INCO-CT-2005- 016663

BEOBAL

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

SSA

PRIORITY 6: Global Change and Ecosystems

Periodic Activity Report

Period covered: from 01.04.2007 to 30.09.2007 **Date of preparation:** 06.11.2007

Start date of project: 01.04.2005 **Duration:** 30 months

Coordinator:
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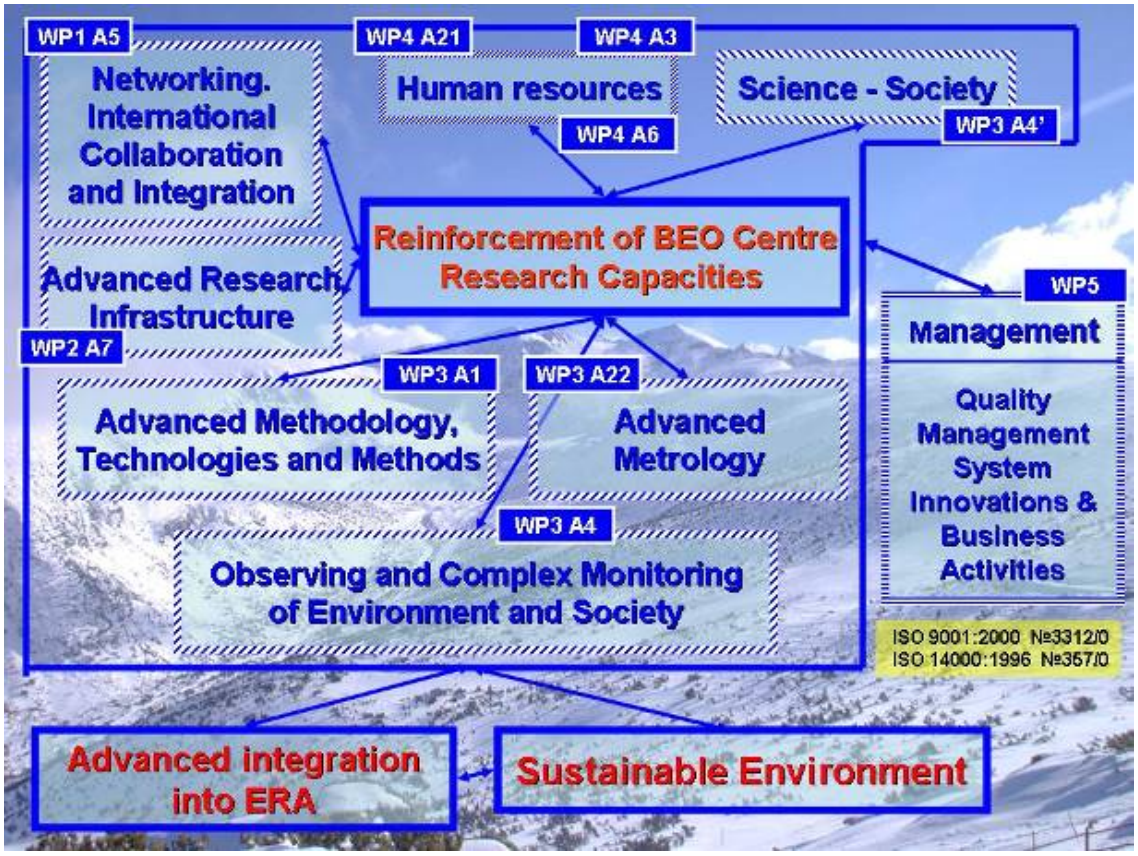
Project coordinator organisation name
Institute for Nuclear Research and Nuclear Energy,
Bulgarian Academy of Sciences

Revision 1

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

INRNE 6th Framework Programme of EU project (*INCO-CT-2005-016663*)

BEOBAL Executive summary



The main purpose of this and others previous and current projects is in next years BEO Moussala to be developed as/for:

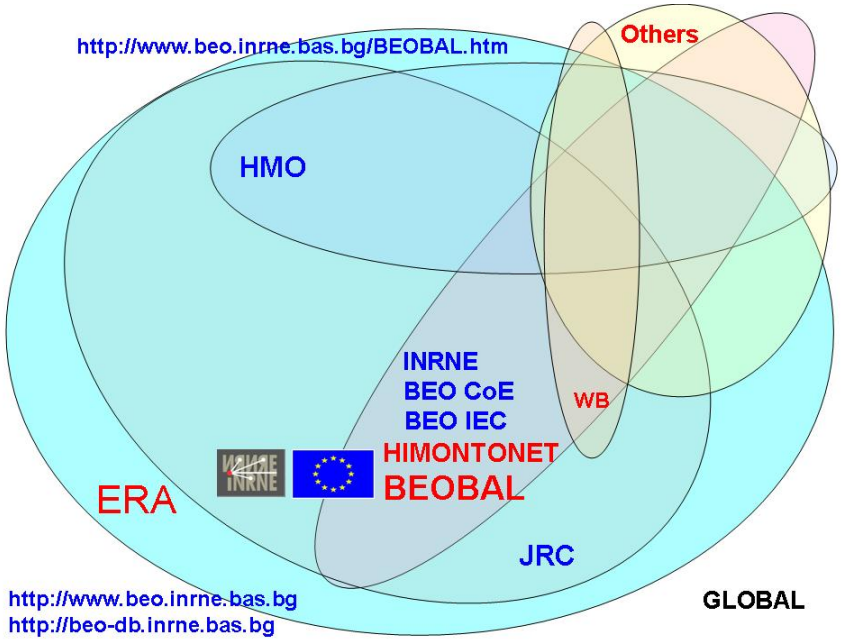
- an observatory attracting the scientists from abroad and to be included as "research infrastructure for transnational access" (at the first time, mainly for neighboring countries)
- the regional station of GAW (Global Atmosphere Watch) programme of World Meteorological Organization
- implementation and development of advanced methodology, technology, methods and advanced metrology
- enhancement of observing and complex monitoring of global change and ecosystems
- diversification, broadening and enhancement of international collaboration and cooperation
- advanced Human Resources long-term management and stimulate of youth in science
- active science communication by advanced Science – Society interaction policy
- application and development of advanced management system
- reinforcement of S&T equipment and systems of BEO CoE directed to enhancement of the research infrastructure of European importance

The basic fields of current and future work and studies at BEO Moussala and in BEO Centre of Excellence are:

- **Global change**
- **Aero - Space weather**
- **Sustainable development**
- **Measuring devices and systems development and enhancement.**

WP1: ***Networking.*** *Diversification, broadening and* ***enhancement of international collaboration*** *and cooperation.* **Operational goal A1** (Networking, International Collaboration & Integration and Reinforced Research Infrastructure)

Objectives ***Networking. Diversification, broadening and enhancement of international collaboration and cooperation*** towards to reach real European integration.
The special attention is paid and a substantial part of work is directed to the joint activities with Balkan institutions, deepening of international collaboration, networking and integration in the space of ERA with European centers of excellence - JRC institutes (**ITU**, Karlsruhe, Germany, **IES**, Ispra, Italy, **IRMM**, Geel, Belgium), European High Mountain observatories (**HMO**), large international institutions of European and global importance like **CERN** and other leading European institutes, traditional and new INRNE partners (**INP**, Prague, Czech Republic, **INFN**, Torino, Italy, **INS**, Izmir, Turkey).



Study visits: 14

2 in UFS Schneefernerhause, Zugspitze, Germany; **2** in IEP and Lomnitsky Stit HMO, Slovakia; **2** in Monte Cimone ISAC-CNR HMO; **2** in Sonnblick HMO, Austria and Hochenpeissenberg Observatory, Germany; **1** in Observatoire de Paris; **2** in NUARC - NPTUO, Odessa, Ukraine; **1** in IUGG GA, Peruggia, Italy; **1** in SEE, Athens, Greece; **1** in YPhI, Yerevan, Armenia.
During these visits BEOBAL project has been presented. As a result several protocols, memorandums and agreements have been signed, and agreements for collaboration, joint research and exchange of information have been reached. Special regional task was directed to the activities with **Neighbor countries and Turkey** (see table 1).
Bilateral cooperation and joint cooperative agreements with European HMO (in the framework of HIMONTONET, BEOBAL, ACCENT, EUSAAR and other EU projects and initiatives) (see table 1).
Deepening of international collaboration, networking and integration in the space of ERA with **large international institutions of European and global importance and INRNE traditional and other new partners**. (see table 1)
6 project proposal **for FP7 have been submitted** and **2** are **in stage of preparation** (in **Research Potential, eContent*Plus*, Science and Society, Security and Ideas** calls) with BEOBAL and other BEO CoE, BEO Moussala and INRNE partners.

