HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL
TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

RC-Specific Evaluation of GIMMEC – GeoInformatics for Monitoring and Modelling of Environmental Change

Seppo Saari & Antti Moilanen (Eds.)

Evaluation Panel: Natural Sciences

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Title:
International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of GIMMEC – GeoInformatics for Monitoring and Modelling of Environmental Change

Type of publication:
Evaluations

Summary:
Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate.
Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs.
Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report.
Chapters in the report:
1. Background for the evaluation
2. Evaluation feedback for the Researcher Community
3. List of publications
4. List of activities
5. Bibliometric analyses
The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.

RC-specific information:

Main scientific field of research:
Natural Sciences

RC-specific keywords:
environmental change, climate change, remote sensing, geoinformatics, modelling, biogeography

Participation category:
2. Research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through

RC's responsible person:
Pellikka, Petri

Keywords:
Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community

Contents

Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (PIs). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the "bottom up" and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which lead to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs' answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.

On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation

Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair

Vice-Rector, professor **Johanna Björkroth**

Vice-Chair

Professor **Marja Airaksinen**

Chief Information Specialist, Dr **Maria Forsman**
Professor **Arto Mustajoki**
University Lecturer, Dr **Kirsi Pyhältö**
Director of Strategic Planning and Development, Dr **Ossi Tuomi**
Doctoral candidate, MSocSc **Jussi Vauhkonen**

Panel members

CHAIR
Professor Jan-Otto Carlsson
Materials science in chemistry and physics, nanotechnology, inorganic chemistry
Uppsala University, Sweden

VICE-CHAIR
Professor Jan van Leeuwen
Computer science, information technology
University of Utrecht, the Netherlands

Professor Caitlin Buck
Probability and statistics, archeology, palaeoenvironmental science
University of Sheffield, Great Britain

Professor David Colton
Mathematics, inverse problems of acoustic and electromagnetic scattering
University of Delaware, USA

Professor Jean-Pierre Eckmann
Mathematics, dynamical systems, mathematical physics
University of Geneva, Switzerland

Professor Ritske Huismans
Geosciences, geodynamics
University of Bergen, Norway

Professor Jukka Jurvelin
Medical physics and engineering
University of Eastern Finland

Professor Lea Kauppi
Environmental sciences, water research
The Finnish Environment Institute, Finland

Professor Riitta Keiski
Chemical engineering, heterogeneous catalysis, environmental technology, mass and heat transfer processes
University of Oulu, Finland

Professor Mats Larsson
Experimental molecular physics, chemical dynamics, molecular spectroscopy, astrobiology
Stockholm University, Sweden

Professor Holger Stark
Medicinal, organic and pharmaceutical chemistry, pharmacology
Johann Wolfgang Goethe Universität, Germany

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by the members from the other panels.

Experts from the Other Panels
Professor Barbara Koch, from the Panel of Biological, Agricultural and Veterinary Sciences
Professor Peter York, from the Panel of Medicine, Biomedicine and Health Sciences

EVALUATION OFFICE
Dr Seppo Saari, Doc., Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, Doc., Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Moilanen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE
Provision of the publication and other scientific activity data
Mrs Aija Kaitera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebom, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY
Provision of the publication analyses
Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.

Acronyms and abbreviations applied in the report

External competitive funding
AF – Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks
Outstanding (5)
Excellent   (4)
Very Good   (3)
Good   (2)
Sufficient   (1)

Abbreviations of Bibliometric Indicators
P - Number of publications
TCS – Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS – Thomson Reuters Web of Science Databases

Participation category
Category 1. The research of the participating community represents the international cutting edge in its field.
Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.
Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.
Category 4. The research of the participating community represents an innovative opening.
Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki
Focus area 1: The basic structure, materials and natural resources of the physical world
Focus area 2: The basic structure of life
Focus area 3: The changing environment – clean water
Focus area 4: The thinking and learning human being
Focus area 5: Welfare and safety
Focus area 6: Clinical research
Focus area 7: Precise reasoning
Focus area 8: Language and culture
Focus area 9: Social justice
Focus area 10: Globalisation and social change

1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation[1] and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University's strategic policies. The improvement of doctoral training should be compared to the University's policy.[2]
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University's research potential.
- to exploit the University's TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

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[1] The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.

[2] Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.

The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

Five stages of the evaluation method were:
1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT[3] compilations on publications and other scientific activities[4]
4. External evaluation
5. Public reporting

1.4 Implementation of the external evaluation

Five Evaluation Panels

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:
1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:
- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

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[3] TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

[4] Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.

1.5 Evaluation material

The main material in the evaluation was the RCs' self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material
1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
   3.1. statistics of publications
   3.2. list of publications
   3.3. statistics of other scientific activities
   3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
   4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
   4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki
- Basic information about the University of the Helsinki
- The structure of doctoral training at the University of Helsinki
- Previous evaluations of research at the University of Helsinki – links to the reports: 1998 and 2005

The Finnish Universities/Research Institutes
- Finnish University system
- Evaluation of the Finnish National Innovation System
- The State and Quality of Scientific Research in Finland. Publication of the Academy of Finland 9/09.

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.

1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the **additional material** as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. Focus and quality of the RC's research
- Description of
  - the RC's research focus.
  - the quality of the RC's research (incl. key research questions and results)
  - the scientific significance of the RC's research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC's research

The additional material: TUHAT compilation of the RC's publications, analysis of the RC's publications data (provided by University of Leiden and the Helsinki University Library)
A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. Practises and quality of doctoral training
- Organising of the doctoral training in the RC. Description of the RC's principles for:
  - recruitment and selection of doctoral candidates
  - supervision of doctoral candidates
  - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
  - good practises and quality assurance in doctoral training
  - assuring of good career perspectives for the doctoral candidates/fresh doctorates
- Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations
A written feedback from the aspects of: processes and good practices related to leadership and management
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. The societal impact of research and doctoral training
- Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
- Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.

The additional material: TUHAT compilation of the RC's other scientific activities.
A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

4. International and national (incl. intersectoral) research collaboration and researcher mobility
- Description of
  - the RC's research collaborations and joint doctoral training activities
  - how the RC has promoted researcher mobility
- Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. Operational conditions
- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management
- Strengths
- Areas of development
- Other remarks
- Recommendations

6. Leadership and management in the researcher community
- Description of
  - the execution and processes of leadership in the RC
  - how the management-related responsibilities and roles are distributed in the RC
  - how the leadership- and management-related processes support
    - high quality research
    - collaboration between principal investigators and other researchers in the RC the RC's research focus
    - strengthening of the RC's know-how
- Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. External competitive funding of the RC
- The RCs were asked to provide information of such external competitive funding, where:
  - the funding decisions have been made during 1.1.2005-31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:

1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation , EU, ERC, foundations, other national funding organisations, other international funding organisations), and

2)The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.
A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance
- Strengths
- Areas of development
- Other remarks
- Recommendations

8. The RC's strategic action plan for 2011–2013
- RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance
- Strengths
- Areas of development

- ▪ Other remarks
- ▪ Recommendations

9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category
A written feedback evaluating the RC's fitness to the chosen participation category
- ▪ Strengths
- ▪ Areas of development
- ▪ Other remarks
- ▪ Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material
Comments on the compilation of evaluation material

11. How the UH's focus areas are presented in the RC's research?
Comments if applicable

12. RC-specific main recommendations based on the previous questions 1–11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:

- ▪ outstanding (5)
- ▪ excellent (4)
- ▪ very good (3)
- ▪ good (2)
- ▪ sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, 'criteria'). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC'S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)
Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of "international attention" or "international impact" etc. in the grading criteria above may be replaced by "international comparability".

Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

Excellent quality of procedures and results (4)

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

Very good quality of procedures and results (3)

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 2 – DOCTORAL TRAINING
Question 3 – SOCIETAL IMPACT
Question 4 – COLLABORATION

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

Excellent quality of procedures and results (4)

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

Very good quality of procedures and results (3)

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and

management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Procedures are of good quality, shared occasionally in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

Procedures are of sufficient quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 9 – CATEGORY

Participation category – fitness for the category chosen

The choice and justification for the chosen category below should be reflected in the RC's responses to the evaluation questions 1–8.

1. *The research of the participating community represents the international cutting edge in its field.*
2. *The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.*
3. *The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.* The research is of high quality and has great significance and impact in its field. However, the generally used research evaluation methods do not necessarily shed sufficient light on the merits of the research.
4. *The research of the participating community represents an innovative opening.* A new opening can be an innovative combination of research fields, or it can be proven to have a special social, national or international demand or other significance. Even if the researcher community in its present composition has yet to obtain proof of international success, its members can produce convincing evidence of the high level of their previous research.
5. *The research of the participating community has a highly significant societal impact.* The participating researcher community is able to justify the high social significance of its research. The research may relate to national legislation, media visibility or participation in social debate, or other activities promoting social development and human welfare. In addition to having societal impact, the research must be of a high standard.

An example of outstanding fitness for category choice (5) [5]

The RC's representation and argumentation for the chosen category were convincing. The RC recognized its real capacity and apparent outcomes in a wider context to the research communities. The specific character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the category.

- Outstanding   (5)
- Excellent   (4)
- Very good   (3)
- Good   (2)
- Sufficient   (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in the positioning of the classification. There was no exact definition for the category fitness.

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[5] The panels discussed the category fitness and made the final conclusions of the interpretation of it.

1.8 Timetable of the evaluation

The main timetable of the evaluation:
1. Registration   November 2010
2. Submission of self-evaluation materials   January–February 2011
3. External peer review   May–September 2011
4. Published reports   March–April 2012
   - University level public report
   - RC specific reports

The entire evaluation was implemented during the university's strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.

2 Evaluation feedback

2.1 Focus and quality of the RC's research

- *Description of*
  - *the RC's research focus*
  - *the quality of the RC's research (incl. key research questions and results)*
  - *the scientific significance of the RC's research in the research field(s)*
- *Identification of the ways to strengthen the focus and improve the quality of the RC's research*

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness

While climate change is recognized as the grand challenge to the mankind and major research efforts have been and are being devoted to it, land cover change has received much less attention. However, it may be even a more serious threat for global ecology, safety and sustainability. GIMMEC combines research on climate change, land cover change, biodiversity and ecosystem services.

GIMMEC seeks through the combined effort to create an interdisciplinary and multidisciplinary RC with specialists in physical geography, remote sensing, forest science, environmental sciences and geospatial monitoring. The aim of GIMMEC is to achieve an international break-through and recognition in applying remote sensing and geoinformatics in climate change impacts studies on land cover and especially on vegetation. The common nominator of the RC is the methodology. Geoinformatics has gained more and more importance within the last years and it is to be expected that this trend continues in the future. Modelling is one key tool for all kind of environmental analysis and so is remote sensing for obtaining geospatial data.

GIMMEC aims at producing: 1) Enhanced methods for radiative transfer modeling in vegetation and for remote sensing data applications for land cover change assessment, 2) Enhanced methods for mapping, monitoring and modeling current and future land cover and biodiversity patterns in different environments under global change, 3) Increase in the quality and quantity of land cover (change) information for climate change, water resources, livelihoods and land use studies, 4) A thorough understanding of the main drivers of land cover change and biodiversity at different spatial scales and in different environments.

