Institute for Nuclear Research and Nuclear Energy

Bulgarian Academy of Sciences

Founded 1972 (Institute of Physics, 1956)

BEO Moussala and BEOBAL FP6 project

Jordan Stamenov,
Boyko Vachev

Mission

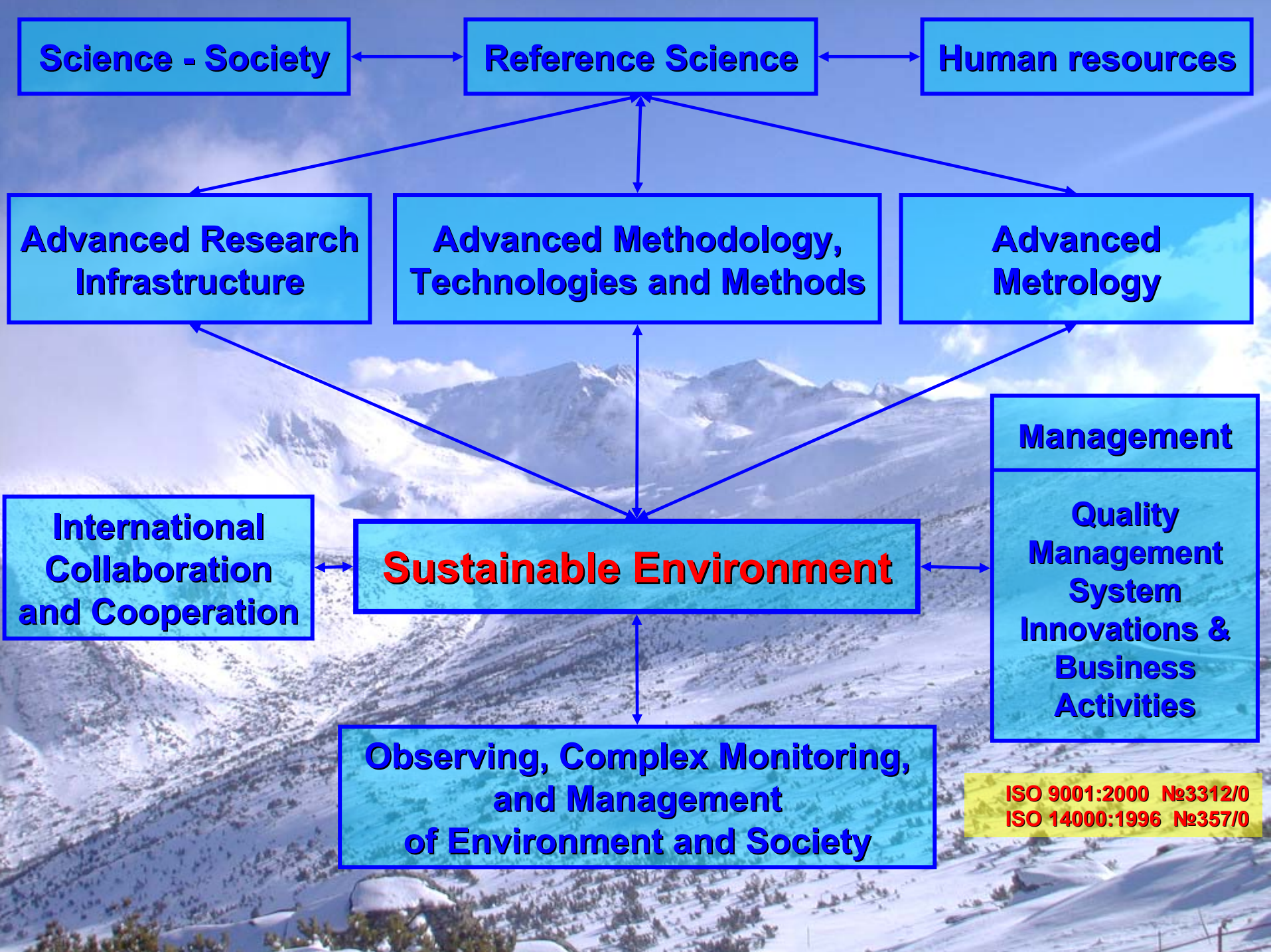
INRNE is nuclear research institution and the biggest leading complex centre in Bulgaria for scientific investigations and applications of the nuclear science