Table 1

Title/Subject	Date	Participant/ Lecturer/ Visitor	Content/Work	Main Output
Monte Cimone HMO, ISAC-CNR	16.05 – 23.05.2007	Ch.Angelov, P.Ivanov	Visit of Institute of Atmospheric Sciences and climate and Mt. Cimone Environmental Research Station; Introducing of the methods for gas and aerosol measurements and some modern fields of studies as aerobiology.	Discussion on measurement technique and specific difficulties due to measurements at high altitude. Outline main directions of collaboration in the field of cosmic rays – atmospheric processes interaction and introduction of new techniques (DOAS) implementation.
NUARC - NPTUO, Odessa, Ukraine	19.06-2.07 19.08– 1.09 2007	S.Mavrodiev	Climate change modelling studies. Working on joint collaboration activities in the field of global and climate change. Working on papers, connected with collaboration activities.	Developing of collaboration in the topics of Climate models and Nuclear Fission; Oral talks for IUGG GA; two papers version of oral talks have been prepared
Observatoire de Paris, Paris, France	07-10.05.07	B.Vachev	Meetings with INFN, Italy partner – Dr. Alba Zanini; joint participation in European day exhibition; meeting with Prof. N. Sanches from OdParis	Support and consultation for FP7 PHASEBASES SiS project proposal has been received from OdP as consortia partner; new contacts have been made with ESA
Sonnblick HMO, Austria and Hochenpeissenberg Observatory, Germany	05-12.06. 2007	Ch.Angelov, P.Ivanov	Visit to ZAMG, Salzburg. Detailed discussion about present state of different research activity carrying out in Salzburg and Sofia and comparison of the methods for investigations on both places. Visit of DWD Hochenpeissenberg Observatory. QA/QC system and BEO data has been discussed	Useful information about software written for monitoring of the atmosphere and immediate correlation of different parameters and for telecommunication system and emergency electrical supply has been received. Additional measurements at BEO, needed to satisfy GAW requirements have been outlined.
IUGG GA, Peruggia, Italy	04-08.07..07	S.Mavrodiev	Participation International Union of Geodesy and Geophysics General Assembly in Perugia, Italy with two oral talks in two different sections (Meteorology and Geophysics)	Discussions and promoting of INRNE BEO Centre studies in the field of complex environmental modelling and climate change
UFS,Schneefernerhause , Zugspitze HMO, DE	11-16.07. 2007	J.Stamenov	Discussions about new I3 FP7 project EurObsNet	The structure of the project has been outlined and BEO Moussala participation has been specified
UFS,Schneefernerhause , Zugspitze HMO, Germany	26-31.08. 2007	B.Vachev	Future development and implementation of DAQAS QA/QC system for GAW stations have been discussed. Some additional aspect to new generation of EurObsNet I3 proposal have been discussed	An initial schedule about GAW QA/QC system implementation in BEO Moussala has been outlined. New suggestions on version of EurObsNet project has been developed and dicussed with co-coordinator Dr. Bittner in DLR
IEP and Lomnitsky Stit HMO, Slovakia	01-06.09. 2007	J.Stamenov, A.Damianova	Visit and discussions in IEP of SAS and Lomnisky Stit HMO. Visits in IH and IG of SAS. Meeting with member of Presidium of SAS Dr.I.Tunyl	Agreement of the mutual cooperation between the Institute for Nuclear Research, BAS and Institute of Experimental Physics SAS has been signed.
Yerevan Physics Institute, Yerevan, Armenia	8-13.09. 2007	J.Stamenov	Presentation of BEOBAL and BEO Moussala activities. Discussion of directions of possible collaboration.	Agreement for INRNE, YPI(CRD) and IHY for joint activities in UNBSS programme for IHY
SEE, Athens, Greece	23-28.09. 2007	I. Angelov	Presentation of BEOBAL activities result in the field of Solar Extreme Events I the frame of COSPAR Colloquia	Presentation a poster and discussions with leading scientists in this field. A paper in a referred journal is in preparation.

