

Eurasia 2010-2014 - Seed Money/Limited Activities 2011 below 150 000 NOK - End Report

Project information

Project title Atmospheric-space weather system interaction in Arctic and mid-latitude regions
Project number CPEASMS-2011/10047
Type of project Seed Money

A - Information on the partnership

A.1 Norwegian partner

A.1.1 Norwegian institution (IiN)

University of Tromsø (NO-UoT)

A.1.2. Institutional legal representative/Head of unit

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A.1.3 Department/section

Proposing Department: Faculty of Science and Technology

A.1.4 Project coordinator

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A.2 Partner in cooperating country

A.2.1 Main partner institution outside Norway (IoN)

Institute of Radio Astronomy (UA)

A.2.2 Institutional legal representative

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A.2.3 Proposing department/faculty

Proposing
department/ Radio Physics of Geospace
faculty:

A.2.4 Project coordinator

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A.3 Partners involved in the project

A.3.1 Partner institutions involved in the project/cooperation

B - Plans for cooperation

During this year (2011) the following types of activity are proposed:

1. Fellowship of a Ukrainian PhD student at the University of Tromsø. The fellowship includes attending courses in Space Physics. The PhD student will take part in the field works within joint IRA-EISCAT measuring campaigns. The student will analyze the data collected during the campaigns. The activity related to the possibility of implementation of the physical models and the techniques to study atmosphere - space weather system interaction developed by IRA scientists at Norwegian observatories is also proposed.

2. A student from the Ukrainian institution will take part in the work of the International ISR workshop and the EISCAT radar school for students (July 2011, Greenland). The student will learn how to request, design and analyze ISR experiments and will have the opportunity to work one-on-one with experienced scientists. This knowledge will be extremely useful for implementation of the techniques designed in the IRA to the project-related areas.

B.1 Planned activities

3. Organization of the workshop on Polar ionospheric investigations and school within the workshop. The leading scientists from the University of Tromsø, Professor Cesar La Hoz and Professor Unni Pia Løvhaug will visit Ukraine and (in the school framework) give lectures on Plasma physics, Incoherent scatter radar technique and climate variability in Arctic region trends.

4. Visit of a Ukrainian research scientist (as a lecturer) to the University of Tromsø. The scientist will give the course of lectures on the techniques of diagnosing the ionosphere and studying the interaction of the atmospheric - space weather system in Antarctic and mid-latitude regions. Also the research scientist will take part in field works related with HF radio diagnostic of natural and heater induced ionospheric plasma irregularities. The visitor will participate in upgrading the HF receiving system installed by IRA on Svalbard and will install a new data acquisition system at the University of Tromsø. The data acquisition system will include a computerized HF receiver (of the same type as already installed on Svalbard, will be purchased for the Project funds), small-size HF antennas, a reference generator and software for remote control, data processing, transfer, and real-time visualization at a web page (will be the IRA input to the Project). Creation of the bipositional data acquisition system (Svalbard and Tromsø) will significantly improve the

efficiency of the HF radio diagnostics of the ionosphere in northern Norway. The receivers and web-interface will be used for organizing practical classes for students.

1. The fellowship of an Ukrainian PhD student, Olesia Charkina, at the University of Tromsø lasted from October 26 to November 25, 2011. During this time she attended a course in cosmic plasma physics. Between October 27 and November 2 Ms. Charkina took part in the preparation of a joint IRA-EISCAT measuring campaign. With support of Norwegian colleagues she studied the structure of UHF incoherent scatter radar system located close to the city of Tromsø. Also the visitor has learnt to operate the facility with assistance of EISCAT colleagues. On November 1 through November 3 Ms. Charkina participated in the heating experiment by controlling the UHF radar. Then she had training on the special data processing software for the EISCAT radar to be able to process and interpret the campaign observational data. As a result of active cooperation with Norwegian colleagues Olesia Charkina has obtained valuable knowledge and useful experience for her scientific work in IRA. She has gained information concerning the EISCAT facilities which would be useful for further collaboration between scientists from EISCAT Scientific Association and IRA NASU.