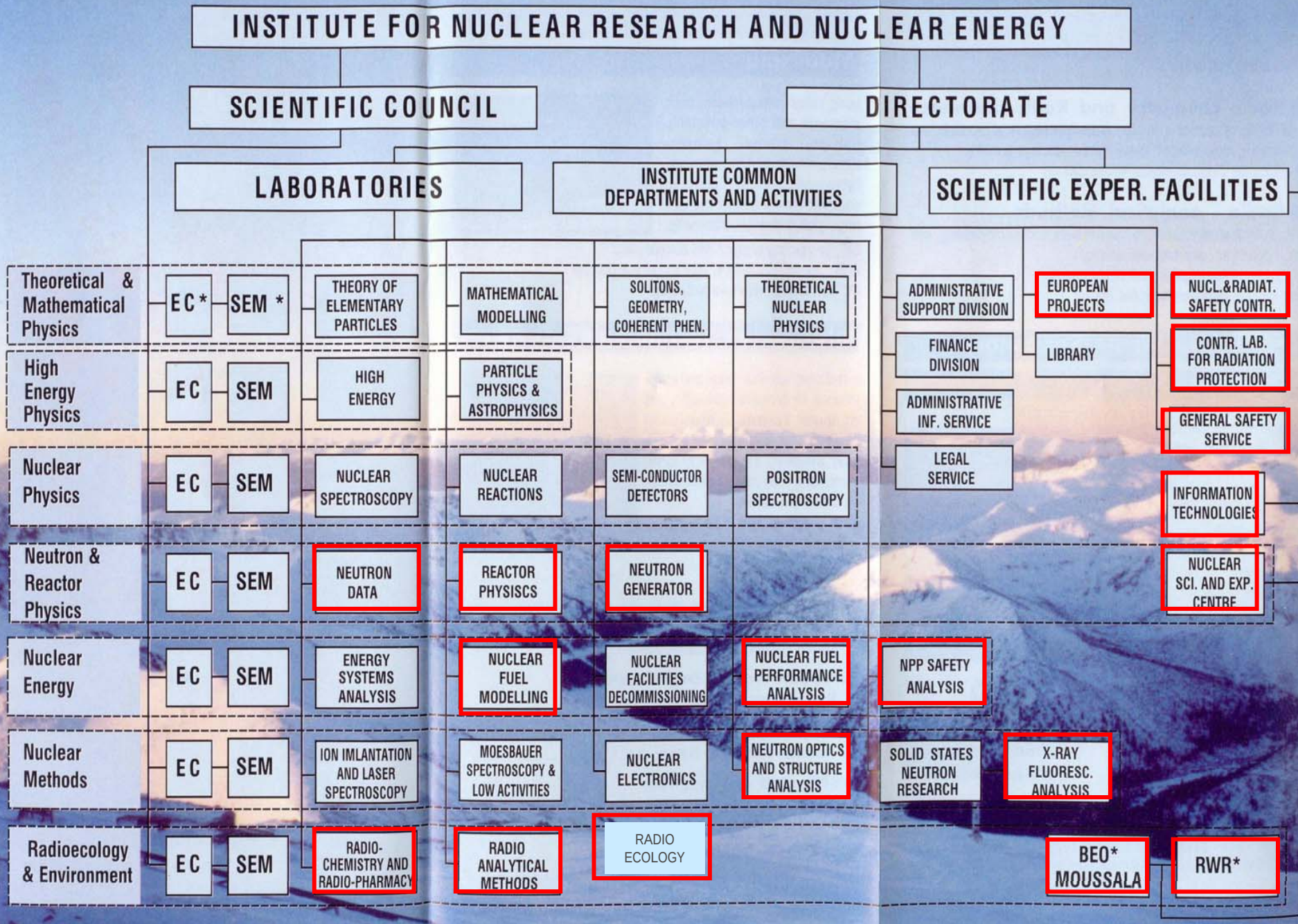
Vision

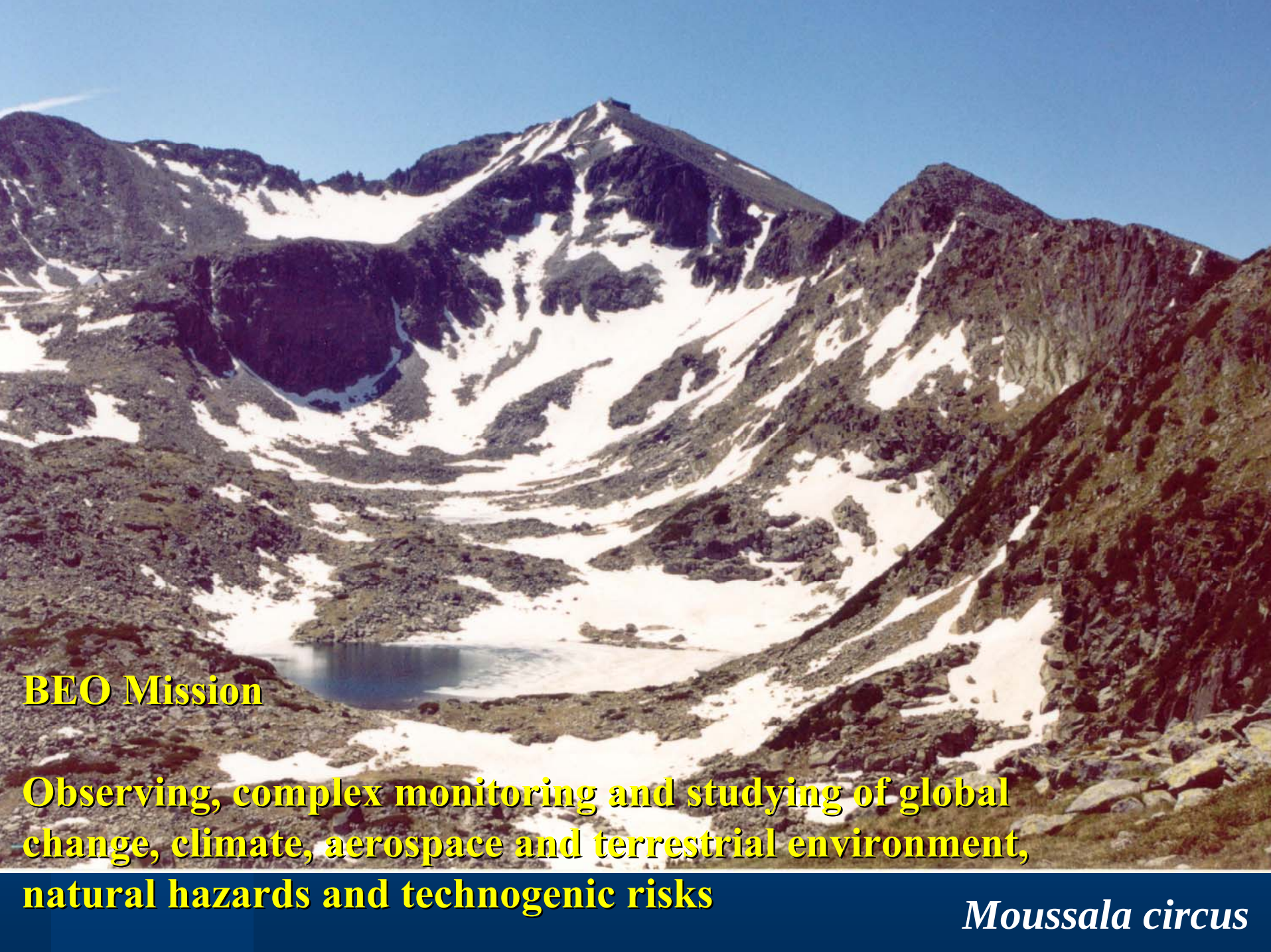
INRNE has to satisfy the needs of the society for support and development of the nuclear science and knowledge towards to perform investigations and applications on the field of nuclear technologies, medicine, industry and environment

Quality management system since 2003/2004

ISO 9001:2000 №3312/0
ISO 14000:1996 №357/0


Science - Society
Reference Science
Human resources
Advanced Research Infrastructure
Advanced Methodology, Technologies and Methods
Advanced Metrology
Management
Quality Management System Innovations & Business Activities
International Collaboration and Cooperation
Sustainable Environment
Observing, Complex Monitoring, and Management of Environment and Society
ISO 9001:2000 №3312/0
ISO 14000:1996 №357/0


INSTITUTE FOR NUCLEAR RESEARCH AND NUCLEAR ENERGY
SCIENTIFIC COUNCIL
DIRECTORATE
LABORATORIES
INSTITUTE COMMON DEPARTMENTS AND ACTIVITIES
SCIENTIFIC EXPER. FACILITIES
Theoretical & Mathematical Physics
EC*
SEM *
THEORY OF ELEMENTARY PARTICLES
MATHEMATICAL MODELLING
SOLITONS, GEOMETRY, COHERENT PHEN.
THEORETICAL NUCLEAR PHYSICS
High Energy Physics
EC
SEM
HIGH ENERGY
PARTICLE PHYSICS & ASTROPHYSICS
Nuclear Physics
EC
SEM
NUCLEAR SPECTROSCOPY
NUCLEAR REACTIONS
SEMI-CONDUCTOR DETECTORS
POSITRON SPECTROSCOPY
Neutron & Reactor Physics
EC
SEM
NEUTRON DATA
REACTOR PHYSISCS
NEUTRON GENERATOR
Nuclear Energy
EC
SEM
ENERGY SYSTEMS ANALYSIS
NUCLEAR FUEL MODELLING
NUCLEAR FACILITIES DECOMMISSIONING
NUCLEAR FUEL PERFORMANCE ANALYSIS
NPP SAFETY ANALYSIS
Nuclear Methods
EC
SEM
ION IMLANTATION AND LASER SPECTROSCOPY
MOESBAUER SPECTROSCOPY & LOW ACTIVITIES
NUCLEAR ELECTRONICS
NEUTRON OPTICS AND STRUCTURE ANALYSIS
SOLID STATES NEUTRON RESEARCH
X-RAY FLUORESC. ANALYSIS
Radioecology & Environment
EC
SEM
RADIO-CHEMISTRY AND RADIO-PHARMACY
RADIO ANALYTICAL METHODS
RADIO ECOLOGY
ADMINISTRATIVE SUPPORT DIVISION
FINANCE DIVISION
ADMINISTRATIVE INF. SERVICE
LEGAL SERVICE
EUROPEAN PROJECTS
LIBRARY
NUCL.&RADIAT. SAFETY CONTR.
CONTR. LAB. FOR RADIATION PROTECTION
GENERAL SAFETY SERVICE
INFORMATION TECHNOLOGIES
NUCLEAR SCI. AND EXP. CENTRE
BEO* MOUSSALA
RWR*
* EC - Expert Council; SEM - Seminar; BEO - Basic Environmental Observatory; RWR Radioactive Waste Repository



BEO Mission

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

Moussala circus

Cosmic ray station Moussala
1959 - 1983

BEO Moussala
1999

Historical dates

1932 - Inauguration of Meteorological Station on peak Moussala.

1959 – Opening of Cosmic Ray Station on peak Moussala.

1983 - Destroy of Cosmic Ray Station (fired).

1993 - Start of Bulgarian-French project OM2 for monitoring and management of high mountain ecosystems.

1999 – Inauguration of Basic Environmental Observatory (BEO) – Moussala.