WP2: ***Reinforcement of S&T equipment and systems of BEO CoE***

Operational goal A2 (Networking, International Collaboration & Integration and Reinforced Research Infrastructure)

Objectives Reinforcement of S&T equipment and systems of BEO CoE directed to ***enhancement of the research infrastructure*** of European importance, connected with: global change observing, ecosystems monitoring, technological and natural risks (study, early detection and control) widely using new information technologies and platforms. The improving of systems for ***observing and complex monitoring*** in attempt to realize adequate management towards to reach sustainable environment. ***Improving BEO Moussala to a regional GAW station***, creating and improving by this way South - East European part of this network, joining ERA.

Upgrading and renewal of S&T equipment: 4

The following equipment is delivered and is at stage of test, measurements or calibration procedures:

- Aerosol instruments (according GAW requirements)
  - Integrated nephelometer for determination of integral light-scattering coefficient of aerosols
  - Inlet to nephelometer
  - Condensation particle counter + neutraliser
- Ozonometr

The following equipment and systems are in regular operation:

- Air quality monitoring system (NOx, CO, CO2, SO2, O3 analyzers, portable calibrator and data acquisition system);
- Systems for cosmic particles, radioactivity detection and complex environmental monitoring:
  - Gamma background probe;
  - Neutron flux meter;
  - Muon telescope;
  - Rn analyser
  - Alpha spectometer
  - Modernized set of portable small devices for complex environmental monitoring (new LET gamma spectrometer, electronic analytical balance, portable multiparameter meter, portable spectrophotometer)
- Modernized computer network;
- Improved automatic weather station (new wind, temperature and pressure sensor and new logger);
- Upgraded system for uninterruptible emergency power supply;
- Improved equipment for radioaerosols research;
- Improved and modernised video control and cloud observing system;
- Modernised electricity supply, thunder protection, transport and other technical infrastructure systems, ect.

Table 2

Type of equipment	Status, Date	Functional characteristics (specification)	Tender procedure	Data transfer	Illustrations
Gas analyser CO2	Delivered Jun 07 Test operation 18.07.07	Gas analyser for measurement CO2 production of Environnement	No tender, 3 offers	On screen and database output, Web integration	
MICROTOPS II ozonometer	Delivered Jun 2007 Test operation Aug 2007	**MICROTOPS II** is a 5 channel hand-held ozonometer for measuring total ozone column; Optical channels: 305.5 ±0.3 nm, 312.5 ±0.3 nm, 320.0 ±0.3 nm, 936 ±1.5 nm, 1020 ±1.5 nm, 10 nm; Resolution: 0.0001uW/cm² on 305nm channel; Dynamic range: >300,000; Viewing angle 2.5° Precision 1-2%; Nonlinearity max 0.002% FS; Operating environment 0 to 50°C, no precipitation; Computer interface RS-232C Power source 4xAA Alkaline batteries Weight 21 oz (600 grams) Size 4"W x 8"H x 1.7"D (10x20x4.3 cm)	No tender, 3 offers	On screen and database output, Web integration	
CPC + neutralizer radioactive source (Am241)	Delivered Sep, Jul 07 Calibration	CPC- Condensation particle counter. Optical counter of aerosols	Direct negotiation	On screen and database output, Web integration	 
Vaisala data logger + new detectors of temperature and pressure	Regular operation Aug2007	The QLI50 Data Logger acts as interface between sensors for meteorological and other parameters and the computer. It performs automatically measuring commands to 20 Voltage and 10 Current inputs with 16-bit A/D converter with digital filters for analog signals, and 8 bit I/O port for digital signals. QLI50 is designed to work in harsh ambient condition and has built EMI (electromagnetic interference) and ESD (electrostatic discharge) protection.	No tender, direct negotiation (improving of existing Vaisala automatic weather station	On screen and database output	

