



Environment and Global Change

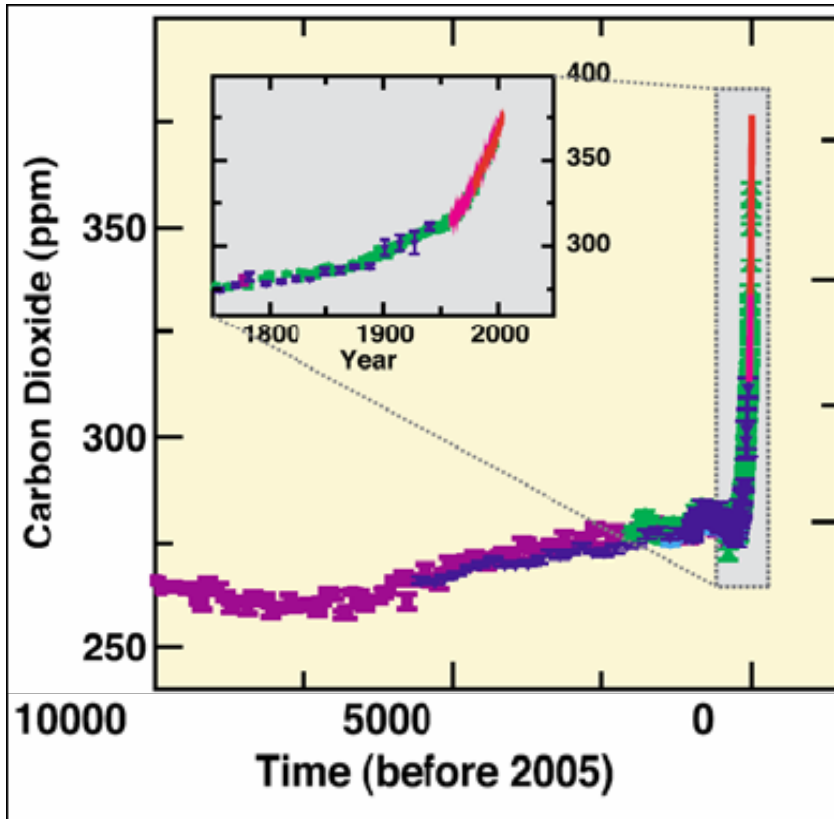
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Climate change

Since the beginning of **industrialisation** the world has experienced a rise in average temperature which is almost certainly due to the man-made amplification of the natural greenhouse effect by the increased emission of greenhouse gases. Evidence for this **temperature rise** includes the melting of glaciers permafrost areas, and the arctic ice cap at an accelerated rate.

Over the same period the concentration of anthropogenic **greenhouse gases** in the atmosphere, among which carbon dioxide (**CO₂**) is the main contributor, has increased to a level not observed for several hundreds of thousands of years;



CO₂ concentration (parts per million, ppm) in the atmosphere during the last 10,000 years; inset panel: since 1750



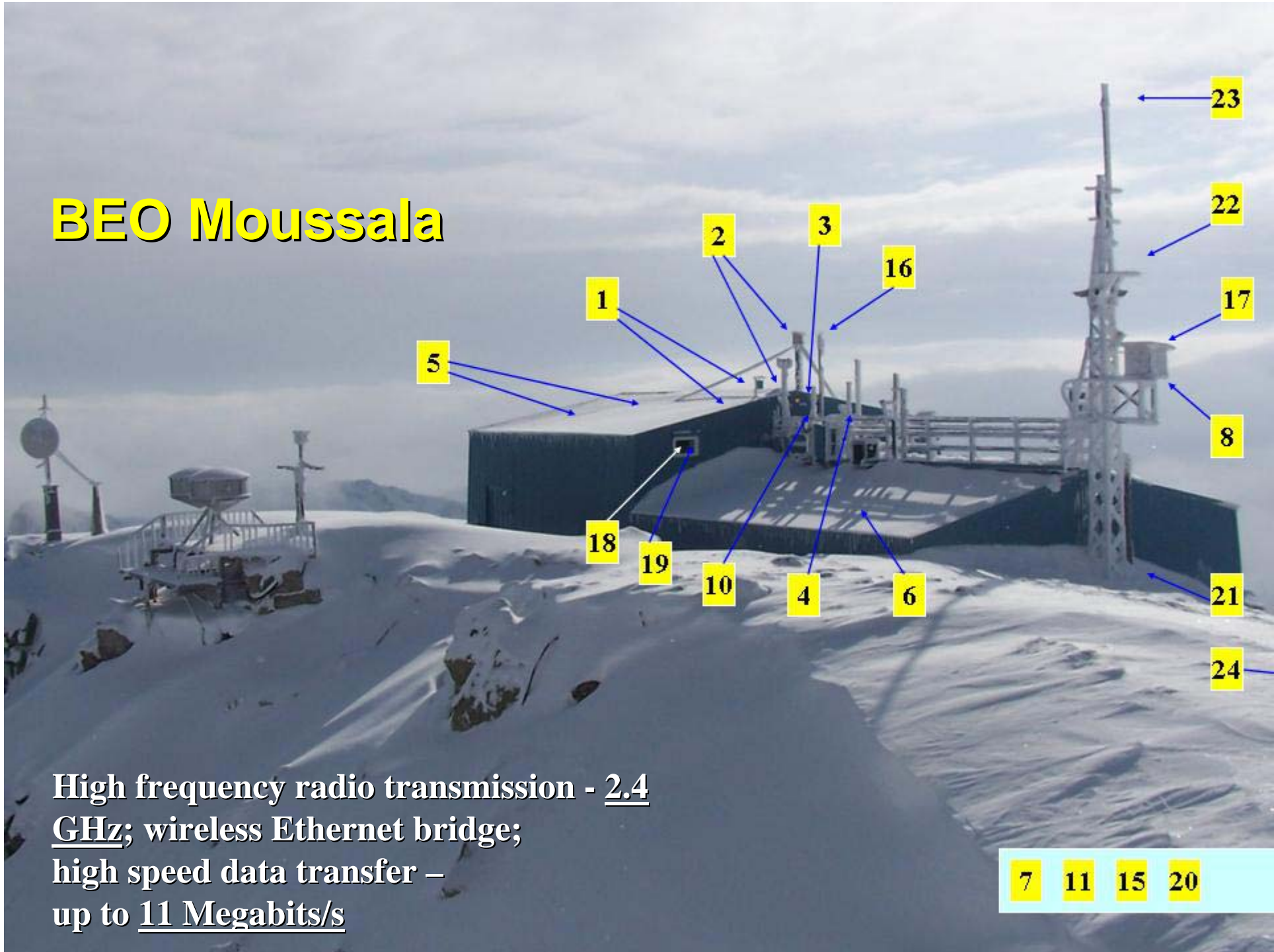
BEO Mission

Observing, complex monitoring and studying of global change, climate, aerospace and terrestrial environment, natural hazards and technogenic risks

