

NMDB – the database of real-time neutron monitor measurements

An excellent cornerstone for space weather applications

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USER LOGIN

Username: *

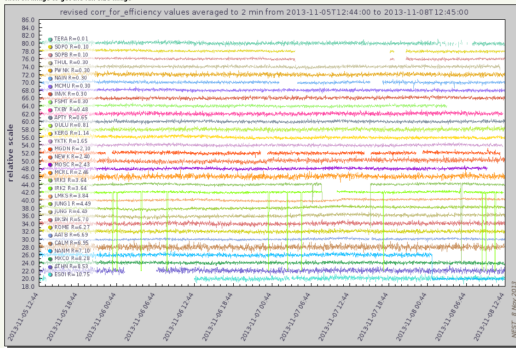
Password: *

Remember me

Cosmic Rays Now !

Posted December 15, 2009 - 3:33pm by Nicolas Fuller

click on image to get the full size image



1st data from NMDA updated every 5 minutes. (refresh the page to update data) (if necessary)



Neutron monitors



NM64 Athens



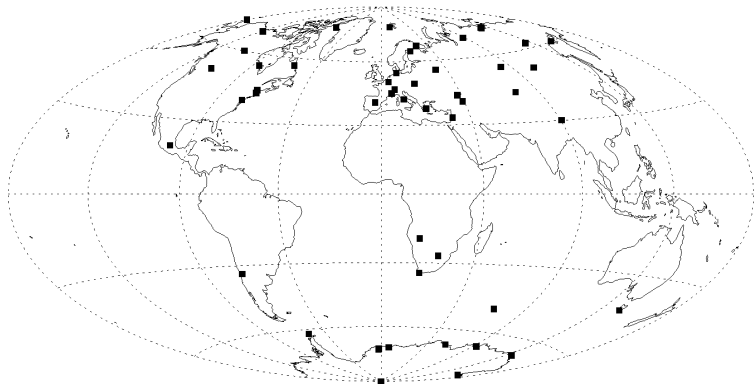
IGY Jungfrauoch

Neutron monitors

- Sensitive to primary CRs energies above ~ 0.5 GeV
- Standardized detectors: IGY and NM64
- Continuous measurements since the 1950s
- Worldwide network with about 50 stations
- Ground based neutron monitors (NMs) remain the state-of-the-art instrumentation for measuring high-energy cosmic rays

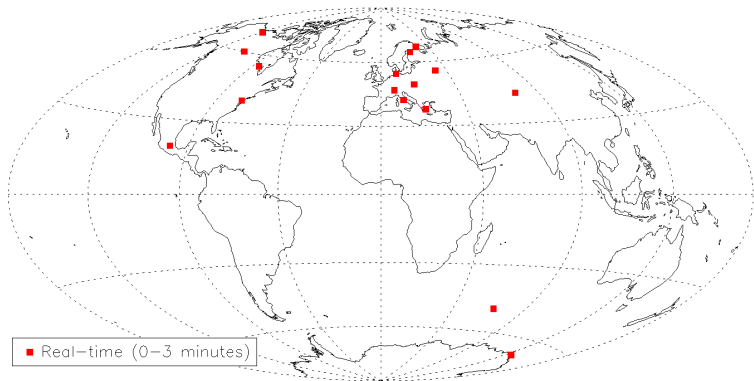
The worldwide network of NMs together with the geomagnetic field act as a giant magnetic spectrometer for cosmic rays in the energy range from ~ 500 MeV to ~ 15 GeV

Worldwide network of NMs



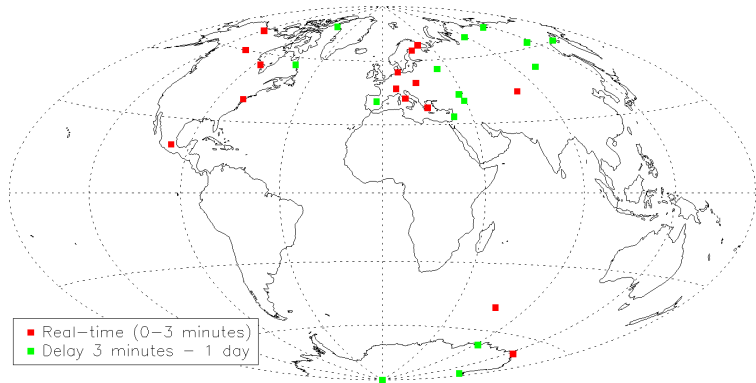
Worldwide network presently consists of ~ 50 stations

