# PROJECT FINAL REPORT

**Grant Agreement number: 204374**

**Project acronym: RESTCA-TERCE-NIPMSS**

**Project title: RE**inforcing **S**&**T CA**pacities of Two Emerging Research Centers for Natural and Industrial Pollutant Materials in Serbia and Slovenia

**Funding Scheme: CSA-SA**

**Period covered: from May 1st 2008 to April 30th 2011**

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[1] Usually the contact person of the coordinator as specified in Art. 8.1. of the Grant Agreement.

[2] The home page of the website should contain the generic European flag and the FP7 logo which are available in electronic format at the Europa website (logo of the European flag: http://europa.eu/abc/symbols/emblem/index_en.htm logo of the 7th FP: http://ec.europa.eu/research/fp7/index_en.cfm?pg=logos). The area of activity of the project should also be mentioned.

## 4.1 Final publishable summary report

### 4.1.1 An executive summary

The REGPOT-2007-3 Project RESTCA-TERCE-NIPMSS (No 204374) focused on reinforcing S&T capacities for environmental studies in Serbia and Slovenia. It provided a critical support of two centres: University of Belgrade - Faculty of Mining and Geology, Serbia (UB-FMG) and Geological Survey of Slovenia (GeoZS) by establishing the partnership among each other and among them and the Institute of Geosciences, University of Frankfurt, Germany (GUF).

The project follows the FP7 research priority related to environment, in particular to industrial waste. A vast majority of the industrial waste in Serbia and adjacent regions is related to mining activities and the investigation of such material is only possible if all the general geological, mineralogical, crystallographic and geochemical issues are fully understood. UB-FMG and GeoZS are among the few institutions with such capabilities in the West Balkan (WB) region. The project major objectives were: 1. Strengthening cooperation/networking between the beneficiaries; 2. Improving technical standards for chemical characterization of solid pollutants at UB-FMG; 3. Promoting GeoZS and UB-FMG to national/regional centres of excellence; 4. Establishing a basis for better networking among the WB institutions and between WB and ERA and promoting the FP7 ideas; and 5. Counterbalancing the effects of 'brain drain' in Serbia.

Project activities carried out from May 1st 2008 until April 30th 2011 and resulted in achieving all the foreseen deliverables. The supply and installation of a multi-purpose, high/low vacuum Scanning Electron Microscope (SEM) (JSM-6610LV), cathodoluminescence detector, Oxford INCA 350 Energy Dispersive System, and a sputter coating device occurred in September 2009. The existing XRD device (PW1050) has been upgraded by an X-ray generator, water cooler and Mo X-ray tube shield housing. This was accompanied with optimization of the laboratory infrastructure (upper photo) including additional supply of an agate ball-mill and APC-UPS system. Simultaneously, a line of knowledge transfer activities were undertaken, such as: 1) staff mobility comprising more than 40 incoming/outgoing flows, 2) organization of three short courses on micronalytical techniques at UB-FMG (SEM-EDS: April, 27-30, 2009; Advanced analytical techniques: February 18-26, 2010; XRD: May 31st – June 5th, 2010), 3) opening two post-doc positions at the UB-FMG (Dr. Aleksandar Pačevski and Dr. Predrag Vulić), 4) two thematic workshops (GeoZS/October 6-9, 2009, see lower photo): "Anthropogenic impact on Human Environment in the SE Europe"; and UB-FMG/November 1-5, 2010: "Environmental problems related to active and abandoned mines in SE Europe"), and 5) various project promotions, including the occasion of the International Year of Planet Earth 2008-2009.

The main positive impacts are evident through a real scientific progress in the targeted research centres without creating strong dependence. This is a step forward in harmonizing the scientific system in EU and in setting-up research-intensive clusters across Europe. In Serbia this will be measured in terms of human and technical capacities, counterbalancing the 'brain-drain' process, and establishing synergy between the research groups dealing with fundamental and applied science. A long term positive achievement of the project will be in creating and promoting a research cluster with a strong commitment to serve the West Balkan society in solving its environmental problems.

### 4.1.2 A summary description of project context and objectives

The major concept of the Project RESTCA-TERCE-NIPMSS is based on the fact that the enlargement of European Research Area (ERA) is best to achieve by identification and strategic support of promising centers within the EU peripheral regions. The project activities were aimed at reinforcing the overall S&T potential of two emerging research groups in Serbia and Slovenia, which are dealing with study of natural and industrial solid pollutants. The project idea focused on improving human potential and technological capacities of these institutions and on establishing strong partnerships both among the two and between them and an excellent research entity in Germany.


The **Faculty of Mining and Geology, University of Belgrade (UB-FMG)** is the only institution in Serbia which focuses on education and research in various fields of earth sciences (see photo). This School covers an enormous range of topics including the evolution of life, nature of planetary interiors, earth-surface processes and related risks, and the process-oriented study of minerals and industrial products. The S&T ambience in geological research and education in Serbia underwent severe erosion during the last two decades, starting from the end of the eighties. This was caused by the overall economic stagnation and destruction of the state infrastructure and collapse of the mining-oriented industry, as well as by more than a decade of scientific isolation of Serbia during the nineties. An additional negative impact was a 'brain drain' followed by a continuous negative selection. However, in spite of that, the Mineralogy-Crystallography and Petrology-Geochemistry Departments of the FMG have preserved their human and material resources which are needed for leadership within the given scientific discipline.

The Project involved a critical reinforcement of the know-how and technical research potential of the **Departments of Mineralogy-Crystallography and Petrology- Geochemistry** of the Faculty of Mining and Geology (hereafter UB-FMG). The UB-FMG cultivates a synergy between basic earth science and environment-oriented disciplines. The reinforcement confirmed UB-FMG a national/regional research centre of excellence on matters related to the study of natural and industrial minerals, with special emphasis on solid pollutant materials. After this improvement of its research capacity, this academic and scientific centre is certainly more capable of responding in a better fashion to the special needs of the social and public community. The existence of such a research centre is of great importance for sustainable development of Serbia and West Balkan (WB) region.

The **Department of Geochemistry and Environmental Geology of the Geological Survey of Slovenia** is a leading research group in this country in matters of various geochemical studies, in particular of those related to environmental changes and anthropogenization. This research entity can potentially play a very important role in networking within the EU regions of convergence because of very large experience in environmental studies in the region of former Yugoslavia. The secondment and twinning measures undertaken by this project fully promoted and exploited RTD results of this scientific entity. In addition, these support actions moved GeoZS towards the European core of research. Simultaneously, this institution will be a strategic link for similar research centers of the adjacent regions to be more easily integrated into ERA.

**The Institute of Mineralogy of the University of Frankfurt (GUF)** provided through this project a critical excellence in human and material capacities which was mobilized in order to achieve the principal objectives of this proposal. As an excellent European research entity this institution helped to set-up strategic partnerships under which the targeted emerging centers in Serbia and Slovenia realized their full research potential during the whole duration of the project. In such a way, the participation of the GUF in the project essentially contributed to the overall European effort to better exploit research potential in less advanced but very perspective regions and thereby to improve economic and social cohesion within them.


Open pit of the Bor copper deposit, Serbia
*Photo by K. Šarić*

The project follows the FP7 research priority related to environment, in particular to industrial waste. A vast majority of the industrial waste in Serbia and adjacent regions is related to mining activities and the investigation of such material is only possible if all the general geological, mineralogical, crystallographic and geochemical issues are fully understood. The GeoZS and especially UB-FMG belong to the region where critical pollution occurred during the last 15 years. This was mostly controlled by war, old technologies and insufficient protection measures. Therefore, this region essentially requires the existence of centers where natural and industrial pollutants can be appropriately analyzed. This is important for sustainable development of this region and will help in many other aspects, such as health, better food production, introduction of new and pure technologies, etc. In this context, the scientific dimension of the project objectives is best seen through the fact that the project addresses very important scientific problems of this region. It is estimated that only in the waste dumps in Serbia there are around 700 millions of tons of flotation or other mining waste material and the situation is similar in adjacent regions. The problems of mining-originated industrial waste has been inadequately constrained from the scientific point of view, mostly (i) because of the fact that geologists (mineralogist, petrologists and geochemists) were not sufficiently involved in solving these problems and (i) due to the overall lack of analytical facilities available.

Developing of a research center in Serbia and its strategic networking with a similar center in Slovenia is aimed at essentially increasing the scientific potential of the South European region with respect to study of solid state pollutants. For instance, in terms of mining industry waste, it is well known that this material is represented by chemically-complex assemblages of crystalline and amorphous solids and their detailed characterization offers an extraordinary technical challenge. X-ray diffraction (XRD) and scanning electron microscopy/energy dispersive x-ray spectroscopy (SEM/EDS) are the two principal methods used to characterize solid phases and their contaminant associations in these wastes. Reinforcing the mentioned centers will make sure that important aspects of study of solid pollutants are systematically applied, such as: a) to make an accurate mineralogical characterization of the material in waste dumps in Serbia and adjacent regions, b) to study primary (e.g. pyrite, gypsum, quartz, carbonates, chlorite, micas, etc.) and secondary/oxidation waste mineralogy in terms of crystal structure and chemical composition (e.g. Fe and Cu sulfates and hydroxy sulfates, Cu carbonates, Fe and Al oxyhydroxides, etc.), c) to identify areas/samples where additional, high-precision techniques must be applied in order to determine contents of toxic elements which are present in low but important concentrations (Pb, Zn, Cd, As, etc), d) to better understand the phenomena that govern the oxidation of the sulfides, which predominate among the minerals present in waste dumps (e.g. solution substitutions/ adsorption processes which may significantly contribute to the intake of released metals into newly formed minerals), e) to perform geochemical simulations of alteration/oxidation processes and other chemical modeling, which strongly depend on a proper identification of the solid phases present, etc.

The following main and specific measurable objectives were addressed by the RESTCA-TERCE-NIPMSS Project:

**1.** Strengthening the international cooperation networking and partnership between the UB-FMG, GUF and GeoZS. This included: a) setting-up a brain-gain environment at the UB-FMG and GeoZS by transferring information and translating research experience from the cooperating EU center; and b) increasing overall training abilities of the members of the wider research community in participating states using mobility activities. This was the axial objective of the project that comprised several milestones and deliverables.

**2.** Improving material research standards at the UB-FMG by renewal and upgrade of the facilities necessary for chemical characterization of solid pollutant minerals and other natural and industrial solid-state products. This encompassed: a) purchasing a Scanning Electron Microscope equipped with Energy Dispersive System (SEM-EDS), cathodoluminescence detector, sputter coating device and necessary mineral standards, b) upgrading the existing XRD system, c) optimizing the existing laboratory infrastructure, and d) configuring a laboratory network/centre for microanalysis of materials related to environmental pollution. This was the core objective of the project.

**3.** Promoting the GeoZS and UB-FMG to national and regional centers of excellence having a mandate to collaborate with government and industry on matters related to microanalytical studies of pollutant minerals and industrial solid state products, in particular on those related to geochemical characterization of solid industrial waste. There was a set of measures aimed at exploiting earlier results of the targeted centres and direct project achievements as well as at spreading awareness of the general project idea and concept.

**4.** Establishing a basis for better networking among the institutions from the European region of convergence and Western Balkan, which have the same research interests. This included dissemination of scientific information at the regional level and counterbalancing the processes of scientific disintegration and fragmentation within the WB region. Addressing of this objective established conditions for better response to further FP calls in these regions.

**5.** Promoting the ideas of the EU 7$^{th}$ Framework Program for the Research, Technological Development and Demonstration (RTD) in Serbia by inviting high-ranked scientist from EU centers of excellence, by organizing lectures and workshops as well as by popularizing the project scope, objectives and outcomes via various dissemination activities. The involvement of EU researchers was carried out in the frame of brain-gain (mobility) activities for which a large part of the budget was allocated.

**6.** Counterbalancing the effects of 'brain drain' in Serbia by restoring the contacts with PhD students and young researchers from Serbia who presently work in research centers worldwide. This objective was addressed by: a) opening two post-Doc positions at the UB-FMG during the Project, b) increasing and encouraging the outgoing mobility with enhanced participation of young people of the Serbian scientific community, c) increasing the student interest for the study of earth sciences by offering improved curricula, d) incorporating new courses about novel analytical techniques and their application.

This proposal directly addresses the research area peripheral to EU (i.e. region of convergence and WB region), which has a great potential but needs specific reinforcements to be appropriately integrated into ERA. Especially important are promising clusters of researchers having already been recognized as clusters of excellence within the given scientific community. Provided that they are strategically supported, these centers can achieve best results in enlarging and integrating ERA.

### 4.1.3 A description of the main S&T results/foregrounds

Main scientific and technological results of the RESTCA-TERCE-NIPMSS Project can be explained in terms of three most important set of activities: 1) Renewal and upgrade of the necessary facilities at the UB-FMG, 2) Reinforcement of international co-operation networking of GeoZS and UB-FMG and 3) Brain-gain activities at the education and research level. Following the project structure, which is broken into five work packages each comprising a definite assemblage of tasks, these activities were mainly addressed by work packages 1-3.

Major S&T results/foregrounds of the Project are given in the following text and they are associated with each set of activities mentioned above.

1) Renewal and upgrade of the necessary facilities at the UB-FMG

This set of activities resulted in improving scientific and technological material resources of the UB-FMG by supplying new and mobilizing the existing material resources as well as by adjusting the general infrastructure within the immediate project area. The achieved progress provided an essential input to the UB-FMG in terms of material resources and represents the essential part for the whole Project implementation. It is noteworthy that the facilities and technical standards at the UB-FMG, in general, have undergone a significant stagnation during the last two decades. Main results are: 1a) Formation of a SEM-EDS Laboratory, and 1b) Upgrade of the existing XRD system.

1a) Formation of a SEM-EDS Laboratory

According to specifications contained in Annex I, this achievement included three subtasks: i) Purchase of a Scanning Electron Microscope equipped with an Energy Dispersive System (SEM-EDS) and other accessories, and ii) Adjusting the existing infrastructure at the UB-FMG, and iii) Completion, installation and maintenance of the new and upgraded facilities and their incorporation into a laboratory system for microanalysis.

*i) Purchase of a Scanning Electron Microscope equipped with an Energy Dispersive System (SEM-EDS) and other accessories*

The first task included purchase and supply of:

- A JSM-6610LV - a multi-purpose high performance, low vacuum analytical scanning electron microscope with a gun chamber with $LaB_6$ filament and ion pump (10-5 Pa) as well as with a turbomolecular pump evacuation unit.
- Oxford INCA Energy 350 – a system for energy-dispersive microanalysis equipped with an analytical silicon drift detector.
- MINI CL – cathodoluminiscence detector 185nm – 850nm.
- BALTEC-SCD-005 – a sputter Au and C coating device.
- STANDARDS – a set of 30 sulphide/heavy metals standard blocks.