In July 2007 BEO has been validated by EC and ESF survey as research infrastructure of pan-European importance (num. 562)

<http://www.beo.inrne.bas.bg>

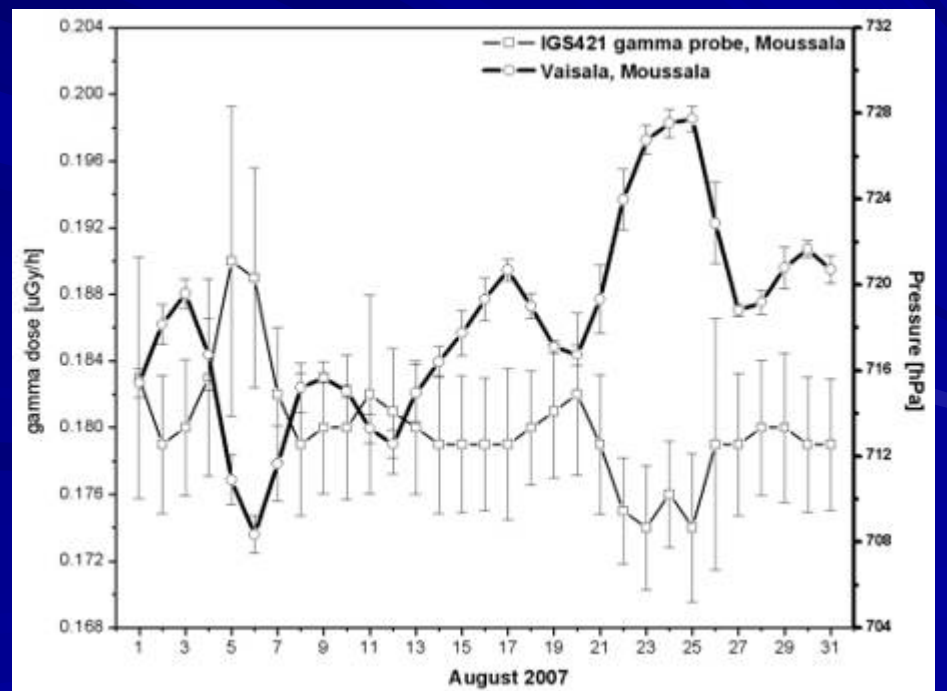
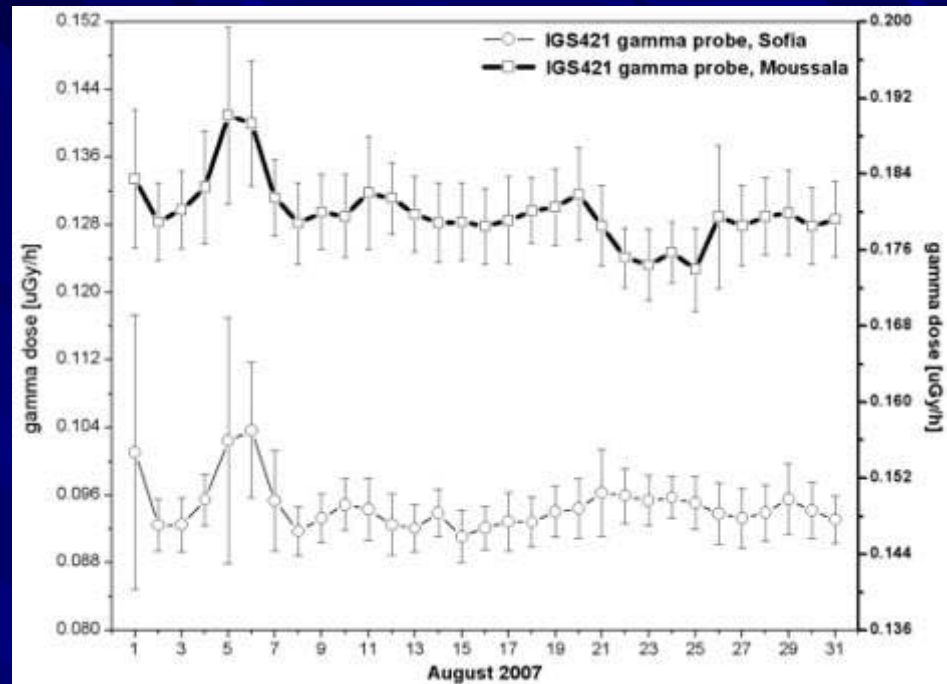
BEO Moussala