NMs real-time data in NMDB



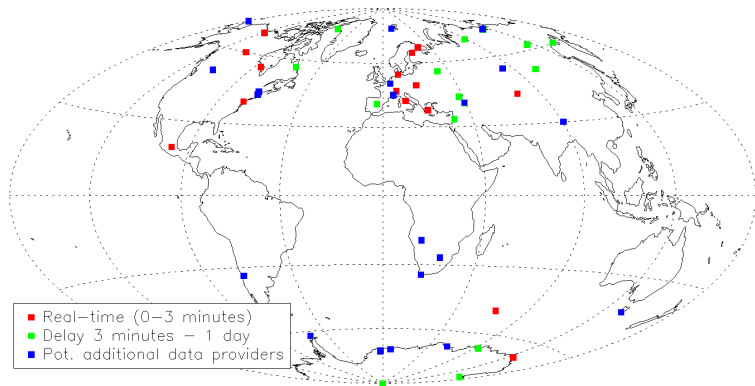
In NMDB data of 15-20 NM stations are available in **real-time**

NMs sending data to NMDB



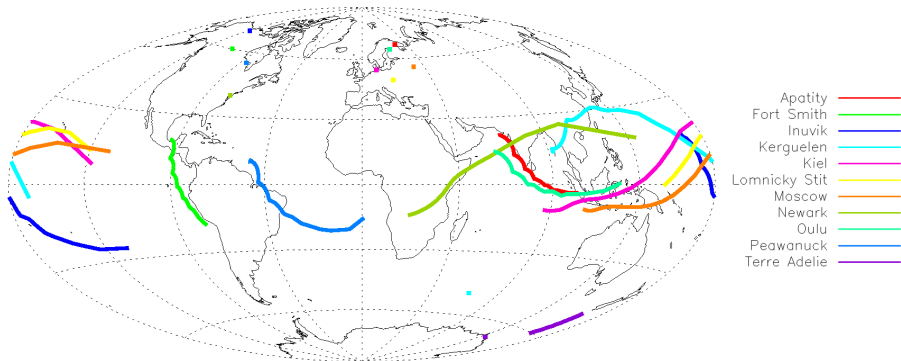
Total ~30 NM stations send data to NMDB
with a delay of <1 day

Worldwide network of NMs



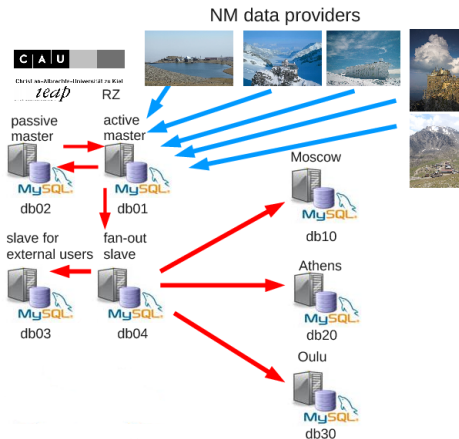
~20 NM stations do not (yet) send data to NMDB

Viewing directions of real-time NMs outside geomagnetic field



Asymptotic directions for rigidities 1-5 GV

Configuration of NMDB servers



Webpage NMDB

Firefox - Neutron Monitor Database |

Neutron Monitor Database - Mozilla Firefox ->

NMDB
neutron monitor database
Neutron Monitor Database

SEARCH

NMDB STATIONS DATA AND PRODUCTS TECHNICAL DOCS NMDB BROCHURES PUBLIC OUTREACH NEWS

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USER LOGIN

Username: *

NMDB: REAL-TIME DATABASE FOR HIGH RESOLUTION NEUTRON MONITOR MEASUREMENTS

Posted May 21, 2008 - 3:11pm by Askar Ibragimov

Solar cosmic ray event (GLE) was observed by neutron monitor network on 17 May 2012 at around 0150 UT. First information on the GLE is available [here](#).

DATA & PRODUCTS

PUBLIC OUTREACH

WHO WE ARE

COSMIC RAYS NOW!