The results will provide benefits for monitoring of the environment, especially by outlining means to improve the spatial quality of land cover and biodiversity information and the accuracy of global change impact models. The technical and applied innovation of the work is in the development of new methods applicable for rapid and cost-efficient environmental impact assessments under global change. Of particular importance in GIMMEC is also the ability to create geospatial databases for wider use among research community and public organizations and users.

GIMMEC puts together researchers from Geoinformatics Research Group led by Prof. Pellikka (geoinformatics) of the Faculty of Science, the 'LAI detectives' group led by Prof. Stenberg (forest mensuration) from the Faculty of Agriculture and Forestry, the biologically and environmentally oriented group led by Dr. Virtanen and ecological modeling group led by Prof. Luoto (physical geography) linking the Faculty of Science and the Faculty of Biological and Environmental Sciences. The combination of the different disciplines provides a good basis for an integrative, innovative, future oriented research in environmental sciences.

All 4 teams within GIMMEC represent the international cutting edge in their respective fields, as evidenced by the bibliometric information provided to us. The h-index of some researchers is remarkably high, but the group as a whole has received a good publication rate. However, the bibliometrics also shows that it is a challenge to maintain the high standard continuously.

The remote sensing expertise of GIMMEC is well known within Europe and the RC belongs in this area to one of the leading research units. However, as GIMMEC states, in its proposed multidisciplinary composition the RC has not yet received an international break-through. GIMMEC will apply new data

types (hyperspectral and multiangular remote sensing data) for which the international break-through has not been possible yet.

GIMMEC is a very relevant and important initiative. Land use changes can have far reaching consequences on biodiversity and ecosystem services, like water and food safety. Based on the records of individual groups forming GIMMEC, it is to be expected that, if successful, also their integrated efforts will produce internationally cutting edge results.

GIMMEC has correctly identified the strengthening of its internal collaboration as a challenge. It can be tackled through better identification of synergies and different researcher roles within the group. Also the other challenge identified - recruitment of complementary expertise or collaboration with other research communities e.g. from the field of ecology, climatology and humanities – is very relevant. Well targeted recruitments would strengthen the holistic approach to land cover change and biodiversity problematics. However, when GIMMEC gets bigger it is more difficult to keep the group focused to innovative developments in certain research areas.

Numeric evaluation: 4.5 (Excellent)

2.2 Practises and quality of doctoral training

- *Organising of the doctoral training in the RC. Description of the RC's principles for:*
    - *recruitment and selection of doctoral candidates*
    - *supervision of doctoral candidates*
    - *collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes*
    - *good practises and quality assurance in doctoral training*
    - *assuring of good career perspectives for the doctoral candidates/fresh doctorates*
- *Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.*
- *Additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations*

ASPECTS: Processes and good practices related to leadership and management

The selection of doctoral students is based on the study plan, potential previous publications, comments from the supervisors and grades from the graduate level studies. Funding is most often provided by research project funding or graduate schools. The research plan is evaluated and commented by the GIMMEC board.

The supervision is arranged within the three departments and faculties involved in GIMMEC, but supported by co-supervision also from a third party, e.g. researchers from other universities, or governmental research institutes to ensure the best possible multidisciplinary supervision.

As GIMMEC is formed from three faculties it is inherently based on inter-disciplinary collaboration between the Dept. of Geosciences and Geography (Faculty of Science), the Dept. of Forest Sciences (Faculty of Agriculture and Forestry) and the Dept. of Environmental Sciences (Faculty of Biological and Environmental Sciences). Doctoral students of GIMMEC are also often working in governmental research institutes building links between university and research organizations. It is also possible to build up graduate schools or doctoral programmes on environmental change between university departments and research institutes. International cooperation is tight with several research institutions providing students good opportunities for exchange and they are encouraged to spend periods abroad already during their doctoral studies.

The quality of doctoral training is assured by the motivated multidisciplinary supervisors, careful selection of doctoral students and a good study programme with doctoral courses, including special courses in the field of environmental change, geographic information systems and remote sensing.

The role of GIMMEC in educating doctoral students in environmental related geoinformatics is central, since the demand for these experts is increasing. The future career percpectives are indeed very good.

Overall, doctoral training is well organized, although a more systematic arrangement, a graduate school or doctoral programme on this specific field would even better guarantee good training for every doctoral student. Close collaboration with other research organizations is an asset, providing students with contacts to potential future employers.

Numeric evaluation: 4 (Excellent)

2.3 The societal impact of research and doctoral training

▪ *Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).*
▪ *Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.*
▪ *Additional material: TUHAT compilation of the RC's other scientific activities.*
ASPECTS: Societal impact, national and international collaboration, innovativeness

Globally, the research field of GIMMEC is very relevant for the society as well as for science. As a consequence, it is attractive to many groups resulting in the strong competition. Also GIMMEC has indicated the need for further enhancement of its international visibility.

Close collaboration with governmental research organizations gives GIMMEC a good opportunity to concretely contribute to the decisions related to the environment and use of natural resources, since those organizations have close relationships with ministries and the EU. The members of GIMMEC are also active as experts in the remote sensing, geoinformatics and space research advisory boards in Finland. For the private sector, GIMMEC provides advanced methods, popularizes the work in newspapers, blogs and other media. Cooperation with private sector could provide good opportunities for TEKES funding.

GIMMEC interacts and contributes with society by producing experts having a good knowledge of geospatial data characteristics, processing and application on environmental change studies.

On the teaching level, the experts of GIMMEC bring up geoinformatics and its tools into schools and contribute to the educational sector of Finland. Its members have already produced school books in geoinformatics, and participated in research and study programmes in national and international level (GISAS and iGuess funded by the EC).

Numeric evaluation: 4 (Excellent)

2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

▪ *Description of*
  ▪ *the RC's research collaborations and joint doctoral training activities*
  ▪ *how the RC has promoted researcher mobility*
▪ *Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.*
ASPECTS: Scientific quality, national and international collaboration

GIMMEC is very strong in networking both nationally and internationally. GIMMEC members have been collaborating internally and within Finland for years with the Finnish Geodetic Institute (FGI), Finnish Meteorological Institute (FMI) and Finnish Environment Institute (SYKE) as well as with Aalto University, and universities of Turku, Jyväskylä, Joensuu, and Oulu. The collaboration has covered both remote sensing of land surface and snow surface research as well as geospatial analysis of biodiversity.

International cooperation has been practiced with European, US and African Universities and other research organizations. The members of GIMMEC have also been taking part in EC projects, especially in hyperspectral remote sensing during the last years, providing doctoral students the opportunity to attend international summer schools under FP6 Marie Curie Research Training Network. A newly funded project

by the Ministry of Foreign Affairs of Finland aims at training African scientists on the impacts of climate change. These scientists will be partly trained by the faculties of GIMMEC in 2011-2015. Members of GIMMEC also host a research school funded by the University of Helsinki (Airborne Imaging Spectroscopy Application and Research on Earth Sciences).

Numeric evaluation: 5 (Outstanding)

2.5 Operational conditions

- *Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).*
- *Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.*

ASPECTS: Processes and good practices related to leadership and management

Geoinformatics is an infrastructure-intensive field of research. Particularly in the past access to the national and international geospatial data has been a bottleneck, but the situation is now improving also in Europe thanks to new legislation. However, there are still some costs related to data. For data processing powerful computers and up-to-date software for geospatial data and image processing are needed.

GIMMEC has some remote sensing instruments and field sensors already, but some critical ones are still missing. Part of the instruments may be obtained from Dept. of Physics or FMI, but portable field instruments should be possessed by GIMMEC itself.

As regards study sites Finland is well positioned since there are a number of field stations of which University of Helsinki owns those in Tvärminne, Lammi, Hyytiälä and Kilpisjärvi. Hyytiälä and Kilpisjärvi are used intensively by GIMMEC members, but extensive field data is also collected from "permanent" field sites in various parts of Fennoscandia and Russia. Well established field study collaboration exists with Austrian and Canadian institutions in Arctic and temperate zones. In Africa, the Taita Research Station (Kenya) of the University of Helsinki is led by the Dept. of Geography and Geosciences (Director Prof. Pellikka).

Overall, the infrastructures are relatively well in place. However, keeping up with the technological development (sensors etc) and software is always a challenge as well as getting funding for technical personnel. As regards access to data GIMMEC could and should, together with other users of data, actively advocate for free data policy in Finland as well as in Europe.

2.6 Leadership and management in the researcher community

- *Description of*
  - *the execution and processes of leadership in the RC*
  - *how the management-related responsibilities and roles are distributed in the RC*
  - *how the leadership- and management-related processes support*
    - *high quality research*
    - *collaboration between principal investigators and other researchers in the RC*
    - *the RC's research focus*
    - *strengthening of the RC's know-how*
- *Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes*

ASPECTS: Processes and good practices related to leadership and management

GIMMEC has established a structure, where one person, Prof. Pellikka, is in charge for the overall management and the RC is divided into teams with a team leader. The PIs of GIMMEC have a lot of experience in leading and managing their own research groups and the procedures seem to be well developed at that level. Otherwise it would not have been possible to produce such high quality results.

A GIMMEC board has been established with representatives from all personnel groups. However, the function of the board should be clearly identified. It could serve as a good instrument for integrating the input of all RC members.

There seems to be a good information network through homepage and newsletter.

The challenge is to develop GIMMEC into a solid real research community of its own right. All the PIs have to have motivation to contribute to building GIMMEC. The material we have been provided indicates that this is the case.

2.7 External competitive funding of the RC

• The RCs were asked to provide information of such external competitive funding, where:
  • the funding decisions have been made during 1.1.2005–31.12.2010, and
  • the administrator of the funding is/has been the University of Helsinki
• On the e-form the RCs were asked to provide:
  1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organizations), and
  2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.
Competitive funding reported in the text is also to be considered when evaluating this point.
ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness and future significance

External funding of GIMMEC has been on the average level. The main source has been the Academy of Finland. They have also some funding from the EU.

There should be good opportunities to increase and diversify the funding, once GIMMEC succeeds in integrating and fully utilizing the synergies of its members. Collaboration with other research organizations would also be useful when approaching different national and international funding agencies.

2.8 The RC's strategic action plan for 2011–2013

• RC's description of their future perspectives in relation to research and doctoral training.
ASPECTS: Scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

Gimmec has set the following goals for the future:
  1. Having a strong and well functioning RC (2011-12)
  2. Being leaders in monitoring and modeling of environmental change using remote sensing and geoinformatics
  3. Sharing the results of remote sensing and geoinformatics with a broader audience (2011-13).

The goals as such are well justified, but very general. The first goal is genuinely for GIMMEC, while the goal 2 is further divided according to the original groups. For GIMMEC to become a real research community providing added value, it would be important to identify also truly joint research goals, since management alone does not create a RC.

No implementation plan to achieve these goals has been presented. Formulation of a few major objectives and a clear plan for their implementation would be highly recommended.

2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category.
Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.

GIMMEC has chosen the participation category. GIMMEC members have a very realistic picture of the present situation and the chosen category very well describes the nature of GIMMEC at the moment. The big challenge is to realize the ambitious goal and integrate the groups at the working level.

Numeric evaluation: 5 (Outstanding)

2.10 Short description of how the RC members contributed the compilation of the stage 2 material

All PIs were involved in the preparation of the material, although prof. Pellikka had the main responsibility.