2002 - Creation of BEO Centre of Excellence

2002-2003 – HIMONTONET and NUSES FP5 projects

2005 – BEOBAL FP6 project

To keep excellent

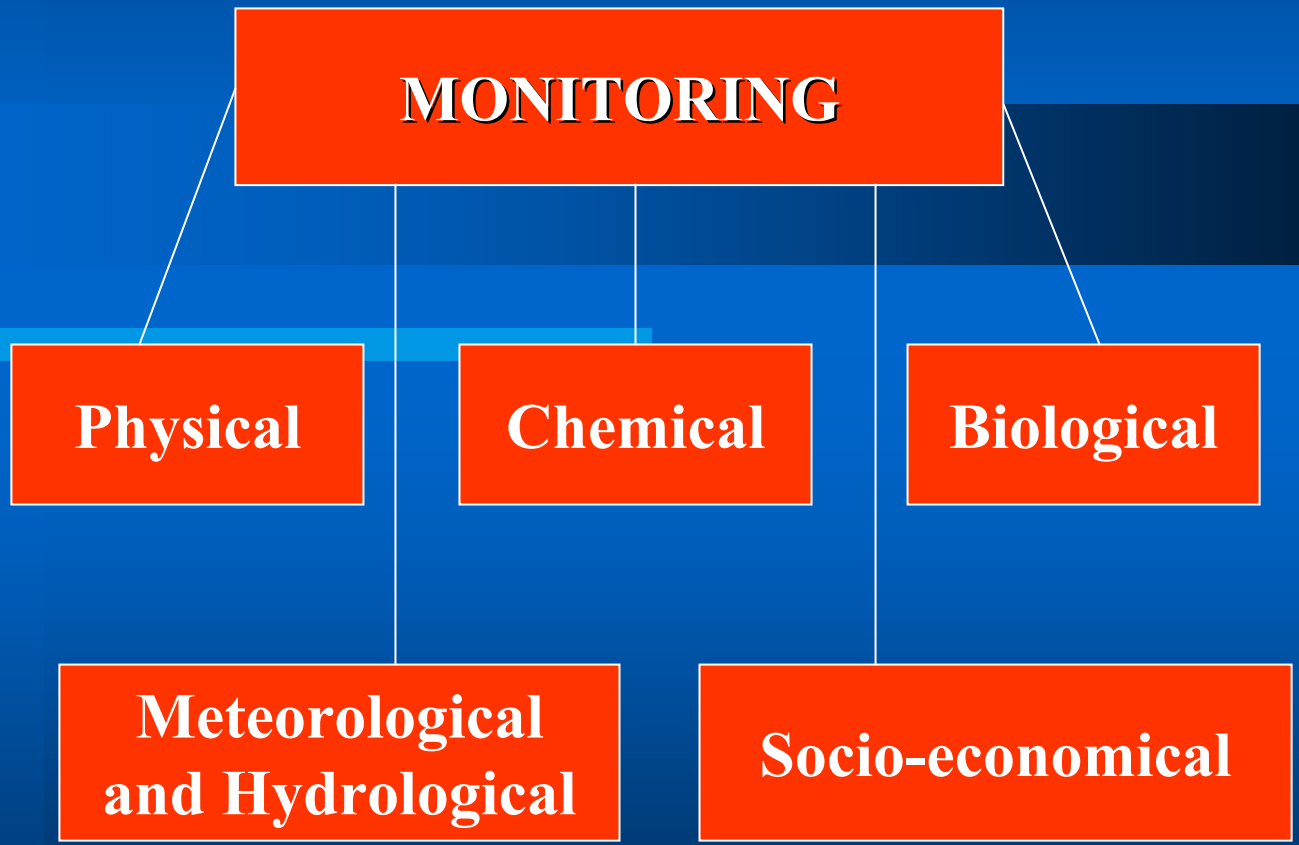
BEO Moussala

BEO Centre of Excellence

HIMONTONET FP5 project

BEOBAL FP6 project

Complex Monitoring and Management of Environment



Main Objectives

Global Change

Space Weather

Sustainable Development

Detecting:

- Aerosols
- Gases
- Radionuclides
- Heavy and Toxic Elements
- Cosmic Radiation
- EM - radiation

Studying Ecotoxicological Effects and Processes

Analysing Environmental Samples

By means of:

Improving of existing measuring devises

Installing new devises

Improving the qualification level and the human resources

Networking with high mountain observatories and JRC institutes

Collaborating with similar nuclear science institutions from Turkey and West Balkan countries: Albania, Macedonia, Serbia and Montenegro

HIMONTONET FP5 project

Director

Scientific council

Head

Expert Councils

BEO Centre of Excellence

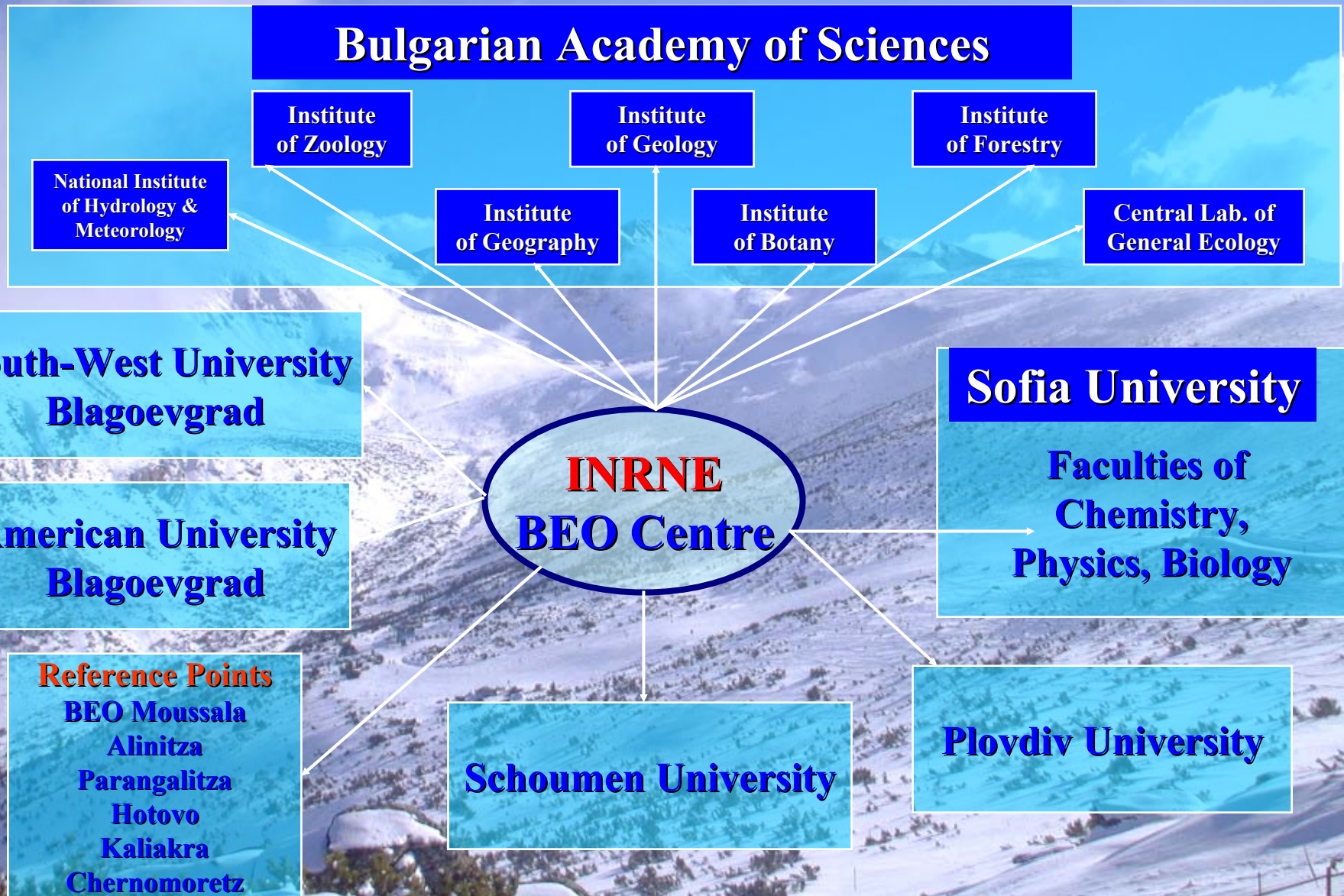
Laboratories and Scientific Experimental Facilities

- BEO Moussala and BEO INRNE
- Radio Analytical Methods
- Radio Chemistry & Pharmacy
- Radioecology
- X-ray - Fluorescent Analysis
- Neutron Generator
- Neutron Data
- Control Laboratory of Radiation Protection
- Information Technologies
- Department of European Projects

- Radioecology &Environment
- Nuclear Methods
- Neutron & Reactor Physics

BEO IEC

BEO Integrated Environmental Centre



BEO Moussala

Fields of Research

Complex Environmental Monitoring
Control of Long Range Radionuclides and Toxic Elements Transport
Atmospheric Physics
Atmospheric Chemistry
Astrophysics

Existing Basic Equipment

- Automatic meteorological station
- Monitors of acidity of clouds
- Nitrogen oxide monitor (TECAN – 700)
- Ozone monitor (DASIBI 1003 AH)
- Monitors for Radionuclide Pollution
- α, β, γ – spectrometry of aerosols
- ^{220} Rn monitoring
- Monitors of gamma background
- Neutron detectors
- Cherenkov light telescope

