EXCELLENCE IN TRAINING AND KNOWLEDGE TRANSFER

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EDUCATIONAL AND KNOWLEDGE TRANSFER GOAL

The shift from discipline-tied fundamental education towards multidisciplinarity is imperative for a successful career in climate and global change science. Therefore, the Center of Excellence has adopted the education of the next generation of scientists in a truly multidisciplinary way of thinking as the chief educational and knowledge transfer goal. The Center of Excellence has also recognized the research career as a whole, ranging from master-level studies to postdoctoral researcher level.

TRAINING PROGRAMMES AND RELATED PROJECTS

Within the Center of Excellence, education and knowledge transfer have been given a special emphasis. Following the CBACCI Education Structure (CBACCI, 2003), determined work has been carried out to develop the multidisciplinary training on all levels (master students, doctoral students, postdoctoral scientists, professors). The following training programmes have been initiated:

- Master’s Degree Programme in Atmosphere-Biosphere Studies: started in 2006, coordinated by University of Helsinki, 10 university partners in Finland, Sweden, Denmark and Estonia
- Nordic Graduate School CBACCI (Biosphere-Carbon-Aerosol-Cloud-Climate Interactions): started in 2003, coordinated by University of Helsinki, 14 partners (10 universities, 4 research institutes)
- National Graduate School in Physics, Chemistry, Biology and Meteorology of Atmospheric Composition and Climate Change: functioned 2006-2009, coordinated by University of Helsinki, 6 partners (3 universities, 2 research institutes, 1 private enterprise)
- National Graduate School in Atmospheric Composition and Climate Change: From Molecular Processes to Global Observations and Models: started in 2010, coordinated by University of Helsinki, 10 partners (4 universities, 3 research institutes, 3 private enterprises)
- Marie Curie Initial Training Network CLOUD-ITN: started in 2008, coordinated by Goethe-University Frankfurt, 8 partners (4 universities, 3 research institutes, 1 private enterprise)

The Center of Excellence is also coordinating and participating in several international projects devoted partially or totally to education development and knowledge transfer, e.g.:

- Integrated Land Ecosystem Atmosphere Processes Study (iLEAPS)
- European Supersites for Atmospheric Aerosol Research (EUSAAR)
- Nordic-Baltic BACCI Network (Biosphere-Aerosol-Cloud-Climate Interactions)
- Nordic-Russian University Network for Successful Cooperation in Higher Environmental Education
- Nordic-Russian Virtual University Campus for Environmental Education
- NordForsk Training Courses

Furthermore, the Center of Excellence has been active in proposing new multidisciplinary programmes on its research areas both in master and doctoral level. Recently, the Center of Excellence units have proposed one Marie Curie Initial Training Network and one Erasmus Mundus Joint Doctorate Programme:

- Marie Curie ITN iLEAPS-CC (International Integrated Land Ecosystem-Atmosphere Processes Study on Climate Change)
- Erasmus Mundus Joint Doctorate Programme AACC (Atmospheric Aerosols and Climate Change)
ACTIVITIES WITHIN THE PROGRAMMES

Within each training programme and educational project, the specific activities include:
- multidisciplinary research training courses;
- inter-university and -institute supervision;
- student, teacher and senior scientist mobility;
- students’ participation in domestic and international conferences, symposia and workshops;
- teacher workshops;
- use and development of new education technologies;
- training in transferable skills.

Research training courses are typically organized jointly, either as one- or two-week intensive courses, usually in one of the measurement stations, or as e-learning. During the first three years of the current Center of Excellence funding period the total number of joint intensive courses has been 18. The training on the intensive courses includes scientific and technological knowledge, transferable skills and public outreach. These courses combine core and transferable skills, always ensuring that these skills are learned actively and kept fully relevant to the students’ own research. The topics of these courses have included e.g. data analysis, model-data assimilation, formation and growth of atmospheric aerosols, organic aerosols, cloud microphysics, and atmosphere-biosphere exchange. The transferable skills included in the education have included working in the field, atmospheric instrument technology, data analysis, computer modelling, writing articles, presentation skills, project management, writing proposals, and commercialization of scientific ideas.

The forms of working during intensive courses include lectures, exercise sessions, seminars, discussion sessions, field work as well as social activities. Very often the emphasis has been on intensive work in small student groups. The experiences on the courses have been very encouraging, both from the teachers’ and students’ points of view. The success of the intensive courses organized by the Center of Excellence is reflected by the fact that the number of applicants to the courses has constantly grown.

In 2008-2010, the total number of e-learning courses within the Center of Excellence has been 10. On e-learning courses, new education technologies have been adopted and developed. Smart-SMEAR (Junninen et al., 2009) is an excellent example of new technologies developed to facilitate multidisciplinary training.

The student and senior scientist mobility in the Center of Excellence is carried out on three different levels:
- between the universities and research institutes;
- between scientific fields (ecology-physics-chemistry-meteorology);
- between the academia and the private sector.

Currently there exist over 40 PhD students within the Center of Excellence having supervisors from at least two participating units. The experience on inter-institution supervision has been extremely positive, providing the students with a broader view on the research problems they are working with.

On the senior scientist level, workshops for teachers and supervisors have been hosted by the Center of Excellence annually. The two-day workshop has always included two parts: training for teachers and discussions educational co-operation and education development. The participating lecturers and supervisors have been trained on teaching, communication and supervising skills, including web-based teaching.

Concerning education and knowledge transfer, special attention has been paid to the transfer of good practices within the Center of Excellence. The joint events, especially the annual workshop for teachers and supervisors, have usually included discussions and evaluation of the practices of the partners.
ACKNOWLEDGEMENTS

The funding from the Ministry of Education is gratefully acknowledged. The Graduate School activities have also been supported by the Academy of Finland (projects No. 118780 and 129663). The work has been supported also by the Academy of Finland Center of Excellence program (project number 1118615).

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