2. A PhD student from IRA, Oleksii Paznukhov, took part in the International Incoherent Scatter Radar workshop and the EISCAT radar school that was held 18 till 23 July 2011 in Kangerlussuaq, Greenland. This workshop was a result of collaboration between the annual AMISR summer school and the EISCAT radar school. He was taught how to request, design and analyze ISR experiments and worked one-on-one with experienced scientists from EISCAT scientific association. Mr. Paznukhov listened to a series of lectures about "Madrigal" database. In collaboration with other students he made a presentation "Observing the polar ionosphere using incoherent scatter radar". Upon returning home Oleksii Paznukhov has successfully used this knowledge to process ISR data recorded by EISCAT and Institute of Ionosphere incoherent radars

3. Organization of the workshop on Polar ionospheric investigations was not implemented due to some toughening of the educational activity in Ukrainian in 2011-2012. The reason for such compression of the curriculum schedule is Ukrainian authorities plan to use infrastructure of the higher education institutions for forthcoming Euro 2012 in Ukraine. We plan that two scientists from Norway will visit Ukraine in September-October 2012. They will give lectures on Plasma physics and Incoherent scatter radar technique. Also, they will take part in the conference "Electromagnetic methods of environmental studies" to be held September 25-27, 2012 in Kharkov, Ukraine.

4. From July 28 to August 12 2011 the Ukrainian project coordinator Oleksandr Koloskov visited University of Tromsø and University Center in Svalbard (UNIS). Before and during the visit he discussed scientific and technical details of the Project with the Norwegian Project Coordinator professor Asgeir Brekke and other members of administrative and technical staff of the University of Tromsø and UNIS. The preferable IRA input to joint Norway-Ukraine measuring campaigns with EISCAT, main aspects of scientific and educational collaboration between institutions, plans for future fellowships and fieldworks of Ukrainian representatives (in particular PhD student Olesia Charkina) were discussed as well. From 2-nd to 7-th of August 2011 Oleksandr Koloskov visited Svalbard (UNIS) for installation and field testing of a new high-frequency (HF) receiver purchased from the project budget and mounting of new antenna system (developed in Ukraine). During the visit an HF receiving facility of the same type was installed by Dr. Koloskov at the University of Tromsø. Both the facilities work in fully automatic mode. Remote control of the receivers, real-time data processing, transferring and visualizing are provided by a special software developed at IRA.

B.2 Actual activities

Activity not included in the initial plan:

From 2 to 12 of September, 2011 an Ukrainian research scientist Dr. Andrey Zalizovski took part in the 9-th EISCAT SOC Meeting at Qingdao (China). He presented a report "Brief on EISCAT activities in Ukraine" and discussed plans for further collaboration between IRA, EISCAT Association and University of Tromsø with EISCAT officers and Norwegian Project Coordinator professor Asgeir Brekke. Also he participated in 15-th EISCAT Workshop and made a presentation "HF Doppler diagnostics of artificial and natural ionospheric irregularities" on the results of processing the data collected by HF receivers in Tromsø and Svalbard that were installed and modified within the Project. From 26 to 30 of March, 2012 Ukrainian project coordinator has visited Tromsø and took part in the 10-th EISCAT SOC Meeting as an invited observer representing Ukraine. He gave a presentation of "Joint Geospace Research Program by the National Academy of Sciences of Ukraine and European Incoherent Scatter Scientific Association for 2012 – 2015" and discussed the perspective of further cooperation with representatives of the University of Tromsø and EISCAT. Also he has upgraded and tested the HF receiving facility at the University of Tromsø.