2.11 How the UH's focus areas are presented in the RC's research

Focus area 3: The changing environment – clean water

GIMMEC provides a very crucial contribution to the UH focus area The changing environment - clean water. Geoinformatics provides key tools for verifying changes in the environment, particularly related to land use and vegetation.

2.12 RC-specific main recommendations

For the further integration of GIMMEC the formulation of a few major joint objectives and a clear plan for their implementation would be highly recommended.

Collaboration with other RCs working on related issues, like LTCC, could also provide new research ideas.

A more systematic arrangement - a graduate school or doctoral programme - is recommended to guarantee good training for every doctoral student.

As access to data is crucial for all researchers GIMMEC could and should, together with other users of data, actively advocate for free data policy in Finland as well as in Europe. GIMMEC could also have valuable expertise to offer to various European and international processes related to the use of geospatial information, like INSPIRE, GEO, GEOSS.

There should be good opportunities to increase and diversify the funding, once GIMMEC succeeds in integrating and fully utilizing the synergies of its members. Collaboration with other research organizations would be useful when approaching different national and international funding agencies. Closer cooperation with private sector could provide good opportunities for TEKES funding.

2.13 RC-specific conclusions

GIMMEC combines research on climate change, land cover change, biodiversity and ecosystem services. Through the combined effort of four research groups they have created an interdisciplinary and multidisciplinary RC with specialists in physical geography, remote sensing, forest science, environmental sciences and geospatial monitoring. The aim of GIMMEC is to achieve an international break-through and

recognition in applying remote sensing and geoinformatics in climate change impacts studies on land cover and especially on vegetation. The common nominator of the RC is the methodology. Geoinformatics, remote sensing and modeling are all key tools for all kind of environmental analysis. Using these tools GIMMEC aims at thorough understanding of the main drivers of land cover change and biodiversity at different spatial scales and in different environments. The technical and applied innovation of the work is in the development of new methods applicable for rapid and cost-efficient environmental impact assessments under global change. Of particular importance in GIMMEC is also the ability to create geospatial databases for wider use among research community and public organizations and users.

All 4 teams within GIMMEC represent the international cutting edge in their respective fields, as evidenced by the bibliometrics. The h-index of some researchers is remarkably high, but the group as a whole has received a good publication rate.

The remote sensing expertise of GIMMEC is well known within Europe and it belongs to the leading research units in this area.

In its proposed multidisciplinary composition GIMMEC has not yet received an international break-through. Based on the records of individual groups forming GIMMEC it is to be expected that also their integrated efforts will produce internationally cutting edge results.

GIMMEC hosts a research school funded by the University of Helsinki (Airborne Imaging Spectroscopy Application and Research on Earth Sciences). The role of GIMMEC in educating doctoral students in environmental related geoinformatics is central, since the demand for these experts is increasing. The future career perspectives are indeed very good.

Close collaboration with governmental research organizations gives GIMMEC a good opportunity to concretely contribute to the decisions related to the environment and use of natural resources since those organizations have close relationships with ministries and the EU. It also provides students with contacts to potential future employers. The members of GIMMEC are active as experts in the remote sensing, geoinformatics and space research advisory boards in Finland. They have also produced school books in geoinformatics.

GIMMEC is very strong in networking both nationally and internationally. GIMMEC members have been collaborating internally and within Finland for years various universities and research institutes. International cooperation has been practiced with European, US and African Universities and other research organizations. The members of GIMMEC have also been taking part in EC projects. A newly funded project by the Ministry of Foreign Affairs aims at training African scientists on the impacts of climate change.

External funding of GIMMEC has been on the average level the main source being the Academy of Finland and some funding from the EU.

2.14 Preliminary findings in the Panel-specific feedback

GIMMEC, like a few other RCs in the NatSci panel, provides an excellent example of a multidisciplinary consortium which has a lot potential to producing outstanding innovative research of high societal relevance. The university should make a thorough analysis on obstacles to be removed as well as on incentives needed to encourage such RCs to evolve.

3 Appendices

A. Original evaluation material
   a. Registration material – Stage 1
   b. Answers to evaluation questions – Stage 2
   c. List of publications
   d. List of other scientific activities
B. Bibliometric analyses
   a. Analysis provided by CWTS/University of Leiden
   b. Analysis provided by Helsinki University Library (66 RCs)

International evaluation of research and doctoral training
at the University of Helsinki 2005-2010

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW

NAME OF THE RESEARCHER COMMUNITY:
Geospatial monitoring and modeling of an environmental change using geoinformatics
(GIMMEC)

LEADER OF THE RESEARCHER COMMUNITY:
Professor Petri Pellikka, Department of Geosciences and Geography, Faculty of Science

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:

- Material submitted by the RC at stages 1 and 2 of the evaluation
  - STAGE 1 material: RC's registration form (incl. list of RC participants in an excel table)
  - STAGE 2 material: RC's answers to evaluation questions
- TUHAT compilations of the RC members' publications 1.1.2005-31.12.2010
- TUHAT compilations of the RC members' other scientific activities 1.1.2005-31.12.2010
- Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010 (analysis carried out by CWTS, Leiden University)

  NB! Since Web of Science(WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library (results available by the end of June, 2011)

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Pellikka, Petri

E-mail:

Phone: +358-9-19151068

Affiliation: University of Helsinki, Department of geosciences and geography

Street address: Gustaf Hällströminkatu 2

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Geospatial monitoring and modelling of environmental change using geoinformatics

Acronym for the participating RC (max. 10 characters): GIMMEC

Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces): Environmental change monitoring and modeling applying remote sensing and geoinformatics are practiced at the University of Helsinki in three faculties; Science, Agriculture and Forestry, and Biological and Environmental Sciences. Our research community (RC) is formed by three teams from these faculties in order to establish the cooperation in research and researcher training in environmental change monitoring within the UH.

The Research Community GIMMEC consists of GeoInformatics Research Group (GIRG) led by prof. Pellikka (geoinformatics), LAI detectives led by prof. Stenberg (forest mensuration), team led by Dr. Virtanen at the Faculty of Biological and Environmental sciences (carbon, environmental protection, biodiversity) and prof. Miska Luoto (physical geography). The field of GIRG is environmental change and land use change detection applying remote sensing and geoinformatics in boreal, tropical and alpine areas. LAI detectives have concentrated on remote sensing of vegetation, e.g. developing monitoring methods for vegetation leaf area index, biomass and carbon in boreal areas. Prof. Luoto is a specialist on biogeographical modeling especially in boreal and arctic areas.

The participants of GIMMEC have cooperated during the last years through various projects, expert exchanges, joint supervision of MSc and PhD students, evaluation tasks and research schools. Pellikka and Stenberg of GIMMEC also submitted a centre of excellence proposal in 2010 to the Academy of Finland, but despite very good evaluation results the centre was not short-listed. All the professors and other principal investigators of GIMMEC (Toivonen, Mõttus, Rautiainen, Virtanen) study climate, vegetation and land use change impacts , and analyze the role of forests in mitigation of climate change, and finally, how these changes influence livelihoods. GIMMEC aims to gather this research and doctoral training, and aims to attract research funding through joint efforts. Cooperation in research and researcher's training is practiced with the Finnish Meteorological Institute, for example.

<u>RC-SPECIFIC STAGE 1 MATERIAL</u> (registration form)

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC's research: natural sciences

RC's scientific subfield 1: Environmental Sciences

RC's scientific subfield 2: Geosciences, Multidisciplinary

RC's scientific subfield 3: Remote Sensing

RC's scientific subfield 4: --Select--

Other, if not in the list: Geoinformatics

4 RC'S PARTICIPATION CATEGORY

Participation category: 2. Research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through

Justification for the selected participation category (MAX. 2200 characters with spaces): All the teams within the GIMMEC represent the international cutting edge in their fields, but in its proposed multidisciplinary composition the RC has not yet received an international break-through. GIMMEC will apply new data types (hyperspectral and multiangular remote sensing data) for which the international break-through has not been possible yet.

Pellikka leads GIRG consisting of 13 persons in various research and coordination level. During the last years GIRG has received international recognition in land cover and land use change studies in Africa, and previously also in glacier change monitoring and in forest damage studies in temperate forests. Stenberg's group (the LAI Detectives) focuses on boreal forest structure modeling and monitoring . Team led by Dr. Virtanen has practiced remote sensing in carbon modeling, but the use of geoinformatics in geospatial modeling has been minor. Prof. Luoto is an expert in geospatial modeling applying remote sensing and geoinformatics. He adds expertise on global change analysis, remote sensing and spatial modelling, including theoretical and applied expertise on species distribution modeling.

GIMMEC seeks through the combined effort to create an interdisciplinary and multidisciplinary RC with specialists in physical geography, remote sensing, forest science, environmental sciences and geospatial monitoring. The common nominator of the RC is the methodology, which is geoinformatics. The aim of the GIMMEC is to achieve an international break-through and recognition in applying remote sensing and geoinformatics in climate change impacts studies on land cover and especially on vegetation.

5 DESCRIPTION OF THE RC'S RESEARCH AND DOCTORAL TRAINING

Public description of the RC's research and doctoral training (MAX. 2200 characters with spaces): GIMMEC aims to study environmental change applying historical and modern remote sensing and geospatial data through monitoring and modeling. The main scientific objectives are to 1) develop advanced optical remote sensing methods for land cover change detection, and 2) to model the consequences of environmental change on land cover (albedo, vegetation, biodiversity) using geospatial data and remote sensing and 3) to apply the results for better understanding of land cover/land use and climate change interactions. The RC concentrates on land cover change studies in the arctic and boreal

zone (Northern Europe) and tropics (East Africa) where the team has long-term experience and data. Climate change impacts are expected to take place especially in these areas.

Domestic and foreign cooperation continues with the Finnish Meteorological Institute, Finnish Geodetic Institute, Finnish Environment Institute, NASA (Land Use and Land Cover Change Programme), Northern Eurasia Earth Science Partnership Initiative, iLEAPS (Integrated Land Ecosystem Atmosphere Processes Study), Boston University (Climate and Vegetation Research Group), University of Toronto (Climate Processes and Climate and Carbon Cycle Modelling), Tartu Observatory, Lund University (Centre for Studies Carbon Cycle and Climate Interactions), French National Institute for Agricultural Research, University of York (York Institute for Tropical Ecosystem Dynamics), Kenya Meteorological Institute, Kenya Forest Research Institute, Department of Resource Surveys and Remote Sensing of Kenya.

The principal investigators will be supervising the GIMMEC doctoral students in the three faculties. Currently the number of doctoral students of the RC is approximately 20. RC will organize post graduate courses in specific fields of geoinformatics and also in relevant application fields. The doctoral students supervised by the PI's in other universities will also be connected team members, thus spreading the cooperation to other disciplines and application fields.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): At the University of Helsinki, geoinformatics was one of the research focus areas of the Faculty of Science during the latter part of the evaluation period (2007–2009). The demand of interdisciplinary geospatial modelling continues to grow within and across the Faculty borders, not only because of the amalgamation of departments, but also due to the increasing labor demand of trained geoinformaticians globally. Geospatial monitoring and modelling of environmental change remain at the core of the current (2010–2012) research focus areas (Materials and Natural Resources, Atmosphere and Climate Change) of the Faculty of Science.