TRAINING

14:27/26

Webpage NMDB

The screenshot shows a web browser window displaying the NMDB website. The browser's address bar shows 'Data and Products |'. The website header features the NMDB logo (neutron monitor database) and a search bar. Below the header is a navigation menu with tabs for 'NMDB STATIONS', 'DATA AND PRODUCTS', 'TECHNICAL DOCS', 'NMDB BROCHURES', 'PUBLIC OUTREACH', and 'NEWS'. The 'DATA AND PRODUCTS' tab is active.

BOOK NAVIGATION

- » NMDB Stations
- » **Data and Products**
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NAVIGATION

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VIEW REVISIONS

Data and Products

Posted May 25, 2008 - 8:46pm by Askar Ibragimov

NMDB online data access tools

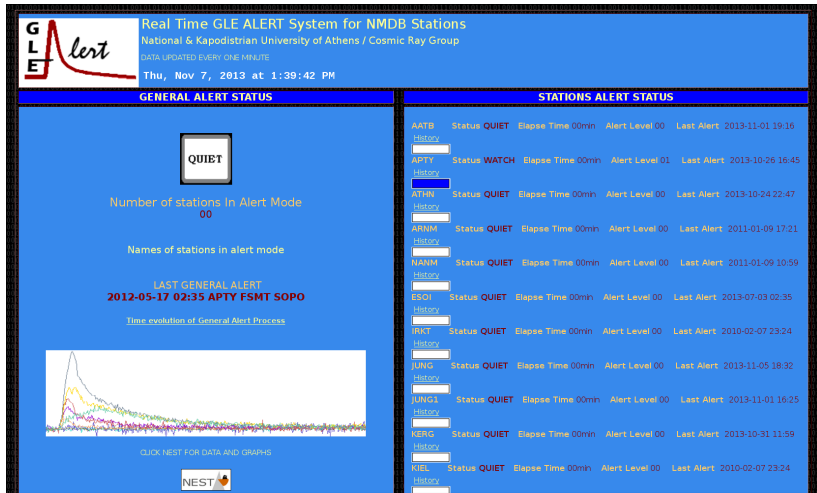
- ▶ Instructions for data retrieval
- ▶ Neutron monitor data access tool (NMDB EVENT SEARCH TOOL) (Obs. Paris / Nicolas Fuller)
description available under PHP interface for data visualisation and retrieval
- ▶ Status of NMDB tables at a glance (L. Stll / Igor Strharsky)

NMDB data products

- ▶ GLE ALARM SYSTEM (NKUA)
- ▶ GLE ALERT SYSTEM (IZMIRAN)
- ▶ Real-time GLE calculations (NKUA)
- ▶ Real-time GLE parameters (IZMIRAN-Apatly)
- ▶ BAROMETRIC COEFFICIENT CALCULATIONS (NKUA-IZMIRAN)
- ▶ SOLAR NEUTRON MONITORING (IZMIRAN-Almaty)
- ▶ CR FLUCTUATIONS (L. Stll / K. Kudela, I. Strharsky)

NMDB data used in other research

Application: GLE Alert



Application: GLE Alert

RESULT of the GLE Alert for the last 12 minutes

DateTime	Total Stations	Used Stations	Stations with increase >2 sigma	Watch	Warning!	Alert !
2013-11-07 13:25:00+00	15	0	0			
2013-11-07 13:26:00+00	15	0	0			
2013-11-07 13:27:00+00	15	0	0			
2013-11-07 13:28:00+00	15	0	0			
2013-11-07 13:29:00+00	15	0	0			
2013-11-07 13:30:00+00	15	0	0			
2013-11-07 13:31:00+00	15	0	0			
2013-11-07 13:32:00+00	15	0	0			
2013-11-07 13:33:00+00	15	0	0			
2013-11-07 13:34:00+00	15	0	0			
2013-11-07 13:35:00+00	15	0	0			
2013-11-07 13:36:00+00	15	0	0			

Application: Real-time GLE parameters

GLE Modeling

[What is modeled and how?](#)

Results of modeling:

[GLE#70 2006.12.13 02:51](#)