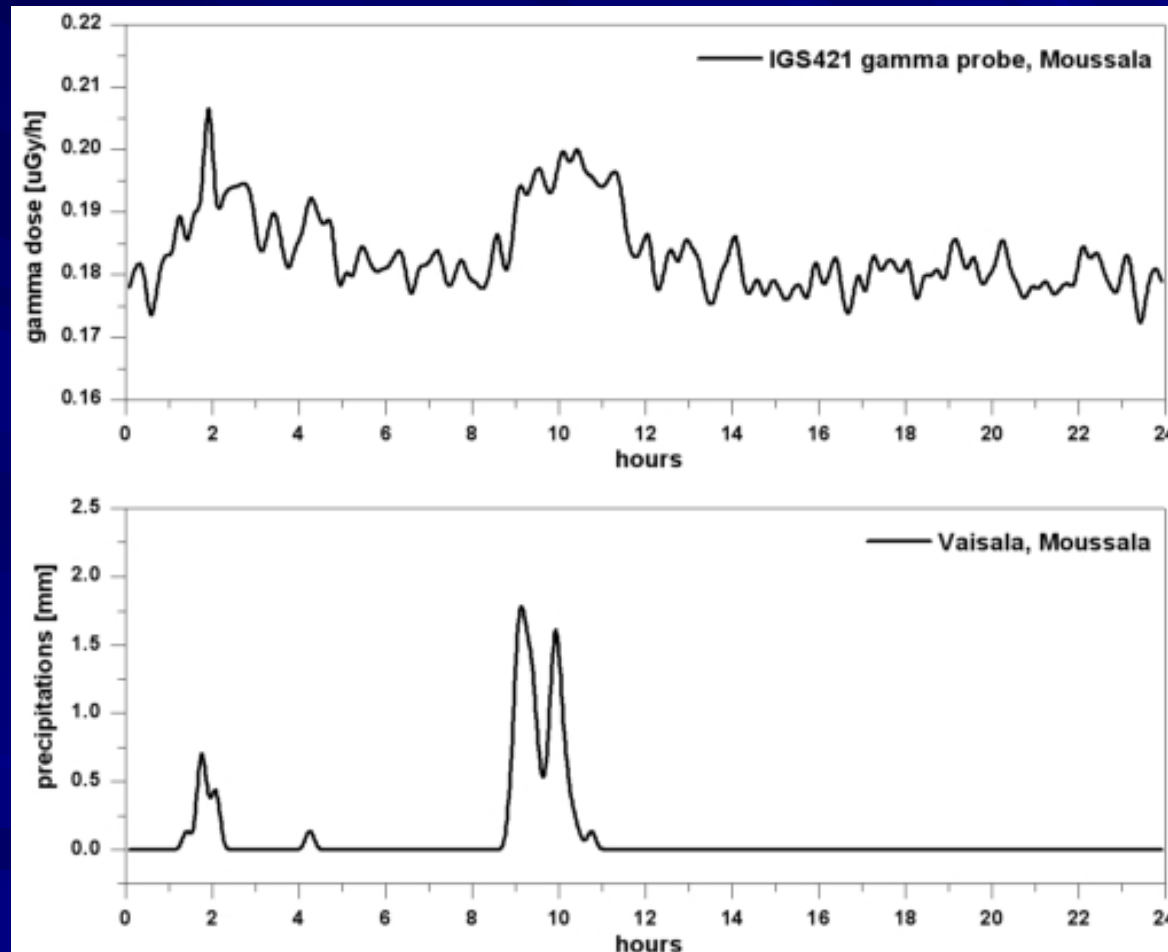
High frequency radio transmission - 2.4 GHz; wireless Ethernet bridge; high speed data transfer – up to 11 Megabits/s

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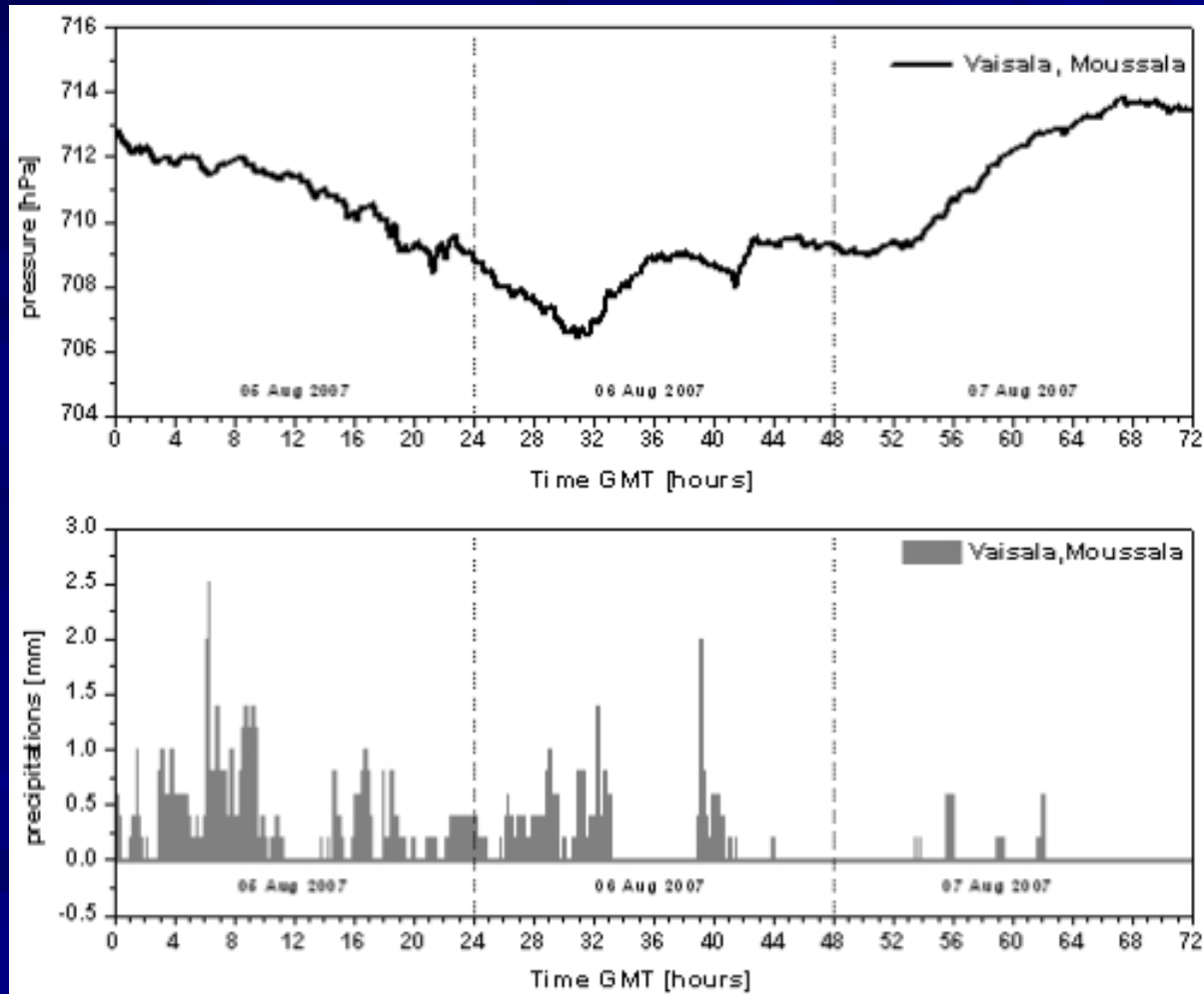
Gamma Background Technidata Detector