The supply of occurred in early June 2009 (*month 14$^{th}$ of the Project*). For the procedure of expenditure, transport and supply subcontracting with the Institute for Nuclear Sciences Vinča – Foreign Trade Office was necessary. All the equipment arrived safely except one box which one shock sensor was broken. After having been examined by specialists and in front of the

representatives of the insurance company and after having agreed that no harms had been done, the protocol of stock reception was signed.

Transport and supply

Unpacking

*ii) Adjusting the existing infrastructure at the UB-FMG*

Adjusting the existing infrastructure at the UB-FMG comprised necessary restructuring, adaptation and optimization of the present working laboratory space at the site, and integrating the purchased system. It included the following activities:

i) Necessary measurements of electromagnetic radiation and vibration parameters in the available rooms and deciding which is most suitable for the equipment installation.
ii) Negotiation for necessary subcontracting and planning of the reconstruction.
iii) Continuous supervising of the works done by subcontractor.
iv) Final preparation for the instrument installation.

The following reconstruction works were successfully carried out:

i) Splitting of the room; it was extremely important in order to physically separate the space for sample preparation and the instrument.
ii) Re-installation of the electric system and change place of the water supply facilities.
iii) Full insulation of the laboratory for providing low vibration and constant temperature.
iv) Insulation of the floor for the same purpose.

Before

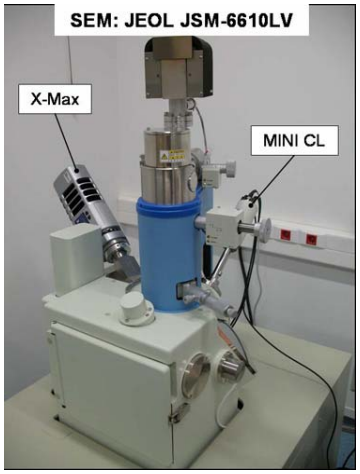
After

*iii) Completion, installation and maintenance of the new and upgraded facilities and their incorporation into a laboratory system for microanalysis.*

This task has been planned as a set off activities including: a) complete installation of the SEM-EDS Laboratory at fit-for-use level and its continuous maintenance, b) upgrade of the associated laboratories, and d) official incorporation of the SEM-EDS Laboratory into the Statute of the UB-FMG.

a) Complete installation and of the SEM-EDS Laboratory at fit-for-use level encompassed five working days of the supplier's specialists (SCAN, the costs included in the prize) and additional purchase of necessary laboratory items and consumables, such as desiccator and ultrasonic cleaner, argon bottle, high purity gas cylinder regulators and connector for hose, and air conditioner, cleaning substances, cloths, sponges, gloves, polishing paste, ladder, teapot, and petty desk accessories, glasses, erlenmeyers, funnels, filters, etc.

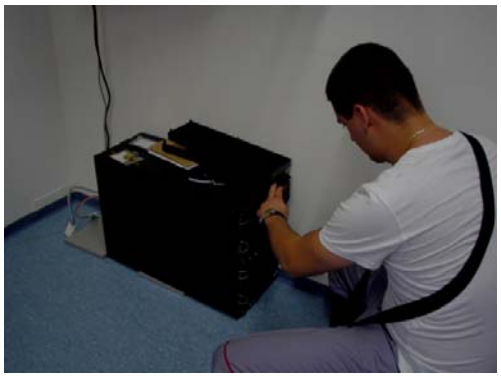
SEM-EDS Laboratory




SEM-EDS+CL

During the third project year we succeeded to carry out around 100 working days. The use of the equipment was free of charge for the whole Serbian research area (non-profit projects only!) and this opportunity was used by more than 60 researchers from around 30 institutions in Serbia and West Balkan region. The widest possible range of materials was analyzed, from human skin to pristine ore minerals as well as from dried leaves to industrial metal alloys.

For ensuring a constant fit-for-use level some consumables, such as abrasives, CDs or other data carriers needed to be purchased. In addition to the consumables, we had to purchase an APC Smart-UPS item for stabilizing the power supply in the SEM-EDS laboratory at the UB-FMG. During the period of more than 15 months of the constant laboratory work (ever since the installation of the laboratory), problems of sudden breaks in power supply occurred several times. This especially occurred during very cold and very hot weather conditions. For this purchase an official permission from the Project Officer was obtained (see also below). The instrument was purchased and supplied on March 2$^{nd}$ 2011.



The APC Smart-UPS system

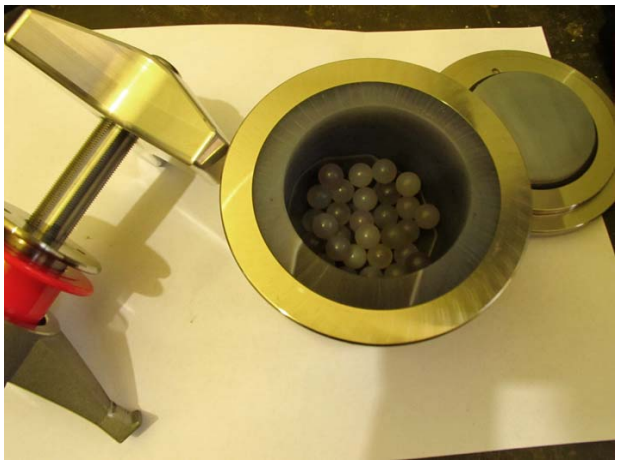
Consumables used for the SEM-EDS Lab

b) Upgrade of accompanying laboratories necessary for sample preparation was aimed at gathering adequate support from the existing infrastructure. The following line of activities were performed during the second project year: i) Construction of a sample preparation chamber. This was completely designed and constructed by the UB-FMG staff and no extra costs were necessary; ii) Service of the equipment in the laboratory for thin-sections. This task has been performed by specialists from the Geological Institute of Serbia and was financed by regular funds of the Faculty; iii) Purchase of small laboratory items and consumables, such as gloves and glass rods, glass plates for thin-sections, polishing paste, ladder, teapot, etc.

The following line of activities were performed during the first and, especially, second project year: a) construction of a sample preparation chamber, b) short service of the equipment in the laboratory for thin-sections, and c) purchase of small laboratory items and consumables, such as gloves and glass rods, glass plates for thin-sections, polishing paste, ladder, teapot, etc.

The most important part of the activities in the last project year is the purchase and supply of an agate ball mill device (Retsch PM200). For this purchase a written permission from the Project Officer Salvatore La Rosa has been obtained on November 5$^{th}$ 2010 (see also below).

Agate ball mill type Retsch PM200



Agate balls used for milling

c) Official incorporation of the SEM-EDS Laboratory into the Statute of the UB-FMG was organized in order to formally constitute the laboratory network within the Departments of Mineralogy, Crystallography, Petrology and Geochemistry. These activities included an application form that was

sent to the Scientific Council of the UB-FMG. The Scientific Council accepted the application and the Laboratory for Scanning Electron Microscopy is officially included into the existing laboratory network.
An application form that was sent to the Scientific Council of the UB-FMG during the second project year. The Scientific Council accepted the application and the Laboratory for Scanning Electron Microscopy is officially included into the existing laboratory network. The final approval was done by the Senate of the University of Belgrade on its 20th regular meeting on April 13th 2011 (*http://webserver.rcub.bg.ac.rs/sr/organ/6/157/Senat*).

1b) Upgrade of the existing XRD system

This task was of special interest for the Crystallography group of the UB-FMG. It was aimed at enabling a higher stability for routine work in the laboratory of Crystallography which will be a part of a laboratory network within the UB-FMG. The task comprised a purchase of an X-ray generator, a water cooling system and an X-ray tube housing for an upgrade of an existing diffractometer at the UB-FMG was started with the collecting the proposals. The process of collecting proposals started at the end of November 2008


Powder diffractometer upgraded (left), water chiller unit for fine focus X-ray tube cooling (middle), and X-ray tube (with Mo X-ray tube) shield housing and shutter control box (right).

X-ray generator Spellman DF60N3 (3 kW) (left) and the renewed electrical and water connections for the instrument (right).

The purchased equipment arrived in July 2009. The representatives of UB-FMG members of Crystallographic laboratory undersigned the protocol of stock reception which included: a water chiller unit for X-ray tube cooling, new X-ray generator, a high voltage cable together with X-ray tube shield housing and shutter control box.

The purchased equipment arrived in July 2009. The upgrade of the diffractometer with the new equipment was commenced in September 2009. Service person from the Oxford Diffraction Ltd. (Mike Barclay), in the presence of representatives of UB-FMG members of Crystallographic laboratory, conducted the upgrade of the instrument (Upper, left) that included:

- the installation of a water chiller unit for X-ray tube cooling (Upper, right),
- the setup of the new X-ray generator (Lower, left),
- and installation of a high voltage cable together with X-ray tube shield housing and shutter control box (Upper middle).

Water and power installation in the laboratory was also upgraded (Lower, right) in order to suitably put the instrument in the working condition.
The upgrade procedure was finished in September 2009, and after additional adjustment the diffractometer was put in the working condition.

2) Reinforcement of international co-operation networking of GeoZS and UB-FMG

This objective generally focused on mobilizing and reinforcing the human potential within the **RESTCA-TERCE-NIPMSS** area by strengthening international cooperation among the beneficiaries. In addition, it was also aimed at exploiting previous RTD results of the project beneficiaries, at first place GeoZS. There are three general results associated with this major Project achievement: 2a) Organization of a short thematic workshop at GeoZS, 2b) Organization of a short thematic workshop at UB-FMG and 2c) Staff mobility used principally for international cooperation and networking.

2a) Organization of a short thematic workshop at GeoZS

This result ensured that human resources of Geological Survey of Slovenia were appropriately mobilized primarily by exploiting its RTD results in the previous period. One of the main activities aimed at this objective was the short thematic workshop entitled **"Applied Environmental Geochemistry - Anthropogenic impact on human environment in the SE Europe".** The workshop was organized on October $6^{th}$-$9^{th}$, 2009 at the Geological Survey of Slovenia (GeoZS).

*Organization and running a workshop*
During the previous Project meetings, the project partners have organized the meeting and have discussed about most suitable time for the workshop, its title as well as to agree upon all the aspects about the program of lectures. Its purpose is providing a basis for further networking in the area of South East Europe and European countries by presenting achievements of previous projects and themes lead by the team of Geological Survey of Slovenia.

*Workshop announcements*
This sub-task comprised production of necessary informational material, such as posters, invitation letters, flyers, etc. The information about the course was available on the both sites, the official web site of project RESTCA and the website of Geological Survey of Slovenia respectively. Information about organisation has been provided to International Association of Hydrogeologists Slovenia

Committee and its members from different geological and hydrogeological organizations, environmental agencies, institutes and private companies.

*Workshop logistics*
So many task had to be completed before the workshop begin, such as booking the accommodation for the foreigner lecturers and some participants, booking and preparing a room for lectures (conference hall at GeoZS), providing the equipment for teaching (computers, video-beam and overhead projectors, etc), preparing the promotion material for the event such as proceeding book, fliers, posters, notebooks, organizing some refreshments for the breaks and other things.

*Program and participants*
During three days of workshop, 36 lecturers from 9 countries (Austria, Bosnia and Herzegovina, Croatia, Germany, Hungary, Italy, Macedonia, Serbia and finally Slovenia) were presented their results in the modern approach of environmental geology and geochemistry based on professional experience. For the last day of workshop has been organized guide excursion of field trip in the Šalek Valley (Velenje) where are located a lignite mine and thermo power plant. The workshop has been attended by 55 participants from 20 institutions from seven European countries.

Plenary session of the workshop "Applied Environmental Geochemistry - Anthropogenic impact on human environment in the SE Europe"

Field trip in the Šalek Valley (Velenje)

2b) Organization of a short thematic workshop at UB-FMG

The thematic workshop entitled: **«Environmental problems related to active and abandoned mines in SE Europe»** was organized on November 1st-5th, 2010 at the University of Belgrade - Faculty of Mining and Geology (UB-FMG).

*The workshop planning*
Planning of the course was directed by idea to have three activities within the seminar: (1) lectures, (2) one day field trip to coal mine and ash deposit of Drmno and (3) opened meeting for all interested people who would like to participate to future common projects.
- *Choice of lecturers*. The main aim of the seminar was to emphasis the main environmental problems related to mining activities not only in Serbia but in SE Europe as well. The RESTCA team decided to invite experts from the surrounding countries following the fact that the countries from the same geographical region share the same environmental problems. Sixteen lecturers from seven countries responded and took participation in the seminar. Invited colleagues from Bosnia and

Herzegovina, Monte Negro and Greece unfortunately were not able to come to Serbia and give lectures.

- *Seminar venue* – The seminar was held at the Ceremony Hall of the UB-FMG. The room was reserved more than one month before starting of the seminar.

- *Coordination with students activities.* The period planed for the seminar was directed not only by students obligations but also by their activities connected with their own projects which are dealing with environmental problems. The RESTCA team wanted to have a meeting simultaneously with opening an exhibition entitled XYXYX which was performed b a student group from UB-FMG.

- *Organizing one day field trip* – One of the aims of the seminar was to visit one of Serbian environmental hot spots. The idea was to visit the coal open pit and ash deposit of Drmno, which is close to Belgrade. In the frame of this task it was necessary to rent a bus, to get permission for visits, to find appropriate date for the trip.

*The course announcements*

As it was done before, the RESTCA-TERCE-NIPMSS team prepared again material necessary to spread out information about the seminar. The team produced posters, circular, invitation letters, all with the aim to announce the program of the seminar and the seminar itself. This time the target group were not only geologists and experts who are dealing with interaction of geology and environment, but also other experts such as chemisists, biologists, engineers of forestry, geographers. It was planned to have around 25 participants. The material was available at least than one month before the seminar started.

*The seminar logistics*

All logistical activities were done by the RESTCA-TERCE-NIPMSS team members starting from September. The main tasks were to agree with the lecturers about titles and content of the lectures, to book the room for lectures and to organize transportation for the field trip. Other activities were organizing a reception at the airport, creation posters, circular, announcements, organizing accommodation for the guests, meetings and social activities, to organize coffee breaks and refreshments etc.