The research field and doctoral training is very significant in changing global environment. Climate change has been long-known process, but land cover change may be even more significant threat for global ecology, safety and sustainability. The RC works in the field of climate change, land cover, change, biodiversity and ecosystem services, which all have global importance. With its links to North America, South America and Africa the RC is well connected.

As GIMMEC is interdisciplinary, it can create a common curriculum for its doctoral students. As geoinformatics is practiced in all the campuses (except Meilahti) and in most of the faculties an RC in geoinformatics is beneficial for the UH in general. On the other hand, GIMMEC is significant as it combines the fragmented research and doctoral training in the field of proposal, which makes it an important partner in consortiums seeking external funding. The students and PhD students graduating from geoinformatics independent from the department or faculty have very high employment rate and very high possibilities for post doctoral funding.

Geoinformatics is also important field in the third mission of the UH, as geospatial data is needed in society and in science everywhere from natural sciences to social studies and healthcare. The members of the GIMMEC are very active in national and international organizations in disseminating the research results for wider audience.

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

Keywords: environmental change, climate change, remote sensing, geoinformatics, modelling,
biogeography

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6 QUALITY OF RC'S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC's research and doctoral training at national and international
level during 2005-2010 (MAX. 2200 characters with spaces): Pellikka established the geoinformatics and
remote sensing curricula for the UH. The number of staff has increased from 2 to 13 and number of yearly
courses from 2 to 12. He has supervised more than 30 MSc theses and 7 PhD theses. 3 PhD theses are
expected to be defended in 2011. Since 2001, he has attracted funding from the EC, Academy of Finland,
Ministry of Education and UH for research projects, infrastructure and graduate schools more than 3.6
MEuros. He is also a director of TERRA research station of UH in Kenya. He also an extensive record in
coordinating international and multidisciplinary research projects. Stenberg is recognized expert in
theoretical modeling of the radiation regime in forest stands and in the development of forest reflectance
models for remote sensing applications. Her papers are cited more than 1500 times and her H-index is 24.
She received the International Union of Forest Research Organizations Scientific Achievement Award as the
first woman. The interdisciplinary remote sensing group is expert in physically-based remote sensing
methods for forests and global satellite-derived vegetation products and a world-pioneer in development
and application of the spectral invariants theory. Group has published 2005-2010 about 50 peer-reviewed
articles in peer-reviewed remote sensing journals, has received about 2.5 MEuros external funding,
including three personal research positions (Academy of Finland) and a NASA-project with Boston
University. Luoto has more than 90 publications in top journals. His H-index is 21 (highest of Finnish
geographers). He is involved in many international research projects, including NordicNetwork "Effect
Studies and Adaptation to Climate Change". He leads Academy projects "Remote sensing and GIS in
biodiversity modeling" and "Impacts of climate change on Arctic vegetation and biodiversity". The projects
investigates dynamics and drivers of changes in the Arctic vegetation, threats caused by climate change to
plant diversity, and develop projections in the Arctic plant biomass patterns. He has an extensive record in
supervising PhD (8) and post-doc projects and coordinating multidisciplinary research projects.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200
characters with spaces): The scientific productivity of the RC should be evaluated by number of
publications, and also by journals' impact factors and researcher's citation and H-indices. In addition to the
scientific publications, also popular publications and invited speeches should be assessed as it shows the
public (and domestic) importance of the research field, which cannot be assessed by citation indices.
Popular articles have been one dissemination channel particularly by prof. Pellikka. The doctoral training
should be assessed by the number of supervised theses, theses on the process, the grading of the theses,
and doctors' success in obtaining post doctoral positions and own funding.

The scientific productivity and significance should be also measured by ability to obtain external funding,
research school positions, research infrastructure, and memberships in research and education networks.

Of particular importance in GIMMEC is also the ability to create geospatial databases for wider use among
research community and public organizations and users.

LIST OF RC MEMBERS

	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
	NAME OF THE RESEARCHER COMMUNITY:		Geospatial monitoring and modeling of environmental change applying geoinformatics and remote sensing, GIMMEC		
	RC-LEADER	P. Pellikka			
	CATEGORY	2			
1	Pellikka	Petri	x	Professor	UH, Faculty of Science, Department of Geosciences and Geography
2	Hjort	Jan		Professor	UH, Faculty of Science, Department of Geosiences & Geography
3	Luoto	Miska	x	Professor	UH, Faculty of Science, Department of Geosciences and Geography
4	Stenberg	Pauline	x	Professor	UH, Faculty of Agriculture and Forestry, Department of Forest Sciences
5	Anttila	Saku		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
6	Clark	Barnaby		Postdoctoral Researcher	UH, Faculty of Science, Department of Geosciences and Geography
7	Gonsamo	Alemu		Postdoctoral Researcher	UH, Faculty of Science, Department of Geography
8	Heiskanen	Janne		Postdoctoral Researcher	UH, Faculty of Agriculture and Forestry, Department of Forest Sciences
9	Hendriks	Johan		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
10	Himberg	Nina		Research Coordinator	UH, Faculty of Science, Department of Geosciences and Geography
11	Hohenthal	Johanna		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
12	Johansson	Tino		Research Coordinator	UH, Faculty of Science, Department of Geosciences and Geography
13	Maeda	Eduardo		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
14	Muukkonen	Petteri		Senior Researcher	UH, Faculty of Biological and Environmental sciences, Dept. Environmental Sciences
15	Mäkiaho	Jari-Pekka		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
16	Mõttus	Matti	x	Postdoctoral Researcher	UH, Faculty of Science, Department of Geosciences and Geography
17	Niemi	Kirsikka		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
18	Omoro	Loice		Doctoral Candidate	UH, Faculty of Agriculture and Forestry, Department of Forest Sciences
19	Rautiainen	Miina	x	Senior Researcher (Academy research fellow)	UH, Faculty of Agriculture and Forestry, Department of Forest Sciences
20	Salonen	Maria		Doctoral Candidate	UH, Faculty of Science, Department of Geosciences and Geography
21	Siljander	Mika		Postdoctoral Researcher	UH, Faculty of Science, Department of Geosciences and Geography
22	Toivonen	Tuuli	x	University Lecturer	UH, Faculty of Science, Department of Geosciences and Geography
23	Virtanen	Tarmo	x	University Lecturer	UH, Faculty of Biological and Environmental sciences, Dept. Environmental Sciences

RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Pellikka, Petri

E-mail of the RC's responsible person:

Name and acronym of the participating RC: GeoInformatics for Monitoring and Modelling of Environmental Change, GIMMEC

The RC's research represents the following key focus area of UH: 3. Muuttuva ympäristö - puhdas vesi – The changing environment - clean water

Comments for selecting/not selecting the key focus area: We chose 3 (changing environment and clean water) as the key area as we are researching environmental change using geoinformatics and remote sensing. One consequence of the environmental change caused by human activity triggering land use change, and climate change triggering land cover change is shortage of (clean) water resources in the tropics, and possible overload of water resources in the alpine, boreal and arctic areas. So the water also fits well to our key focus area. Another potential key focus could have been 1 (basic structure, material and natural resources of the physical world) as forests, vegetation, land cover, and even land is indeed part of the natural resources of the physical world. Nevertheless, it was the words "environment and change" which made us to choose key focus area 3 as it is broader and focuses on change.

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1 FOCUS AND QUALITY OF RC'S RESEARCH (MAX. 8800 CHARACTERS WITH SPACES)

- **Description of the RC's research focus, the quality of the RC's research (incl. key research questions and results) and the scientific significance of the RC's research for the research field(s).**

  Human activities increasingly affect the terrestrial biosphere, resulting into land cover change, land use change, habitat loss and degradation which ultimately impair ecosystem function and ecosystem services. Moreover, the changes affect the land surface radiation balance and water balance. Due to the rapidity of environmental change there is a need to detect and predict changes of the environment, and to model the consequences of the changes in order to produce scientific evidence for the preparation of mitigation plans and adaptation strategies.

  Remote sensing data, methods and results has the capacity to detect natural and human-induced land cover changes. Used in an integrative mode, advanced remote sensing methods integrated with novel modelling techniques can provide information about both historical and current habitat and land use factors affecting biodiversity patterns. Relationships between species distributions and remotely sensed data, particularly in conjunction with other environmental data sets, can be used to predict the land cover and biodiversity patterns over large areas. Enhancements of the methods from basic remote sensing methods (e.g. modeling of radiative transfer in vegetation) to understanding the main drivers of land cover change and biodiversity decline at different spatial scales are needed. Due to the complexity of the issue, a multidisciplinary approach integrating different natural sciences and socioeconomic issues of land use planning is considered necessary.

  Multidisciplinary GIMMEC seeks for theoretical understanding and methodological advances in monitoring and modelling of environmental change and biodiversity using geoinformatics and remote sensing.

  The key research topics are: 1) Coupling of models and measurements of radiative transfer in vegetation with remote sensing data sets, 2) Development of advanced optical remote sensing methods for monitoring land cover changes and habitat properties across different scales, 3) Applying the results for

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modelling land cover and climate change interactions and the environmental consequences of land cover change to biodiversity, water resources and livelihoods.

The work will concentrate mostly on remote sensing of vegetation, e.g. developing physically-based models and methods for monitoring vegetation leaf area index, biomass and carbon in boreal forests. Furthermore it will be specializing modeling of climate and land cover change from the arctic to tropics and its biogeographical, ecological and environmental consequences.

As a result of the research work, GIMMEC will produce: 1) Enhanced methods for radiative transfer modeling in vegetation and for remote sensing data applications for land cover change assessment, 2) Enhanced methods for mapping, monitoring and modeling current and future land cover and biodiversity patterns in different environments under global change, 3) Increase in the quality and quantity of land cover (change) information for climate change, water resources, livelihoods and land use studies, 4) A thorough understanding of the main drivers of land cover change and biodiversity at different spatial scales and in different environments.

The results will provide benefits for monitoring of the environment, especially by outlining means to improve the spatial quality of land cover and biodiversity information and the accuracy of global change impact models. The technical and applied innovation of the work is in the development of new methods applicable for rapid and cost-efficient environmental impact assessments under global change. Of particular importance in GIMMEC is also the ability to create geospatial databases for wider use among research community and public organizations and users.

GIMMEC puts together researchers from GeoInformatics Research Group led by Prof. Pellikka (geoinformatics) of the Faculty of Science, the 'LAI detectives' group led by Prof. Stenberg (forest mensuration) from the Faculty of Agriculture and Forestry and ecological modeling group led by Prof. Luoto (physical geography) linking Faculty of Science and Faculty of Biological and Environmental Sciences. Also other PI's (Mõttus, Rautiainen, Toivonen, Virtanen) play an important role in the team. The participants of GIMMEC have cooperated during the last years through various projects, expert exchanges, joint supervision of graduate and doctoral students, evaluation tasks and research schools. Pellikka and Stenberg also submitted a centre of excellence proposal in 2010 to the Academy of Finland.