The close collaboration in the area of higher education has been established between the University of Tromsø and Institute of Radio Astronomy. It includes participation of an Ukrainian student Oleksii Paznukhov in the Scientific EISCAT radar school and the International Incoherent Scatter Radar workshop, training of PhD student Olesia Charkina in the University of Tromsø, field work of the research scientist Oleksandr Koloskov carried out in Tromsø and Svalbard concerning installation and testing of new facilities intended for scientific researches and education of the students. New experience gained by the Project participants is extremely important for the development of long-term cooperation of the institutions involved in the Project and sharing experience of Norwegian colleagues with Ukrainian party. In particular, upon returning to IRA Ukrainian students have successfully used knowledge of Incoherent scatter radar theory and data processing algorithms in their PhD research activity. Several seminars devoted to techniques of ISR data processing and training in the use of "Madrigal" database were organized in the department of Radio Physics of Geospace (Ukraine). Both the HF receiving facilities which were installed by Dr. Koloskov in Tromsø and Svalbard operate in the round-the-clock monitoring mode. They have collected data which characterize the conditions of near space environment in the Northern Scandinavia area. Special software developed by the Ukrainian party provides real-time presentation of this information in public available database at the web page <http://ri.kharkov.ua/geospace/en/data.html>. These data were used for both teaching the students with Doppler technique of ionospheric sounding and scientific researches during the joint IRA-EISCAT heating campaign carried out in November, 2011. The program for fellowship of Olesia Charkina in the University of Tromsø included usage of these data for ionosphere diagnostic during the November measurements. Also her fieldwork activity was connected with the control of EISCAT ISR radar during the campaign, collecting and processing the observational data. Another important result of the project is selection of Norwegian and Ukrainian scientific facilities (ionospheric riometers, magnetometers, permanent GPS station, meteorological stations etc.) suitable for implementation of new algorithms and software developed in IRA for the diagnostic of near Earth environment. These methods use standard data of already existing instruments for diagnostics of the atmospheric-space weather system. The perspectives of using information from both public available databases and data sets from unique equipment installed in IRA, Institute of Ionosphere (Ukraine) and University of Tromsø were analyzed. These techniques will be used both for educational and research purposes.

B.3 Results

B.4 Achievement of goals

The Project achieve its main goal to establish the cooperation in higher education between the University of Tromsø and Institute of Radio Astronomy in the area of "Atmospheric-space weather system interaction in Arctic and mid-latitude regions". This is an important subject for further developing the space weather concept and investigating the problem of global climate changes, as well as implementation of up to date knowledge and modern scientific concepts to the sphere of higher education. Also the institutions reached a mutual understanding of the capabilities of each of the parties how to increase the internationalization of higher education and share Norwegian experience from the Bologna reform to Ukrainian partner. When running the project Ukrainian students get training in Norway. They realized the fellowship program at the University of Tromsø and participated in the Scientific EISCAT radar school and International Incoherent Scatter Radar workshop. Field work of the student was connected with participation in real scientific measuring campaigns and operation with unique research facilities: Incoherent scatter radar, HF heater (EISCAT), computerized HF receivers (IRA). Analysis and interpretation of the data obtained during the campaign became the subject of the students PhD work. The results were presented at the international workshop and will be published in scientific journals. Within the current project set of internet controlled HF receiving facilities developed in IRA and located in Norway was significantly improved. Observational data are stored in the public available Internet database usable for both teaching of the students and scientific researches. Prospects of use for the educational purposes the internet published data sets from other research facilities of IRA, Institute of Ionosphere and EISCAT were also analyzed. All this results forms solid basis for further cooperation in educational and research area between the institutions involved in Project. The results and perspectives of this cooperation were discussed and approved during the visits of Ukrainian project coordinator to Norway and participation of IRA representative Dr. Zalizovski in 9-th EISCAT Scientific Oversight Committee Meeting (Qingdao, China, 2011).

B.5 Continued cooperation

The current Project has provided a sustainable development of cooperation between the Norwegian and Ukrainian parties in higher education area. Ukrainian students have had an opportunity to participate in international young scientist schools and workshops, attend lectures at the University of Tromsø and carry out their PhD work using active research facilities (incoherent scatter radar, EISCAT ionospheric HF Heater, autonomous HF receiving facilities, etc.). We plan also that two scientists from Norway will visit Ukraine in September-October 2012. They will give lectures on Plasma physics and participate in the conference "Electromagnetic methods of environmental studies". The current Project starts the development of methodologies; software and hardware, which will provide in the nearest future the usage of the data sets obtained by research facilities in Norway and Ukraine for organizing practical works with students. Participants of the Project in cooperation with the Institute of Ionosphere (Ukraine) plan to apply for a new joint network Project "Norwegian-Ukrainian cooperation aimed to sustainable development of the education process in geospace research". The scientific, academic and technical staffs of the Institute of Ionosphere have an invaluable experience of operation with unique incoherent scatter radar similar to Norwegian facilities located near Tromsø and at Svalbard. The method of incoherent scattering is the reference and the most informative solution for ionospheric sounding. Together with the original techniques of passive diagnostic of near-Earth environment, developed in IRA, they form a good basis for the development of theoretic courses and practical works, as well as new teaching methods and materials for students of all educational levels. It will provide the implementation of up to date knowledge and modern scientific theories to the sphere of higher education. The project will support training for the Ukrainian students in Norway, as well as participation of representatives of both countries in scientific schools and workshops. It is supposed to make Annual student and young scientist "Ionospheric" conference of the Institute of Ionosphere at Ukraine to be an international one, ensuring participation of lecturers and speakers from Norway and other countries. Training and exchange of administrative and technical staff of the institutions are also planned.