*The seminar executing*

The whole seminar was divided into three parts:

*I – Lectures* – Lectures were given within four days of the seminar. Lectures were divided into few topics: (a) general information about environment pollution (b) problems related to organic pollutants such as coal exploration and petroleum burning (the lecture of Dr D. Životić was an introduction to the field trip and localities that were visited during excursion) (c) environmental problem in surrounding countries – Romania, Bulgaria, Bosnia and Herzegovina, Macedonia, Croatia and (d) environmental problems in Serbia – the Bor district as a main hot spot in Serbia – the problem of the Bor area was elaborated from diffeerent points of view – from geological and geochemical to microbiological and remediation activities. Special guest of the seminar was a student group who presented their project-exhibition entitled: *'Conscience for landfill should (better) be recycled'*. The exhibition was opened on Monday at the corridor of the UB-FMG and lasted simultaneously with the seminar.

*Program*

The seminar was opened by Dr. Vladica Cvetković, project coordinator, who gave a short welcome note and a presentation about the idea of the RESTCA-TERCE-NIPMSS. Dr Kristina Šarić, Scientific Secretary of the RESTCA project who guided the rest of the meeting. The program of the seminar was completely filled. Sixteen lecturers from seven countries had talks about important environmetal problems: Dr. Stefan Weyer and Dr. Marina Lazarov – both from the University of

Hannover, Gemany, Dr. Ladislav Palinkaš (University of Zagreb, Faculty of Sciences, Croatia), Dr. Dragana Životić (UB - Faculty of Mining and Geology), Dr. Branimir Jovančićević (UB - Faculty of Chemistry), Dr. Mihaela Sima (Insitute of Geography, Romanian Academy of Science), Dr. Radostina Atanassova (Geological Institute, Bulgarian Academy of Science), MSc. Tomaž Budkovič, Dr. Mateja Gosar and MSc. Jasminka Alijagić - all from Geological Survey of Slovenia, Dr. David Alderton (University of London, Royal Holloway, United Kingdom), Dr. Trajče Stafilov (Ciril and Methodius University, Macedonia), Dr. Anja Došen (Institute Vinča, Serbia), MSc. Božidar Đokić (Geological Institute of Serbia, Serbia), MSc. Lidija Đokić (UB-Faculty of Biology), MSc. Dragana Ranđelović (UB-Faculty of Forestry). The official language of the seminar was English, but two lecturers (MSc. T. Budkovič and MSc. B. Đokić) gave their presentations in Serbian.

*The course participants*

The seminar was attended by 50 participants from the following eleven different institutions from Serbia and from abroad:
University of Belgrade (UB) – Faculty of Mining and Geology,
UB – Faculty of Forestry,
UB – Faculty of Chemistry,
UB – Faculty of Geography,
UB – Faculty of Biology,
University of Novi Sad – Faculty of Technology,
Geological Institute of Serbia,
Geological Survey of Slovenia,
Serbain Academy of Sciences and Arts,
Nuclear Insitute "Vinča".

The educational structure of the participants was heterogeneous – from undergraduate, graduate and post-graduate students (BSc, MSc and PhD), then post-doctors, teachers and engineers to full professors and academicians. The seminar was followed by geologists, archaeologists, engineers of forestry, chemists, biologists as well as retired researchers and unemployed engineers.

*Field trip*

Field trip was guided by the Kostolac company. He and his collaborators shown us the main ash deposit of Drmno which is building at the moment according to European standards. Further information about ash itself were provided by Dr. Aleksandra Rosić, a member of the RESTCA team. At the end of the field trip, the famous Roman archaeological site Viminacium was visited as well.

*Round table meeting*

The round-table meeting was organized on Thursday, at 14 h, after lectures. It was a transparent and available meeting to all interested researchers who had in ther mind to work on common projects dealing with environmental problems and heavy pollutants in the region. The idea was to start with multidisciplinar and international project written in the frame of various funding schemes, such as NATO, COST, FP7, etc.

The beginning of the meeting

Project Secretary Dr. Kristina Šarić

Students present their exhibition


Dr. Radostina Atanassova (Bulgaria)


Dr. Mihaela Sima (Romania)

Dr. David Alderton (UK)


Participants at the coal mine Kostolac


Observing the coal ash deposit of Drmno

2c) Staff mobility used principally for international cooperation and networking

The existing international co-operation of the beneficiaries was reinforced and new contacts with EU research centers were established via a set of mobility activities. Staff mobility was generally organized by producing General Plans for mobility activities for each Project year, which were approved by Project Management Board. In addition to Project resources, the existing pathways of cooperation and exchange programs were also used (e.g. bilateral projects, CEEPUS, etc.). The following set of mobility activities were realized during the whole duration of the Project (this list does not include the visits of staff members in order to participate or organize meetings presented as separate results of the Project):

| Staff member | Visit to | Time (duration) | Purpose |
|---|---|---|---|
| Aleksandar Kremenović (UB-FMG) | GeOZS | December 7th-21st, 2008 (14 days) | Visit in the frame of the existing bi-lateral cooperation between Serbia and Slovenia. Important contacts within the wide project environment in order to achieve best results with the project implementation. A number of meetings with Slovenian representatives were undertaken during this visit. |
| Vladica Cvetković, project coordinator (UB-FMG) | GeOZS | February 6th-10th 2009 (5 days) | Coordination of the activities of all the Work packages, short discussions with the GeoZS Management, two meetings with the GeoZS project team members, many informal talks with other GeoZS staff including a visit to the SEM-EDS laboratory. |

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|---|---|---|---|
| Vladica Cvetković, project coordinator (UB-FMG) | GUF | March 1st-7th 2009 (7 days) | Two short meetings with the GUF project team members, many informal talks with other GUF staff, visits to the GUF laboratories, at first place SEM and EPMA facilities. Travel to Mainz and several contacts with Serbian researchers and PhD students, presently active at Max-Plank Institute and Max-Plank University. |
| Branislav Trivić (UB-FMG) | University of Innsbruck | January 20th – February 19th 2009 (one month) | Checking the possibilities to widen the cooperation to matters related to environment protection, visit the SEM laboratory in Innsbruck, and to discuss the matters of possible common FP7 applications. Partially in the frame of CEEPUS. |
| Aleksandar Kremenović (UB-FMG) | University of Innsbruck | February 2nd-27th 2009 (25 days) | Discussions with Prof. Volker Kahlenberg and Prof. Richard Tesard, who are highly experienced in cooperative work with companies and simultaneously in the work on different technological problems. Contacts with Serbian people who were at the moment in Innsbruck: Dr. Biljana Lazić and MSc Predrag Vulić. Partially in the frame of CEEPUS. |
| Axel Gerdes (GUF) | Ankara, Turkey | April 13th-17th 2009 (5 days) | Participation to the 62nd Geological Congress of Turkey at the Congress Centre of General Directorate of Mineral Research and Exploration (MTA). Presentation the project **RESTCA-TERCE-NIPMSS** and discussions with Earth Scientists worldwide in order to broaden international cooperation and networking. |
| Robert Šajn and Jasminka Alijagić (GeoZS) | Skopje, F.Y.R.O.M | May 2009, (one week) | (1) Discussion about current geochemical projects, cooperation in future joint projects, expansion of cooperation with the involvement of interested researchers of the Western Balkans, and discussion of common occurrence in FP7 - RESTCA and other European projects, (2) Ceremony and Award of the National Award of the R. Macedonia "Goce Delčev" for scientific achievements in 2008, and (3) Invitation of Macedonian colleagues to the workshop at GeoZS. |
| Robert Šajn, Jasminka Alijagić, Mateja Gosar and Miloš Majer (GeoZS) | Varaždin, Croatia | May 2009 (three days) | Formal discussions with participants from Austria, Croatia, Hungary and Slovenia. Preparing the project proposal for the application for The South East Europe Transnational Cooperation Programme. Invitations to participate to the workshop at GeoZS in October 2009. |
| Nada Vasković (UB-FMG) | Ljubljana, Slovenia | May 24th-June 7th, 2009 (15 days) | Strengthening the cooperation between Slovenian and Serbian institutions in the field of earth sciences. Short lectures to students of the University of Ljubljana and several discussions with Slovenian colleagues in terms of future cooperation. |
| Vladica Cvetković and Kristina Šarić (UB-FMG) | Bijeljina, Bosnia and Herzegovina | June 1st, 2009 (one day) | A meeting at the Technical Institute d.o.o. from Bijeljina with colleagues from that |

| | | | |
|---|---|---|---|
| | | | institution and other colleagues from Geological Survey – Zvornik and the Mining Institute from Prijedor. A presentation about RESTCA-TERCE-NIPMSS FP7 project and facilities of the new laboratory of SEM-EDS located at the UB-FMG. Discussions about regional problems connected with natural and industrial pollutants. |
| Robert Šajn and MSc. Jasminka Alijagić (GeoZS) | Bosnia and Herzegovina | July 2009 (one week) | Discussions about current geochemical projects (Vareš) and participation in future joint projects (Geochemical Atlas of Sarajevo and Tuzla). The extension of cooperation with the involvement of interested researchers in the field of Western Balkan countries and discussion of common applications in FP7 and other European projects. |
| Gerhard Brey (GUF) | UB-FMG | September 21st-30th 2009 (10 days) | A working week with the Serbian RESTCA members. Strengthening cooperation between scientific and research institutions from Serbia and Germany. Apart of University of Belgrade, Prof. G. Brey also visited Geological Institute of Serbia, especially Department of Geochemistry and Environment Protection. |
| Robert Šajn and Jasminka Alijagić (GeoZS) | Masaryk University, Czech Republic | November 2009 (4 days) | Presentation of the results of geochemical researches in the former Yugoslavia. They discussed with the colleagues about the possibility of future cooperation and joint appearance in future EU projects. Special attention was given to an idea about the possibility of uptake of organic pollutants in research geochemical survey GeoZS. |
| Robert Šajn and Jasminka Alijagić (GeoZS) | Vienna, Austria | November 2009 (three days) | A formal meeting of the GBA-Vienna between representatives of Austria (Bäk, R, Pirkl, H. and Schedl, A.), Croatia (Halamić, J.), Hungary (Jordan, G) and Slovenia (Alijagić, J. and Šajn, R.). Discussion and preparing the final draft of the project "Toxic / Harmful elements distribution in the Drava River floodplain as a basic tool for Environmental Risk Assessment and Improvement" in the SEE JCP (The South East Europe Transnational Cooperation Programme). |
| Marina Lazarov (GUF) | Freiburg, Germany | December 21st to 23rd 2009 (4 days) | Discussion about the possibilities of making common applications for further FP7 projects between GUF, UB-FMG and other German universities. Contacts with Prof. B. Dold were in focus. |
| Vladica Cvetković, Kristina Šarić and Suzana Erić (UB-FMG) | University "Goce Delčev" of Štip (F.Y.R. of Macedonia) | March 24th-30th 2010 (one week) | A few meetings with scientific staff of the University were organized. Discussions with Prof. Dr. Blažo Boev, vice rector, Prof. Dr. Blagoj Golomeov, dean of the Faculty of Natural and Technical Sciences, Prof. Dr. Tena Šijakova-Ivnova, vicedean form the Faculty of Natural and Technical Sciences about future cooperation, especially on projects dealing with pollution of the environment of the Balkan region. |

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|---|---|---|---|
| Robert Šajn and Jasminka Alijagić (GeoZS) | UB-FMG | May 2010 | Participation to the 15th Congress of Serbian Geologists and had three lectures: 'Environmental geochemical investigation in Slovenia, an overview', 'Slovenian activities and cooperation of GeoZS in geochemical investigation in former Yugoslavia' and 'Distribution of chemical elements in an old metallurgical area, Zenica, Bosnia and Herzegovina'. |
| Branislav Trivić (UB-FMG) | Innsbruck (Austria) | June 2010 (20 days) | Strengthening the cooperation between the UB-FMG and Department for Geology of the University of Innsbruck (Austria). Discussions were related to development of fission-track dating at the UB-FMG. This method has already been widely applied by the Innsbruck researchers. Note that this visit was partly undertaken through CEEPUS network, hence, no accommodation costs were covered by the RESTCA-TERCE-NIPMSS Project. |
| Aleksandar Kremenović (UB-FMG) | Darmstadt (Germany) | August/September 2010 (one weak) | Enhancing activities related to reinforcement of international co-operation and networking and Attendance to 26th European Crystallographic Meeting (ECM-26) and 12th European Powder Diffraction Conference (EPDIC-12). |
| Robert Šajn, Gorazd Žibret, Mateja Gosar, Jasminka Alijagić and Miloš Miler | Bovec (Slovenia) | September 2010 (three days) | Participation to the 3rd Geological Congress of Slovenia. Presentation of Slovenian activities and cooperation of GeoZS in geochemical investigation in former Yugoslavia. |
| Robert Šajn, Gorazd Žibret and Jasminka Alijagić (GeoZS) | Šibenik (Croatia) | October 2010 (three days) | Participation to the 4th Geological Congress of Croatia. Promotion of the Geological Survey of Slovenia and exploited their resent scientific achievements. |
| Vladica Cvetković and Dr. Kristina Šarić (UB-FMG) | Vienna (Austria) | November, 2010 (two days) | Reinforcing the cooperation between the UB-FMG and Vienna University. They offered the colleagues from the Vienna University a line of cooperation possibilities including mobility, joint Diploma theses and joint project applications. In addition, they made several contacts with Serbian students, researchers and academics who are presently active in Vienna with the main purpose to organize the final RESTCA-TERCE-NIPMSS meeting. |
| Predrag Vulić (UB-FMG) | Innsbruck (Austria) | November 8th to 24th 2010 (one month) | Strengthening the cooperation between the UB-FMG and Department for Geology of the University of Innsbruck (Austria). |
| Aleksandar Kremenović (UB-FMG) | Bern (Switzerland) | February 2011 (one week) | The activities related to the reinforcement of international co-operation and outreach activities. The RESTCA-TERCE-NIPMSS project activities as well as idea of EU framework projects were presented to members of the Department of Mineralogical Crystallography, University of Bern. |

3) Brain-gain activities at the education and research level

This set of activities was generally aimed at gaining necessary theoretical and practical laboratory skills about up-to-date standards in microanalytical techniques, especially those used in geo-environmental studies as well as at training the staff and graduate and post-graduate students of the UB-FMG and GeoZS in routine work procedure of using the new equipment. This brain gain was designed to lead to critical reinforcing the research capability of the members of wider scientific and research community in the EU convergence and WB regions. There were the following results associated with this major Project achievement: 3a) Organization of a short course on principles and applications of SEM-EDS systems at the UB-FMG, 3b) Organization of a course on other microanalytical techniques with particular emphasis on the application in environmental studies, 3c) A course in application of x-ray diffraction, 3d) Offering two post-doc positions at the UB-FMG, 3e) The integration of the SEM-EDS course into curricula at the UB-FMG, 3f) Staff mobility.