GLE 17 May 2012 01:49 UT

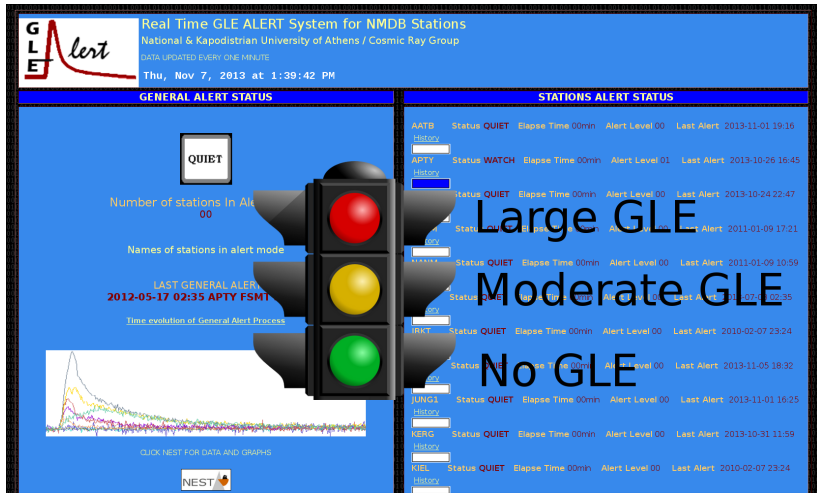
(based on NMDB data)

22 stations used:

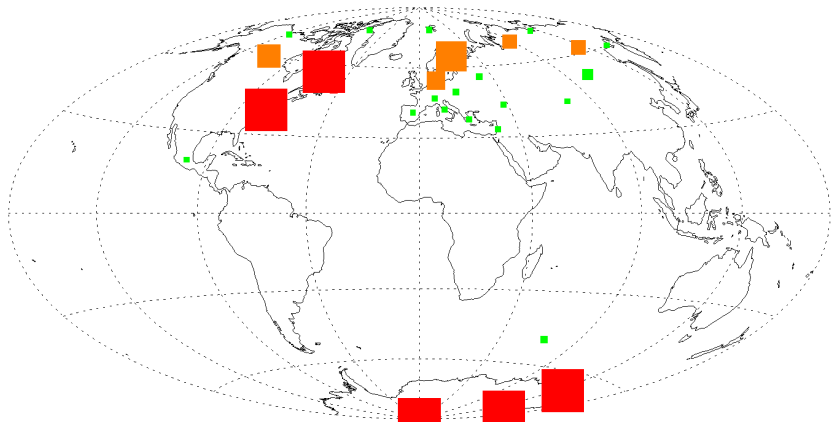
APTY, ATHN, BKSJ, FSMT, INVK, IRK2, JUNG, KERG, KIEL2, MGDN, MCMJ, MOSC, NAIN, NEWK, NRLK, OULU, PWNK, ROME, SOPO, THUL, TXBY, YKTK

UT	J_0 (m^2 s ster $G\dot{V}^{-1}$)	γ	$\Delta\gamma$	$2\sigma^2$ radians ²	ϕ degrees	λ degrees	$D\epsilon$ %
02:05	2.29E+05	2.67	1.24	3.09	-23	-99	10
02:10	1.20E+05	3.04	1.03	3.48	-23	-99	8
02:15	7.38E+04	2.45	1.14	3.77	-25	-96	9
02:20	3.72E+04	2.31	1.02	3.20	-24	-94	8
02:25	2.65E+04	2.29	0.99	3.64	-26	-90	8
02:30	4.26E+04	3.07	1.02	5.49	-27	-88	6
02:35	4.08E+04	3.11	1.04	6.36	-30	-81	4
02:40	5.03E+04	3.43	1.32	8.57	-31	-77	4
02:45	5.71E+04	3.76	1.61	14.60	-29	-76	4
02:50	6.67E+04	3.96	1.57	9.68	-30	-74	4
02:55	7.95E+04	4.56	1.58	8.42	-30	-70	5
03:10	4.66E+04	4.03	1.79	10.86	-18	-80	5