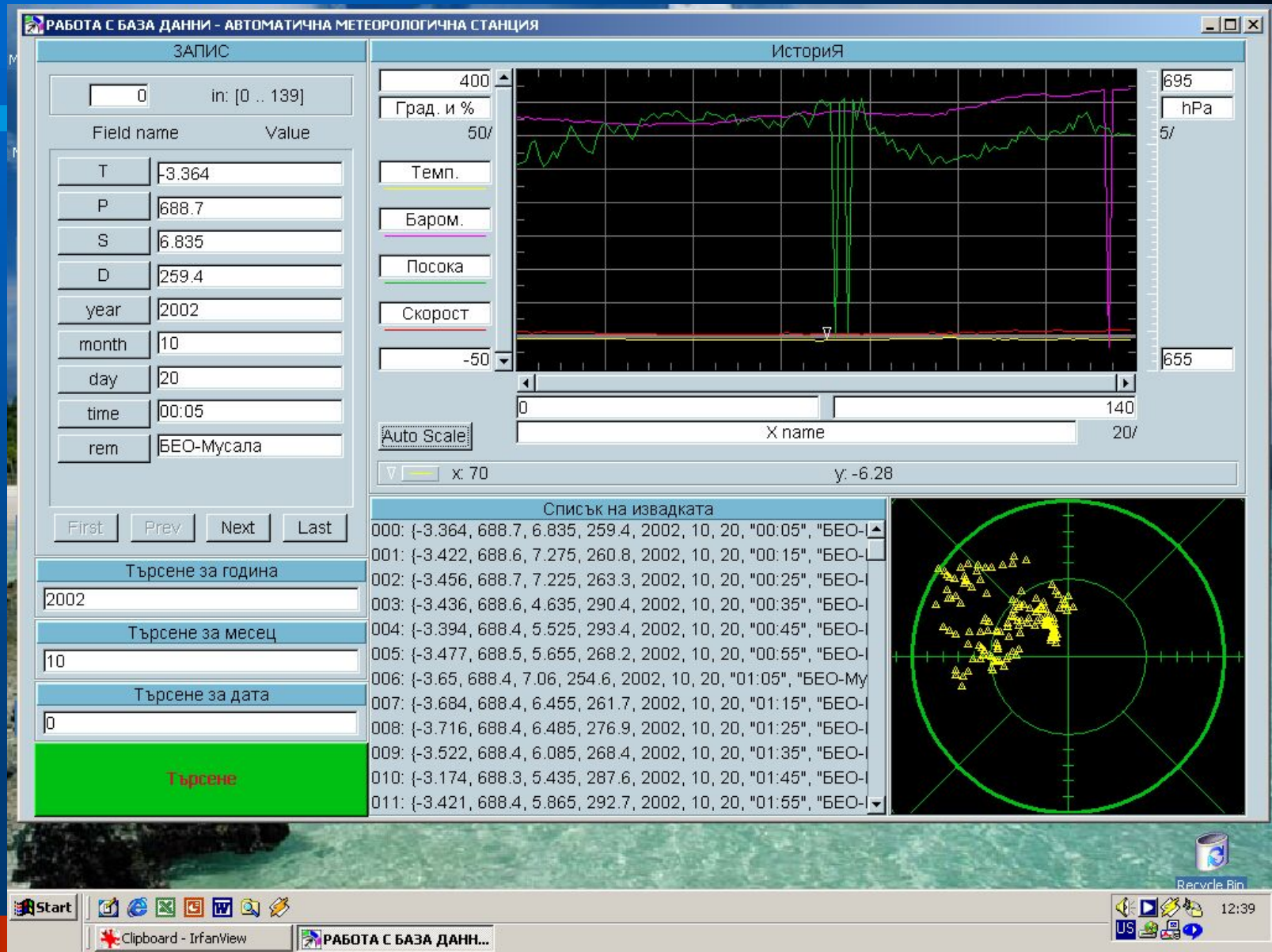
BEO Moussala

GAW

Global change observing

BEO Moussala

Automatic meteorological station Vaissala



Version. 6.0.8

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19 : 39 : 24

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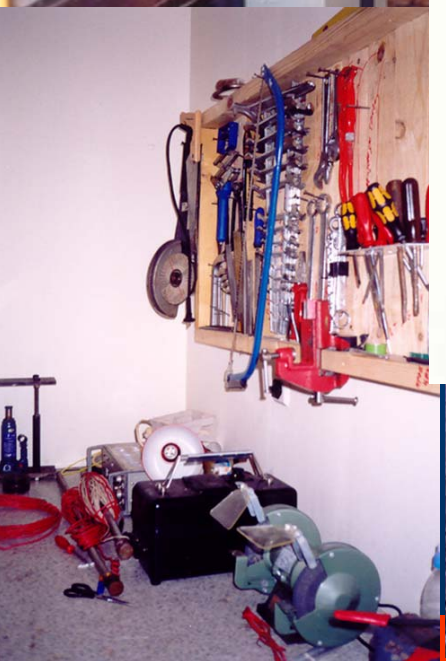
9 10 11 12 13 14 15 16

BEO Moussala

Aerosol observing
Radionuclides
Heavy metals

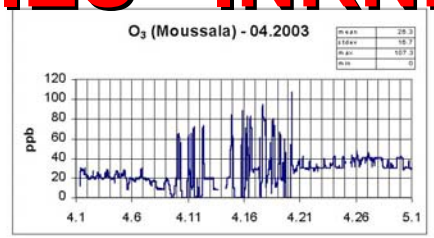
BEO Moussala - interior



Gamma background measurements with SAPHYMO

~ Scintillation detector

IES - INRNE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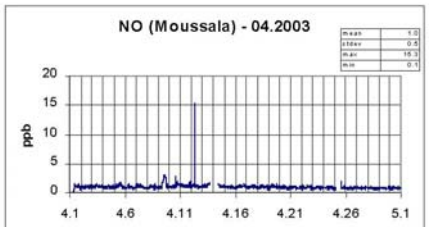
80
60
40
20
0
4.1
4.6
4.11
4.16
4.21
4.26
5.1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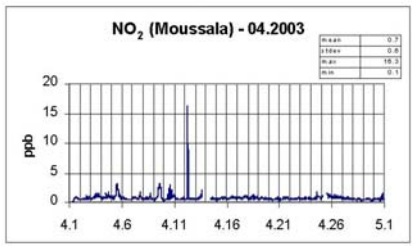
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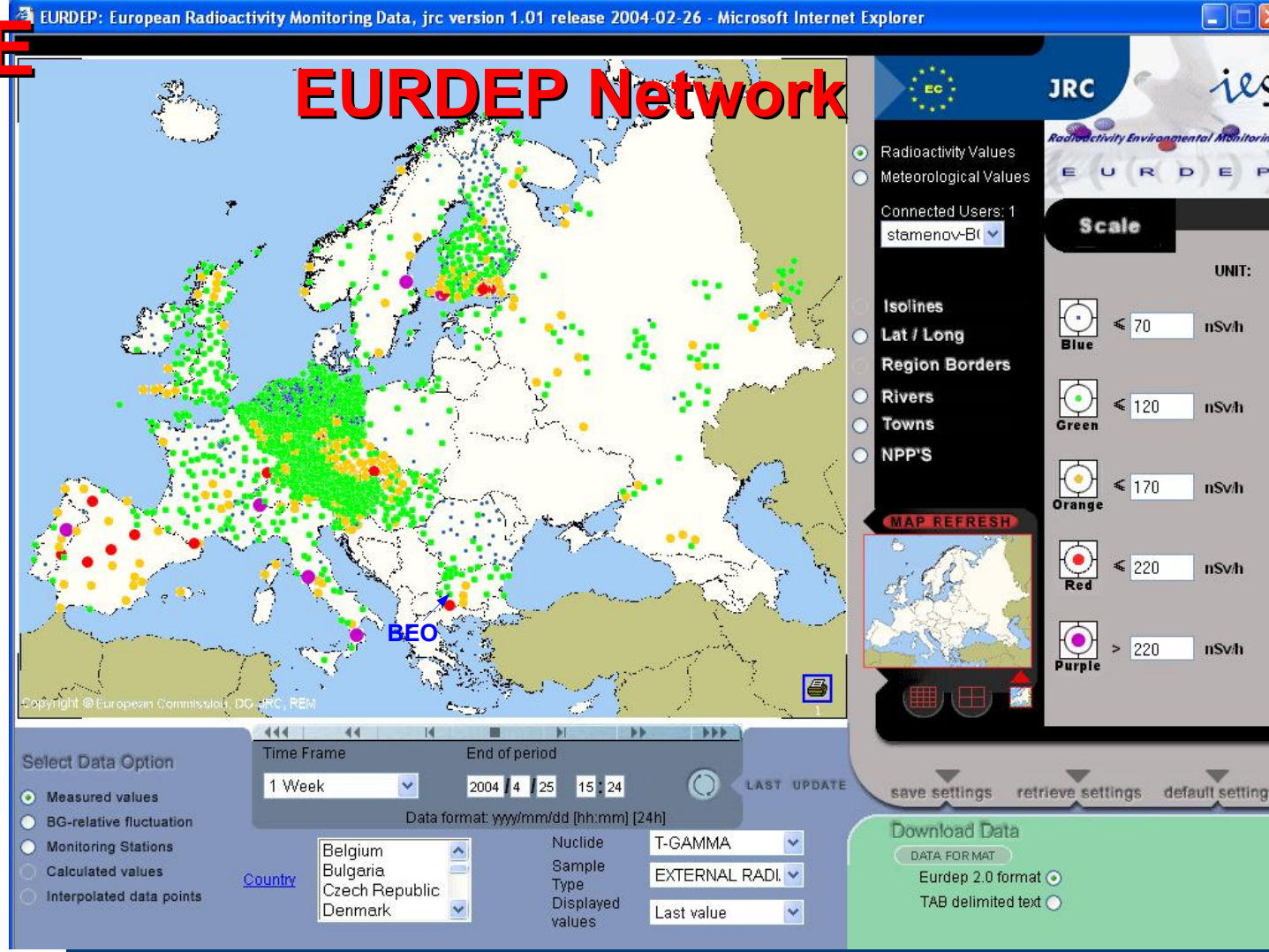
EURDEP: European Radioactivity Monitoring Data, jrc version 1.01 release 2004-02-26 - Microsoft Internet Explorer
EURDEP Network
JRC
Radioactivity Values
Meteorological Values
Connected Users: 1
Isolines
Lat / Long
Region Borders
Rivers
Towns
NPP'S
Scale
UNIT:
Blue
70
nSv/h
Green
120
nSv/h
Orange
170
nSv/h
Red
220
nSv/h
Purple
220
nSv/h
MAP REFRESH
BEO
Copyright © European Commission, DG-JRC, REM
Select Data Option
Measured values
BG-relative fluctuation
Monitoring Stations
Calculated values
Interpolated data points
Time Frame
1 Week
End of period
2004 / 4 / 25
15 : 24
LAST UPDATE
Data format: yyyy/mm/dd [hh:mm] [24h]
Country
Belgium
Bulgaria
Czech Republic
Denmark
Nuclide
T-GAMMA
Sample Type
EXTERNAL RADI.
Displayed values
Last value
save settings
retrieve settings
default setting
Download Data
DATA FORMAT
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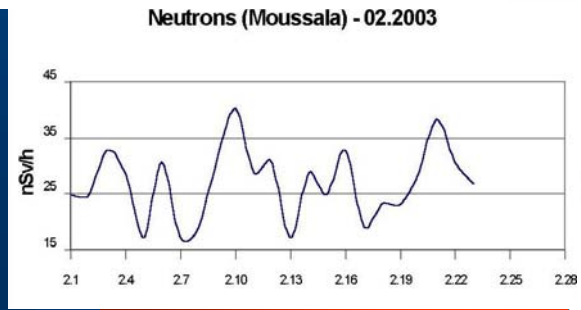
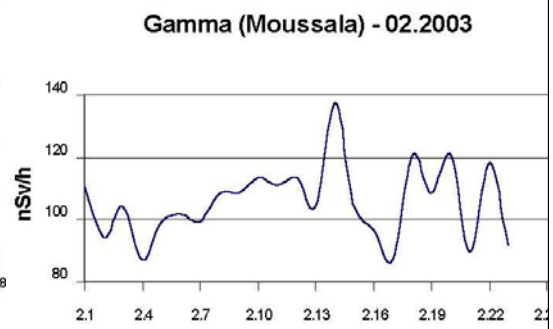
TAB delimited text