3a) Organization of a short course on principles and applications of SEM-EDS systems at the UB-FMG

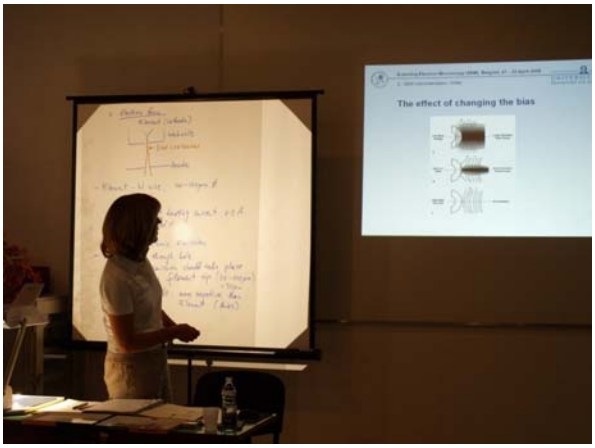
The course entitled **'Principles and application of SEM-EDS systems'** was organized at the UB-FMG between April, 27$^{th}$ and 30$^{th}$ 2009. It was led by members of Beneficiary 2 (**GUF-University of Frankfurt)**: Dr. Heidi Höfer, Dr. Axel Gerdes and Dr. Marina Lazarov. Apart of the GUF team members, Dr. Dirk Frei from the Geological Survey of Denmark was invited to contribute to the short course by his lecture.

The course participants were familiarized with theoretical constraints, system capability, and general analytical procedure of the technique of scanning electron microscopy, energo-dispersive analytical technique and cathodoluminescence imaging systems. The presentations of Dr. Heidi Hoefer, and partly those of Dr. Marina Lazarov, covered basic principles of scanning electron microscope technique including SEM instrumentation, sample collection, preparation and limitations of the method, different types of sample imaging, and quantitative analyses and applications of an EDS system. Dr. Marina Lazarov introduced the method of cathodoluminescence, which was further addressed more in detail by the presentation of Dr. Axel Gerdes. Dr. A. Gerdes gave a talk entitled *'Application of cathodoluminescence imaging in Earth sciences, using zircon as example'*. Dr. Dirk Frei gave a talk entitled *'Application of Computer Controlled Scanning Electron Microscopy (CCSEM) in Geosciences'*. In addition to the scientific part, there was an important contribution given by BSc. Slavko Žižek, director of the SCAN Company (Pridvor, Slovenia). This company is the supplier of the instrument which will be installed in the SEM-EDS laboratory at the UB-FMG. On this occasion BSc. S. Žižek gave short presentations entitled: *'JEOL JSM 6610LV and its possibilities'* and *'OXFORD Xmax detectors and possibilities'*.

The course in general has provided the scientific audience of Serbia with important training in making accurate *in situ* measurements of a large suite of elements in various minerals (silicates, carbonates, phosphates, oxides), and other materials ranging from silicate glasses to metals. Principles of data acquisition, calibration and quantification strategies were also presented. A wide area of application of this analytical technique including analyses of: pressed powder briquettes (e.g. rocks, soils, sediments, etc.), archaeological materials (glass beads, ceramics), plastics, metals (e.g. steel industry), semi-conductor materials, catalysts (e.g. zeolite) and biological material (tree rings, shells, teeth, bones, etc.) was addressed.

The course attended 64 participants. Many target groups identified in Annex I had their representatives, such as UB-FMG, Faculty of Dentistry, Faculty of Technology and Metallurgy, Faculty of Archaeology, Faculty of Chemistry, and Faculty of Forest Engineering (all from the University of Belgrade), Faculty of Technology (University of Novi Sad), Department for Environment Protection of the Educons University (Serbian private University), Geological Institute of Serbia, etc. Besides, there were three members of GeoZS team (Dr. Robert Šajn, Dr. Gorazd Žibert and MSc Jasminka Alijagić, two PhD students/young researchers from the Former Yugoslav Republic of Macedonia (Faculty of Agriculture and Faculty of Mining and Geology, Štip), and one PhD student from the University of Košice (Slovakia).

The course audience




Dr. Heidi Höfer giving a talk

3b) Organization of a course on other microanalytical techniques with particular emphasis on the application in environmental studies

The short course entitled "Microanalytical techniques in applied earth science" was organized on February 18th-26th, 2010 at the University of Belgrade - Faculty of Mining and Geology (UB-FMG).

*The course planning*

Planning of the course was directed by few important activities that should be synchronized:

- The invited lecturers had various obligations beside the seminar
- Selection of appropriate room for lectures
- Coordination of students' obligations (exam period and start of new semester) and date of the seminar
- Incorporation a short practical course in the laboratory of SEM-EDS.

*The course announcements*

The RESTCA-TERCE-NIPMSS team prepared material necessary to spread out information about the seminar. The team produced posters, circular, invitation letters, all with the aim to announce the program of the seminar and the seminar itself. The target group were geologists and experts who are dealing with interaction of geology and environment. It was planned to have around 25 participants. The material was available more than one month before the seminar started. Special announcement

was given for the practical course in the laboratory where it was emphasized that limited number of participants is planned.

*The course logistics*
All logistical activities were done by the RESTCA-TERCE-NIPMSS team members starting from January. The main tasks were to agree with the lecturers about titles and content of the lectures and to book the room for lectures (Lecture Hall at the Serbian Academy of Sciences and Arts). Other activities were organizing a reception at the airport, creation posters, circular, announcements, organizing accommodation for the guests, meetings and social activities etc.

*The courses*
As it was mentioned before, the whole seminar was divided into two parts:
*I – Short practical course* – held in the Laboratory of SEM-EDS at the UB-FMG. The course was given by Dr Heidi Höfer and Dr Axel Gerdes from GUF form February 15$^{th}$ to February 19$^{th}$ according to schedule given in the circular. Seven participants were firstly introduced to theoretical information about a SEM-EDS system and after that they analysed different material and use all devices that the SEM-EDS system has.
*II – Theoretical part* – held in the Serbian Academy of Sciences and Arts. Fourteen lecturers give lectures about different microanalytical techniques in applied earth science and environmental problems caused by mining activities. Around 25 to 30 participants were daily present in the lecture hall.

*Lecturers and participants*
The short practical course was led by Dr Heidi Hoefer and Dr Axel Gerdes who worked with seven participants in the Laboratory of SEM-EDS of the UB-FMG.

The theoretical course was opened by a project coordinator Dr Vladica Cvetković and Dr Kristina Šarić, Scientific Secretary of the RESTCA project, guided the rest of the meeting. The lecturers of this short course were: Dr Axel Gerdes (Goethe Institute, University of Frankfurt, Germany), Dr Marina Lazarov (Goethe Institute, University of Frankfurt, Germany), Dr Robert Šajn (Geological Survey of Slovenia, Slovenia), MSc Jasminka Alijagić (Geological Survey of Slovenia, Slovenia), Dr David Alderton (University of London, Royal Holloway, United Kingdom), Dr Dirk Frei (GEUS, Denmark), Dr Stefan Weyer (Koeln University, Germany), Dr Mihaly Postfai (University of Pannonia, Hungary), Dr Trajče Stafilov (Ciril and Methodius University, Macedonia), Dr Biljana Škrbić (University of Novi Sad, Serbia), Dr Milica Kašanin-Grubin (EDUCONS University, Serbia), MSc. Božidar Đokić (Geological Institute of Serbia, Serbia), MSc. Dušan Kojić, University of Belgrade, Serbia), Dr Aleksandar Pačevski (University of Belgrade, Faculty of Mining and Geology).

The seminar attended participants from the following eleven different institutions from Serbia and from abroad:
University of Belgrade (UB) – Faculty of Mining and Geology,
UB – Faculty of Forestry,
UB – Faculty of Technology and Metallurgy,
UB – Faculty of Chemistry,
UB – Faculty of Philosophy, Dept. of Archaeology,
University of Novi Sad – Faculty of Technology,
Private university "EDUCONS" (Sremska Kamenica),
Geological Institute of Serbia,
Geological Survey of Slovenia,

Serbain Academy of Sciences and Arts,
RioSava Exploration.

The educational level of the participants was heterogeneous – from BSc to MSc and PhD students, post-doc researchers, professors, engineers, academicians. The course was followed by geologists, archaeologists, technologists, engineers of agriculture and forestry, chemists, as well as retired researchers and unemployed engineers. The course was evaluated by the participants and has got very good results.

Short practical course on SEM/EDS given by Dr. Heidi Höfer (GUF)


Dr David Alderton (Royal Holloway, UK)

The audience of the theoretical course

3c) A course in application of x-ray diffraction

The course entitled "X-ray diffraction and its application in the investigation of crystalline materials" was successfully organized on May 31$^{st}$- June 5$^{th}$, 2010 at the University of Belgrade - Faculty of Mining and Geology (UB-FMG). The organization of the course included the following activities (see *Report on Deliverable D3.4*):

*The course planning*
The course was organized in two parts. The first part was organized in UB-FMG Ceremony Hall. Basis and principles of X-ray diffraction on polycrystalline material were presented. The second part was organized in Ivanjica (a small town 250 km away from Belgrade) along with the Annual conference of the Serbian Crystallographic Society. This second part was dedicated to applications of

X-ray diffraction in investigation of polycrystalline material. In such a way, the course had a rather large audience and that was important primarily because the RESTCA-TERCE-NIPMSS project had an invaluable opportunity to directly promote itself in front of much wider scientific community than it was expected for this course. In addition, the occasion of having a meeting outside of Belgrade was used for organizing a half-day field trip to Jarandol basin (on the way back to Belgrade).

*The course announcements*

The RESTCA-TERCE-NIPMSS team prepared material necessary to spread out information about the seminar. The team produced posters, circular, invitation letters, all with the aim to announce the program of the seminar and the seminar itself. The website was regularly updated and the information about the course was available at least two months before the start. Besides the UB-FMG team members have prepared many informal invitations to all the colleagues that were potentially interested. The target groups were chemists, physicists, geologists and all experts who are dealing with interaction of natural/technical sciences and environment. It was planned to have around 50 participants. The material was available more than one month before the seminar started. Special announcement was given for the practical course in the laboratory where it was emphasized that limited number of participants is planned. The application form was prepared electronically and the first deadline was April 15$^{th}$ later prolonged until April 25$^{th}$ 2010.

*The course logistics*

All logistical activities were done by the RESTCA-TERCE-NIPMSS team members starting from January 2010. The main tasks were to agree with the lecturers about titles and content of the lectures. However, there was a line of tasks which had to be completed before the start of the course, such as booking the accommodation for the lecturers and some participants (e.g. from Germany, Austria, Switzerland), booking the room for lectures, providing the equipment for presentations (computers, video-beam and projectors, etc), organizing refreshments for the breaks, meetings, social activities, etc.

*The course program and execution*

The course entitled **"X-ray diffraction and its application in the investigation of crystalline materials"** was organized on May 31$^{st}$- June 2$^{nd}$, 2010 at the University of Belgrade - Faculty of Mining and Geology (UB-FMG) (first part) and from June 3$^{rd}$-5$^{th}$ in Ivanjica (second part). The whole course was done according to the program that was designed by the UB-FMG project team. It encompasses the tasks of direct conducting and undertaking the course itself, such as steering the schedule, maintenance of the lecturing equipment, accommodating slight changes in the program, organizing an inquiry for evaluation, and so on.

The course was opened by Dr. Vladica Cvetković, project coordinator, who gave a short welcome note and a fifteen minute presentation about the idea of the RESTCA-TERCE-NIPMSS. In addition, project coordinator gave a short introduction for each lecturer. The official language of the course was English.

*The course participants*

The course was attended by 57 participants from the following 17 different institutions from Serbia and abroad. The educational level of the participants was heterogeneous – from BSc to MSc and PhD students, post-doc researchers, professors, engineers. The course was followed by geologists, chemists, physicists, technologists, as well as retired researchers and unemployed engineers.

The x-ray course participants


Dr. Aleksandra Rosić

Dr. Biljana Lazić (Bern, Switzerland)

Crystallographic Conference in Ivanjica

3d) Offering two post-doc positions at the UB-FMG

The advertisement for two post-doc positions was published on February, 27th, 2009 in a daily newspaper 'Politika'. The original advertisement has been immediately placed on the project website (http://www.rgf.bg.ac.rs/restca/scanned/advertisment.jpg). The original deadline for applications was set on April 20th 2009. Two applications arrived before deadline and were officially taken into consideration. Only one application was successful because the other candidate was not a PhD holder at the time of application. In this context, only one post-Doc position was filled at the beginning of the second project year.

Accordingly, the first successful candidate was Dr. Aleksandar Pačevski (http://www.rgf.bg.ac.rs/restca/team1.html) and he made a two-year contract with the UB-FMG starting from the May 1st 2009. The contract lasted until the end of the project (April 30th 2011). The second position remained unfilled six months. The second advertisement was published on November 6th 2009 in the most distinguished Serbian daily newspaper 'Politika'. It was an advertisement for a young-researcher position and it attracted four candidates. The Commission decided that the most successful candidate is Mr. Predrag Vulić who was in the late stage of his PhD in Innsbruck, Austria. The contract with Predrag Vulić started from December 1st 2009 and lasted until the end of the project (April 30th 2011).

3e) The integration of the SEM-EDS course into curricula at the UB-FMG

This task was originally scheduled for the third year and foreseen to be undertaken using a common procedure according to the existing regulation of the UB-FMG and Ministry of Education of the Republic of Serbia.

*Aims and outcomes of the SEM-EDS course*
Getting theoretical and practical knowledge of various possibilities and usage of scanning electron microscopy and X-ray microanalysis in geology and other sciences. It is expected that the students finishing this subject are able to work in a laboratory for scanning electron microscopy and to interpret the obtained results of X-ray microanalysis.

*Duration and target groups*
Fourteen academic weeks. Undergraduate, graduate and PhD students of the FMG.