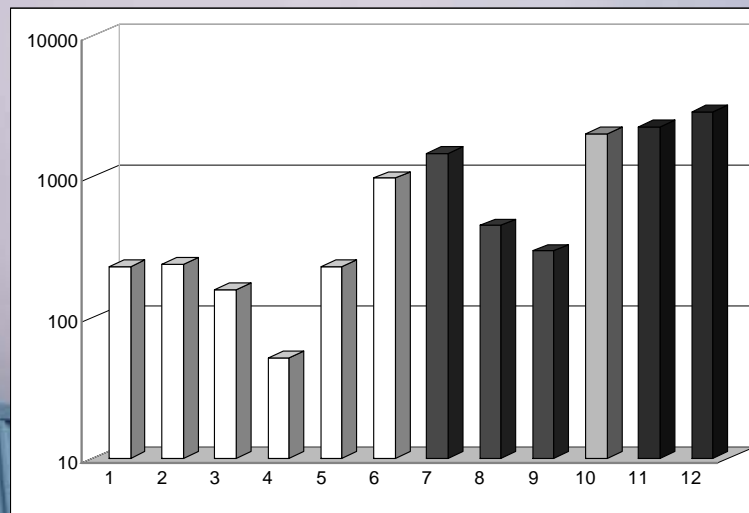
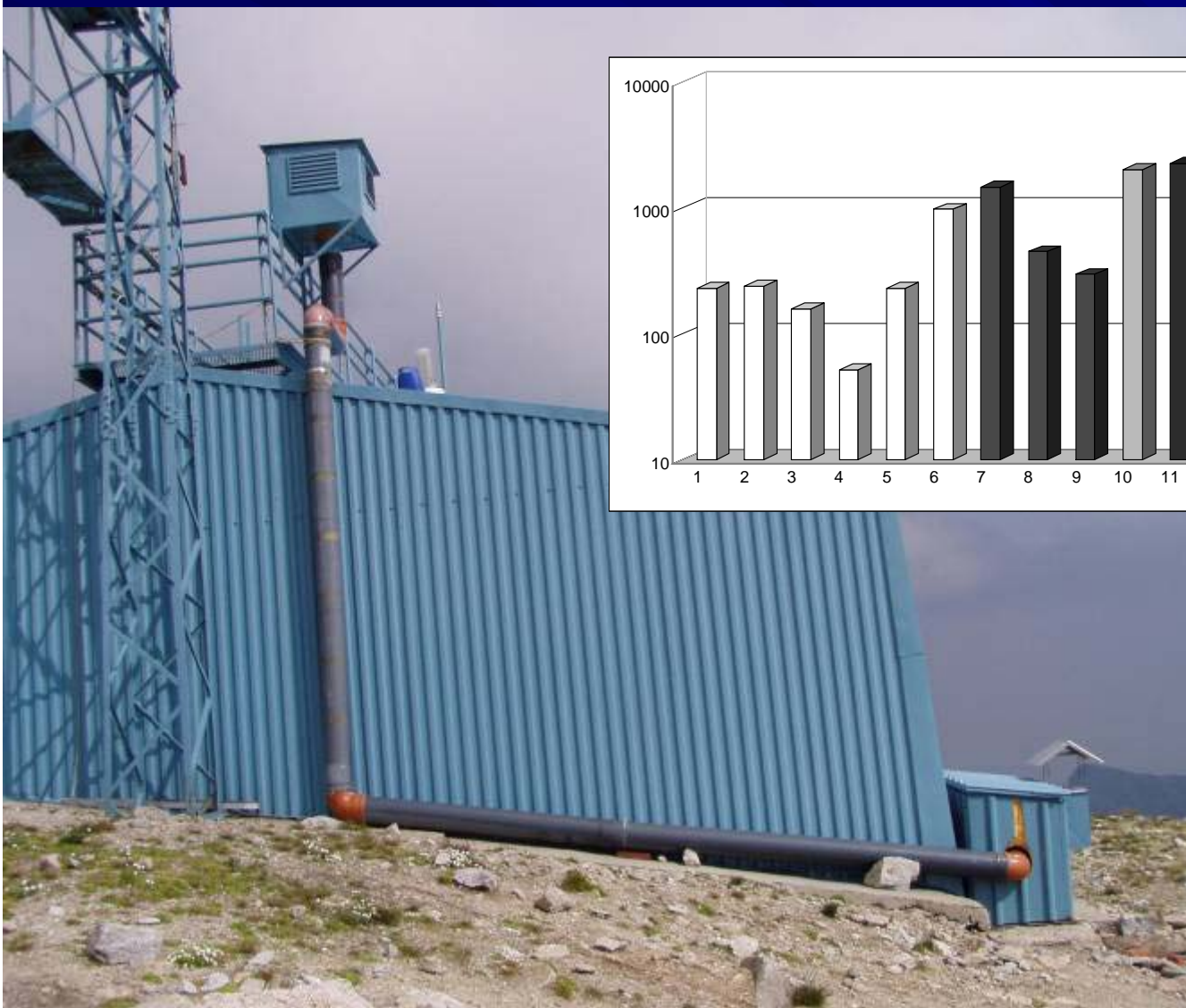
Correlation between gamma-background and precipitation at peak Moussala



