Neutron monitors network vs Muon telescopes network?
Muon telescopes - 2018

Muon telescopes

Global muon detector network
Real-time Neutron Monitor Database

The Real-time Neutron Monitor Database is a worldwide network of standardized neutron monitors, used to record variations of the primary cosmic rays. The measurements complement space-based cosmic ray measurements.

NMDB: Real-Time Database for high-resolution Neutron Monitor ...

NMDB: Real-Time Database for high-resolution Neutron Monitor measurements. NMDB provides access to Neutron Monitor measurements from stations around the world. The goal of NMDB is to provide easy access to all Neutron Monitor measurements through an easy to use interface. NMDB provides access to real-time as well as historical data.

Real-time Neutron Monitor Database - Wikipedia

The Real-time Neutron Monitor Database (or NMDB) is a worldwide network of standardized neutron monitors, used to record variations of the primary cosmic rays. The measurements
NMDB: Real-Time Database for high-resolution Neutron Monitor measurements

NMDB provides access to Neutron Monitor measurements from stations around the world. The goal of NMDB is to provide easy access to all Neutron Monitor measurements through an easy to use interface. NMDB provides access to real-time as well as historical data.

The Drupal version of the NMDB webpage had to be taken down due to security issues. Not all pages have been converted to the new page yet, please help to convert your pages if you can. The NMDB data tools tools and of course NEST are all available.

NMDB distributes official data provided by the PI’s of the neutron monitor stations. Data of different origin may not have been validated or authorised by the respective PI, and any deviation with respect to the authorised data is not his/her responsibility.

Data retrieved via NMDB are the property of the individual data providers. These data are free for non commercial use within the restrictions imposed by the providers. If you use such data for your research or applications, please acknowledge the origin by a sentence like "We acknowledge the NMDB database (www.nmdb.eu), founded under the European Union's FP7 programme (contract no. 213007) for providing data.", and acknowledge individual monitors following the information given on the respective station information page (see sub-pages under www.nmdb.eu).

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How the Muon Telescopes Work - University of Rochester
https://www.pas.rochester.edu/~pavone/particle-www/telescopes/background/How the ... How the Cosmic Ray Telescopes Work. Scintillator. A scintillator is a special type of plastic that emits a photon when a charged particle passes through it. Scintillators can be made of plastic or liquid, even laundry detergent has been used. When the charged particle hits the plastic, it excited the electrons in the plastic to a higher ...

Links to Cosmic ray DATA
cro.izmiran.ru/common/links.htm

Solar Neutron Telescopes, Monitoring Solar Neutrons in Real Time; Solar Neutron Telescope Network; Muon Telescopes and I-Cameras. Global Muon Detector Network (Muon Telescopes, Muon Hodoscopes, Ionization cameras, Carpets) Base Pochefstroom University. Cosmic ray/Gamma ray/Neutrino and similar experiments; Magnetometers. IZMIRAN; Kiruna (Sweden)

PARTICLE Telescope Operating Instructions and Information
https://www.pas.rochester.edu/~pavone/particle-www/telescopes/index.html
PARTICLE Telescope Operating Instructions and Information. How Muon Telescopes Work; Setup Instructions for the muon telescopes. Information for old set-ups. Please read before
Network of Cosmic ray Stations

- Neutron Monitors
- Solar Neutrons
- Muon Telescopes
- Base Potchefstroom University
- Magnetometers
- GPS systems
- Ionosphere
- Related Data
- Space Weather

Neutron Monitors, operated

- All Cosmic Ray Stations.
  Name - means original site of the station.
- idB - site created by WDC-B2+IZMIRAN using of the data archives and sources in Real Time
  (original station sites, NMDB). Data submitted in a single format.

- idB & Alma-AtaB (Mt.Tien Shan) & DataBase of Kazakhstan Spectrograph & Alma-AtaB (Mt.Tien Shan) new
- idB & Apatity
- idB & Athens
- idB & Baksan
- idB & Barentsburg
- idB & Beijing or Digital Data
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- idB & Calgary
- idB & Cape Shmidt
- idB & Climax
- idB & Yerevan2000 (Mt. Nor-Ameer and 2000 m)

Solar Neutron Telescope Network

Muon Telescopes and l-Cameras

- Global Muon Detector Network (Muon Telescopes, Muon Hodoscopes, Ionization cameras, Carpets)

Base Potchefstroom University

- Cosmic ray/Gamma ray/Neutrino and similar experiments

Magnetometers

- IZMIRAN
- Kiruna (Sweden)
- Norwegian stations
- Swedish

Related Data

Space Weather
### Sao Martinho Muon Telescope

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**References**

- [Cosmic Ray Muon Observation At Southern Space Observatory](#)
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### Sao Martinho Muon Telescope

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**References**

- Cosmic Ray Muon Observation At Southern Space Observatory
COSMIC RAY MUON OBSERVATION AT SOUTHERN SPACE OBSERVATORY – SSO (29°S, 53°W)