*Content of the course*
1. Week – Basic principle of scanning electron microscopy (SEM)
   1) basic theory; 2) historical notes; 3) applications; 4) advantages and limitations
2. Week – SEM: instrumentation and modes of operation.
   1) how the SEM works; 2) electron guns; 3) electron lenses; 4) electron probe diameter versus electron probe current.
3. Week – Specimen preparation and mounting
   1) specimen preparation of various materials; 2) sputter coating; 3) laboratory equipment, tools and accessories.
4. Week – Electron beam-specimen interactions
   1) the beam enters the specimen; 2) interaction volume; 3) imaging signals: backscattered and secondary electrons.
5. Week – Image formation and interpretation
   1) basic SEM imaging process: scanning action, image acquisition, magnification, depth of field and image distortion; 2) detectors; 3) role of the specimen and detector in contrast formation; 4) image quality.
6. Week – Special topics in scanning electron microscopy
   1) high-resolution imaging; 2) variable-pressure and environmental SEM; 3) crystallographic contrast and electron backscatter patterns.
7. Week – Generation of X-rays in the SEM specimen
   1) continuum X-ray production; 2) characteristic X-ray production; 3) depth of X-ray production; 4) X-ray absorption and fluorescence.
8. Week – X-ray spectral measurements and qualitative X-ray analysis
   1) energy-dispersive spectrometer (EDS); 2) wavelength-dispersive spectrometer (WDS); 3) EDS qualitative analysis; 4) comparison of EDS with WDS.
9. Week – Quantitative X-ray analysis
   1) basic principle, adventages and limitations; 2) quantitative analysis procedures; 3) standards and standardless analysis; 4) matrix effects and ZAF factor; 5) precision and sensitivity.
10. Week – Quantitative X-ray analysis of the natural minerals and synthetic compounds
    1) homogeneity and heterogeneity of the minerals and compounds; 2) quantitative analyses of silicates and oxides; 3) quantitative analysis of sulphides and alloys; 4) light element analysis.
11. Week – Special topics in electron beam X-ray microanalysis
    1) X-ray mapping; 2) line scan; 3) microanalysis of non-polished samples; 4) low-voltage microanalysis.

12. Week – Cathodoluminescence
    1) cathodoluminescence: basic theory; 2) equipment and imaging; 3) chatodoluminescence in minerals; 4) geological application of cathodoluminescence.
13. Week – Interpretation and presentation of the SEM images and X-ray microanalysis
    1) planning and choice of the analysis; 2) representative and specific sample details; 3) imaging with set of magnifications; 4) coupled imaging with various signals; 5) simultaneous presentation of the results.
14. Week – Application of the electron microscopy techniques: some examples
    1) SEM application in geology; 2) SEM application in environmental protection; 3) SEM application in various sciences; 4) SEM and related techniques: complementary of the methods.

*Official status of the course*

The course is officially waiting the approval of the Accreditation Commission authorized by the Ministry of Education and Science of the Republic of Serbia. The next accreditation process will be in 2012 and until that the course content will be included into existing courses: 'Methods of Investigations of Rocks and Minerals', 'Instrumental Mineralogy' and 'Analytical Methods in Geochemistry.'

3f) Staff mobility used for brain-gain and training activities

Activities designed to address this major objective were supported by a set of mobility activities. As for the previous major objective, staff mobility was generally organized by producing General Plans for mobility activities for each Project year, which were approved by Project Management Board. In addition to Project resources, the existing pathways of cooperation and exchange programs were also used (e.g. bilateral projects, CEEPUS, etc.). The following set of mobility activities were realized during the whole duration of the Project (this list does not include the visits of staff members in order to participate or organize meetings presented as separate results of the Project):

| Staff member | Visit to | Time (duration) | Purpose |
|---|---|---|---|
| Aleksandar Kremenović (UB-FMG) | Eötvös Loránd University, Budapest, Hungary | April 5th-9th 2009 (5 days) | ttending of the short course on X-ray line profile analysis at the Department of Materials Physics, Eötvös Loránd University, Budapest, Hungary (http://szft.elte.hu/~gubicza/XLPA). |
| Miloš Majer (GeoZS) | Gdansk, Poland | May 10th to 14th 2009 (5 days) | Attending the 11th European Workshop on Modern Developments and Applications in Microbeam Analysis (EMAS 2009), organized by the European Microbeam Analysis Society. Presenting results sharing experiences of using SEM/EDS for environmental and geochemical researches. |
| Suzana Erić and Kristina Šarić (UB-FMG) | GUF | June 14th-21st, 2009 (one week) | Gaining practical knowledge for working in the Laboratory for Electron Microscopy. The practical course was given mainly by Dr. Heidi Hoefer and Dr. Marina Lazarov. Both Dr. Kristina Šarić and Dr. Suzana Erić passed the whole procedure of working on a SEM-EDS system starting from preparing samples to final analysing using different detectors and interpretation of the results. |
| Heidi Höfer (GUF) | Wiesbaden | June 25th 2009 (one | Participation to one day short course about |

| | | | |
|---|---|---|---|
| | (Germany) | day) | further opportunities of the "Oxford" software program for the SEM. This was important because the seminar was dedicated to a new Oxford software, exactly the same to the one which had been supplied to the UB-FMG in June 2009. |
| Aleksandar Kremenović (UB-FMG) | University of Toronto (Canada) (Note: all the costs are covered by Serbian Ministry for Science and Technological development) | July 8th-August 5th 2009 (one month) | Attending annual American Crystallographic Association Meeting, Toronto, Canada (http://www.cins.ca/aca2009/). Presenting scientific results dedicated to design of a nanomaterial that is used for remediation of soil contaminated with herbicides. On July 10th and 16th he visited *ZENN Motor* Company (http://www.zenncars.com/), one of the leading developer, manufacturer and supplier of electric vehicles *in* Canada and at whole North American continent. |
| Axel Gerdes and Mahdi Gobadi (GUF) | Aachen, Germany | September 09th 2009 (one day) | Visit to the SEM laboratory at the Aachen University and discussion about new set-up opportunities of a scanning electron microscope. |
| Heidi Hoefer, Axel Gerdes and Marina Lazarov (GUF) | UB-FMG | September 21st-30th 2009 (ten days) | A working week with the Serbian RESTCA members. Leading an intensive practical course only for the RESTCA members (Dr. Kristina Šarić, Dr. Suzana Erić and Dr. Aleksandar Pačevski). Special emphasis was given to preparation of samples, especially nanomaterial and organic matter as well as accomplishing high resolution SE-images and quantitative chemical analyses. |
| Mateja Gosar, Tomaž Budkovič and Tamara Teršič (GeoZS) | Litije (Slovenia) | March 2010 (3 days) | Participation to the Mine Sitarjevec International Conference (Outbursts of Water from the Abandoned Mines; Causes, Consequences, Remediation, and Responsibility). The experts from GeoZS gave a several lectures and shear their knowledge and experience according to the topic of the conference. |
| Aleksandar Pačevski (UB-FMG) | University of Miskolc, Budapest, Hungary | | Visit to BAY-NANO Institute for Nanotechnology, Miskolc. The main goal of this visit was to gain basic knowledge for working in the Laboratory for High-Resolution Transmission Electron Microscopy (HRTEM). Besides HRTEM method, Dr. A. Pačevski introduced equipment and basic principle of Field Emission Scanning Electron Microscopy (FESEM) and Micro-Raman spectroscopy and techniques of Raman imaging and mapping. |
| Robert Šajn and Jasminka Alijagić (GeoZS) | Skopje, F.Y.R. of Macedonia | April 2010 (5 days) | Demonstrating a program in the field of geochemistry for researchers and graduate students (preparing plans, sampling, sample preparation, analysis, data processing and visualization). The practical work was attended by 20 researchers and graduate students from 11 research institutions or government, with an area of three countries (Macedonia, Kosovo and Austria). |
| Gorazd Žibret (GeoZS) | Chania, Crete | June 2010 (4 days) | Participation to the international conference |

| | | | |
|---|---|---|---|
| | (Greece) | | CHAOS 2010 – the 3rd Chaotic modeling and simulation international conference. Presentation the following contribution: »Chaos game technique as a tool for the analysis of natural geomorphological features«. |
| Predrag Vulić (UB-FMG) | Innsbruck (Austria) | August 2010 (7 days) | Training and knowledge transfer activities in terms of X-Ray Powder Diffraction Technique that represents important part of this project in renewal and upgrade of the facilities of UB-FMG. Special attention has been given to exchange of the experiences, training in operating the existing equipment, as well as equipment that is planned to be purchased. |
| Vladica Cvetković (UB-FMG) | GUF, Mainz, Germany | September, 2010 (20 days) | Discussions and laboratory training activities in GUF and at the University of Mainz. This opportunity was important for project coordinator to meet all Serbian colleagues that at the time was active in Frankfurt and Mainz: Dr. Dejan Prelević, Dr. Marina Lazarov, Dr. Biljana Starijaš, MSc Irena Prelević, MSc Zoran Jovanović, and MSc Milica Božović. |
| Aleksandar Pačevski (UB-FMG) | GUF | November 2010 (two weeks) | Training activities in relation to Electron Microscopy techniques. It generally included: 1) SEM maintenance. 2) Instructions for EMPA-WDS. 3) Introduction to EBSD technique. 4) Introduction to special techniques for sample preparation. |
| Robert Šajn and MSc Jasminka Alijagić (GeoZS) | Skoplje (FYROM) | January, 2011 (five days) | Strengthening the cooperation between GeOZS and University of Skoplje Faculty of Chemistry. Prof. Dr Trajče Stafilov organized the whole program in which core was training programs for undergraduate students on practical environmental geochemistry. The course was given by Dr. Robert Šajn and MSc Jasminka Alijagić and was attended by 10 participants. |
| Robert Šajn and Jasminka Alijagić (GeoZS) | UB-FMG | February, 2011 (5 days) | Training activities of Serbian students (Study programs in 'Geology' and 'Environmental Protection'). There was also organized a very short field course for best students in order to acquire necessary knowledge in sampling procedures, data archiving and processing. Ten students participated to the theoretical part and four students were taken to a two-days field training. |
| Robert Šajn (GeoZS) | UB-FMG | March 2011 (one week) | The second part of the training program for the UB-FMG undergraduate and postgraduate students in sampling procedure and other field work techniques in environmental studies. Ten students participated to the theoretical part and four students were taken for one week field training. |

### 4.1.4 The potential impact (including the socio-economic impact and the wider societal implications of the project so far) and the main dissemination activities and exploitation of results (not exceeding 10 pages)

4.1.4.1 Expected impact

It is possible to define various positive impacts which be discussed with respect to the time-frame (short- and long-term impacts), type of beneficiaries (emerging research centers, wider research community, graduate and post-graduate students, public sector, etc.), or the impact domain (science/education, economy, decision-makers policy etc.). In the following section the effects that are considered as impacts at a national (Serbia and Slovenia), regional (European region of convergence and West Balkan) and European level are described.

1) Expected impact at the national level

The environment protection continuously presents new analytical challenges in Serbia and Slovenia because government and regulatory authorities require industry to meet tighter environmental standards. Therefore, the promotion of UB-FMG as center of excellence with the newly established SEM-EDS Laboratory is of particular significance. In particular for Serbia, the problem of industrial waste can be regarded as one of the priorities, mostly because of: (a) the absence of coherent administrative regulation, (b) the lack of documentation sources which could identify various materials as industrial waste, and (c) the absence of a comprehensive strategy on the national level in how to deal with this delicate problem. As a consequence, there is neither proper public education, i.e. dissemination of information about origin, types and characteristics of industrial waste and that, in turn, gives rise to a growing fear of the whole community of improper treatment and repository of dangerous materials.

The **RESTCA-TERCE-NIPMSS** was committed to providing long-term benefits to the educational, scientific and research community in Serbia and Slovenia. In particular, the project results have significant positive repercussions in the fields of applied environment-oriented earth sciences.

The Project results are expected to induce several positive effects: a) Improved research and educational infrastructure at the UB-FMG exerts a positive influence for other institutes/research centers in Serbia, which co-operate with the UB-FMG, b) Overall human and technical capacities of the UB-FMG and GeoZS (other than those directly targeted by the project) have been dramatically mobilized and there was spreading a prosperous research atmosphere at the UB-FMG, d) The ‘brain drain’ process, which has severely affected the human source potential of Serbia during the last fifteen years, is, at least, partly counterbalanced; there was a line of specific activities of the Project that were devoted to this problem, e) Competence of the Faculty of Mining and Geology in the future accreditation processes for high-school and university education in Serbia led by government authorities is increased, f) the UB-FMG now demonstrates its philosophy of strong linkage of research to undergraduate and graduate education, g) Synergy between the research groups dealing with fundamental science and those predominantly engaged in applied disciplines is by the Project results strongly encouraged, h) Student interest for graduate and post-graduate (MSc and PhD) programs in earth and environmental sciences is expected to increase in the following years.

2) Expected impact for the EU convergence and Western Balkan regions

The **RESTCA-TERCE-NIPMSS** project results allow the GeoZS and UB-FMG to acquire very high positions in the context of the EU convergence and WB scientific community. From such position, these research entities will from now on act as cluster centers for regional networking in the given realms. This is of great importance for future activities in the field of basic and applied earth sciences.

The measures of the impact at the regional level are generally twofold: a) The volume of personal contacts, inter-institutional exchanges and other mobility program activities among the countries in the mentioned regions in the fields of education, scientific work and research substantially increased druging the Project implementation, and b) The project results provide conditions for future preparation of joint project proposals of two or more Western Balkan and European convergence countries. The latter issue is attractive for future EU Framework Program calls; the GeoZS and UB-FMG may now serve as a core-centre or part of it for future interdisciplinary networking, joint research and other co-operation activities in the region.

These short- and medium-term impacts will potentially generate a process of re-aggregation of the science base and consolidation of the research potential within the EU convergence region and Western Balkans. The existence of a much more coherent system of exchange of information and spread of knowledge within a given region is essential in topics such as natural mineral resources, environmental or various geological problems.

3) Expected impact at European level

Although the Project philosophy may sound local in application it is much more international in relevance. The project success at the regional level automatically has a positive influence for the main objectives of EU 7$^{th}$ FP, primarily in making a contribution to the integrating and strengthening the ERA. In this context, increasing S&T potential and improving scientific coherence in the regions at the EU periphery are important for the main goals of FP7. The realized strengthening the international co-operation networking among the beneficiaries represents necessary conditions for setting-up of research-intensive clusters across Europe.

The following positive impacts can be recognized at the European level: a) The realized unlocking, mobilizing and reinforcing the human and material potential of UB-FMG and GeoZS is a step forward in integrating the ERA by reinforcement of a research center of already proven capacity; the reinforced institutes are added values at the European level; b)The GUF, as an excellent EU research center, had benefits of scientific collaboration with research centers and individuals of the region peripheral to EU and that is of importance for widening their area of investigation and enabled them to stimulate new ideas.