GIMMEC scientists are internationally recognized as major contributors to their fields of study and are experienced in conducting research in arctic, boreal, temperate and tropical environments. GIMMEC is unrestrained to traditional disciplinary boundaries, and will be able to will break down the sectoral scientific and technical barriers. Fitted seamlessly together, GIMMEC is able to develop group-breaking results in geospatial monitoring and modelling of environmental change. GIMMEC is already prominent in many research areas, namely in advanced remote sensing of vegetation biophysical variables such as the leaf area index, biomass and biocarbon modeling, remote sensing of land cover and land use change and in biodiversity and vegetation dynamics modeling. Thus, GIMMEC as a unified group has the cutting-edge knowledge of the entire process of biodiversity and land cover change modeling and monitoring, from the theoretical understanding of the physical processes influencing remote sensing results to that of applying these data in understanding the consequences of land cover change and biodiversity loss at various scales and various environments.

GIMMEC as a whole composes a research unit where deep expertise in different branches of geosciences and biological sciences unites with advanced methodological know-how (remote sensing, mathematical modeling, spatial simulation, geoinformatics). It brings together scientists from different faculties at the University of Helsinki, and forms, via collaboration, an international network of scientists. The strength is the multidisciplinary approach to integrate remote sensing and biodiversity questions and its sustainable use and management. No other research consortium in Finland has as wide expertise as we do.

<u>RC-SPECIFIC STAGE 2 MATERIAL</u>

- **Ways to strengthen the focus and improve the quality of the RC's research.**

Strengthening the internal collaboration within new GIMMEC is required to identify still better our joint strengths and researcher roles within the group. Also, recruitment of complementary expertise or collaboration with other research communities e.g. from the field of ecology, climatology and humanities would strengthen our holistic approach to land cover change and biodiversity problematics. The specialists seen important are ecologists in order to study impact of environmental change to ecosystem services, climatologists and physicists in order to study more consequences of the environmental change to water resources and regional climate, researchers who study the fundamental interactions between land surface and radiation needed in developing remote sensing methods for the above mentioned applications and finally, experts from humanities in order to bring social aspects and to study impacts of environmental change on livelihoods and to develop mitigation and/or adaptation strategies. Joint investments on research equipment will also strengthen groups work in the long run.

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2 PRACTISES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC's principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practises and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

The principles to recruit and select students are simple: we aim to have the best students in the field from Finland and abroad. The selection is based on the study plan, potential previous publications, comments from the supervisors and grades from the graduate level studies. In the selection process, the candidates have to present a study plan identifying the main research questions of the thesis, the components of the thesis (articles), needed skills and datasets, timetable and a funding plan to carry out the work. Funding options are many, but most often provided by research project funding or graduate schools. The research plan is evaluated and commented by the GIMMEC board. Suggestions are made to ensure the integration of the work to on-going research.

GIMMEC aims at attracting top doctoral students worldwide through active collaboration and researcher/teacher exchange with other research universities. Also, we pay attention to our visibility in international journals and the internet. At our own departments, graduate students are integrated with research work already during their course works and theses and potential doctoral student are encouraged to continue with the group. Thus far, these two recruitment methods have yielded an international and well-functioning group of efficient doctoral students.

The supervision is arranged within the three departments and faculties involved in GIMMEC, but supported by co-supervision also from a third party, e.g. researchers from other universities, or sectoral research institutes to ensure the best possible multidisciplinary supervision. Doctoral students are an integral part of the research group and supervision of the work is done on a daily basis. Scientific articles are most often written as joint efforts of the doctoral students and their supervisors. Thus also the actual scientific work also supports researcher training.

As GIMMEC is formed from three faculties it is inherently based on inter-disciplinary collaboration between the Dept. of Geosciences and Geography (Faculty of Science), the Dept. of Forest Sciences (Faculty of Agriculture and Forestry) and the Dept. of Environmental Sciences (Faculty of Biological and Environmental Sciences). The project collaborates on a daily basis also with other departments (e.g. Dept. of Biosciences, Dept. of Physics) and national institutes such as Finnish Meteorological Institute, Finnish Geodetic Institute, Finnish Forests Research Institute and Finnish Environment Institute. The present doctoral students of GIMMEC have been already working in governmental research institutes

<u>RC-SPECIFIC STAGE 2 MATERIAL</u>

building links between university and research organizations. It is also possible to build up graduate schools or doctoral programmes in environmental change between these university departments and research institutes.

International cooperation is tight with several research institutions, such as NASA (Land Use and Land Cover Change Programme), NEESPI (Northern Eurasia Earth Science Partnership Initiative), iLEAPS (Integrated Land Ecosystem Atmosphere Processes Study), Boston University (Climate and Vegetation Research Group), University of Toronto (Climate Processes and Climate and Carbon Cycle Modelling), Tartu Observatory, Lund University (Centre for Studies Carbon Cycle and Climate Interactions), INRA (French National Institute for Agricultural Research), University of York (York Institute for Tropical Ecosystem Dynamics), Kenya Meteorological Institute, Kenya Forest Research Institute, Department of Resource Surveys and Remote Sensing of Kenya, Peruvian Amazonian Research Institute (IIAP), only to name few of the partners that support our doctoral training.

The quality of doctoral training is guaranteed, first of all, by the motivated multidisciplinary supervisors, careful selection of the doctoral students and a good study programme with doctoral courses, including special courses in the field of environmental change, geographic information systems and remote sensing. In order to keep up and improve the quality, feedback from students is collected after each course.

Every year the progress of the student is evaluated and possible problems in studies or research will be discussed and solutions searched for. The post-graduate study programme is planned for 4 years. The 1st year is for the setup of the research questions, collection and processing of the data, fieldwork and coursework. The 2nd year is for coursework, analysis of the data and the results and writing the 1st article. During the 3rd year 2-3 articles are written, while the 4th year is for the potential extra papers and for the synopsis of the thesis.

The doctoral theses are compiled, typically consisting of 4 to 6 articles, of which at minimum 50 % are already published in international high-impact journals. The doctoral student should be the first author in 80% of them. Best possible journals are selected as publishing platform and supervisors actively support the research work and writing process of each article. Furthermore, the students are encouraged to spend periods abroad already during their doctoral studies.

GIMMEC aims at inviting distinguished foreign professors as examiners and opponents of the doctoral theses as makes it possible to involve their organizations in GIMMEC. As an example, distinguished professors Philip Lewis from University College London, Prof. Jing Chen from University of Toronto and Rector Tom Veldkamp from ITC have recently (2009-2011) acted as examiners in the public examination of the doctoral theses.

The multidisciplinary environment experts that GIMMEC trains are expected to take active role e.g. in building the governmental adaptation strategies for the climate change (several governmental sectors/ministries involved). During the last years, remote sensing experts, global change researchers, biodiversity investigators and geographers have been well integrated in the society. Traditionally they have been placed in environmental administration and in education, but in the future the need for this type of experts is increasing also in politics, the media and the private sector as environmental consultants.

The doctoral students graduating from GIMMEC have excellent career perspectives due to many reasons: 1) scientific credibility of the graduating doctoral students is ensured by publishing in high-level scientific journals and by inviting foreign examiners and opponents for the doctoral theses; 2) the fields of remote sensing, environmental monitoring and modeling are rapidly expanding and there is a high needs for experts both within Academia and elsewhere in the society from administration to consultancy companies; 3) the doctoral students are able to build a strong collaboration networks

already during their studies, 4) the doctoral students are involved in teaching and capacity building of e.g. local experts in developing countries, thus gaining practical experience on various working environments.

During the last years, remote sensing experts, global change researchers, biodiversity investigators and geographers have been well integrated in the society. Traditionally they have been placed in environmental administration and in education, but in the future the need for this type of experts is increasing also in politics, the media and the private sector as environmental consultants. For example, all of the graduates and doctors of the GeoInformatics Research Group have been well-employed. They have either received a post-doctoral position in respected universities or research organizations, or a position in consulting companies working either in Finland or

- RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The strength of the doctoral training is the multi- and interdisciplinary supervision by the PI's and post-doc researchers of GIMMEC, and the challenge is to have up-to-date field devices for physical measurements of the land cover characteristics. The number of doctoral students will be increased together with arranging teaching in English both for graduate and doctoral students as a part of the internationalization aims of the UH. Also the current exchange and cooperation agreements between the UH and other universities will be exploited, e.g. with University of Nairobi and the Fatih University in Turkey and Olomouc University in Czech Republic. With these universities, the mobility is focused in geoinformatics.

3 SOCIETAL IMPACT OF RESEARCH AND DOCTORAL TRAINING (MAX. 4400 CHARACTERS WITH SPACES)

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

Decision makers, politicians, environmentalists and scientists are highly interested to understand and forecast how biodiversity and ecosystems respond to changing land use and climate. Sustainable management of natural resources is the core approach for a long term flow of societal values from ecosystems.

The work of GIMMEC has direct relevance to EU and international policy initiatives on climate change and biodiversity, such as UN-REDD, UN-REDD+ and IPCC. The overall impact of GIMMEC is to improve our understanding of land cover and climate change on the structure and functioning of vegetation and biodiversity. These topics are ripe for scientific exploration and have great societal relevance. GIMMEC will contribute strongly to address the land cover and climate change impacts on environment by employing a multidisciplinary approach so as to ensure that a genuine linkage between the environment and society is established. GIMMEC is especially relevant to issues of assessing the effects of climate change and its management on the vulnerability of various ecosystems, ecosystem preservation and services, biodiversity protection and consequences of climate.

For the public sector, the most important interaction and contribution from GIMMEC is cooperation in research with the governmental research organizations. In addition GIMMEC will give recommendations on its findings for Finnish and foreign ministries including best practices, impact assessments and practical guides. For the private sector, GIMMEC provides advanced methods, popularizes the work in newspapers, blogs and other media. With private sector cooperation with TEKES funding for example is possible. For non-governmental organizations (NGOs), GIMMEC provides training courses for stakeholders of the various projects and participates in thematic networks. Our graduate and doctoral students also participate in the surveys NGO's are carrying out.

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GIMMEC interacts and contributes with society by producing experts having a good knowledge of geospatial data characteristics, processing and application on environmental change studies. With the ever increasing environmental change caused by population growth, climate change, land use and land cover change, such experts are called for since understanding of what is going on requires scientific results on which mitigation and adaptation strategies can be built. The GIMMEC geoinformatics researchers differ from the ones produced at the technical universities as forestry, biology and geography background provides a holistic view about landscape, forest and ecology dynamics.

On the teaching level, the experts of GIMMEC bring up geoinformatics and its tools into schools and contribute to the educational sector of Finland. The members of it have already produced school books in geoinformatics, and participated in research and study programmes in national and international level (GISAS and iGuess funded by the EC). Moreover, GIMMEC produces papers for the Ministry of Education, participates in discussion groups, sets up web-pages, writes newspaper articles and participates in scientific forums for popularization of science. The members are also active as experts in the remote sensing, geoinformatics and space research advisory boards in Finland

- Ways to strengthen the societal impact of the RC's research and doctoral training.

In the dissemination plan GIMMEC would publish in the best possible scientific journals, but also aims at popularizing science by publishing in newspapers, magazines, university media, and webpages both in Finnish and English. As popularization of scientific results is well practiced by some of the members, it is easy spread the know-how to other members.

GIMMEC will be an active member of international research and development networks, which will promote the societal impacts and generate new research collaboration. The results will be presented in homepages and the data will be shared among the GIMMEC members and its essential collaboration partners through an Internet platform.

Traineeships will be arranged in governmental, private and third sector organizations. By doing that, society is better aware of the research carried out and on the other hand the doctoral student learns the demands the work sector has for scientists, which helps in career development. Traineeship could be linked to a scientific article production or popular article writing.