C - Accounts

C Budget and expenditure

NOK - Norwegian kroner	Budget 2011	Expenditure 2011	Expenditure 2012	Sum
Scholarships/fellowships				
Scholarships to Bachelor students	0	0	0	0
Scholarships to Master students	0	0	0	0
Fellowship grants to Ph.D students	43 040	37 491	0	37 491
SUM - Scholarships/fellowships	43 040	37 491	0	37 491
Institutional development				
Networking/conferences/seminars/workshops	25 260	20 915	0	20 915
Travel expenditure, partner in cooperating country (IoN)	34 360	28 266	0	28 266
Travel expenditure, partner in Norway (IiN)	38 720	0	0	0
Other operating costs/running costs (including gender-related activities)	8 600	30 756	0	30 756
SUM - Institutional development	106 940	79 937	0	79 937
Project administration				
Project administrative costs (max 7 percent of total budget)	0	0	0	0
SUM - Project administration	0	0	0	0
SUM - Total	149 980	117 428	0	117 428

C.2 Specification of budget

1. Fellowship of the Ukrainian PhD student in University of Tromsø (1 student, 4 months)

living expenditures and accommodation - 35040 NOK

travel - 8000 NOK

sum: 43040 NOK

The fellowship for Mrs. Olesia Charkina at the University of Tromsø will be from September to December 2011.

2. Networking/conferences/seminars/workshops (A student from the Ukrainian institution will take part in the work of the International ISR workshop and the EISCAT radar school. 1 student, 12 days)

living expenditures - 6960 NOK

accommodation - 9000 NOK

travel - 9300

sum: 25260 NOK

Oleksii Paznukhov will take part at the EISCAT radar school in Greenland from 16 till 25 of July 2011.

3. Travel expenditure, partner in cooperating country (IoN) (1 visitor, 17 days)

living expenditures - 9860 NOK

accommodation - 13500 NOK

travel - 11000 NOK

sum: 34360 NOK

Alexander Koloskov will visit to Tromsø and Svalbard in the period July 27 – August 13.

4. Travel expenditure, partner in Norway (IiN) (2 visitors, 7 days)

living expenditures - 9520 NOK

accommodation - 11200 NOK

travel - 18000 NOK

sum: 38720 NOK

The workshop in Ukraine will be arranged in October 2011.

5. Other operating costs/running costs (necessary equipment for doing field work) 8600 NOK

6. The project is expected to be terminated by April 1. 2012

C.3 Specification of expenditure

1. Fellowship grants to Ph.D students

The fellowship for Mrs. Olesia Charkina (Ph.D. student from the Institute of Radio Astronomy) at the University of Tromsø lasted from October 26 to November 25, 2012.

Leaving expenses, accommodation – 31 707 NOK

travel -5784 NOK

sum of expenditures: 37 491 NOK

2. Networking/conferences/seminars/workshops

A student from the Ukrainian institution Mr. Oleksii Paznukhov took part in the work of the International ISR workshop and the EISCAT radar school in Greenland from 18 till 23 of July 2011

Sum of expenditures: 20 915 NOK

3. Travel expenditure, partner in cooperating country (IoN)

Dr. Oleksandr Koloskov visited Tromsø and Svalbard in the period July 28 – August 12

Sum of expenditures: 28 266NOK

4. Travel expenditure, partner in Norway (IiN)

2 visitors, 7 days

Not performed

5. Other operating costs/running costs:

necessary equipment for doing field work: WinRadio G-313i HF receiver

Sum of expenditures: 13 064 NOK

6. From 2 to 12 of September, 2011 an Ukrainian research scientist Dr. Andrey Zalizovski took part in the 9-th EISCAT SOC Meeting at Qingdao (China). Also he participated in 15-th EISCAT Workshop.

Sum of expenditures: 17 692,39 NOK (reported as other operating costs)