WP3 ***Advanced methodology, technology, methods, metrology, observing and complex monitoring.***
Science – society interactions. **Operational goal A3, (Networking, International Collaboration & Integration and Reinforced Research Infrastructure), Operational goal C (Advanced Science – Society Interaction policy)**

Objectives: ***Implementation and development of advanced methodology, technology, methods and advanced metrology, observing and complex monitoring*** in the field of Global change and ecosystems and their regional and European projections and components including: impact and mechanisms of greenhouse gas emissions and atmospheric pollutants from all sources on climate, ozone depletion and carbon skins, towards to improve predictions and forecasts; operational forecasting and modelling, global change observing systems; especially environmental radioactivity, monitoring and assessment of technological and natural hazard and risks.
Advanced metrology development and implementation in the field of global change observing, environmental radioactivity and radioecology, radiochemistry and radionuclide analysis, based on the close collaboration with JRC institutes. ***Observing and complex monitoring*** of Global change processes and ecosystems in attempt to realize adequate management towards to reach sustainable environment. ***Advanced Science – Society Interaction policy*** towards to reach not only dissemination of the obtained research results but to succeed in the active communication and dialogue with the public organizations, government and NGOs. ***Improving responses to socio-economic needs of the country.***

Exchange of personnel and of results and joint experiments: **5**
1 visit to Hochenpeissenberg Observatory, Germany; **1** visit to INFN, Torino branch, Italy; **2** visits to CERN, Geneve, Switzerland; **1** visit to ITF, Leipzig, Germany.

Visits for research activities: 2
(visits for joint research activities to BEO Centre of Excellence of scientists from leading European institutions, BEOBAL partners, EU and Balkan countries)
1 from Hochenpeissenberg Observatory, Germany; **1** from CERN, Geneve, Switzerland.

Conference activities: 1
BEOBAL Conference – Informational Days "Nature and Society"
15.06.07, Shumen, 17-19.06.07, Varna and 28-29.06.07, Blagoevgrad
See details at:
http://www.beo.inrne.bas.bg/BEOBAL/BEOBAL_Conference-Informational Days.htm

Science communication:

- Improvement of BEO web sites and development of BEOBAL web page

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

- **3** CD, electronic, **2** web sites and **1** web page and other publications
- **14** Public lectures
- **7** Posters
- **5** Exhibitions, including Bulgarian Academy of Sciences realisation of the exhibition “INRNE European Project”
- Media activities – TV activities: **6;** Radio activities: **5;** 1 video film; publications in popular journals, newspapers, bulletins, news agencies, web releases, ect.: **14;** Media briefings: **3**
- **3** volumes of OM2 multi volume series – 2 (10 and 11)devoted for BEOBAL training seminars and 1 (12) with the proceedings of BEOBAL conference
- **1** BEOBAL BEO Moussala leaflet **–** second edition

WP4: ***Improvement of Human Resources.*** **<u>Operational goal B</u> (Advanced Human Resources long-term Management)**

Objectives: ***Advanced Human Resources long-term management*** reaching and preserving European qualification level and creating the best home for young scientist, additionally attracting young scientist from other countries

Description of work Young students from Bulgaria will be attracted to work in the BEO Integrated environmental centre preparing PhD and Post doc studies devoted to the global change and environmental problems. Plan for a regular improvement of qualification level will be realized among the basic staff of the BEO CoE and BEO IEC.

The objective of this WP will be achieved primarily by the use of PhD (post doc) form of qualification, in the institutes – partners, INRNE and institutes and universities from BEO IEC, by use also of activity 2 (visiting fellows -hosting scientist from aboard for teaching and training activities) and activity 3 training for Ph.D. students and/or post-doctoral researchers

Short stays for specialization: 3

2 Hochenpeissenberg Observatory, Germany, **1** UFS Schneefernerhause, Zugspitze, Germany.

Young researcher's specialization: 1

1 specialisations in the institutes of Joint Research Centre of European Commission
1 in IRMM, Geel, Belgium, last 4 month of 12 months specialisation, started from August, 2006.