Neutrons (Moussala) - 02.2003
nSv/h
45
35
25
15
2.1
2.4
2.7
2.10
2.13
2.16
2.19
2.22
2.25
2.28


Gamma (Moussala) - 02.2003
nSv/h
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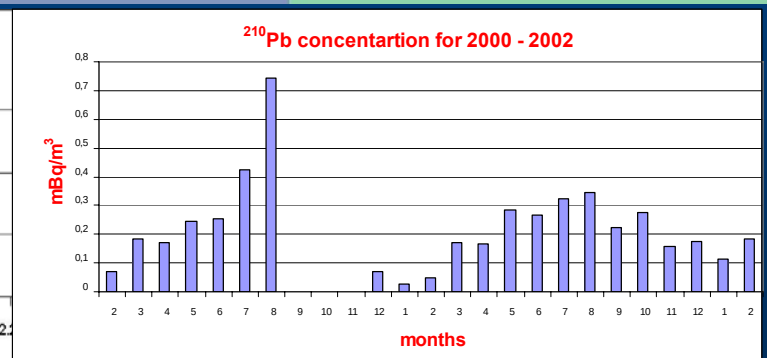
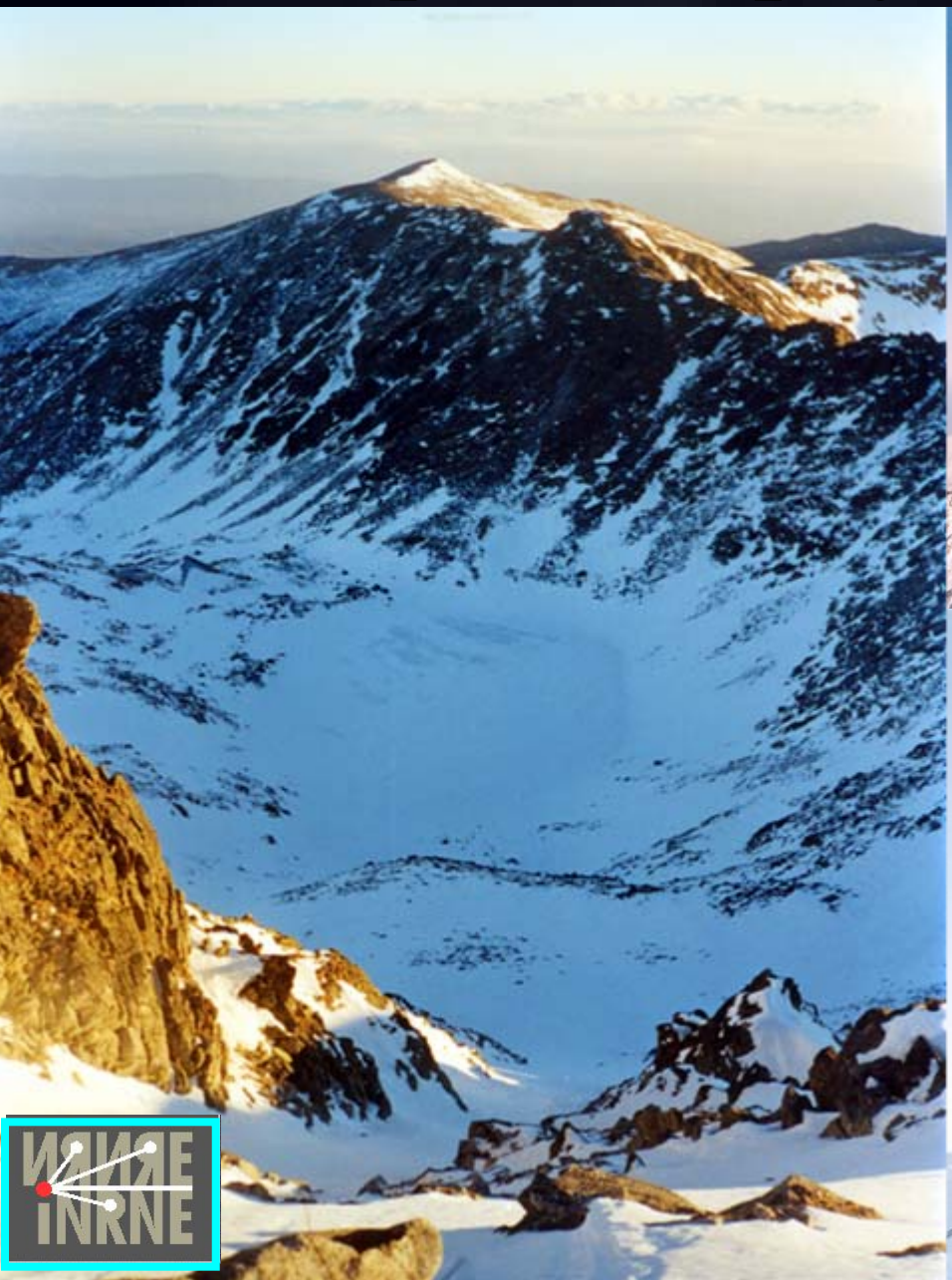
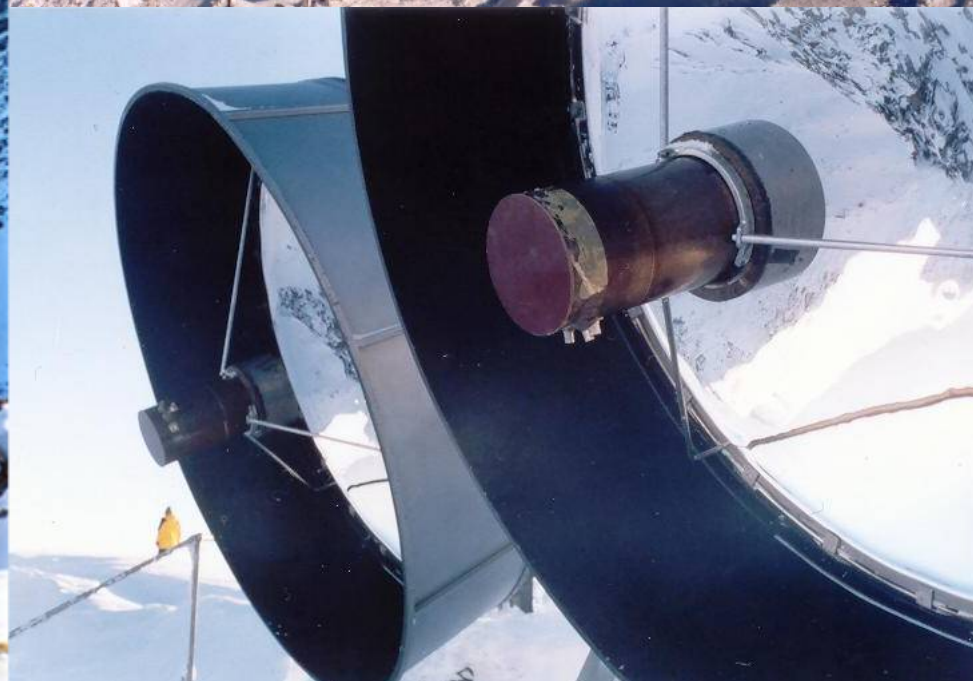
120
100
80
2.1
2.4
2.7
2.10
2.13
2.16
2.19
2.22