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4 INTERNATIONAL AND NATIONAL (INCL. INTERSECTORAL) RESEARCH COLLABORATION AND RESEARCHER
MOBILITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

The GIMMEC members have been collaborating internally and within Finland for years with the Finnish Geodetic Institute (FGI), Finnish Meteorological Institute (FMI) and Finnish Environment Institute (FEI) among research organizations and with Aalto University, and universities of Turku, Jyväskylä, Joensuu, and Oulu among universities. The cooperation has related both to remote sensing of land surface and snow surface research as well as geospatial analysis of biodiversity. Mobility of the GIMMEC researchers between different universities and research institutes has ensured good connections with all the relevant actors in Finland.

International cooperation has been practiced with Boston University and NASA (USA), Estonian University of Life Sciences and Tartu Observatory (EE), INRA Avignon (FR), Academy of Sciences of the Czech Republic (CZ), Lund University (S), NORUT Northern Research Institute, University of Bergen (N), University of Wageningen (NL), University of Zurich (CH), VITO, University of Ghent and Catholic University of Leuven (B), Bavarian Academy of Sciences (D), University of Innsbruck and Joanneum Research (A), University of Nairobi (K), University of Adelaide and CSIRO (Australia), universities of York,

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Cambridge and Oxford (UK), Carleton University and universities of Toronto and Victoria (CDN), National Institute of Space Research (Brazil).

The members of GIMMEC have also been taking part in EC projects, especially in hyperspectral remote sensing during the last years, such as HYRESSA and HYPERINET, which have arranged summer schools for doctoral students under FP6 Marie Curie Research Training Network. GIMMEC operates within the CBIO-NET network (Nordic Council of Ministers) and the FICCA program (Academy of Finland). GIMMEC is linked in PALSALARM (Global change impacts on sub-arctic palsa mires and greenhouse gas feedbacks to the climate system, Nordic Council of Ministers), and FP6 ALARM (Assessing large scale environmental risks with tested methods) and FP6 MACIS (Minimization of and Adaptation to Climate change Impacts on biodiversity).

A newly funded project by the Ministry of Foreign Affairs of Finland (Climate Change Impacts on Ecosystem Services and Food Security in Eastern Africa – Increasing Knowledge, Building Capacity and Developing Adaptation Strategies) aims at training African scientist on the impacts climate change research (ecosystem services, livelihoods, biodiversity). These scientists will be partly trained the faculties of GIMMEC in 2011-2015. Members of GIMMEC also host research school funded by the University of Helsinki (Airborne Imaging Spectroscopy Application and Research on Earth Sciences), which has three positions with supervised by FEI, FMI, and UH.

GIMMEC aims to be an international research group. Previously within GIMMEC there have been members from Brazil, Estonia, the Netherlands, UK, Ethiopia and Kenya, as well as long-term visitors from Russia, Spain, Turkey and short-time visitors from Belgium, Czech Republic, Germany and UK. In the past, its members have spent research periods abroad in Norway, Switzerland, USA, United Kingdom, Belgium, Peru, and Kenya. Recent post doc periods of GIMMEC members have been spent in Estonia, Australia, Switzerland, Sweden, USA and Canada.

- RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

GIMMEC seeks to continue joint-supervision of doctoral students within UH and Finnish sectoral research organizations as it has and will be a strength in true research collaboration. The other strengths of GIMMEC has been high-quality research, opportunity for multidisciplinary collaboration, high-quality supervision and high-quality research links abroad. The main challenge in research collaboration and researcher mobility is the funding, since international cooperation requires some travelling. In order to facilitate mobility, the members of GIMMEC seek funds from the Academy of Finland, CIMO, and EC (Marie Curie) for personal travel grants and work abroad. Another mean is to apply funding for research school (such as HYPER-I-NET). It is especially targeted to start cooperation with organizations working in slightly different field, e.g. University of Leuven in Belgium, which is not only studying land use changes using remote sensing, but also taking the human impact and livelihoods into account.

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5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).

Geoinformatics requires infrastructure. Starting from data, national and international geospatial data is required, but these data are typically not free of charge. The required data include e.g. digital elevation models, population data, land cover data and meteorological data. Especially time series of multitemporal remote sensing data of various spatial scales is required. This data is becoming less expensive, but still it has its cost. For data processing, powerful computers are needed and also up-to-date software for geospatial data and image processing. Within geography, geoinformatics requires the

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most in terms of data, hardware and software. Remote sensing data acquisition and field measurements are also within the topics of GIMMEC. Some remote sensing instruments and field sensors exist already, but there is a demand for field spectroradiometers in visible, near infrared and middle infrared range, broadband and narrowband radiation sensors and logging systems, hydrometeorological measurement devices especially in areas of low operational network coverage (developing countries) and other field observations data. Part of the instruments may be obtained from Dept. of Physics or FMI, but portable field instruments should be possessed by the GIMMEC itself.

When studying environmental changes from the arctic to the tropics it is essential to have more or less permanent study sites. In Finland we are happy to have number of field research stations of which University of Helsinki possesses ones in Tvärminne, Lammi, Hyytiälä and Kilpisjärvi. From these Hyytiälä and Kilpisjärvi are used a lot by the GIMMEC members, but in addition extensive field data from "permanent" field areas are gathered from various parts of Fennoscandia and Russia. Arctic field study area has been glacierized area in Ötztal Austria, in which there is a research station of a collaboration partner Bavarian Academy of Sciences. Field site in temperate zones are in the foothills of the Bavarian Alps and in the temperate forests of Quebec, Canada. A great success story of the GIMMEC is that the Taita Research Station of the University of Helsinki is led by the Dept. of Geography and Geosciences (Director Pellikka). So far 5 PhD these and more than ten MSc theses are written from the natural laboratory of the Taita Hills, which is a very permanent field site of GIMMEC and one of the main research sites. http://blogs.helsinki.fi/terra-kenya/, http://www.helsinki.fi/science/taita/.

Successful research requires good personnel in long-term, which can be recruited and trained by teaching. Therefore GIMMEC sees that teaching is a natural part of doctoral student's career. A course or practical given by a doctoral student or post-doc about his/her own research topic is beneficial for own research and a very good learning experience. Some of the new research findings or new methods can be tested by students, for example.

From the student's point of view, courses given by doctoral students are very beneficial, since doctoral students are at the leading edge of research where they are very active themselves. For the research community, new talents can be recruited for through teaching and coursework for graduate and doctoral studies. They will become future members of GIMMEC.

- RC's strengths and challenges related to operational conditions, and the actions planned for their development.

The strength of the operational conditions is that all the RC members see the importance of combining teaching and research. Strength related to research and field work is that GIMMEC has more or less permanent study areas and test sites in Finland and abroad. The challenge of the RC is to have up to date field work sensors, powerful work stations and enough expensive software licenses. These can be partly obtained through research projects, but partly they should be provided by university infrastructure funds. One should also note that more infrastructure and facilities also requires more personnel for management, which requires extra funds. That is a challenge as well.

RC-SPECIFIC STAGE 2 MATERIAL

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6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC's research focus and strengthening of the RC's know-how.

The leadership and management of GIMMEC are divided as it consists of various teams which will start working together. The leader or person in charge is Prof. Pellikka, who also leads the team in land cover and change studies (2). The team in physical measurements and remote sensing method development is led by Prof. Stenberg (1), while the team in ecological and biodiversity modeling is led by Prof. Luoto (3). The teams cross over the faculties, which is strength of the GIMMEC as it keeps it very mobile. The topics within team 1 are remote sensing of leaf area index, physical modeling of vegetation and hyperspectral remote sensing (PI's: Stenberg, Rautiainen, Mõttus), in team 2 remote sensing of land cover change and land cover change modeling (PI's: Pellikka, Toivonen) and in team 3 biodiversity modeling and ecological modeling (PI's: Luoto, Virtanen). Each of the PI's can supervise doctoral students, but typically there are supervisors from more than one team. The board of GIMMEC consists of team leaders, 2 other PI's, 2 doctoral students and 2 graduate students of which the PI's, doctoral students and graduate students will be chosen by the team leaders. The board of GIMMEC will officially meet twice a year, but unofficial meetings can be held almost every month.

The professors and other principal investigators have all gained experience in leading, coordinating and managing research projects funded by the Academy of Finland or European Commission. Stenberg, Luoto and Pellikka have had their research groups earlier, while the others are currently successfully building up theirs.

GIMMEC will practice researcher's mobility within the RC, but also outside of it as it has done in the past. Heiskanen made PhD studies at the Dept. of Geosciences and Geography, but post-doc studies within the Dept. of Forest Sciences, from which Mõttus changed to Dept. of Geosciences and Geography. Most of the members have carried out part of the research abroad (SPRI-Cambridge, Munich, Zurich, Umeå, Ottawa, Ghent, Wageningen, London, CSIRO-Melbourne, Toronto, INBE-Sao Paolo). A growing area of cooperation is East Africa and especially Nairobi, in which the partners are International Centre of Insect Physiology and Ecology, World Agroforestry Centre and University of Nairobi.

GIMMEC will set up homepages of its own with links to each of the teams and partners. A newsletter will be set up and mailed to its partners worldwide. Each year GIMMEC will arrange a 2-day research seminar in which GIMMEC members will present their current achievements. In addition 1-2 foreign distinguished guests will be invited to participate.

- RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes.

The strength of the leadership and management is that all the partners know each other well from the past, and each of the members have their own strong area of expertise. Members are experienced in leadership and management. As the GIMMEC has open and collegial scientific atmosphere there is a great potential to transfer good methods and tools across the disciplines.

The challenges are how to attract funding for the RC so that it would be active in collaborative research and develop itself. A challenge for the PI's is the short-term and temporary contracts of the doctoral students.

7 EXTERNAL COMPETITIVE FUNDING OF THE RC

- Listing of the RCs external competitive funding, where:
  - the funding decisions have been made during 1.1.2005-31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki

- Academy of Finland (AF) - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010: 1750000

- Finnish Funding Agency for Technology and Innovation (TEKES) - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010:

- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010: 180000

- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010:

- International and national foundations – names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the foundations: Nokia Donation
  - Koneen säätiö
  - Suomen kulttuurirahasto
  - Metsämiesten säätiö
  - Emil Aaltosen Säätiö
  - Marjatta ja Eino Kollin Säätiö
  - total amount of funding (in euros) from the above-mentioned foundations: 340000

- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the funding organizations: Nature Kenya
  - Chinese Scholarship Council
  - total amount of funding (in euros) from the above-mentioned funding organizations: 20000

- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the funding organizations: Centre of International Mobility
  - Ministry of Foreign Affairs of Finland
  - Ministry of Education
  - Palosuojelurahasto
  - total amount of funding (in euros) from the above-mentioned funding organizations: 1300000

8 RC'S STRATEGIC ACTION PLAN FOR 2011–2013 (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's future perspectives in respect to research and doctoral training.

GOAL 1. Having a strong and well functioning RC (2011-12)

A1.1) Establishing a common working culture (2011): The PI's will define together the common working culture for the entire RC (Lab meetings, e-mail lists and their use policies, selection and support of doctoral students and post-docs, handling, storing and documenting of project data sets). Common working culture will be adopted by the end of 2011.