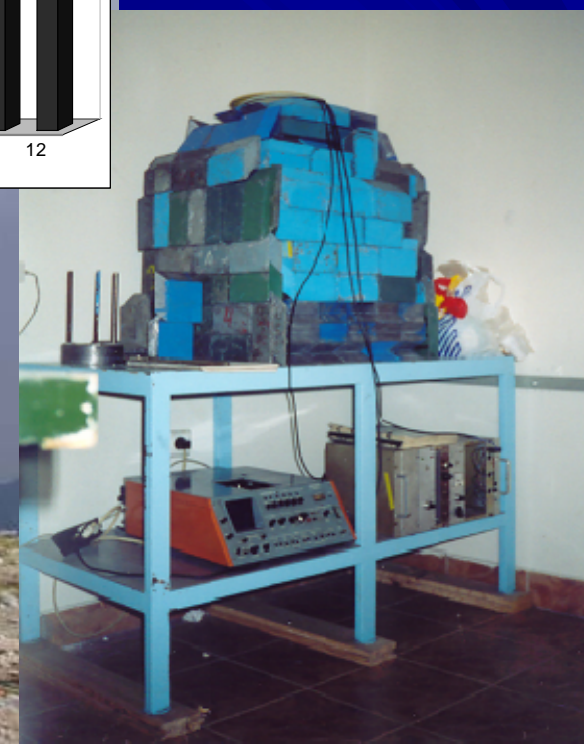
Correlation between pressure and precipitation at peak Moussala



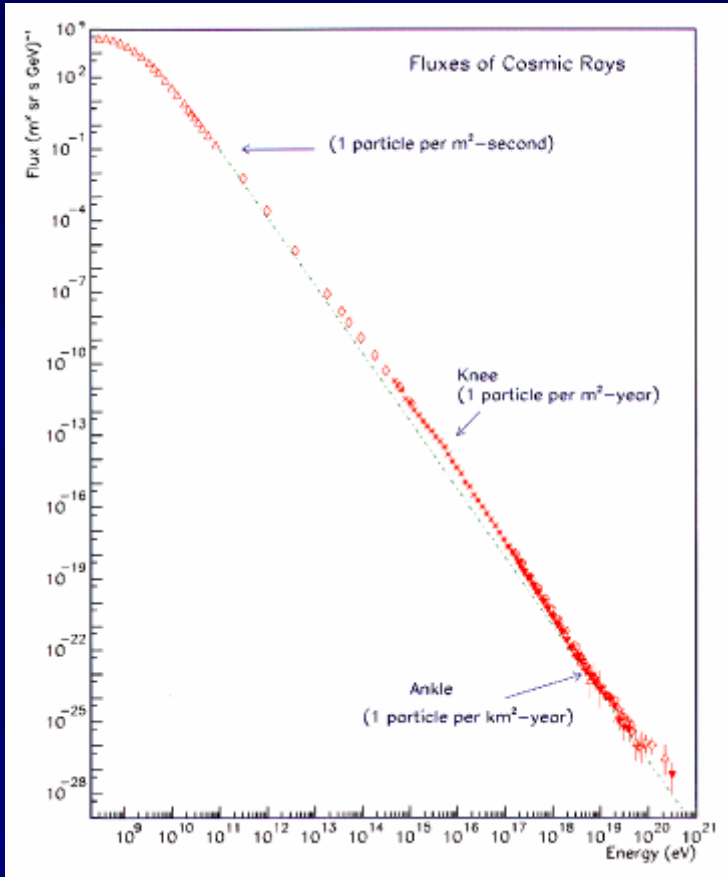
BEO Moussala Radio, heavy metal and toxic elements aerosols measurements



Concentration of Fe (ng/m³) in aerosols from peak Moussala (1-6), North-East of Bulgaria (7-10) and Sofia (11-12)