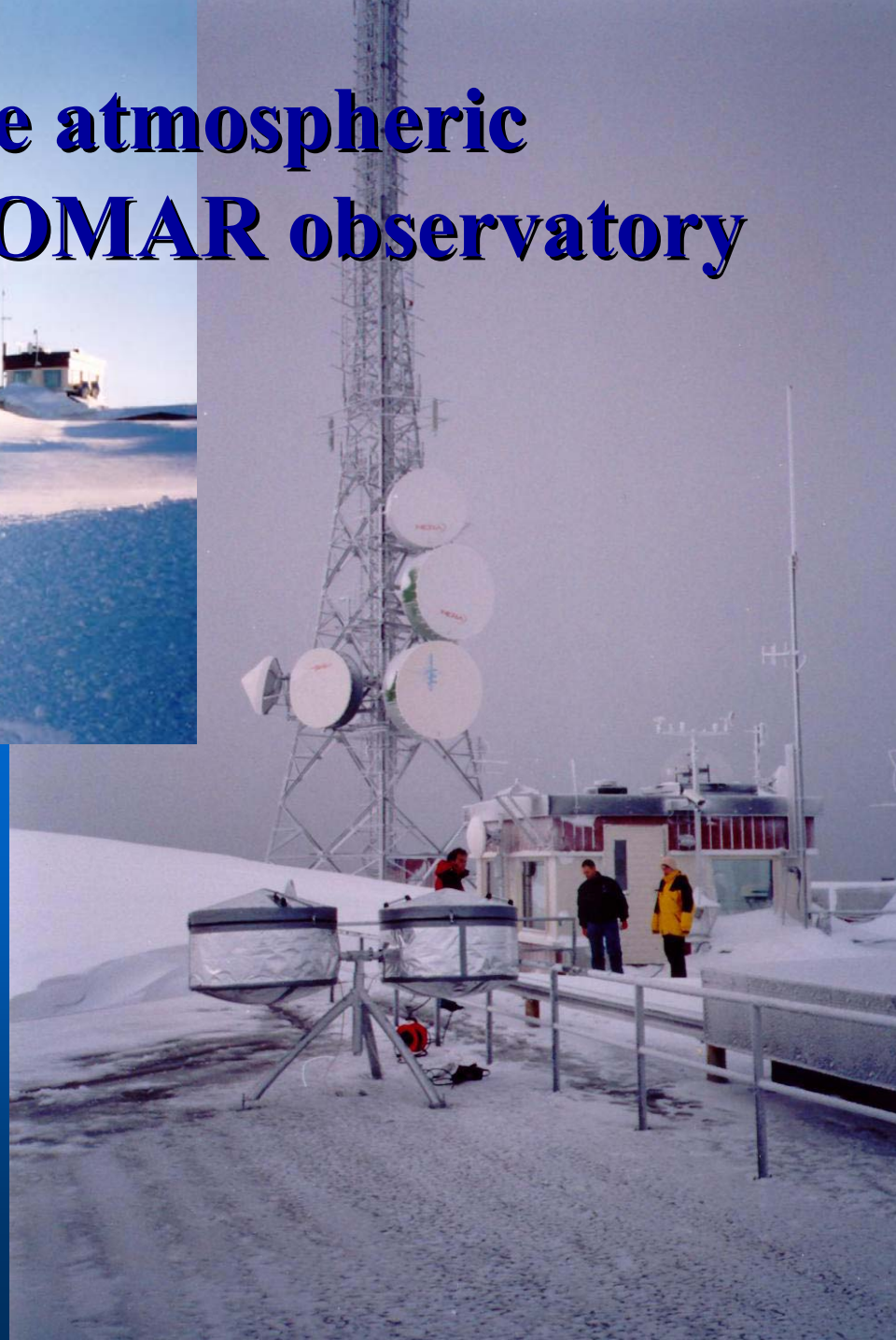

210Pb concentartion for 2000 - 2002
mBq/m3
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
2 3 4 5 6 7 8 9 10 11 12 1 2 3 4 5 6 7 8 9 10 11 12 1 2
months

Astroparticle physics at BEO Moussala





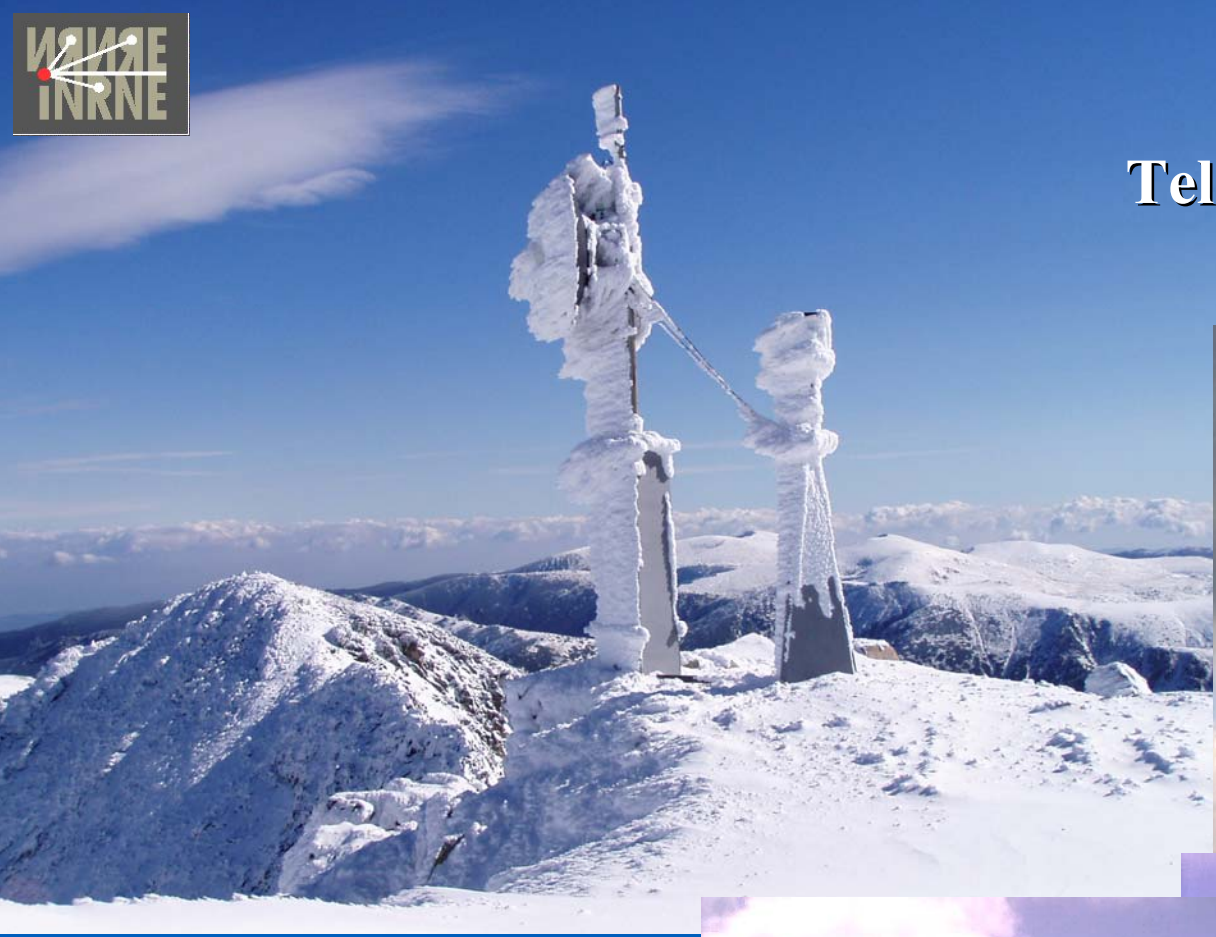
Measurements of the atmospheric transparency at ALOMAR observatory