4.1.4.2 The main dissemination activities and exploitation of results

Alongside its major activities, this project included a line of dissemination activities in order to increase public awarenes about the project achievements. The whole Work Package 4 was devoted to these activities. Dissemination platform was organized in order to: a) perform stakeholder analysis to

identify levels and modes of communication, b) try to have acces to multiple communication media and to foster feedback to in order to have ideas about communication adequacy, and c) conduct periodic internal controls of dissemination activities by Project Management Board.

Dissemination was aimed at making sure that project objectives and results are known to non-consortium and non-educational and non-research institutions in the whole region of the EU convergence. Knowledge transfer and transfer of interim and final results of the project served as a further promotion of the project beneficiary institutions to their Government, but to industry and public sector, as well. This was an important prerequisite in terms of influence further budget decisions of some targeted groups and potential project stakeholders.

Dissemination activities and exploiting the Project results have been performed through three independent tasks, namely: 1) Building up and regular updating the RESTCA-TERCE-NIPMSS Website, 2) Short presentations of the project results at various meetings, and 3) Presentations of project results to government, industry and public sector.

1) Building up and regular updating the RESTCA-TERCE-NIPMSS Website

The Website of the project (www.rgf.bg.ac.rs/restca/) was completed in early August (Month 4th). From the very beginning the Web presentation of **RESTCA-TERCE-NIPMSS** contained all relevant information about the project and has been regularly updated. The site was designed to be an effective mean of communication, to spread information about the project, and to convince possible interest groups that it may be valuable for them to use the project foreground.

The site homepage contains the original and specially designed project logo, EU flag, FP7 logo, the main project data (including full project name, full acronym, grant agreement number, call identifier, as well as the names of project coordinator and project officer), six buttons for further information, Serbian flag for the Serbian version, and the counter. The buttons led to the following contents i) **about project** (project ID, major ideas, concepts and objectives) (see also figure below), ii) **consortium** (consortium as a whole, legal entities, teams and team members), iii) **events** (a continuously updated overview of past events and future activities including circulars, advertisements, announcements and galleries), iv) **contact us** (post addresses, phone and fax numbers and E-mail addresses), and v) **related links** (the links to web-pages of possible stakeholders, FP7 official sites, etc.). The site was used to spread the circular for the short course organized on April 27-30th and the announcement for two post-doc positions offered at the UB-FMG, as well as to inform about other project activities, such as kick-off meeting, mobility of project

members, progress in purchasing an SEM-EDS system and upgrading XRD, etc. The Website has the full content both in English and in Serbian.

The project Website was done by the UB-FMG staff and for this task no subcontracting was necessary, as indicated in Annex I. The RESTCA site is hosted and administered by the official IT-Department of the UB-FMG, and this service, including the regular maintenance and updating, is completely running without problems, although some risks and related contingency measures were originally planned. The change of the domain from www.rgf.bg.ac.yu into www.rgf.bg.ac.rs occurred at the beginning of 2009 and from September 2009 only the latter is used.


During the whole duration of the Project the RESTCA site was hosted and administered by the official IT-Department of the UB-FMG, and this service, including the regular maintenance and updating, is completely running without problems originally planned. From September 2009 only new domain is active: www.rgf.bg.ac.rs. It is also worth noting that the official site of the UB-FMG has a new design starting from November 2009 (see photo). Most users agree that this new graphical solution is much more informational and illustrative.
Most users agree that this new graphical solution is much more informational and illustrative. The RESTCA banner is together with the other FP7 project that is ongoing at the UB-FMG (PROMITHEAS – 4; ENV.2010.1.1.6).

2) Short presentations of the project results at various meetings

The project **RESTCA-TERCE-NIPMSS** was successfully promoted at various occasions. Principal way of dissemination was associated with the meetings organized directly as project activities, short visits of Project team members in the frame of staff mobility, by the participation to other meetings, and in various other occasions. The list of these dissemination activities is as follwos:

*17th International Fair of Ecology, Medicinal Herbs and Water "Eco-world" (October 8-12, 2008).* The major concept of **RESTCA-TERCE-NIPMSS** and its expected impacts were presented at the Fair which was attended by many exhibitors and visitors dealing with environment protection and return to nature. The project was promoted by coordinator Prof. Dr. Vladica Cvetković at the official exhibition place of the Serbian Ministry of Science and Technological Development.

*The first National Congress of Macedonian Geologists (October 14-16, 2008) in Ohrid (F.Y.R. Macedonia).* Oral and poster presentations were given by coordinator Prof. Dr. Vladica Cvetković

and project scientific secretary Dr. Kristina Šarić, respectively. The Congress was organized as part of the activities of UN Year of Planet Earth 2008 and it was attended by more than 100 participants. Among the participants the officials of the Ministry for Environmental Protection of the F.Y.R. o Macedonia were also present. The **RESTCA-TERCE-NIPMSS** project members made contacts with Ministry Assistant Dr. Sonja Lepitkova.

*National Meeting of Slovenian geologists, held in Ljubljana in March 2009.* Members of GeoZS Dr. Robert Šajn and MSc Jasminka Alijagić presented the project idea and its major objectives at the meeting. The meeting was organized as part of the activities in the UN Year of Planet Earth.

*Short course on scanning electron microscopy and energy dispersive technique, April 27-30$^{th}$ 2009, UB-FMG.* This was the first course organized by the Project and had 64 participants. Before the course lectures there was a short introduction given by coordinator Dr. Vladica Cvetković.

*Presentations at GeoZS and GUF, October 2009.* GeoZS and GUF team members presented the main project ideas and concepts to the colleagues at other Departments of their institutions. This was done by various occasions, small department meetings, informal talks, etc.

*Petnica Science Center, October 2009.* Dr. Suzana Erić gave a short presentation about the project in front of an audience of 40 junior researchers in the, who were attending a regular seminar in geology; the project ideas and planned activities provoked a great interest of these young people.

*Presentations at GeoZS and in other centres in Slovenia.* Prof. Dr. Aleksandar Kremenović had a set of dissemination activities in Slovenia. He visited four institutions: i) Geological Survey of Slovenia, Department of Geochemistry and Environmental Geology, ii) Institute Jožef Štefan, Department for Nanostructured Materials, iii), iv) Biotechnical Faculty, Agronomy Department, Centre for Soil and Environmental Science, University of Ljubljana. Presentation of project activities for other above mentioned institutions was organized at meetings in direct contacts. Special attention regarding dissemination activity was paid during a meeting with experts from the Biotechnical Faculty listed as closer cooperation between our two institutions is planned for future.


*Conference "Week of Innovative Regions in Europe - WIRE2010", Granada (Spain, 15$^{th}$-17$^{th}$ March 2010).* Project coordinator took part to the conference jointly organized by the Spanish Ministry of Science and Innovation and the European Commission under the auspices of the Spanish EU Council Presidency. 'WIRE2010' was a high-level forum for discussion of stakeholder's good practices and ideas on how to make the best of European, national and regional funding for R&D and innovation and more efficient ways to conduct future actions. In this line, REGPOT programme (Capacities - FP7) had a whole dedicated conference on which project coordinator directly participated in the poster session (see photo) as well as by an abstract published in the proceedings

volume.
The abstract entitled GETTING READY TO SERVING THEWEST BALKAN REGION IN ENVIRONMENT PROTECTION: REGPOT 2007-3 Project No 204374 can be downloaded at: http://www.rgf.bg.ac.rs/restca/regpot_2007_3_204374_abstract_wire2010.pdf. The presented poster can be seen below or downloaded at: http://www.rgf.bg.ac.rs/restca/Poster_REGPOT_No204374_site.jpg.

*Thematic workshop at the GeoZS, October 2009.* In the frame of the RESTCA-TERCE-NIPMSS activities Geological Survey of Slovenia is organizing a workshop entitled *"Environmental geochemistry - Anthropogenic impact on the human environment in SE Europe"*. The workshop was a great opportunity for representing the GeOZS achievements, gaining the knowledge from other participating countries in the field of environmental geochemistry, as well as for strengthening the international cooperation networking and partnership between SEE and EU countries. Exactly 66 authors from 9 countries (Austria, Bosnia and Herzegovina, Croatia, Germany, Hungary, Italy, Macedonia, Serbia and Slovenia) presented 36 contributions in environmental geology and geochemistry based on professional experience. During the workshop RESTCA-TERCE-NIPMSS project activities was presented to the audience. The project as well as FP7 program was promoted to the audience.

*A short course "Microanalytical techniques in applied Earth science", February 15$^{th}$ and 26$^{th}$ 2010 at the UB-FMG.* More than 40 participants from several faculties, scientific institutes and companies followed the seminar. Fourteen lecturers from seven countries were: Dr. Axel Gerdes (GUF), Dr. Marina Lazarov (GUF), Dr. Robert Sajn (GeoSZ, Slovenia), MSc. Jasmina Alijagic (GeoSZ, Slovenia), Dr. David Alderton (University of London, Royal Holloway, United Kingdom), Dr. Dirk Frei (GEUS, Denmark), Dr. Stefan Weyer (Koeln University, Germany), Dr. Mihaly Postfai (University of Pannonia, Hungary), Dr. Trajče Stafilov (Ciril and Methodius University, Macedonia), Dr. Biljana Škrbić (University of Novi Sad, Serbia), Dr. Milica Kašanin-Grubin (EDUCONS Uniocersity, Serbia), MSc. Božidar Đokić (Geological Institute of Serbia, Serbia), MSc. Dušan Kojić, University of Belgrade, Serbia), Dr. Aleksandar Pačevski (UB-FMG). The project as well as the idea of the whole FP7 was promoted to the audience.

3) Presentations of project results to government, industry and public sector.

The main purpose of this task was to promote qualitative and quantitative growths of the targeted institutions, especially UB-FMG, and to improve their impact on the national and regional level, as well as to increase the level of awareness and education of potential users in Serbia in the field of investigation of natural and industrial pollutant materials. The target group for outreach measures were universities, other institutes, and larger companies from the country and in Western Balkan region. In order to achieve these objectives organized **RESTCA-TERCE-NIPMSS** as an "open centre" which provide not only service in analysis of pollutant materials but also offers help and collaboration trough different seminars and training courses.

**Targeted groups**

Dissemination and outreach activities within this project targeted the audience outside the project environment and informed industry, and public and private sectors on the issues of **RESTCA-TERCE-NIPMSS**. This was provided by: (a) delivering various printed (hard copies and electronic documents) material, and (b) by organizing short presentations on targeted sites (such as, for

instance, congresses and other meetings). It was demonstrated that **RESTCA-TERCE-NIPMSS** is oriented to develop the project deliverances at the user level and to offer the use of training methods to a wide spectra of possible stakeholders. The following three beneficiary groups and stakeholders of the **RESTCA-TERCE-NIPMSS** project were in the focus of these project activities:

*Wide educational/research community in Serbia and in EU convergence region*
The existence of research centres linked by a strategic partnership, such as UB-FMG and GeoZS, ensure a great benefit for the educational and research community of the region. Various institutions dealing with studies of various solid state materials, for instance, Faculty of Natural and Mathematical Sciences, Faculty of Technology and Metallurgy, School of Dentistry in Belgrade, Faculty of Forestry, Faculty of Chemistry, Educons University, Agricultural Faculty (Štip, F.Y.R. of Macedonia) or different research institutes in this region like Geological Institute of Serbia, Institute of Chemistry, Technology and Metallurgy, Institute IMS Belgrade, museums, for instance National Museum and Natural Museum, all expressed interests to collaborate with the reinforced UB-FMG. In particular, this potential cooperation is oriented on preparation of mutual proposals for any of the Seventh Framework Program Themes.

*Civil society*
The scientific problems addressed by this proposal are very closely related to environment protection and increase of the quality of life. It is particularly true for specific regions in East Serbia or neighbouring areas, especially in Bosnia and Herzegovina and Macedonia. The mining areas of Bor, Majdanpek and Veliki Krivelj, for instance, are regions of very low income and life standard, which are produced after a long time of non-systematic exploitation. Moreover, these are the areas of great environmental risks with respect to the existence of many tailing dumps or waste material originated from flotation or smelting plants. This project produce two major benefits for these communities: (i) first, the environmental risks produced by present industrial pollutants are studied more in detail and better understand, and (ii) the possibility of exploitation of some tailings are evaluated (for instance, the tailing dump 1 near Bor was estimated to contain around 12 million of tons of copper ore).

*Decision-maker institutions in Serbia and WB region*
Serbian Government has announced a strategic program called National investment plan and one of the priorities is the reinforcement of infrastructure. Aiming at critical infrastructure improvements, this project represents direct contribution to this program. Ministry of Science and Environmental Protection of Republic of Serbia has introduced a program named "Technological development" in which a substantial financial support should be provide for risk assessment and recultivation of mining plants. However, the so far partly due to existing world economic crisis and luck of Serbian Government investments in public sector reached outcomes are much less then expected; especially in terms of process-oriented knowledge about solid state waste, its origin and environment effects. Apart of solving environment problems, the **RESTCA-TERCENIPMSS** achievements provided invaluable contribution for revealing possibilities to recycle waste material from some dumps in many areas in Serbia. At the moment RESTCA team activities are focused on milestones. However, building up connections with Government is important part of our activity. Exchange of information's with Ministry of Science and Environmental Protection, Ministry of Science and Technological Development, Agency for Environmental Protection as well as other decision-maker institutions are regular and intensive.

It should be noted that new cycles of projects granted by Ministry of Science and Education of Serbia granted project (Project No 176016: **'Magmatism and geodynamics of the Balkan Peninsula from Mesozoic to present day: significance for the formation of metallic and non-metallic mineral deposits'**) for the period 2011-2014. Almost all project team members of RESTCA-TERCE-

NIPMSS project are members of this project. The experience collected in last three years through realization of RESTCA-TERCE-NIPMSS project improve capacities of the group in a way that Ministry of Science and Education of Serbia decided to grant money for further upgrade of equipment (purchase of a WDS system and a powder diffractometer of new generation) in amount of money of about 400000 EUR. This indicates that effort shown through the RESTCA-TERCE-NIPMSS project realization was recognized by government of Serbia. This will increase capacity of group to a level that will be sufficient for application to scientific (not SSA) EU framework project.

*Private sector*
Private sector in Serbia as well as in whole WB is in period of growing but unstable. However, promotions to different private companies were performed (navesti sve sastanke na kojima je pricano o projektu npr. RioSava as a branch of Rio Tinto, Erin Ventures, Kovilovača d.o.o, etc.). Moreover, some companies have found interest to cooperate. At the moment the main interest for cooperation is connected to promotion of these companies/our group and use of microanalytical techniques that were established at the beginning of the project. This makes good bases for strengthening of cooperation with private sector, and for future common application on open calls dedicated to public-private partnership and innovation.