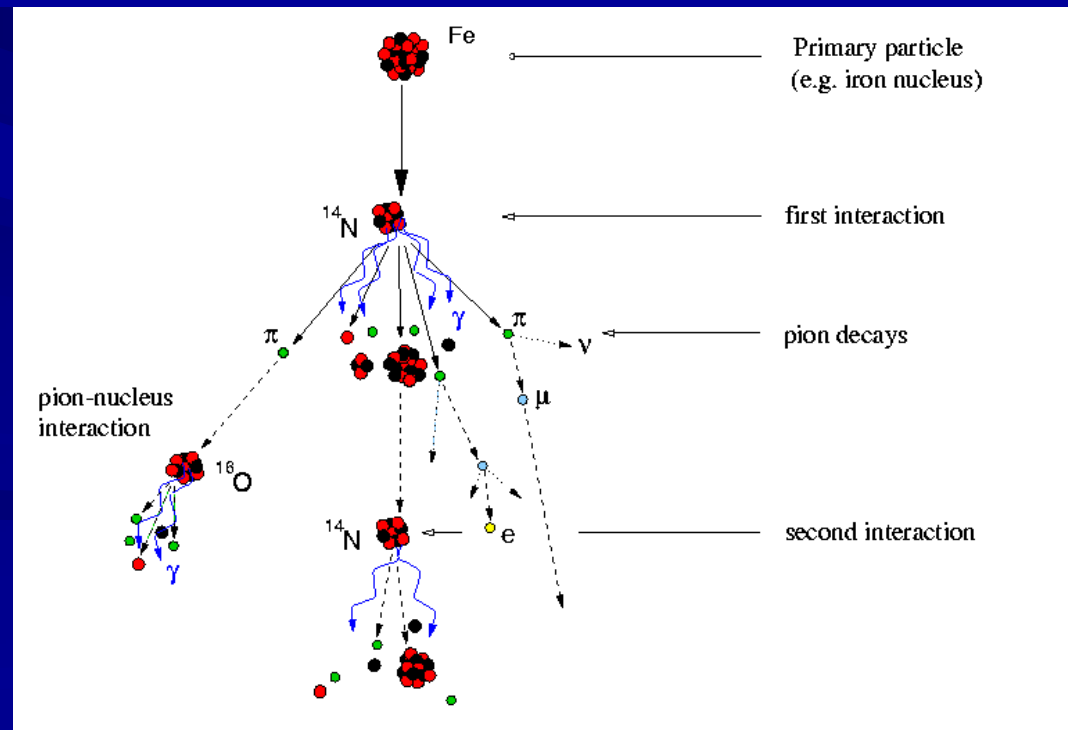


Primary cosmic rays

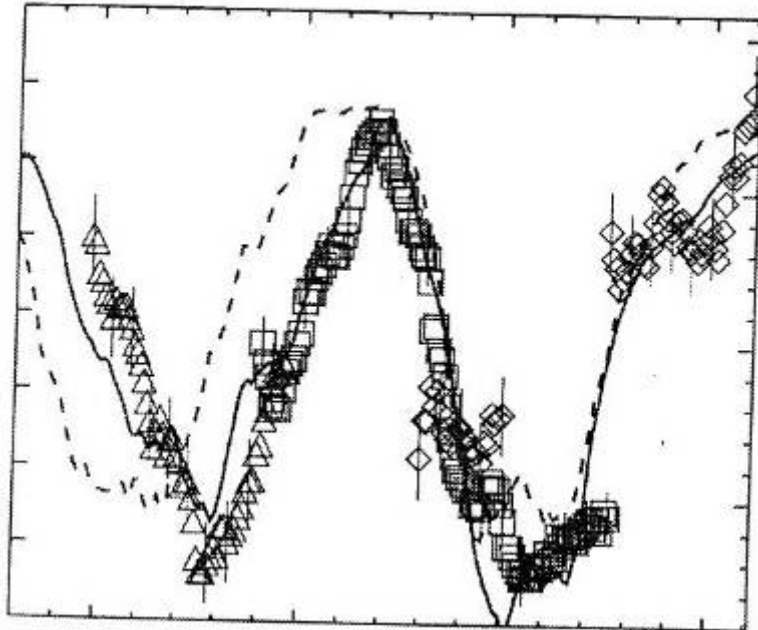


Primary cosmic rays are stable charged particles

Secondary Cosmic Rays



CR Flux Intensity and Cloud Cover

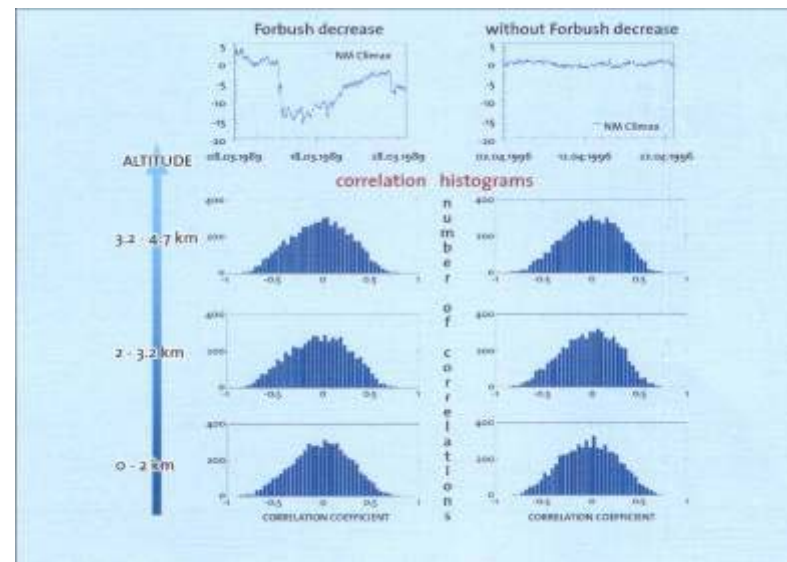


Changes in Earth total clouds cover for 4 cloud data sets obtained from satellite observation and cosmic ray fluxes (solid curve)

N. Marsh, H. Swensmark,

Space Science Rev. 1-16, 2000.