A1.2) Gaining additional funding to support the work (2011-13): Funding is actively applied from the funding mechanisms of the Academy of Finland, TEKES and European Commission. Funding will be applied to the own projects of the RC, and the RC will participate in larger research groups, and thematic networks. The expertise of the entire group is used to formulate the cutting edge research questions, and to brush-up the applications. The potential doctoral and post-doctoral students are also encouraged to gain their own funding, to join the group.

A1.3) Networking with collaborating institutes (2011-13): We will maintain close relationship with our collaborators and seek for new interactions and collaboration with the relevant labs and research groups.

GOAL 2: Being leaders in monitoring and modelling of environmental change using remote sensing and geoinformatics.

A2.1) Recruiting high-level PhD students and post-doctoral researchers (2011-2013): Research is closely integrated in the MSc level teaching in all departments, ensuring the interest towards the research themes, as well as the needed background skills of the potential doctoral students. Doctoral student and post-doctoral positions are announced to an international audience, to ensure a) the quality of the incoming students and b) to increase the visibility of the group.

A2.2) Ensuring sufficient instruments and computing power for the research work (2011-12): We will update our equipment to have the powerful and up to date number crunching computers and spectro-radiometric field and laboratory equipment needed for high-level research.

A2.3) Continuing high-level research on empirical and theoretical studies on interactions between land surface and radiation: The research current work will be continued and new researchers will be integrated to currently running projects (actions 1.1 & 1.3). From 4 to 6 researchers will be working of the topic, publishing their results in the most respected journals in the field remote sensing and physics.

A2.4) Continuing the development of applicable methodologies for mapping of habitat properties and land cover change: On the basis of theoretical understanding (2.3), we will develop enhanced and applicable solutions for land cover change mapping. The work will also produce data sets on land cover and LC change in different regions from the arctic to the tropics. 5 to 7 researchers will be working of the topic, publishing their results in the most respected journals in the field of remote sensing, geoinformatics and environmental modeling.

A2.5) Gaining understanding on and modeling the consequences of land cover change: We will use our data sets and methods to model land cover and climate change interactions and environmental consequences of land cover change to biodiversity, water resources and livelihoods. 5 to 7 researchers will be working of the topic, publishing their results in the most respected journals in the field of global change, land use planning, biogeography, geoinformatics and environmental modeling.

RC-SPECIFIC STAGE 2 MATERIAL

GOAL 3. Sharing the results with a broader audience (2011-13)

A3.1) Sharing our data sets: Our land-cover data will be made available to potential collaborating partners, leading to increased collaboration, and applications for our land cover (change) models.

A3.2) Integrating students to the work: The RC's work continues to be integrated to university courses of geography, forest mensuration, and biology.

A3.3) Capacity building (in developing countries):The team members will continue to participate in teaching projects in developing countries and e.g. schools teachers, to distribute the their findings to grass root-level, when appropriate.

A3.4) Popularizing our results: We will continue to publish our results and findings also outside international journals, on webpages, professional magazines and newspapers.

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9 SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

The material for stage 2 is compiled as a group effort of all PI's in the research group, lead by prof. Petri Pellikka. The first draft of the stage 2 document was drafted out by Prof. Pellikka after a meeting with RC members and contribution by email from those members who are currently on research visits abroad. After the first draft the members commented the draft, giving suggestions for the enhanced research topics, operational conditions and other parts. The members sent lists of past and current research visits and cooperation partners abroad and provided lists of the funding for the period between 2005-2010. The GIMMEC drafted together the strategy for 2011-2013, which was compiled by PI Dr. Tuuli Toivonen, who also participated in the final editing of the material together with Prof. Pellikka.

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

GIMMEC/Pellikka

1 Analysis of publications

- Associated person is one of Petri Pellikka , Jan Hjort , Miska Luoto , Pauline Stenberg , Saku Anttila , Barnaby Clark , Janne Heiskanen , Johan Hendriks , Nina Himberg , Johanna Hohenthal , Tino Petri Johansson , Eduardo Eiji Maeda , Jari-Pekka Mäkiaho , Matti Mõttus , Miina Rautiainen , Maria Salonen , Mika Siljander , Tuuli Kaarina Toivonen , Tarmo Virtanen ,

Publication type	Publication year						
	2005	2006	2007	2008	2009	2010	Total Count 2005 - 2010
A1 Refereed journal article	17	22	23	23	29	24	138
A2 Review in scientific journal						1	1
A3 Contribution to book/other compilations (refereed)		1	2	2	7	1	13
A4 Article in conference publication (refereed)	8	2	6	3	1	2	22
B1 Unrefereed journal article	2	3	3	5	3	1	17
B2 Contribution to book/other compilations (non-refereed)		2		1	1		4
B3 Unrefereed article in conference proceedings	1	2	2	3			8
C1 Published scientific monograph		1		1	1	1	4
C2 Edited book, compilation, conference proceeding or special issue of journal	1	2	1		2	2	8
D1 Article in professional journal						2	2
D2 Article in professional hand or guide book or in a professional data system, or text book material		1			1		2
D4 Published development or research report	1	2					3
D5 Text book or professional handbook or guidebook or dictionary			1				1
E1 Popular article, newspaper article			3	1	2	6	12
E1 Popular contribution to book/other compilations			2				2

GIMMEC/Pellikka

2 Listing of publications

A1 Refereed journal article

2005

Heikkinen, RK, Luoto, M, Kuussaari, M, Pöyry, J **2005**, 'New insights into butterfly-environment relationships using partitioning methods', **Proceedings of the Royal Society B. Biological Sciences**, vol 272, pp. 2203-2210.

Kaasalainen, S, Rautiainen, M **2005**, 'Hot spot reflectance signatures of common boreal lichens', **Journal of Geophysical Research**, vol 110, no. D20, 10 s.

King, DJ, Olthof, I, Pellikka, PKE, Seed, ED, Butson, C **2005**, 'Modelling and mapping damage to forests from an ice storm using remote sensing and environmental data', **Natural Hazards**, vol 35, no. 3, pp. 321-342.

Luoto, M, Hjort, JK **2005**, 'Evalutation of current statistical approaches for predictive geomorphological mapping', **Geomorphology**, vol 67, no. 3-4, pp. 299-315.

Luoto, M, Hjort, J **2005**, 'Evaluation of current statistical approaches for predictive geomorphological mapping', **Geomorphology**, vol 67, pp. 299-315.

Luoto, M, Pöyry, J, Heikkinen, RK, Saarinen, K **2005**, 'Uncertainty of bioclimate envelope models based on the geographical distribution of species', **Global Ecology and Biogeography**, vol 14, pp. 575-584.

Manninen, T, Stenberg, P, Rautiainen, M, Voipio, P, Smolander, H **2005**, 'Leaf area index estimation of boreal forest using ENVISAT ASAR', **IEEE Transactions on Geoscience and Remote Sensing**, vol 43, no. 11, pp. 2627-2635.

Muukkonen, P, Heiskanen, J **2005**, 'Estimating biomass for boreal forests using ASTER satellite data combined with standwise forest inventory data', **Remote Sensing of Environment**, vol 99, no. 4, pp. 434-447.

Peltoniemi, JI, Kaasalainen, S, Näränen, JA, Rautiainen, M, Stenberg, P, Smolander, H, Smolander, S, Voipio, P **2005**, 'BRDF measurement of understory vegetation in pine forests: dwarf shrubs, lichen, and moss', **Remote Sensing of Environment**, vol 94, no. 3, pp. 343-354.

Pykälä, J, Luoto, M, Heikkinen, RK, Kontula, T **2005**, 'Plant species richness and persistence of rare plants in abandoned semi-natural grasslands in northern Europe', **Basic and Applied Ecology**, vol 6, pp. 25-33.

Rautiainen, M **2005**, 'Retrieval of leaf area index for a coniferous forest by inverting a forest reflectance model', **Remote Sensing of Environment**, vol 99, no. 3, pp. 295-303.

Rautiainen, M, Stenberg, P **2005**, 'Simplified tree crown model using standard forest mensuration data for Scots pine', **Agricultural and Forest Meteorology**, vol 128, no. 1/2, pp. 123-129.

Rautiainen, M, Stenberg, P, Nilson, T **2005**, 'Estimating canopy cover in Scots pine stands', **Silva Fennica**, vol 39, no. 1, pp. 137-142.

Rautiainen, M, Stenberg, P **2005**, 'Application of photon recollision probability in coniferous canopy reflectance simulations', **Remote Sensing of Environment**, vol 96, no. 1, pp. 98-107.

Sihvonen, P, Siljander, M **2005**, 'Species diversity and geographical distribution of Scopulini moths (Lepidoptera: Geometridae, Sterrhinae) on a world-wide scale', **Biodiversity and Conservation**, vol 14, no. 3, pp. 703-721.

Smolander, S, Stenberg, P **2005**, 'Simple parameterizations of the radiation budget of uniform broadleaved and coniferous canopies', **Remote Sensing of Environment**, vol 94, no. 3, pp. 355-363.

Virkkala, R, Luoto, M, Heikkinen, RK, Leikola, N **2005**, 'Distribution patterns of boreal marshland birds: modelling the relationships to land cover and climate', **Journal of Biogeography**, vol 32, pp. 1957-1970.

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Austin, MP, Belbin, L, Meyers, JA, Doherty, MD, Luoto, M **2006**, 'Evaluation of statistical models used for predicting plant species distributions: Role of artificial data and theory', **Ecological Modelling**, vol 199, pp. 197-216.

Fronzek, S, Luoto, M, Carter, TR **2006**, 'Potential effect of climate change on the distribution of palsa mires in subarctic Fennoscandia', **Climate Research**, vol 32, pp. 1-12.

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Heiskanen, J **2006**, 'Tree cover and heoght estimation in the Fennoscandian tundra-taiga transition zone using multiangular MISR data', **Remote Sensing of Environment**, vol 103, pp. 97-114.

Hjort, JK, Luoto, M **2006**, 'Modelling patterned ground distribution in Finnish Lapland: an integration of topographical, ground and remote sensing information', **Geografiska Annaler. Series A. Physical Geography**, vol 88, no. 1, pp. 19-29.

Hjort, J, Luoto, M **2006**, 'Modelling patterned ground distribution in Finnish Lapland: An integration of topographical, ground and remote sensing information', **Geografiska Annaler. Series A. Physical Geography**, vol 88A, pp. 19-29.

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Kultti, S, Mikkola, K, Virtanen, T, Timonen, M, Eronen, M **2006**, 'Past changes in the Scots pine forest line and climate in Finnish Lapland: a study based on megafossils, lake sediments and GIS-based vegetation and climate data', **Holocene**, vol 16, no. 3, pp. 381-391.

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Hendriks, JPM, Pellikka, P **2007**, 'Semi-automatic glacier delineation from Landsat imagery over Hintereisferner glacier in the Austrian Alps', **Zeitschrift für Gletscherkunde und Glazialgeologie.**, vol 41, pp. 55-57.

Hjort, J, Luoto, M, Seppälä, M **2007**, 'Landscape scale determinants of periglacial features in subarctic Finland: a grid-based modelling approach', **Permafrost and Periglacial Processes**, vol 18, pp. 115-127.

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2010

Rautiainen, M, Heiskanen, JH **2010**, 'Metsän vuodenaikaisvaihtelut satelliittikuvissa', **Metsätieteen aikakauskirja**, no. 1, pp. 75-78.