Possible application: GLE Alert



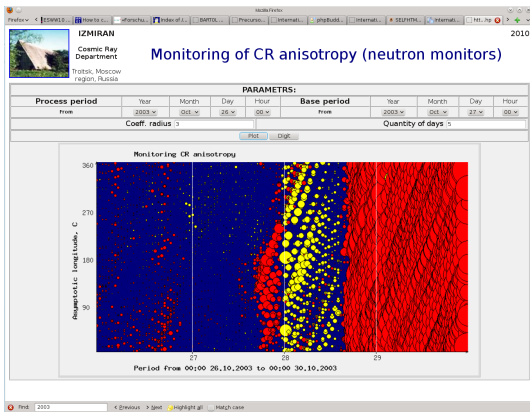
Possible application: GLE Alert



$\Delta N < 10\%$, $10\% < \Delta N < 50\%$, $\Delta N > 50\%$

Size of square gives information on the magnitude of ΔN

Application: CR ANISOTROPY



Precursors indicate the arrival of solar wind disturbances
→ Forecasting instrument

Application: NEST

Warning: Station list have not been properly retrieved. Station colors in the generated plots may not correspond to the ones in the search form. You can reload the form page to avoid this
3 ways 2 use NEST

Quick Plots
Last Data GLE 71 GLE 70

conditions & information to use data

[oct 2013] Welcome to Mexico station (MXC O)
[march 2013] session on cosmic ray

Stations

<input type="checkbox"/> AATB	<input type="checkbox"/> APTY	<input type="checkbox"/> ARNM	<input type="checkbox"/> ATHN	<input type="checkbox"/> BKSN
<input type="checkbox"/> BURE	<input type="checkbox"/> CALM	<input type="checkbox"/> DOUR	<input type="checkbox"/> ESOI	<input type="checkbox"/> FSMT
<input type="checkbox"/> HERM	<input type="checkbox"/> INVK	<input type="checkbox"/> IRK2	<input type="checkbox"/> IRK3	<input type="checkbox"/> IRKT
<input type="checkbox"/> JUNG	<input type="checkbox"/> JUNG1	<input type="checkbox"/> KERG	<input type="checkbox"/> KIEL	<input type="checkbox"/> LMKS
<input type="checkbox"/> MCMU	<input type="checkbox"/> MCRL	<input type="checkbox"/> MGDN	<input type="checkbox"/> MOSC	<input type="checkbox"/> MRNY
<input type="checkbox"/> MXCO	<input type="checkbox"/> NAIN	<input type="checkbox"/> NANM	<input type="checkbox"/> NEWK	<input type="checkbox"/> NRLK
<input type="checkbox"/> NVBK	<input checked="" type="checkbox"/> OULU	<input type="checkbox"/> POTC	<input type="checkbox"/> PWNK	<input type="checkbox"/> ROME
<input type="checkbox"/> SANA	<input type="checkbox"/> SOPB	<input type="checkbox"/> SOPO	<input type="checkbox"/> TERA	<input type="checkbox"/> THUL
<input type="checkbox"/> TSUM	<input type="checkbox"/> TXBY	<input type="checkbox"/> YKTK		

All stations Online stations Same color reset colors

Date Selection (UTC)
Last 1 days hours mins
From: 17 Oct 2013 00:00 To: 18 Oct 2013 00:00

Resolution
Time resolution

Overplot main

Overplot extras

NMDB tables

Env. & meta data

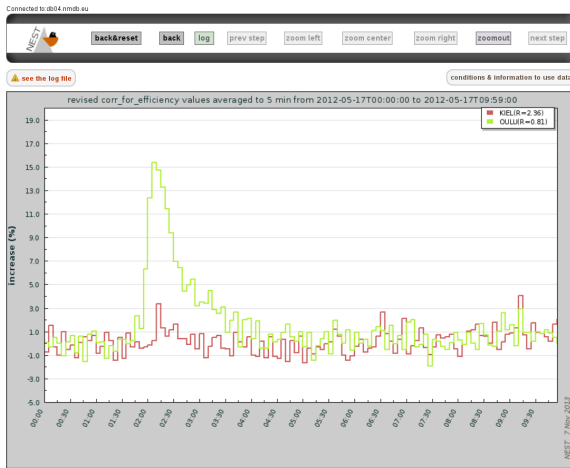
Scaling Options

Event Options

Ascii Options

NEST: NMDB Event Search Tool

Application: NEST



Total Execution Time:0.250 sec (0.013 sec for mysql query)

Application: NEST

Connected to db04.nmdb.eu

back&reset back log prev step zoom left zoom center zoom right zoomout next step

 [see the log file](#)

[conditions & information to use data](#)

Data retrieved via NMDB are the property of the individual data providers. These data are free for non commercial use to 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), and the PIs of individual neutron monitors for providing data.'