M.R. DA SILVA¹, D.B. CONTREIRA¹, S. MONTEIRO¹, N.B. TRIVEDI¹, K. MUNAKATA² T. KWABARA² and N.J. SCHUCH¹

¹Southern Regional Space Research Center, CRSPE/INPE-MCT, Santa Maria, Brazil;
²Physics Department, Faculty of Science, Shinshu University, Matsumoto, Japan

Abstract. Under an agreement on scientific cooperation between Brazil and Japan, a prototype detector of cosmic ray muons has been operating since March 2001 at Southern Space Observatory (SSO) located at São Martinho da Serra (29°S, 53°W), Brazil, in order to observe cosmic ray precursors of

### Mephi Hodoscope TEMP

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References:
- Меточика учета температурного эффекта для данных наземных мюонных голографов
- Мониторинг температуры атмосферы на разных высотах по угловому спектру мюонов
Mephi URAGAN Muon Hodoscope
Mephi URAGAN Muon Multi-Directional Telescope

PI: Petruchin A.A.
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Tel: 8(495) 3248780; 8(495) 3248278; 8(495) 3239040
Fax: 8(495) 3248780

http://nevod.mephi.ru/

Basic informations. 0 mwe

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<tr>
<td>Standard pressure, mbar [hPa]</td>
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<tr>
<td>Vertical geomagnetic cutoff rigidity</td>
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<tr>
<td>Detector type</td>
<td>320×3.5×8 gase detectors (unit Θ 0.0035×3.5 m³)</td>
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Детектор УРАГАН состоит из четырех супермодулей. Каждый супермодуль (СМ) УРАГАН представляет собой восемь слоев газоразрядных камер, оснащенных двухкоординатной системой внешних считающих пластин (стримеров). Каждый слой собирается из 20 камер, в свою очередь камера состоит из 16 трубок с площадью поперечного сечения 9.9 мм² и длиной 3.5 м, собранных в один пластиковый корпус. Функционирование камер в режиме ограниченного стримера обеспечивается специально подобранной трехкомпонентной газовой смесью (аргон+CO2+pentan) и выбором рабочего напряжения. Супермодуль обеспечивает высокую пространственную и угловую точность регистрации мюонов (соответственно 1 см и 1 градус) в широком диапазоне зенитных углов от 0 до 80 градусов. Эффективная геометрическая площадь одного СМ составляет 11.9 м2. Средний темп счета одного супермодуля составляет ~ 1500 событий в секунду.
Geomagnetic storm’s precursors observed from 2001 to 2007 with the Global Muon Detector Network (GMDN)

M. Rockenbach,1 A. Dal Lago,2 W. D. Gonzalez,2 K. Munakata,3 C. Kato,3 T. Kuwabara,4 J. Bieber,5 N. J. Schuch,5 M. L. Duldig,6 J. E. Humble,6 H. K. Al Jassar,7 M. M. Sharma,7 and I. Sabbah8,9

Received 16 June 2011; revised 19 July 2011; accepted 24 July 2011; published 27 August 2011.

Figure 1. Pitch angle distribution in function of time for the three geomagnetic storm’s precursors examples observed by the GMDN (top) on November 9, 2004 showing a loss cone (LC), 10 hours prior to the SSC, (middle) on December 14, 2006 showing a loss cone (LC), 8 hours prior to the SSC, and (bottom) on October 24, 2003 showing a loss cone (LC), 5 hours prior to the SSC. Each circle represents an hourly measurement by a single telescope plotted at the appropriate time (abscissa) and pitch angle (ordinate) of the telescope’s viewing direction. A pitch angle of 0° corresponds to the sunward IMF direction. Open and solid circles represent, respectively, an excess and deficit of cosmic ray intensity relative to the average, and the diameter of each circle is proportional to the magnitude of deficit or excess.

SSC: storm sudden commencement
Geomagnetic storm’s precursors observed from 2001 to 2007 with the Global Muon Detector Network (GMDN)


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Figure 3. Magnetic storms intensity and the appearance time distribution histograms of the precursors. NP, no-precursor; EV, enhanced variance; LC, loss cone precursors; SS, super storms; IS, intense storms; and MS, moderate storms.
5. CONCLUSIONS

We point out that different values of q are appropriate for cosmic rays of different energy ranges and show that loss cone precursors to Forbush decreases should typically be detectable by neutron monitors about 4 hr prior to shock arrival and by muon detectors about 15 hr prior to shock arrival. The results are consistent with observational surveys and suggest that ground-based cosmic-ray detectors can play a useful role in space weather forecasting.
Primary cosmic ray

\[ N_e^{\pi^0} = \gamma N_e \]
\[ N_e^{\text{dec}} = \alpha N_e \]
\[ N_e^\delta = \beta N_e \]
\[ \alpha + \beta + \gamma = 1 \]