Forbush Effect and Cloud Cover



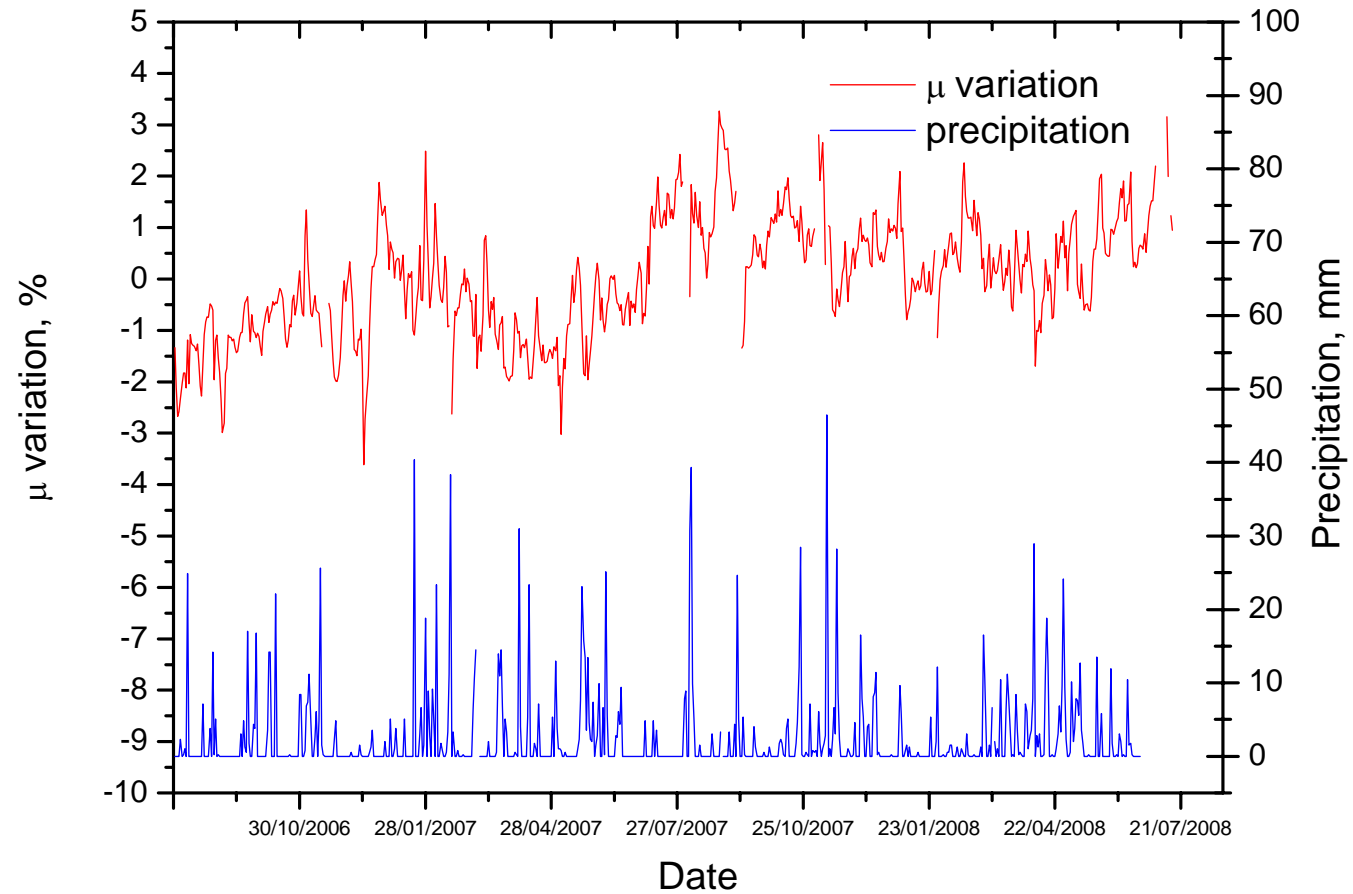
J. Calagovic, L. Desorgher,

E.O. Flueckiger, J. Beer,

HFSJG poster

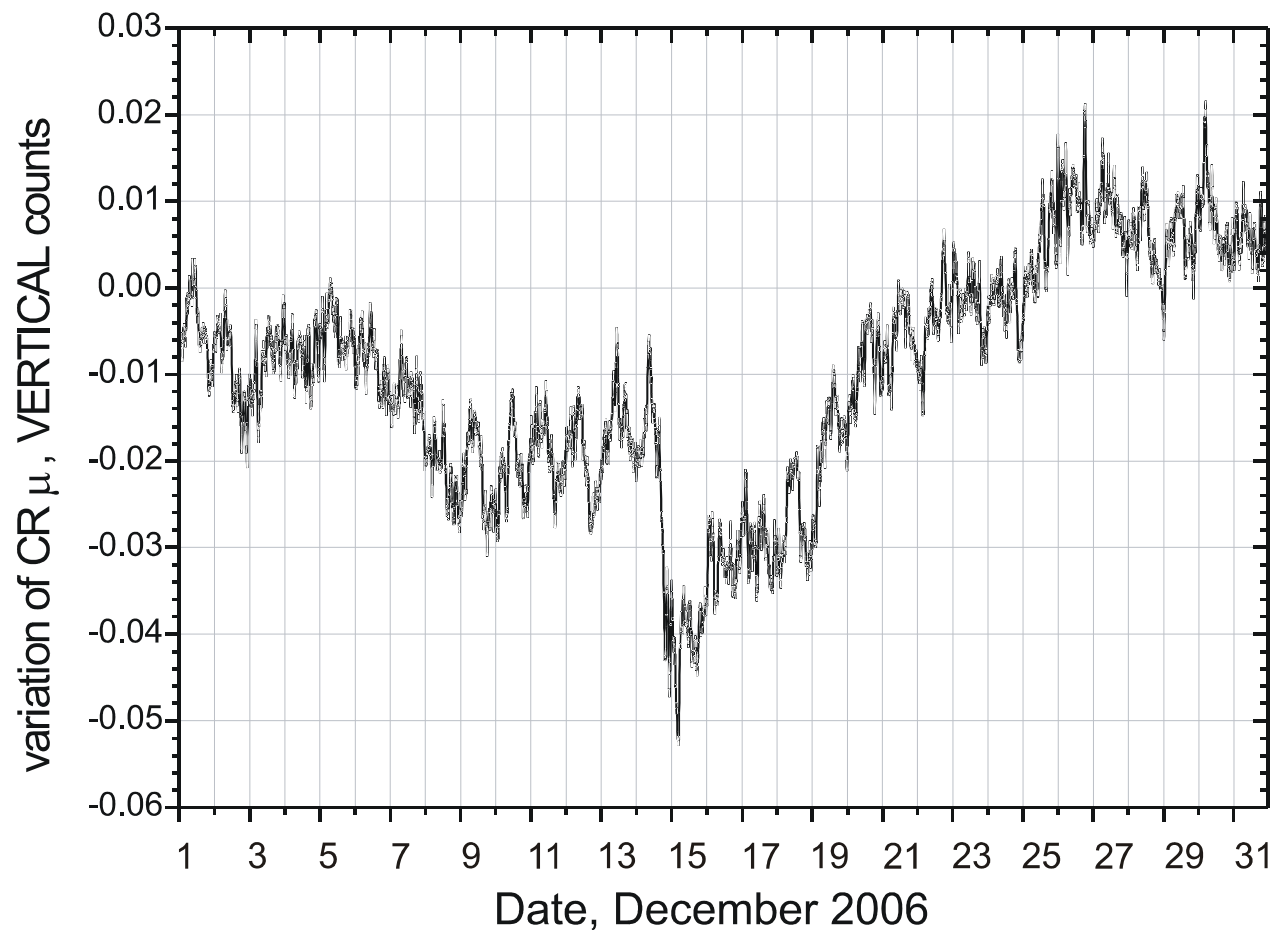
Cosmic muon flux variations

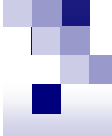
Precipitation impact



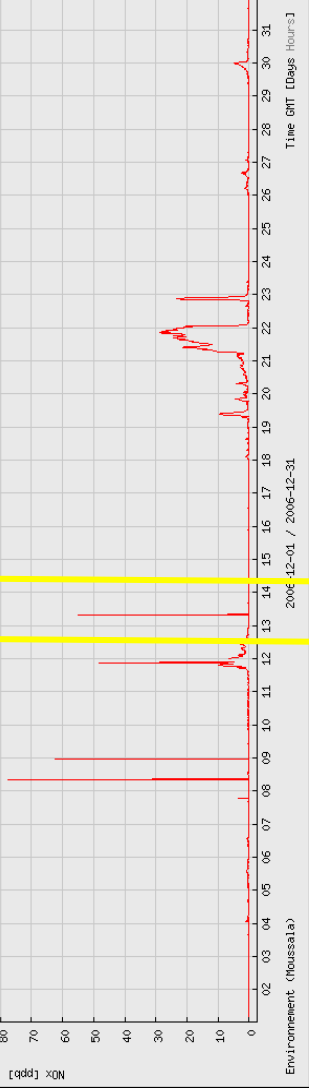
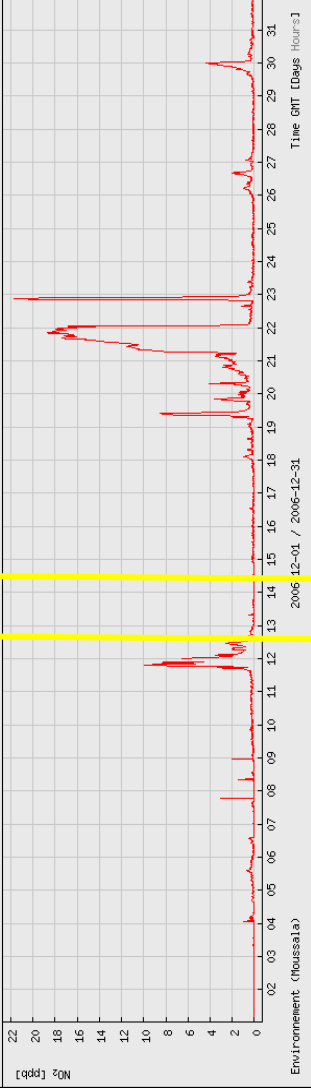
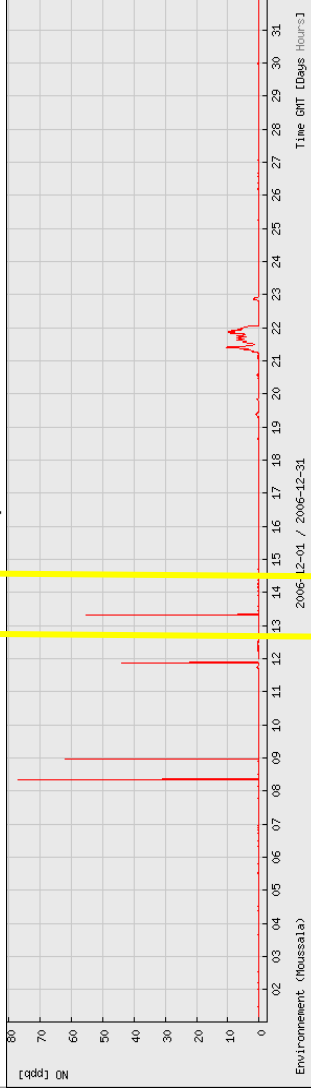
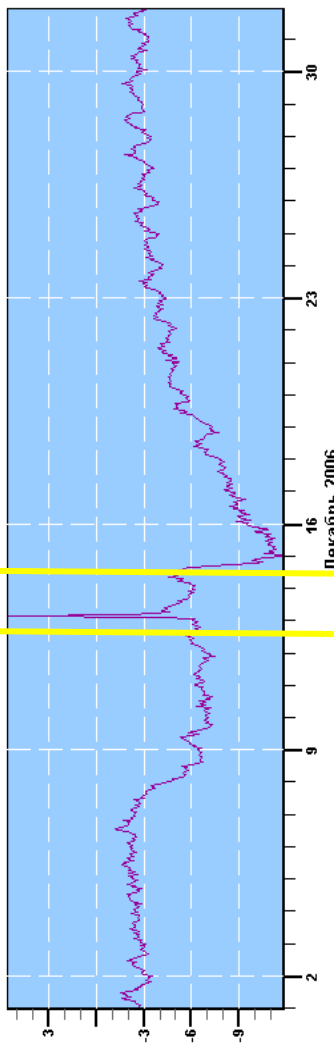
Pressure corrected muons variations and precipitation.
(almost 2 years period)