There were following special occasions during which the Project achievements were introduced to government, industry and public sector:

*Posters, flyers and other promotion material.*
UB-FMG team members have designed poster and flyer presentations. This material contained a graphical expression of the main project ideas and other useful information, such as the project Website and contact details. This material was delivered to possible stakeholders, for instance: Geological Institute of Serbia, Ministry of Science and Technological Development, other faculties and research institutes belonging to the University of Belgrade, Serbian Environmental Protection Agency, etc. This material has promoted **RESTCA-TERCE-NIPMSS** as a project developing its deliverables at the user level and to offer the use of training methods to a wide spectrum of possible interest groups.

*Cooperation with Serbian Agency for Environmental Protection.*
Prof. Dr. Aleksandar Kremenović made two official visits to Serbian Agency for Environmental Protection (part of Serbian Ministry of Environmental Protection - SEPA), Division for soil protection. The major concept of **RESTCA-TERCE-NIPMSS** and its expected impacts were presented. Common interest for cooperation in recognition and definition of soil pollution hot spots were expressed. The agreement was made that the link of the **RESTCA-TERCE-NIPMSS** Website should be available on the official SEPA webpage and vice versa. Prof. Dr. Aleksandar Kremenović attended the presentation of "2008$^{th}$ Annual Report of the State of Environment in Serbia" organized by Serbian Agency for Environmental Protection - SEPA (part of Serbian Ministry of Environmental Protection). The presentation was organized on 11$^{th}$ November in hotel Best Western ŠUMADIJA in Belgrade. The report could be found on site http://www.sepa.sr.gov.yu/index.php?&search=0&page=0. During the presentation breaks common interest between RESTCA-TERCE-NIPMSS and SEPA for cooperation in recognition and definition of earth pollution hot spots were expressed.

*Promotion of Serbian Success at the REGPOT 2007 Call.*
Assistant Minister Dr. Viktor Nedović promoted the great success of Serbian re search institutions in the REGPOT-3-2007 program in a sown TV broadcast of the Serbian Public Service. Although at a more general level (but covering a much wider audience) Assistant Minister has mentioned

**RESTCA-TERCE-NIPMSS** project using the information which was provided for him by the project coordinator.

*The opening ceremony of the SEM-EDS laboratory at the UB-FMG.*
A particular occasion for the project promotion was the opening ceremony of the SEM-EDS laboratory. It was held on September 18th at the UB-FMG. More than 70 participants from different scientific organizations and industrial companies attended the ceremony. Among the invited persons, two members of the Serbian Academy of Sciences and Arts Academicians Stevan Karamata and Zoran Maksimović were also presented. Prof. Miloš Nedeljković, State Secretary in the Ministry of Science and Technological Development of the Republic of Serbia, symbolically opened the laboratory by plugging in the electron gun (see photo bellow, left). By his speech, Prof. Miloš Nedeljković encouraged scientists of various fields to use the laboratory facilities as well as to apply for other projects. Moreover, on this occasion Prof. Ljupko Rundić, President of the National Committee for Year of Planet Earth of the Government of Republic of Serbia attended the opening ceremony. It was concluded that the activities of the RESTCA-TERCE-NIPMSS project fits perfectly to the activities of the YPE 2008/2009.

Prof. M. Nedeljković, State Secretary of the Ministry of Science and Technological development turns the electron gun on

Academician Zoran Maksimović speaks during the opening ceremony

*Activities of the SEM-EDS Laboratory.*
A feedback from promotion activities could be measured throught number of visits to the SEM-EDS laboratory. Since the openning ceremony (September, 2009; Month 17th) there were three to four visits to the SEM-EDS every week. The list of institutions is very large as well as the list of scientific disciplines which need services of scanning electron microscope in Serbia. For the purpose of the laboratory promotion the UB-FMG staff designed and produced a flyer for dissemination in Serbian. The flyer contains all valuable information about the SEM-EDS Laboratory. The photograph (right) shows the cover page of the flyer. Other measurable effects of the promotion are evident through many offers from a large number of scientific and research institutions for including the UB-FMG SEM laboratory into their project proposals for the last call for funding of the Ministry of Science and Technological Development of the Republic of Serbia.

*Promotion activities of Project Coordinator.*
In October 2009, project coordinator Prof. Dr. Vladica Cvetković was elected Dean of the Faculty of Mining and Geology. In this context, there were many opportunities in which he could directly or indirectly promote FP7 ideas, RESTCA-TERCE-NIPMSS project achievements and, above all, new

and most up-to-date Scanning Electron Microscope Laboratory in Serbia. Among other occasions, there were:

- Admittance ceremony for new students of the Faculty (October, 2009 at the main student amphitheatre of the UB-FMG, around 200 people, students and Faculty staff).
- Ceremony of disclosure of bust of Milutin Milanković, famous Serbian scientist worldwide known by his theory of cyclic insulation of planet Earth (December 31th, 2009, the last day of 'Milanković's Year in Serbia', UB-FMG entrance hall, around 30 people present, TV, radio, newspaper and internet coverage).
- Opening Ceremony of the Exhibition '40 Years of Computer Application in Serbian Mining' (April 12th 2010, Serbian Academy of Sciences and Arts, around 70 people present, newspaper and internet coverage).
- Project RESTCA-TERCE-NIPMSS was specially promoted by interview of project coordinator Vladica Cvetković given to the weekly newspaper 'NIN'. This interview is given in Serbian and can be downloaded at http://www.rgf.bg.ac.rs/aktuelnosti/Aktuelnosti/nin.pdf. The translated title of the interview is 'Faculty that fits the sustainable development in Serbia' and it points out at many places the role of the RESTCA project to the overall increase of research capacities at the Faculty of Mining and Geology. It also contains a photo from the Laboratory of SEM-EDS.

*Special meeting at the UB-FMG, March, 2011.*

In addition to the activities indicated in Annex I, a special double-program meeting was organized in Belgrade on 17-18th March 2011. Project Officer Salvatore La Rosa approved this idea along with necessary re-allocation of funds. The meeting was divided into two sessions: 1 - OPERA: Our People in European Research Area, 2 - RESTCA-TERCE-NIPMSS Project: Major achievements and their sustainability. The second day was dedicated to the project RESTCA. The Serbian team members presented the main tasks of the project. Schedule is given bellow.

*Special promotion material for the SEM-EDS Laboratory.*


The SEM-EDS brochure

## 4.2 Use and dissemination of foreground

**Section A (public)**

| TEMPLATE A1: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| NO. | Title | Main author | Title of the periodical or the series | Number, date or frequency | Publisher | Place of publication | Year of publication | Relevant pages | Permanent identifiers[3] (if available) | Is/Will open access[4] provided to this publication? |
| 1 | | | | | | | | | | |
| 2 | | | | | | | | | | |
| 3 | | | | | | | | | | |
| | | | | | | | | | | |

**The project RESTCA-TERCE-NIPMSS was a capacity building project aimed at increasing research potential of the targeted centres. Therefore, no peer reviewed publications were foreseen as resulting from direct project achievements.**

[3] A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

[4] Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

| TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NO. | Type of activities[5] | Main leader | Title | Date | Place | Type of audience[6] | Size of audience | Countries addressed |
| *1* | *Web* | *Kristina Šarić* | *Web site of the Project* | *August, 2008* | *Belgrade, Serbia* | *Scientific Community, Civil Society, Policy makers, Medias* | *More than 1000 users* | *N/A* |
| *2* | *Poster* | *Suzana Erić* | *Project REGPOT-2007-3 RESTCA-TERCE-NIPMSS* | *September, 2008* | *Belgrade* | | *N/A (100 of the copies are deliverd to many institutions in Serbia and abroad)* | *N/A (100 of the copies are deliverd to many institutions in Serbia and abroad)* |
| *3* | *Conference* | *Vladica Cvetković* | *17th International Fair of Ecology, Medicinal Herbs and Water "Eco-world"* | *October 8-12, 2008* | *Belgrade* | *Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias* | *More than 1500* | *3-5* |
| *4* | *Presentation* | *Aleksandar Kremenović* | *Serbian Agency for Environmental Protection* | *October, 2008* | *Belgrade* | *Scientific Community Civil Society, Policy* | *15* | *1* |

5[5] A drop down list allows choosing the dissemination activity: publications, conferences, workshops, web, press releases, flyers, articles published in the popular press, videos, media b6riefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters, Other.

[6] 7A drop down list allows choosing the type of public: Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias ('multiple choices' is possible.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | *8makers* | | |
| *5* | *Conference* | *Vladica Cvetković, Kristina Šarić* | *The first National Congress of Macedonian Geologists* | *October 14-16, 2008* | *Ohrid (F.Y.R. Macedonia)* | *9Scientific Community* | *More than 100* | *4* |
| *6* | *Interview* | *Viktor Nedović, Asisst. Minister* | *Promotion of Serbian success in the REGPOT 2007 Call* | *November 2008* | *Belgrade* | *Scientific Community, Civil Society, Policy makers, Medias* | *N/A (the interview was broadcasted on the TV public service)* | *N/A (the interview was broadcasted on the TV public service)* |
| *7* | *Conference* | *Robert Šajn, Jasminka Alijagić* | *National Meeting of Slovenian geologists* | *March 2009* | *Ljubljana* | *Scientific Community* | *More than 100* | *4* |
| *8* | *Short course* | *All team members* | *Short course on scanning electron microscopy and energy dispersive technique* | *April 27-30th 2009* | *Belgrade* | *Scientific Community* | *More than 50* | *5* |
| *9* | *Presentation* | *Suzana Erić* | *Petnica Science Center* | *October 2009* | *Petnica, Serbia* | *Scientific Community* | *40* | *1* |
| *10* | *Presentation* | *Aleksandar Kremenović* | *Geological Survey of Slovenia, University of Ljubljana* | *November 2009* | *Ljubljana, Slovenia* | *Scientific Community* | *30* | *2* |
| *11* | *Presentation* | *All project team members* | *The opening ceremony of the SEM-EDS laboratory at the UB-FMG* | *on September 18th 2009* | *Belgrade, Serbia* | *Scientific Community, Civil Society, Policy makers, Medias* | *70* | *2* |
| *12* | *Other* | *Vladica Cvetković* | *Admittance ceremony for new students of the Faculty* | *October 1st, 2009* | *Belgrade, Serbia* | *Scientific Community* | *250* | *2* |
| *13* | *Workshop* | *All team members* | *"Environmental geochemistry - Anthropogenic* | *October 2009* | *Ljubljana, Slovenia* | *Scientific Community* | *More than 50* | *5* |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | *impact on the human environment in SE Europe"* | | | | | |
| *14* | *Articles published in the popular press* | *Vladica Cvetković* | *'Faculty that fits the sustainable development in Serbia'* | *November 2009* | *Belgrade, Serbia* | *Scientific Community, Civil Society, Policy makers, Medias* | *N/A (the interview was published in the distinguished weekly newspaper 'NIN').* | *N/A (the interview was published in the distinguished weekly newspaper 'NIN').* |
| *15* | *Media briefing* | *Vladica Cvetković* | *Ceremony of disclosure of the bust of Milutin Milanković* | *December, 31st 2009* | *Belgrade, Serbia* | *Scientific Community, Civil Society, Medias* | *More than 50 present (plus TV, radio, newspaper and internet coverage).* | *N/A (TV, radio, newspaper and internet coverage).* |
| *16* | *Short course* | *All team members* | *"Microanalytical techniques in applied Earth science"* | *February 15th and 26th 2010* | *Belgrade, Serbia* | *Scientific Community* | *More than 50* | *6* |
| *17* | *Poster* | *Vladica Cvetković, Kristina Šarić, Suzana Erić* | *"Getting readz for serving the society in solving its environmental problems"* | *March 2010* | *Belgrade, Serbia* | *Scientific Community (higher education, Research), Industry, Civil Society, Policy makers, Medias* | *N/A* | *N/A (The poster is available in the Faculty corridor)* |
| *18* | *Conference* | *Vladica Cvetković* | *"Week of Innovative Regions in Europe - WIRE2010"* | *15th-17th March 2010* | *Granada, Spain* | *Scientific Community, Industry, Civil Society, Policy makers, Medias* | *More than 3000* | *25* |
| *19* | *Media briefing* | *Vladica Cvetković* | *Opening Ceremony of the Exhibition* | *April 12th 2010* | *Belgrade, Serbia* | *Scientific Community, Industry, Civil* | *50 (plusTV, radio, newspaper* | *N/A (TV, radio, newspaper and internet coverage).* |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | *'40 Years of Computer Application in Serbian Mining'* | | | *Society, Policy makers, Medias* | *and internet coverage).* | |
| *20* | *Workshops* | *Vladica Cvetković* | *The thematic workshop entitled: «Environmental problems related to active and abandoned mines in SE Europe»* | *November 1st to 5th 2010* | *Belgrade, Serbia* | *Scientific Community, Industry* | *60* | *8* |
| *21* | *Presentation* | *All team members* | *RESTCA-TERCE-NIPMSS Project: Major achievements and their sustainability* | *March 18th 2011* | *Belgrade, Serbia* | *Scientific Community, Industry, Civil Society, Policy makers, Medias* | *70* | *3* |
| *22* | *Special brochure about the SEM-EDS Laboratory* | *Kristina Šarić, Aleksandar Pačevski, Suzana Erić* | *SEM LAB* | *March 2011* | *Belgrade, Serbia* | *Scientific Community, Industry, Civil Society, Policy makers, Medias* | *N/A (100 copies)* | *N/A (100 copies)* |

**Section B (Confidential[7] or public: confidential information to be marked clearly)**
**Part B1**

| TEMPLATE B1: LIST OF APPLICATIONS FOR PATENTS, TRADEMARKS, REGISTERED DESIGNS, ETC. | | | | | |
|---|---|---|---|---|---|
| Type of IP Rights[8]: | Confidential Click on YES/NO | Foreseen embargo date dd/mm/yyyy | Application reference(s) (e.g. EP123456) | Subject or title of application | Applicant (s) (as on the application) |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

**N/A**
**The project RESTCA-TERCE-NIPMSS was a capacity building project aimed at increasing research potential of the targeted centres. Therefore, no patents, trademarks or registered designs were foreseen to result from the project.**

[7] Note to be confused with the "EU CONFIDENTIAL" classification for some security research projects.

