

Evaluation of the Research and Professional Activity of the Institutes of the Czech Academy of Sciences (CAS) for the period 2010–2014

Final Report on the Evaluation of the Institute

Name of the Institute: Global *Change Research Centre of the CAS, v. v. i., Brno*

Fields, in which the Institute registered its teams:

Biological sciences including biotechnology and agricultural sciences

Observer representing the Academy Council of the CAS: Vladimír Mareček

Observer representing the Institute: Zdeněk Žalud, substitute observer Karel Klem

Commission No. 7: Biological sciences including biotechnology and agricultural sciences

Chair: Emeritus Professor Erick Vandamme

Date(s) of the visit of the Institute: November 2 - November 11, 2015

Programme of the visit of the Institute: see attached Minutes from the visit

Evaluated research teams:

No. 3 - *Division of impact studies and physiological analyses*; **No. 7** - *Division of innovation and adaptation techniques*

A. Evaluation of the Institute as a whole

1. Introduction

This institute as a whole can be evaluated as performing quite well; as a young centre, it will take an ongoing effort to reach top level. Suggestions are given below per team. The Global Change Research Centre of the CAS consists of two autonomous institutes: CzechGlobe in Brno and the Institute of Nanobiology and structural biology (INSB) in Nove Hradky. Research activities are spread over five divisions: 1) climate analysis and modelling, 2) ecosystem analysis, 3) impact studies and physiological analyses, 4) human dimensions of global change impacts, and 5) innovation and adaptation techniques. Division 3 and 5 are now assessed. As operating sectors, they have five departments: 1) Economic department, 2) Technical support department, 3) Department of project management, 4) Department of information technologies, and 5) Department of aircraft operation. In addition, there are two scientific secretarial offices and five centres for the management. They address global and local atmospheric and climate changes. They tackle these issues by studying from micro to nano-scale with state-of-art facilities. It is a new centre that was started building in 2010 and was finished end of 2014.

2. Strengths and opportunities

They employ international scientists , covering 19 nationalities. Installation of state-of-art facilities, which are funded by several grants, is still ongoing.

3. Weakness and threats

The centre is mainly staffed with young researchers with limited international experience and context, and collaboration is mainly based on international readership, and representatives from all society levels, including farmers representatives .

4. Recommendations

Keep the overall quality further improving .

5. Detailed evaluations

Declaration of quality of the results and share in their acquisition

Their results appear not only in ecology-related journals but also in top-ranked journals such as PNAS.

Declaration on the involvement of students in research

The centre is composed mainly of young researchers. Students are integrated in the project and play an important role in the research. Ph. D students are employed at GCRC.

Declaration on societal relevance

There are lots of demands on their unique imaging system that are aimed for the precise monitoring and investigation of terrestrial ecosystems. They launched airborne carrying scanners and imaging spectroscopy and developed the platform for post-processing data obtained from airborne studies . The system is applied for the assessment of biochemical properties of forests and cultivated fields. Their activities are reported in different media (TV, radio, video presentation, newspaper, magazines). The Centre organizes various pedagogical activities such as summer schools, workshops, trainings, exhibitions, and so on.

Declaration on the position in the international and national context

The Centre collaborates with national and international universities and their outcome meets international standards.

Declaration on the vitality and sustainability

Sustainability of the centre is guaranteed as it is equipped with unique and state of art facilities.

Declaration on the strategy and plans for the future

The Centre is confronted with employment issues , diversity of nationalities, age distribution, and gender issues of their human resources to pursue interdisciplinary research.

B. Evaluation of the individual teams

Evaluation of the Team No. 3: Division of impact studies and physiological analyses

1. Introduction

Dr. Urban presented his group and stated the mission: “To investigate molecular and physiological mechanisms that are responsible for adaptation and acclimatisation and resistance of plants to perturbations”. The group intends to integrate studies over temporal scales (days, seasons) and spatial scales (individual leaves to ecosystems). At the heart of this are studies on plant photosynthesis and metabolism. There is a very healthy, young, vigorous group profile, which has been built over the last 3 years. There are 28 researchers, 16 below 40 years old, running 11 projects; 3 are international projects, 6 projects are funded by CR agency. There are absolutely fabulous facilities. These facilities include state of the art analytical instruments, smart growth chambers (phytotrons), glasshouses, field equipment, aerial analytical equipment and more. The research has potential to be world leading.

2. Strengths and Opportunities

This group has amazing resources; there is a really excellent underpinning vision for the institute, and the staff members are well placed to be world leaders in climate change. If they achieve that status, scientists from around the world will come here, to exploit the skills and facilities.

3. Weaknesses and Threats

Our main worry is that the groups do not integrate effectively enough to ensure synergy of activity (see below). It will not take advantage of the infrastructure if the groups are successful, but remain independent. The group may well lack underpinning in house man-power and know-how (technical support) to run all the facilities at full capacity.

4. Recommendations

The staff should be publishing in much higher IF journals; we are confident that this will happen in the near future. We recommend that the staff should not be distracted on activities that are not on focus to their own mission. For example, finding that lignin extracts are an anti-cancer agent might generate an income and can be useful, but it is a distraction from the research success and the mission.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

There are some good papers submitted, the best being a paper in New Phytologist. There are also a lot published in Czech Journals, in Czech, which have low impact and are not useful outside of the Czech Republic. We expect the paper profile to rise. There is also some activity generating patents and in spin-off products.

Declaration on the involvement of students in research

3 PhD students were awarded post-doc stipends from CAS. Students are also involved in teaching. Staff are also running workshops for PhD students and ESRs.