The December 2006 Forbush decrease, vertical direction - BEO muon telescope



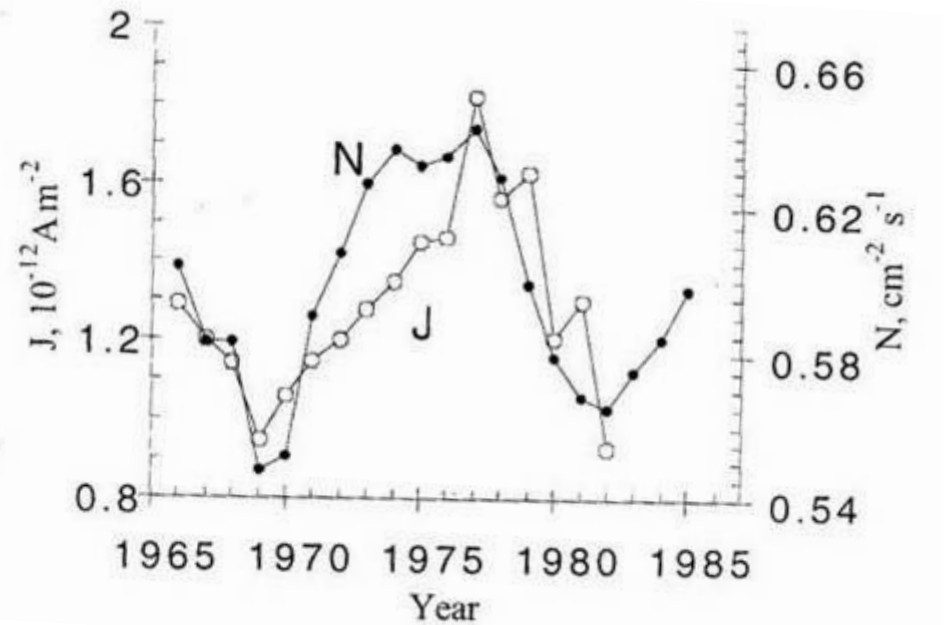


Cosmic rays variations(%).



CR and Lightning

Yearly Number of lightning (black points) and Ion production rate (circles) in the air column h: 2-10km of the middle altitudes



Stozhkov Y. et al.

Space Science Reviews, 2000



CONCLUSION:

- There are correlations between secondary cosmic radiation characteristics, environmental parameters and global change

Where is a will

there is a way!

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