69E-03	5.60E-03

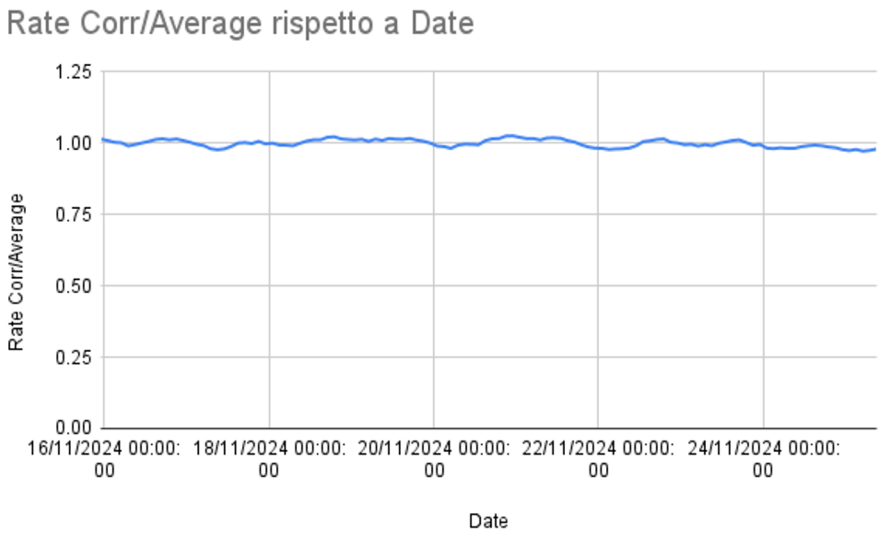
Data of the second graph: Average ang/Barometric coeff

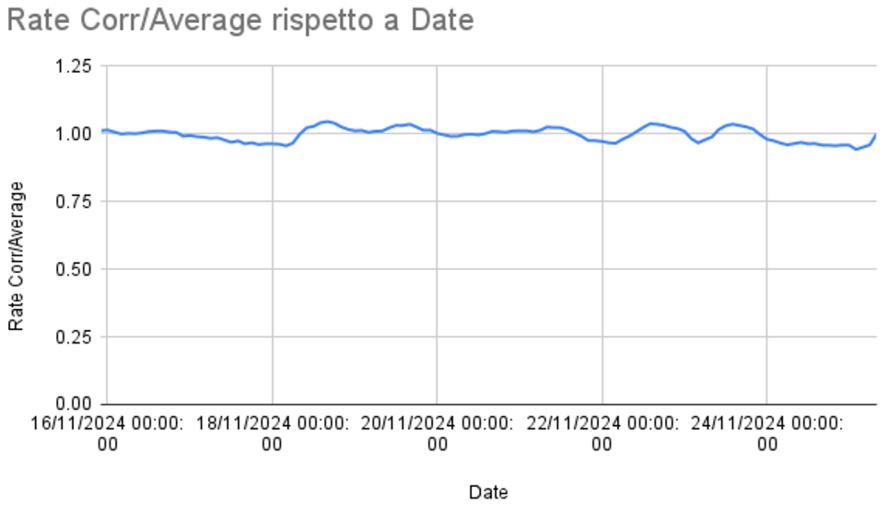
5	15	25	35	45	55
1.08E-02	1.00E-02	9.05E-03	8.74E-03	8.82E-03	1.09E-02

Analysis

After the first part:

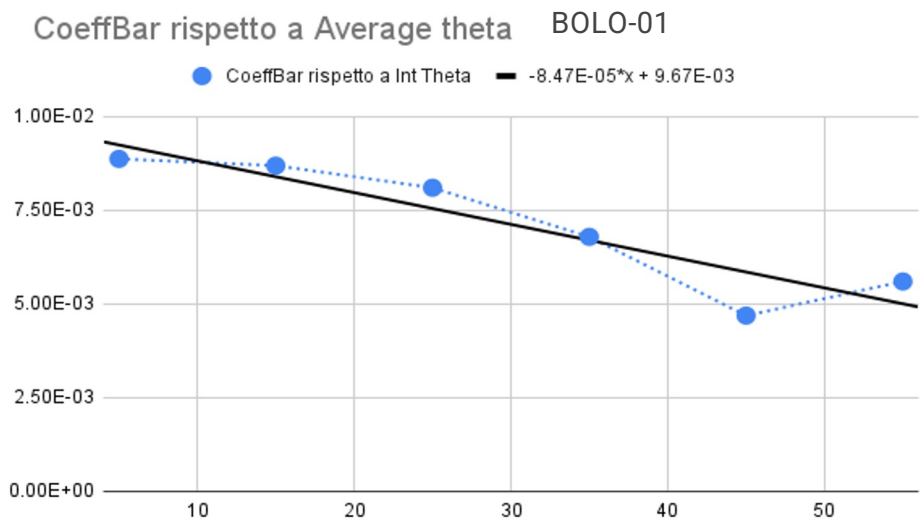
- repeated the process for the track events for each range of angles
- found the different barometric coefficient for each range of angles

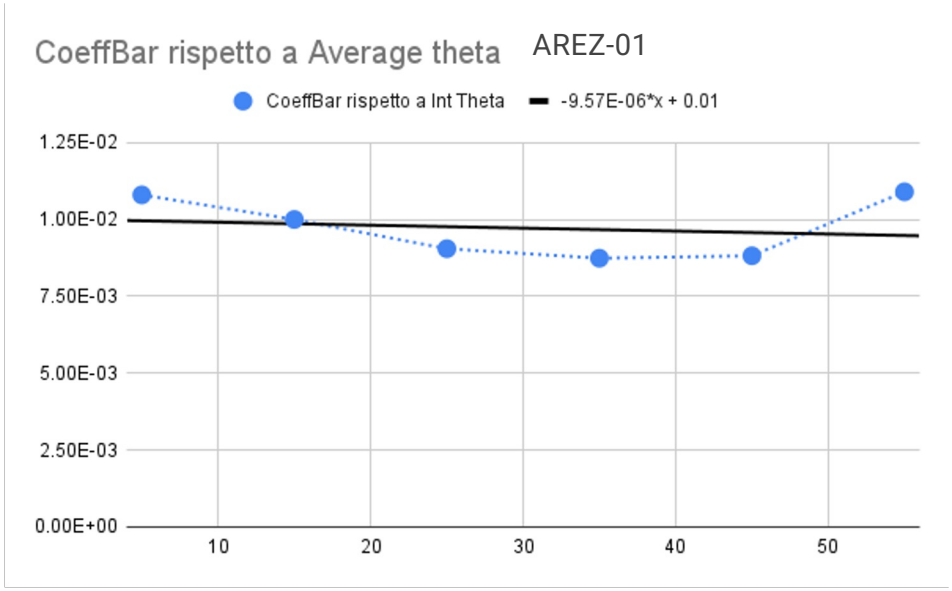




Comparison between graphs

demonstration of the correct functioning of the telescope





Comparison between graphs of barometric coefficient/ average angle

in these graphs we can observe the variation of the barometric coefficient against the different value of theta.

Conclusions

- Rate is fairly constant
  Around 32 (BOLO-01), 21 (AREZ-01)