Declaration of societal relevance

There is clear societal relevance in an area of global concern, impacting the economies of countries all around the world.

Declaration on the position in the international and national context

There is extremely high potential for this group to place itself to a top international lead position.

Declaration on the vitality and sustainability

Staff have organised an international conference - 2nd Annual Meeting of UV4Growth COST Action, from which papers were published in a journal special issue. More of this work is needed. Such activities will elevate the profile of the institute. The numbers of young staff means that the future looks very rosy. The equipment base is absolutely superb, the envy of many labs.

Declaration on the strategy and plans for the future

The institute should have ambition to be global leaders in climate change, not just good in the Czech Republic. To achieve that the teams need to collaborate more closely, and also with internationally reputed institutes. The experiments should be designed to exploit approaches from the small to macro-scale, integrating approaches, systems, mathematical modelling in coordinated experiments. This will give even more synergy that the institute can exploit also internationally. The Centre has a clear line of responsibility, starting with the Czech Globe project, and has been proven to be long term productive and has been positively evaluated by various national and international external assessments. This structure has contributed to the successful implementation of research projects and such as CzeCOS, CzechGlobe 2020, ESFRI –projects, ...)

Evaluation of the Team No. 7: Division of innovation and adaptation techniques

1. Introduction

The division of Innovation and Adaptation Techniques is, like the Centre, a young unit, expanding from four scientists in 2010 to eleven in 2014. It has broad but defined and contemporary research mission and research goals, ranging from systems biology, through remote sensing, to algal germplasm characterization and imaging. Overall, the goals should lead to a system level approach to studying ecosystems. Much of the recent period has been spent building research infrastructure and reconstruction

2. Strengths and Opportunities

Quality and range of equipment is excellent and well-targeted for the questions being addressed. The research area is of major international importance. The work is underpinning our understanding of the place of plants in the environment, and is establishing datasets and techniques that will be valuable for future millennia, with an important global dimension to the vision given by the research group leader. The group is part of a number of important European and international networks, but within this has a niche with remote sensing, recognized internationally as an

important area, and complementing other monitoring approaches. A clear strength it that the group has recognized the needs for "stimulating student international collaborations and students' involvement in research" (we agree and point these out also as a weakness and threat).

3. Weaknesses and Threats

The team is young, and may not have the European and global contacts that are helpful to develop collaborations and help the researchers mature ideas that will lead to high-profile presentations and publications. There was a limited number of students, although this is understandable given the increase in size recently. It is important that the equipment in place is exploited fully, since much will become outdated. It is also important that there is substantial support for maintenance and to subsidize running costs (for lab equipment and the Cessna Caravan) so that they can be used to the full. There is a need for continuity of funding for strategic and underpinning research - making continuous measurements over decades etc., and that funding does not drop precipitously (particularly if there is no realistic opportunity for replacement with grants), at the end of the current period.

4. Recommendations

They need to prioritize scientific output, collaborations, and grant-writing, having completed the period of building, staffing and equipping – this will be a significant change in the outlook and day-to-day work of many of the staff. They must secure funds for equipment maintenance. The group should now exploit the equipment in place extensively (and not acquire additional infrastructure, where needed this should come through collaborations). Strong international advisory board would be very valuable with senior researchers from Europe and rest-of-world, including non-academic membership (certainly from relevant companies, but also maybe retired politicians, journalists, charitable foundation, farmers, food company, pharma/Proctor & Gamble/Unilever) would be helpful, both to give guidance on questions being asked, and also to help dissemination of knowledge about the research group and its capabilities.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

There are some excellent publications, particularly given both the age of scientists and what has obviously been huge efforts dedicated to equipment and recruitment. Now the volume of publications - not necessarily in generalist journals - should be increased.

Declaration on the involvement of students in research.

They have recognized the need for increased student participation. Having grown from a University Department, this should be a priority, and also there should be opportunities, ideally with stipend support funding, for longer and shorter students - both international and national. The group needs to initiate and join networks of researchers (including those like COST/ESF which will fund short-term visiting fellowships). It needs to gain a high profile at international conferences and through review articles.

Declaration on societal relevance

The group's work is critical to underpin understanding of climate and the environment in Czech Republic, Europe and the world. As such, it has and needs to continue with a high media and public profile, as well as outreach to schools etc. Opportunities for exploitation and selling of data should be considered: there is much interest in buying data from remote sensing.

Declaration on the position in the international and national context

The young group has huge potential to gain a major position in these contexts. It is important that all efforts are made to join major consortia, collaborate very widely, be open with results and techniques, support databases.

Declaration on the vitality and sustainability

The vitality was well covered in the PowerPoint slides distributed at the meeting. We affirm these objectives, including international ambitions, industrial partnerships, exploiting their equipment and techniques, and the expansion of teaching at all levels (Bachelor, Masters, PhD) throughout Europe.

Declaration on the strategy and plans for the future

They have both short and long-term objectives which are clearly seen. The need for international advice and collaborations is critical to achieving many of these, and to place CzechGlobe among the top institutes in the world. There are huge applications to forestry, agriculture and urban systems, and this in combination with modelling (systems and in silico), genomics/genetics/breeding, exploiting observations and long-term data-sets, should place this group among the world leaders. Some structuring and prioritizing, through grant applications and available people, would be helpful to achieve short term and long-term goals. They need to have many smaller questions to address with individual projects, to establish and gain focus.

Date: December 15, 2015

Commission Chair: Emeritus Professor Erick Vandamme