	ROME	JUNG	KIEL	OULU
2012-05-17 00:00:00	155.017	158.974	169.330	106.787
2012-05-17 00:05:00	154.987	160.495	173.217	106.362
2012-05-17 00:10:00	155.943	160.043	170.047	107.221
2012-05-17 00:15:00	155.536	158.190	168.837	106.708
2012-05-17 00:20:00	157.040	157.778	172.290	105.566
2012-05-17 00:25:00	156.460	159.528	169.650	106.815
2012-05-17 00:30:00	154.767	160.090	170.300	107.407
2012-05-17 00:35:00	157.506	159.117	168.497	105.858
2012-05-17 00:40:00	156.057	159.484	170.730	107.329
2012-05-17 00:45:00	155.613	157.890	171.553	105.045
2012-05-17 00:50:00	156.253	159.595	170.947	107.515
2012-05-17 00:55:00	156.060	160.379	171.727	107.787
2012-05-17 01:00:00	155.660	160.244	169.100	106.759
2012-05-17 01:05:00	155.500	159.715	170.127	106.827
2012-05-17 01:10:00	154.227	160.250	172.130	105.343
2012-05-17 01:15:00	155.793	158.661	170.983	106.477
2012-05-17 01:20:00	155.207	160.613	168.093	105.981
2012-05-17 01:25:00	155.463	158.038	171.420	107.067
2012-05-17 01:30:00	154.817	159.862	168.417	107.634
2012-05-17 01:35:00	156.377	159.485	172.050	106.664
2012-05-17 01:40:00	155.060	158.662	170.020	106.939
2012-05-17 01:45:00	154.507	159.438	170.807	109.207
2012-05-17 01:50:00	154.797	158.687	169.853	108.037
2012-05-17 01:55:00	156.543	158.715	170.067	113.417
2012-05-17 02:00:00	154.567	158.742	170.317	119.850
2012-05-17 02:05:00	156.647	158.223	171.003	123.075
2012-05-17 02:10:00	157.063	159.443	176.280	122.406
2012-05-17 02:15:00	157.173	159.810	172.793	120.825
2012-05-17 02:20:00	154.650	159.173	171.623	118.895
2012-05-17 02:25:00	154.640	159.582	172.553	116.688
2012-05-17 02:30:00	154.980	159.068	173.413	114.118

Readout of data from data base

```
mysql> select start_date_time,measured_corr_for_pressure from JUNG_ori where st  
art_date_time>='2013-11-07 07:00' AND start_date_time<='2013-11-07 07:30';
```

start_date_time	measured_corr_for_pressure
2013-11-07 07:00:00	185.801
2013-11-07 07:01:00	186.792
2013-11-07 07:02:00	185.819
2013-11-07 07:03:00	181.275
2013-11-07 07:04:00	182.564
2013-11-07 07:05:00	181.295
2013-11-07 07:06:00	189.298
2013-11-07 07:07:00	181.705
2013-11-07 07:08:00	188.769
2013-11-07 07:09:00	183.163
2013-11-07 07:10:00	186.115
2013-11-07 07:11:00	180.827
2013-11-07 07:12:00	185.648
2013-11-07 07:13:00	180.678
2013-11-07 07:14:00	186.343
2013-11-07 07:15:00	180.939
2013-11-07 07:16:00	185.648
2013-11-07 07:17:00	184.83
2013-11-07 07:18:00	181.5
2013-11-07 07:19:00	177.973
2013-11-07 07:20:00	180.734
2013-11-07 07:21:00	187.05
2013-11-07 07:22:00	183.052
2013-11-07 07:23:00	180.249
2013-11-07 07:24:00	185.813
2013-11-07 07:25:00	182.771
2013-11-07 07:26:00	185.574
2013-11-07 07:27:00	183.762
2013-11-07 07:28:00	186.249

Conclusions

- 30 NMs of 50 NMs send data to NMDB
- 15-20 NMs send data in real-time to NMDB
- Different applications available under www.nmdb.eu
- Interested users can obtain direct access to MySQL NMDB to develop tailored applications
- New applications using NMDB data in connection with space weather are welcome

Contact us: questions@nmdb.eu