BEO Moussala participation in a joint FP6 project

BEO Moussala

Telecommunication system



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

Lightning-conductor System

BEO Moussala

BEO Moussala

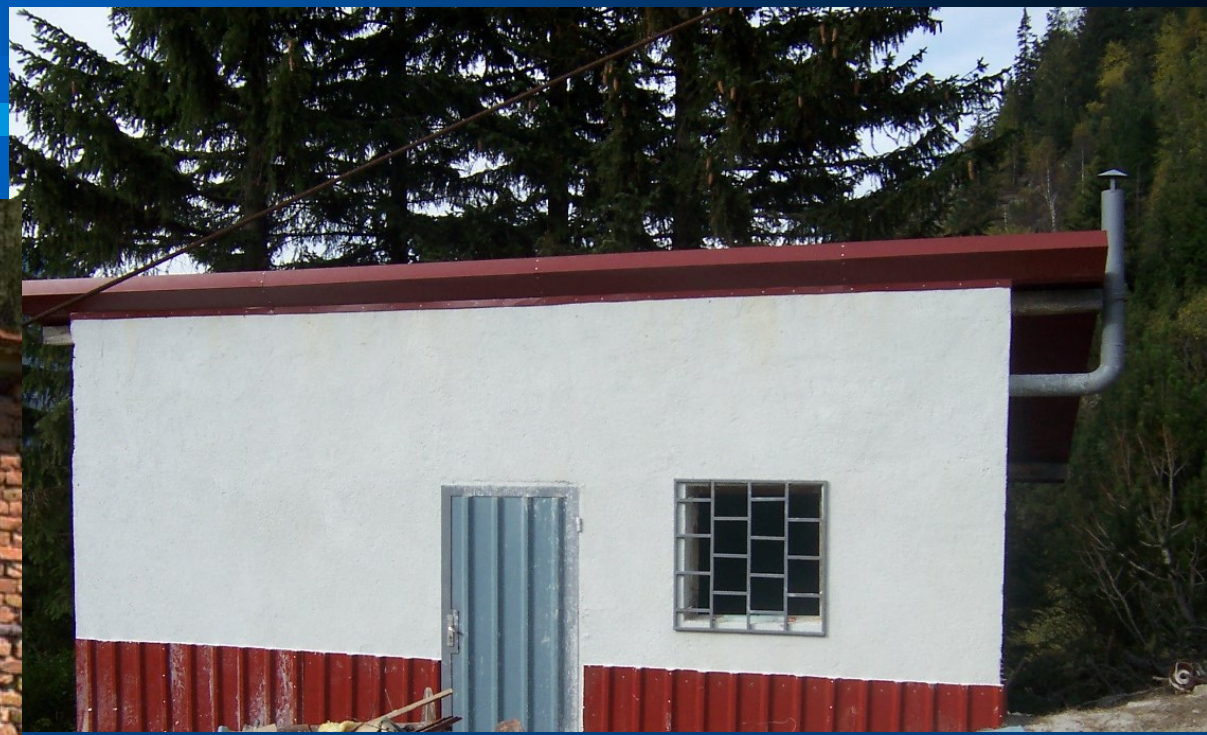
reserve electricity supply


Vasil Barakov
(1939 - 2004)
the first observer
at BEO

BEO Moussala

Interior

Cargo lift valley station “Beli Iskar”



Institute for Nuclear Research and Nuclear Energy
Bulgarian Academy of Sciences

BEOBAL

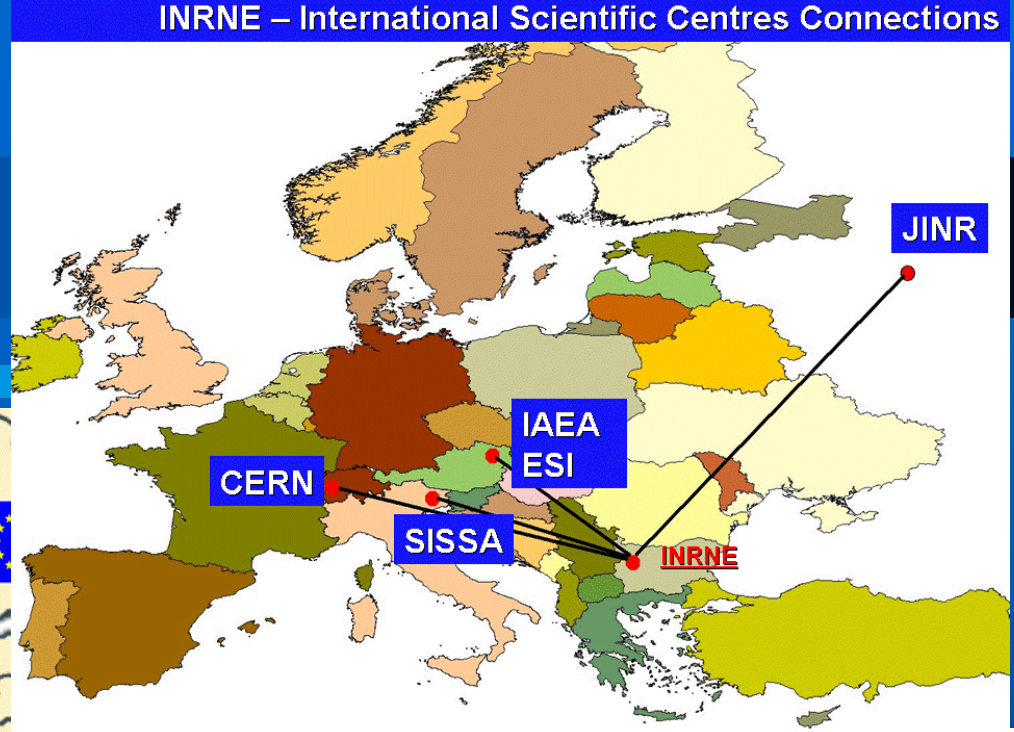
BEO Centre of Excellence

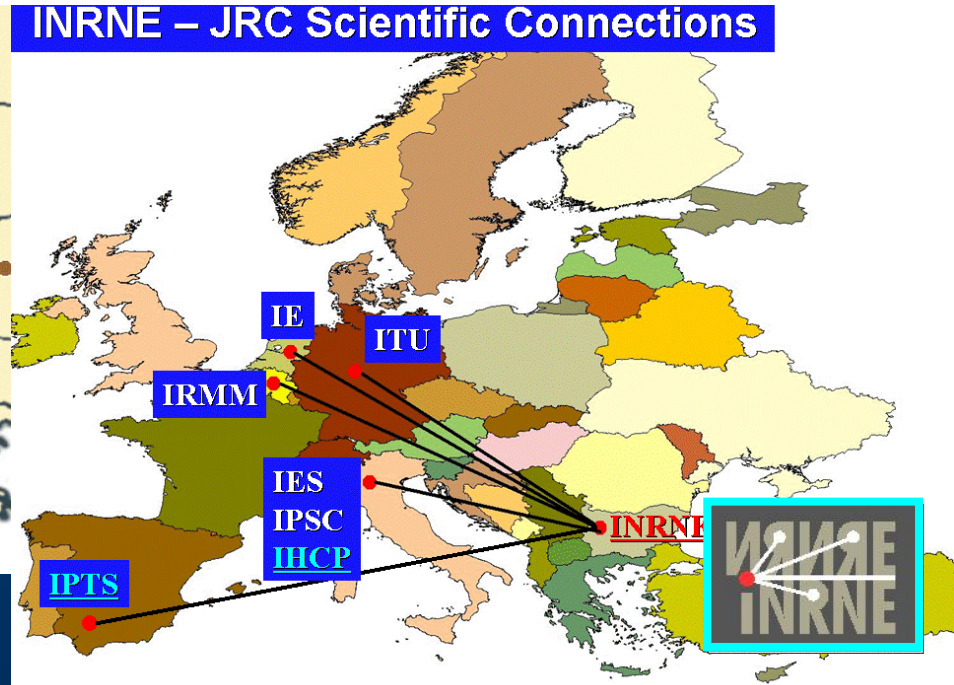
BEO Centre of Excellence
Research Capacity Improvement for
Sustainable Environment and
Advanced Integration into ERA