[8] A drop down list allows choosing the type of IP rights: Patents, Trademarks, Registered designs, Utility models, Others.

**Part B2**

| Type of Exploitable Foreground[9] | Description of exploitable foreground | Confidential Click on YES/NO | Foreseen embargo date dd/mm/yyyy | Exploitable product(s) or measure(s) | Sector(s) of application[10] | Timetable, commercial or any other use | Patents or other IPR exploitation (licences) | Owner & Other Beneficiary(s) involved |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

**N/A**

**The project RESTCA-TERCE-NIPMSS was a capacity building project aimed at increasing research potential of the targeted centres. Therefore, no exploitable foreground which should fulfil the criteria from the above presented table resulted from the project.**

[19] A drop down list allows choosing the type of foreground: General advancement of knowledge, Commercial exploitation of R&D results, Exploitation of R&D results via standards, exploitation of results through EU policies, exploitation of results through (social) innovation.

[10] A drop down list allows choosing the type sector (NACE nomenclature) : http://ec.europa.eu/competition/mergers/cases/index/nace_all.html

## 4.3 Report on societal implications

Replies to the following questions will assist the Commission to obtain statistics and indicators on societal and socio-economic issues addressed by projects. The questions are arranged in a number of key themes. As well as producing certain statistics, the replies will also help identify those projects that have shown a real engagement with wider societal issues, and thereby identify interesting approaches to these issues and best practices. The replies for individual projects will not be made public.

| **A General Information** *(completed automatically when **Grant Agreement number** is entered.* | |
|---|---|
| **Grant Agreement Number:** | 204374 |
| **Title of Project:** | Reinforcing S&T Capacities of Two Emerging Research Centers |
| **Name and Title of Coordinator:** | Vladica Cvetković, PhD, Full Professor |

| **B Ethics** | |
|---|---|
| **1. Did your project undergo an Ethics Review (and/or Screening)?**<br>• If Yes: have you described the progress of compliance with the relevant Ethics Review/Screening Requirements in the frame of the periodic/final project reports?<br>Special Reminder: the progress of compliance with the Ethics Review/Screening Requirements should be described in the Period/Final Project Reports under the Section 3.2.2 *'Work Progress and Achievements'* | ***No*** |
| **2. Please indicate whether your project involved any of the following issues (tick box) :** | ***YES*** |
| **RESEARCH ON HUMANS** | |
| • Did the project involve children? | |
| • Did the project involve patients? | |
| • Did the project involve persons not able to give consent? | |
| • Did the project involve adult healthy volunteers? | |
| • Did the project involve Human genetic material? | |
| • Did the project involve Human biological samples? | |
| • Did the project involve Human data collection? | |
| **RESEARCH ON HUMAN EMBRYO/FOETUS** | |
| • Did the project involve Human Embryos? | |
| • Did the project involve Human Foetal Tissue / Cells? | |
| • Did the project involve Human Embryonic Stem Cells (hESCs)? | |
| • Did the project on human Embryonic Stem Cells involve cells in culture? | |
| • Did the project on human Embryonic Stem Cells involve the derivation of cells from Embryos? | |
| **PRIVACY** | |
| • Did the project involve processing of genetic information or personal data (eg. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)? | |
| • Did the project involve tracking the location or observation of people? | |
| **RESEARCH ON ANIMALS** | |
| • Did the project involve research on animals? | |
| • Were those animals transgenic small laboratory animals? | |

| | |
|---|---|
| • Were those animals transgenic farm animals? | |
| • Were those animals cloned farm animals? | |
| • Were those animals non-human primates? | |
| **RESEARCH INVOLVING DEVELOPING COUNTRIES** | |
| • Did the project involve the use of local resources (genetic, animal, plant etc)? | |
| • Was the project of benefit to local community (capacity building, access to healthcare, education etc)? | **X** |
| **DUAL USE** | |
| • Research having direct military use | No |
| • Research having the potential for terrorist abuse | No |

# C Workforce Statistics

**3. Workforce statistics for the project: Please indicate in the table below the number of people who worked on the project (on a headcount basis).**

| **Type of Position** | **Number of Women** | **Number of Men** |
|---|---|---|
| Scientific Coordinator | | 1 |
| Work package leaders | 1 | 4 |
| Experienced researchers (i.e. PhD holders) | 9 | 9 |
| PhD Students | 3 | 2 |
| Other | 0 | 2 |

| | |
|---|---|
| **4. How many additional researchers (in companies and universities) were recruited specifically for this project?** | **15** |
| Of which, indicate the number of men: | 6 |

## D Gender Aspects

| | | | |
|---|---|---|---|
| **5.** | **Did you carry out specific Gender Equality Actions under the project**? | X<br>○ | Yes<br>No |

**6. Which of the following actions did you carry out and how effective were they?**

| | | Not at all effective | | | | Very effective |
|---|---|---|---|---|---|---|
| ❑ | Design and implement an equal opportunity policy | ○ | ○ | X | ○ | ○ |
| ❑ | Set targets to achieve a gender balance in the workforce | ○ | ○ | X | ○ | ○ |
| ❑ | Organise conferences and workshops on gender | X | ○ | ○ | ○ | ○ |
| ❑ | Actions to improve work-life balance | ○ | X | ○ | ○ | ○ |
| ○ | Other: | | | | | |

**7. Was there a gender dimension associated with the research content – i.e. wherever people were the focus of the research as, for example, consumers, users, patients or in trials, was the issue of gender considered and addressed?**

○ Yes- please specify

X No

## E Synergies with Science Education

**8. Did your project involve working with students and/or school pupils (e.g. open days, participation in science festivals and events, prizes/competitions or joint projects)?**

X Yes- please specify
Organizing short courses, workshops and seminars with participation of students. Improving the existing curricula at the targeted center.

○ No

**9. Did the project generate any science education material (e.g. kits, websites, explanatory booklets, DVDs)?**

○ Yes- please specify

X No

## F Interdisciplinarity

**10. Which disciplines (see list below) are involved in your project?**

○ Main discipline[11]: 1.4

○ Associated discipline[11]: 2.3 ○ Associated discipline[11]:

## G Engaging with Civil society and policy makers

| | | | |
|---|---|---|---|
| **11a** | **Did your project engage with societal actors beyond the research community?** *(if 'No', go to Question 14)* | X<br>○ | Yes<br>No |

**11b If yes, did you engage with citizens (citizens' panels / juries) or organised civil society (NGOs, patients' groups etc.)?**

○ No

○ Yes- in determining what research should be performed

○ Yes - in implementing the research

X Yes, in communicating /disseminating / using the results of the project

[11] Insert number from list below (Frascati Manual).

| | | |
|---|---|---|
| **11c In doing so, did your project involve actors whose role is mainly to organise the dialogue with citizens and organised civil society (e.g. professional mediator; communication company, science museums)?** | X<br>○ | Yes<br>No |

**12. Did you engage with government / public bodies or policy makers (including international organisations)**

- ○ No
- ○ Yes- in framing the research agenda
- ○ Yes - in implementing the research agenda
- X Yes, in communicating /disseminating / using the results of the project

**13a Will the project generate outputs (expertise or scientific advice) which could be used by policy makers?**

- X Yes – as a **primary** objective (please indicate areas below- multiple answers possible)
- ○ Yes – as a **secondary** objective (please indicate areas below - multiple answer possible)
- ○ No

**13b If Yes, in which fields?**

| | | | | | |
|---|---|---|---|---|---|
| Agriculture | | Energy | | Human rights | |
| Audiovisual and Media | | Enlargement | | Information Society | |
| Budget | | Enterprise | | Institutional affairs | |
| Competition | | **Environment** | | Internal Market | |
| Consumers | | External Relations | | Justice, freedom and security | |
| Culture | | External Trade | | Public Health | |
| Customs | | Fisheries and Maritime Affairs | | Regional Policy | |
| Development Economic and Monetary Affairs | | Food Safety | | Research and Innovation | |
| **Education, Training, Youth** | | Foreign and Security Policy | | Space | |
| Employment and Social Affairs | | Fraud | | Taxation | |
| | | Humanitarian aid | | Transport | |

**13c If Yes, at which level?**

- ○ Local / regional levels
- X National level
- ○ European level
- ○ International level

## H Use and dissemination

| | |
|---|---|
| **14. How many Articles were published/accepted for publication in peer-reviewed journals?** | **N/A** |
| **To how many of these is open access[12] provided?** | **N/A** |
| **How many of these are published in open access journals?** | **N/A** |
| **How many of these are published in open repositories?** | **N/A** |
| **To how many of these is open access not provided?** | **N/A** |
| **Please check all applicable reasons for not providing open access:** | **N/A** |
| ❑ publisher's licensing agreement would not permit publishing in a repository<br>❑ no suitable repository available<br>❑ no suitable open access journal available<br>❑ no funds available to publish in an open access journal<br>❑ lack of time and resources<br>❑ lack of information on open access<br>❑ other[13]: …… | **N/A** |

| | | |
|---|---|---|
| **15. How many new patent applications ('priority filings') have been made?** *("Technologically unique": multiple applications for the same invention in different jurisdictions should be counted as just one application of grant).* | | **N/A** |
| **16. Indicate how many of the following Intellectual Property Rights were applied for (give number in each box).** | Trademark | **N/A** |
| | Registered design | **N/A** |
| | Other | **N/A** |
| **17. How many spin-off companies were created / are planned as a direct result of the project?** | | |
| ***Indicate the approximate number of additional jobs in these companies:*** | | **2** |

**18. Please indicate whether your project has a potential impact on employment, in comparison with the situation before your project:**

| | | | |
|---|---|---|---|
| ❑ | Increase in employment, or | ❑ | In small & medium-sized enterprises |
| ❑ | Safeguard employment, or | ❑ | In large companies |
| ❑ | Decrease in employment, | X | None of the above / not relevant to the project |
| ❑ | Difficult to estimate / not possible to quantify | | |

| | |
|---|---|
| **19. For your project partnership please estimate the employment effect resulting directly from your participation in Full Time Equivalent (*FTE = one person working fulltime for a year*) jobs:** | *Indicate figure:* |

[12] Open Access is defined as free of charge access for anyone via Internet.
[13] For instance: classification for security project.

| | |
|---|---|
| Difficult to estimate / not possible to quantify | ❑ |

# I Media and Communication to the general public

**20. As part of the project, were any of the beneficiaries professionals in communication or media relations?**

○ Yes X No

**21. As part of the project, have any beneficiaries received professional media / communication training / advice to improve communication with the general public?**

○ Yes X No

**22 Which of the following have been used to communicate information about your project to the general public, or have resulted from your project?**

| | | | |
|---|---|---|---|
| ❑ | Press Release | ❑ | Coverage in specialist press |
| X | Media briefing | X | Coverage in general (non-specialist) press |
| X | TV coverage / report | X | Coverage in national press |
| X | Radio coverage / report | ❑ | Coverage in international press |
| X | Brochures /posters / flyers | X | Website for the general public / internet |
| ❑ | DVD /Film /Multimedia | X | Event targeting general public (festival, conference, exhibition, science café) |

**23 In which languages are the information products for the general public produced?**

| | | | |
|---|---|---|---|
| X | Language of the coordinator | X | English |
| ❑ | Other language(s) | | |

***Question F-10*:** Classification of Scientific Disciplines according to the Frascati Manual 2002 (Proposed Standard Practice for Surveys on Research and Experimental Development, OECD 2002):

**FIELDS OF SCIENCE AND TECHNOLOGY**

1. NATURAL SCIENCES

1.1 Mathematics and computer sciences [mathematics and other allied fields: computer sciences and other allied subjects (software development only; hardware development should be classified in the engineering fields)]

1.2 Physical sciences (astronomy and space sciences, physics and other allied subjects)

1.3 Chemical sciences (chemistry, other allied subjects)

1.4 Earth and related environmental sciences (geology, geophysics, mineralogy, physical geography and other geosciences, meteorology and other atmospheric sciences including climatic research, oceanography, vulcanology, palaeoecology, other allied sciences)

1.5 Biological sciences (biology, botany, bacteriology, microbiology, zoology, entomology, genetics, biochemistry, biophysics, other allied sciences, excluding clinical and veterinary sciences)

2 ENGINEERING AND TECHNOLOGY

2.1 Civil engineering (architecture engineering, building science and engineering, construction engineering, municipal and structural engineering and other allied subjects)

2.2 Electrical engineering, electronics [electrical engineering, electronics, communication engineering and systems, computer engineering (hardware only) and other allied subjects]

2.3. Other engineering sciences (such as chemical, aeronautical and space, mechanical, metallurgical and materials engineering, and their specialised subdivisions; forest products; applied sciences such as

geodesy, industrial chemistry, etc.; the science and technology of food production; specialised technologies of interdisciplinary fields, e.g. systems analysis, metallurgy, mining, textile technology and other applied subjects)

3. MEDICAL SCIENCES

3.1 Basic medicine (anatomy, cytology, physiology, genetics, pharmacy, pharmacology, toxicology, immunology and immunohaematology, clinical chemistry, clinical microbiology, pathology)

3.2 Clinical medicine (anaesthesiology, paediatrics, obstetrics and gynaecology, internal medicine, surgery, dentistry, neurology, psychiatry, radiology, therapeutics, otorhinolaryngology, ophthalmology)

3.3 Health sciences (public health services, social medicine, hygiene, nursing, epidemiology)

4. AGRICULTURAL SCIENCES

4.1 Agriculture, forestry, fisheries and allied sciences (agronomy, animal husbandry, fisheries, forestry, horticulture, other allied subjects)

4.2 Veterinary medicine

5. SOCIAL SCIENCES

5.1 Psychology

5.2 Economics

5.3 Educational sciences (education and training and other allied subjects)

5.4 Other social sciences [anthropology (social and cultural) and ethnology, demography, geography (human, economic and social), town and country planning, management, law, linguistics, political sciences, sociology, organisation and methods, miscellaneous social sciences and interdisciplinary , methodological and historical S1T activities relating to subjects in this group. Physical anthropology, physical geography and psychophysiology should normally be classified with the natural sciences].

6. HUMANITIES

6.1 History (history, prehistory and history, together with auxiliary historical disciplines such as archaeology, numismatics, palaeography, genealogy, etc.)

6.2 Languages and literature (ancient and modern)

6.3 Other humanities [philosophy (including the history of science and technology) arts, history of art, art criticism, painting, sculpture, musicology, dramatic art excluding artistic "research" of any kind, religion, theology, other fields and subjects pertaining to the humanities, methodological, historical and other S1T activities relating to the subjects in this group]