

Athens COST-724 Workshop
2-4 April 2007
‘Real time database for Neutron Monitors’

Scientific Report / Results

by

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The workshop which was held in Athens at the meeting hall ‘Kostis Palamas’ of the University of Athens from 2 to 4 of April 2007 organised by Prof. H. Mavromichalaki of the University of Athens, was attended by twenty (20) Experts from nine (9) countries:

- Belgium: Daniel Heynderickx, Koen Stegen
- Greece: Helen Mavromichalaki, Xenophon Moussas, Panagiota Preka-Papadima, Christos Sarlanis, Christina Plainaki, George Souvatzoglou, Athanasios Papaioannou, George Mariatos, Maria Gerontidou
- Italy: Mario Parisi
- Germany: Christian Steigies
- Slovakia: Karel Kudela
- Russia: Anatoly Belov, Eugenia Eroshenko, Victor Yanke
- Israel: Lev Dorman
- Switzerland: Rolf Butikofer
- Armenia: Valery Babayan

Monday 2 April

The morning session opened with extensive presentations on neutron monitor station infrastructure and functioning. An overview was presented of already operational real-time databases around Europe.

The afternoon session was devoted to a visit of the Athens neutron monitor station. The operators demonstrated the functioning of the instrument and the data collection system. Some of the forecasting applications were also demonstrated and explained in detail.

A general discussion session was held on the current situation of neutron monitor stations and databases:

- M. Parisi pointed out that agreements should be established between station PI’s and the data base host in order to apply for support for the maintenance and running of the stations.
- The experience of the Athens cosmic ray team with space weather prediction was pointed out by X. Moussas.
- K. Kudela stressed that ongoing efforts (Athens, IZMIRAN, RECORD, ...), should be harmonized.

- D. Heynderickx suggested that a market analysis should be made to identify potential users.
- E. Eroshenko underlined that the aim of FP7 is to provide free access to data and services for researchers. This does not exclude other types of access for other classes of users.
- Real-time data is preliminary; this should be clearly stated on the data base access. Preliminary data should be replaced when corrected data becomes available.
- Reliable space weather prediction services need more than neutron monitor data.
- E. Eroshenko pointed out that the Dourbes station (Belgium) has stopped providing data. D. Heynderickx will check on the situation.

Tuesday 3 April

In their presentation on cosmic ray variations, the IZMIRAN group suggested to establish a virtual observatory instead of a “classical” centralized data base. One of their arguments was the volume of data to be stored. It was pointed out that the total volume of data for all neutron monitor stations since the start of observations is only of the order of several 10Gb, which easily fits on a modern laptop.

With the approach of downloading files and storing them locally, a non-negligible part of the code for applications is devoted to constructing file and directory names, opening files and reading in specific formats. This effort can be avoided when an SQL database with standard access queries is used.

K. Kudela pointed out that the study of cosmic ray variations needs muon telescope data in addition to neutron monitor data. He added that a space weather forecast project is established in Yakutsk.

G. Souvatzoglou stressed the importance of stable data formats for data providers in order to avoid problems with download functions.

M. Parisi asked whether there would be one central data base or a distributed system. Data bases can be both local and distributed.

The data policy for each station should be reflected in the data base, and the origin of the data should be clearly visible.

The issue of station synchronization was discussed. A possible solution is to use the ntp protocol, for which there is freely available software. It was pointed out that not all stations have access to internet, so this approach is not valid for all stations. Some stations use radio clocks, which should be a stable solution as well.

C. Steigies and D. Heynderickx demonstrated prototypes of databases and various ways to access them in different application types.

It was agreed to implement an SQL database at BIRA. Those stations that are able will push their data in the highest possible time resolution to the database. For the

other stations, a pull method will be implemented. K. Stegen will visit a number of stations (Lomnický štít, Rome, Athens, ...) to implement the necessary software for pushing data. The database should be able to automatically push data to other centres or users (e.g. ANMODAP).

The exact content of the database is still under discussion. As a starting point, the IZMIRAN archive of 1-hr neutron monitor measurements will be downloaded and ingested for all stations that are in the archive and which give permission. The data columns will be a time stamp, pressure, uncorrected and pressure corrected counts.

The issue of storing different versions of the data was discussed. One option is to replace e.g. real-time data with corrected data when they become available. R. Bütikofer stressed that it is important to store both the raw data and final data.

Wednesday 4 April

Discussion on funding in FP7

C. Steigies gave a review on the procedure to submit proposals for FP7 e-infrastructures. The first deadline for submittal is 2 May. It is decided to submit two proposals: one for e-infrastructure for the 2 May deadline, and one for research infrastructures for the autumn deadline.

A list of work packages was established, with a preliminary list of participants and work package leaders. The overall manager still has to be selected.

WP	Leader	Member				
1. Architectural design	Brussels	Kiel	Athens			
2. guidelines for data acquisition	Oulu	IZMIRAN	Kiel			
3. applications/service	IZMIRAN	Athens	Bern	Israel	Slovakia	Rome
4. user tools (access to db and contribution, training)	Brussels	Athens	France	Armenia		
5. management	?	Brussels	France	IZMIRAN		

The interested parties not present during the discussion (e.g. K. Kudela, I. Usoskin) will receive an e-mail with the above table and a request to urgently indicate in which WPs they wish to participate. All information necessary for writing the proposal will be put on the workshop website at Athens.

Conclusions

This workshop was a historical occasion in the sense that for the first time neutron monitor station representatives and scientists were gathered for a dedicated meeting on standardisation and collaboration to establish a common platform for data exchange and for future developments.

The main outcomes of the workshop are:

- A concrete plan for submitting FP7 proposals
- A set of action items on the data providers to send extensive descriptions of their instrumentation, data content and processing to BIRA for publishing alongside the database.
- A list of metadata will be compiled.
- An SQL database will be established at BIRA, with access to all data provided by the consortium. BIRA will assist with the procedures to populate and access the database, regardless of the outcome of the FP7 proposals.

Athens, 4 April 2007

**H. Mavromichalaki
Local Organizer
University of Athens**