FP6 Project

BEOBAL –

Long – Term Development of Strategic Cooperation and Integration





BEOBAL – Objectives

Main Goal

Reinforcement of the BEO Centre of Excellence Research Capacities, and by this way the respective S&T potential of INRNE and Bulgaria for advanced Sustainable Environment studies, devoted to the main Global change and ecosystems observing problems, using sophisticated information technologies and advanced Integration in ERA, in their institutional, national, regional and European aspects

4 BASIC OBJECTIVES

- **Networking, International Collaboration & Integration and Reinforced Research Infrastructure**
- **Improvement of Human Resources**
- **Advanced Science – Society Interactions**
- **Advanced Management**

BEO Moussala

The Next Development of Equipment, Measuring and Research at BEO:

Air Quality Monitoring System for trace and greenhouse gases

- O3 Analyzer
- NOx Analyzer
- CO Analyzer
- SOx Analyzer

Aerosols Measuring System

- Cascade Impactor
- BAM for PM2,5 and PM10 Measurements
- Integrated nephelometer

Radiological Control System

- Gamma Background Detector
- Radon Analyzer
- Alpha Spectrometer

Space Weather Research

- Active neutron detector based on SNM 15 detectors
- Polyethylene sphere with lead as a neutron breeder
- Muon telescope

Meteorological Observing System

- Automatic meteorological station (Vaisala) improvement – new wind sensor

BEOBAL – Partners

N	Organization	Country	Role
1	INRNE	Bulgaria	*Executor and Co-ordinator*
2	JRC EC, Joint Research Centre	Belgium	*Cooperative Partner*
3	ITU, JRC EC, Karlsruhe	Germany	*Scientific Collaborator (SC)*
4	IES, JRC EC, Ispra	Italy	*SC*
5	IRMM, JRC EC, Geel	Belgium	*SC*
6	HMO MC	Italy	*SC*
7	HMO TG	Italy	*SC*
8	HMO ZS	Germany	*SC*
9	High HMO JFJ	Switzerland	*SC*
10	HMO SB	Austria	*SC*
11	NPI	Czech Republic	*SC*
12	INS	Turkey	*SC*
13	ALOMAR	Norway	*SC*
14	MOHP-DWD	Germany	*SC*
15	NILU	Norway	*SC*
16	BEO IEC	Bulgaria	*SC*, Users
17	CERN	Switzerland	*SC*
18	Vinca Institute for Nuclear Science, Belgrade	Serbia, Serbia and Montenegro	User
19	Centre for Ecotoxicological Research, Podgorica	Montenegro, Serbia and Montenegro	User
20	Institute of Nuclear Physics, Tirana	Albania	User
21	Institute of Physics, Scopie	Former Yugoslavian Republic of Macedonia	User

BEOBAL – Work Packages Structure

Training Seminars

***Prof. Klaus Luetzenkirchen,* ITU, JRC** " In situ measurements for complex environmental monitoring using portable equipment", **I year;**

***Prof. Maria Betti,* ITU, JRC** " Application of radio – analytical methods in environmental studies", II year;

Dr. Leonard Barrie, **WMO,**" Application of advanced methods and techniques for climate and global change studies**", I year;**

Dr. Marc De Cort, **IES, JRC** "Systems for monitoring and reporting of environmental radioactivity", **I year**;

Dr. Uwe Wätjen or Dr. Philip Taylor, **IRMM, IRC,** "Radionuclide analysis and standardization. ISO17025 standard for calibration labs, dealing with uncertainty of measurements ", **I year;**

Dr. Chris Jones, **CERN, IT,** "GRID technologies application in environmental and global change studies", **I year**;

Dr. Weingarten, **CERN**, **SD,** "Environmental monitoring and complex safety", II year

BEOBAL – Work Packages Structure

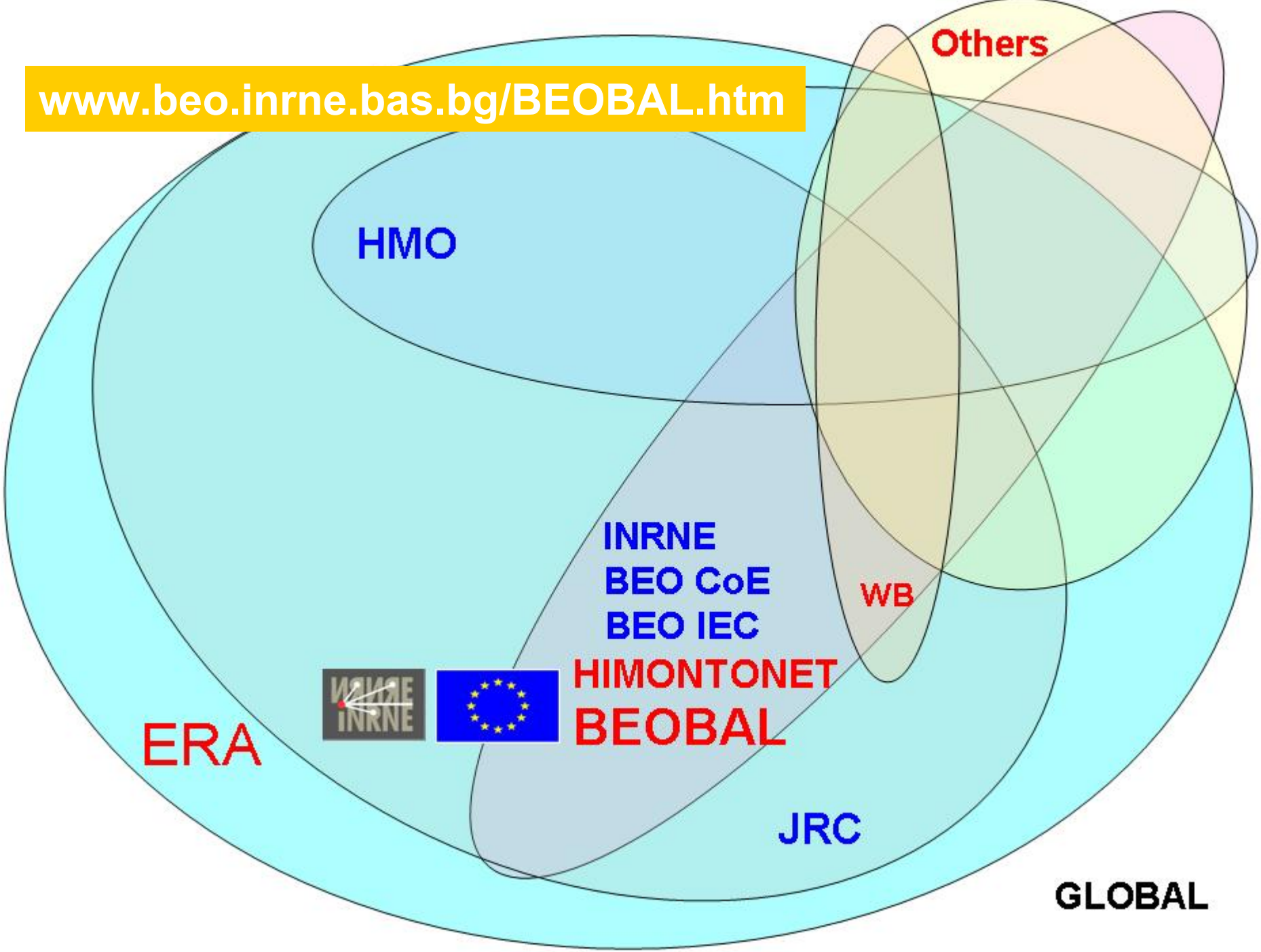
Conference Activities

Three levels of conference activities are planned:

3.3.1. (7) ***Methodological and coordination workshop***, Bulgaria, October 2005

3.3.2. *(22)* ***Project conference*** *"Global Changes, Environment and Sustainable Development of the Society",* UFS, Schneefernerhause, Zugspitze, Germany, 2nd half of 2nd year

3.3.3. (27) ***Conference – Informational Days,*** *"South – East Europe Environment – Collaboration, Cooperation, Integration in ERA"*, INRNE, BEO CoE, Bulgaria, Sofia, 1st half of 3d year


www.beo.inrne.bas.bg/BEOBAL.htm
Others
HMO
INRNE
BEO CoE
BEO IEC
WB
HIMONTONET
BEOBAL
ERA
JRC
GLOBAL

Where is a will

there is a way

For contacts

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fax: (359 2) 975 36 19

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http://www.beo.inrne.bas.bg
http://beo-db.inrne.bas.bg

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Design: B.Vachev