B2 Contribution to book/other compilations (non-refereed)

2006

Mikkola, K, Virtanen, T **2006**, 'Ilmaston ja maastonmuotojen vaikutus männyn metsänrajaan', **Ilmastonmuutos Lapissa - näkyvätkö muutokset - sopeutuuko luonto?, Metsäntutkimuslaitos, Rovaniemen toimintayksikkö, Rovaniemi**, pp. 14-24.

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2008

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2009

Virtanen, T **2009**, 'Arktiset alueet: Metsänrajalta kylmyysaavikolle', in M Piirainen, J Enroth, R Vauras, H Väre (eds)**, Kasvit. Luonnossa. 3, [WSOY] : Weilin + Göös, Helsinki**, pp. 72-79.

GIMMEC/Pellikka

B3 Unrefereed article in conference proceedings

2005

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2006

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Rautiainen, M, Mõttus, M, Stenberg, P **2006**, 'Physically-based parametrization of the reflectance of coniferous stands', in **Proceedings: international workshop 3D remote sensing in Forestry, Vienna, 14th-15th Feb. 2006 / Tatjana Koukal, Werner Schneider (eds.)**, pp. 141-144.

2007

Lang, M, Kuusk, A, Nilson, T, Mõttus, M, Kuusk, J, Rautiainen, M, Lükk, T **2007**, 'Järvselja test site for the RAMI (Radiation transfer Model Intercomparison) Phase 4', in **Proceedings of the ForestSat 2007 conference, Montpellier, France (November 5-7)**.

Reusen, I, Holzwarth, S, Nieke, J, Kooistra, L, Malthus, T, Chabrillat, S, Kaufmann, H, Gomez-Sanches, J, Homolova, L, Itten, K, Malenovsky, Z, Muelleman, K, de Miguel, E, Mõttus, M, Müller, A, Pellikka, P, Schaepman, M **2007**, 'Towards an improved access to hyperspectral data across Europe (HYRESSA)', in **Proceedings of 5th EARSeL Workshop on Imaging Spectroscopy**.

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Fronzek, S, Carter, T, Räisänen, J, Ruokolainen, L, Luoto, M **2008**, 'Probabilistic projections of climate change effects on sub-arctic palsa mires using the response surface method', in **Interactions between Land Use and Climate – Multidisciplinary Perspectives from Local Land Use to Global Climate** , pp. 23.

Mõttus, M, Rautiainen, M, Stenberg, P **2008**, 'Vegetation reflectance modeling: connecting canopy structure, angular effects and photon recollision probability', in **14th Australasian remote sensing and photogrammetry conference: Darwin, Australia, 29 September - 3 October 2008 : proceedings**.

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C1 Published scientific monograph

2006

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2008

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2010

Toivonen, T, Jaakkola, T, Vuori, M **2010**, *Solmukohta vai pussinperä? Kumpulan kampus pääkaupunkiseudun joukkoliikenneverkossa*, **Helsingin yliopiston maantieteen laitoksen julkaisuja B, no. B55, Helsingin yliopisto, Geotieteiden ja maantieteen laitos, Helsinki**.

C2 Edited book, compilation, conference proceeding or special issue of journal

2005

Hjort, JK, Kosonen, K (eds) **2005**, *Palsoista pajalaan: Tutkimuretki Pohjois-Fennoskandiassa*, **Helsingin yliopiston maantieteen laitoksen tutkimusretkiraportteja, no. 41, [Helsingin yliopisto], Helsinki**.

2006

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Mäkiaho, J(, Kaakinen, I, Rinne, P, Mäkiaho, J (eds) **2006**, *Megacitystä Milpalle: tutkimusretki Meksikoon 2006,* **Helsingin yliopiston maantieteen laitoksen tutkimusretkiraportteja, Helsingin yliopiston maantieteen laitos, Helsinki**.

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Johansson, T, Pellikka, P, Sorvali, J (eds) **2009***, SAFARI NJEMA: an interdisciplinary field expedition to South-East Kenya,* **Department of geography, Helsinki**.

Pellikka, P, Rees, WG (eds) **2009***, Remote Sensing of Glaciers – techniques for topographic, spatial and thematic mapping of glaciers,* **CRC Press**.

2010

Inkinen, TA, Linkola, H, Hjort, J (eds) **2010***, Terra 122:1,* **Terra. Maantieteellinen aikakauskirja, no. 1, vol. 122**, vol. 122, 1 edn**, Suomen maantieteellinen seura**.

Pellikka, P, Rees, WG (eds) **2010***, Remote Sensing of Glaciers: Techniques for topographic, spatial and thematic mapping of glaciers,* vol. 2010, **CRC Press, Taylor & Francis Group, A Balkema Book, Leiden**.

D1 Article in professional journal

2010

Siljander, M **2010**, 'Pelastuspalvelujen saavutettavuudesta selvitys: Paikkatieto paljastaa tulevaisuuden paloaseman sijainnin', **Kuntatekniikka**, vol 2010, no. 8, pp. 13-15.

Vuori, M **2010**, 'Saavutettavuuden maantiedettä Perun Amazoniassa', **Positio : paikkatiedon erikoislehti**, vol 2010, no. 1, pp. 6-8.

D2 Article in professional hand or guide book or in a professional data system, or text book material

2006

Himberg, N **2006**, '3000 m – ahtaan- ja korkeanpaikan kammot samana päivänä.', **Transalpina 2005 – Seminaarityöt ja matkapäiväkirjat tutkimusretkeltä Alppien ylitse ja takaisin. , Helsingin Yliopiston maantieteen laitoksen tutkimusretkiraportteja 42, Helsinki**, pp. 100-101.

2009

Himberg, N **2009**, 'The multiple uses and values of Taita Hills forests.', in T Johansson, P Pellikka, J Sorvali (eds)**, Safari njema – an interdisciplinary field expedition to South-East Kenya. , Helsingin yliopiston maantieteen laitoksen tutkimusretkiraportteja, no. 46, University of Helsinki, Helsinki**.

D4 Published development or research report

2005

Watt, A, Gelan, A, Courbaud, B, Topping, CJ, Klok, C, Maes, D, Bogusz, D, Framstad, E, Skov, F, Waetzold, F, Matteucci, G, Deffuant, G, Haberl, H, Tóth, J, Heizlar, J, Krause, K, Halada, L, Drechsler, M, Luoto, MS, Petit, S, Dullinger, S, Marañon, T, Parr, T, Dirnböck, T, Tappeiner, U, Grandin, U **2005***, Modelling and Forecasting,* **A Long-Term Biodiversity, Ecosystem and Awareness Research Network (ALTER-Net)**.

2006

Pellikka, P, Vuolteenaho, J **2006***, Transalpina 2005: seminaarityöt ja matkapäiväkirjat tutkimusretkeltä Alppien ylitse ja takaisin,* **Helsingin yliopiston maantieteen laitoksen tutkimusretkiraportteja, no. 42, Helsingin Yliopisto, Helsinki**.

Schulman, A, Luoto, MS **2006***, Concept of "High Nature Value (HNV) farmland" and identification of HNV areas in Finland,* **Finnish Environment Institute, Helsinki**.

D5 Text book or professional handbook or guidebook or dictionary

GIMMEC/Pellikka

2007

Ervasti, V, Kytömäki, J, Paananen, J, Toivonen, T **2007**, *Globus,* vol. , Aluetutkimus**, WSOY Oppimateriaalit, Helsinki**.

E1 Popular article, newspaper article

2007

Kalliola, R, Toivonen, T **2007**, 'Tailor-made ficilities to enhance spatial communication: services according to user needs',
Geoinformatics, vol 10, no. 5, pp. 20-23.

Pellikka, P **2007**, 'Kenian vuorilla jalat hapoilla', **Helsingin Sanomat**.

Toivonen, T, Kalliola, R **2007**, 'A Novel solution of the Finnish NSDI: Data lending service', **Geoinformatics**, vol 10, no. 7, pp. 24-25.

2008

Johansson, T **2008**, 'Maantieteen opetuksen tulevaisuutta tarkasteltiin Liverpoolissa', **Natura**, vol 45, no. 3, pp. 17-18.

2009

Johansson, T **2009**, 'iGuess: Paikkatietoalan täydennyskoulutusta opettajille', **Natura**, vol 4 (2009), pp. 12-13.

Toivonen, T **2009**, 'Innovaatioiden esteitä poistettava', **Helsingin Sanomat**.

2010

Pellikka, P **2010**, 'Richard Leakeyn hurja elämä', **Helsingin Sanomat**, vol 2010, pp. D1.

Pellikka, P **2010**, 'Eyjafjöll repesi jo maaliskuussa', **Helsingin Sanomat**, vol 2010, pp. D1.

Pellikka, P **2010**, 'Tuhka syntyi jään ja magman kohdatessa', **Helsingin Sanomat**, vol 2010, pp. D1.

Pellikka, P **2010**, 'Pääkallon paikalla: Turkanajärven rannoilla eroosio paljastaa ihmisen menneisyyttä', **Helsingin Sanomat**, vol 2010,
pp. D1.

Pellikka, P **2010**, 'Entä jos Katla purkautuu?', **Helsingin Sanomat**, vol 2010, pp. D1.

Pellikka, P **2010**, 'Rannoilla kävelystä täsmäiskuihin', **Helsingin Sanomat**, vol 2010, pp. D1.

E1 Popular contribution to book/other compilations

2007

Walters, M, Shetler, SG **2007**, 'Aavikot', in JF Luhr, M Tikkanen (eds)**, Maapallo, Karttakeskus, Helsinki**, pp. 282-301.

Farndon, J, Palmer, D, Walters, M **2007**, 'Muuttuva maa', in JF Luhr, M Tikkanen (eds)**, Maapallo, Karttakeskus, Helsinki**, pp. 104-
139.

GIMMEC/Pellikka

1   Analysis of activities 2005-2010

- Associated person is one of Petri Pellikka , Jan Hjort , Miska Luoto , Pauline Stenberg , Saku Anttila , Barnaby Clark , Janne Heiskanen , Johan Hendriks , Nina Himberg , Johanna Hohenthal , Tino Petri Johansson , Eduardo Eiji Maeda , Jari-Pekka Mäkiaho , Matti Mõttus , Miina Rautiainen , Maria Salonen , Mika Siljander , Tuuli Kaarina Toivonen , Tarmo Virtanen ,

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	18
Prizes and awards	8
Editor of research journal	52
Editor of research anthology/collection/conference proceedings	1
Peer review of manuscripts	54
Membership or other role in research network	5
Membership or other role in national/international committee, council, board	43
Membership or other role in public Finnish or international organization	14
Membership or other role of body in private company/organisation	6
Participation in interview for written media	20
Participation in radio programme	2
Participation in TV programme	2

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2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Petri Pellikka ,

Supervision of doctoral thesis, Petri Pellikka, 01.01.2005 → 31.12.2005, Germany

Supervision of doctoral thesis, Petri Pellikka, 01.01.2005 → 31.01.2005, Germany

Supervision of doctoral thesis, Petri Pellikka, 01.01.2006 → 31.12.2006, Finland

Supervision of doctoral thesis, Petri Pellikka, 01.01.2008 → 31.12.2008, Finland

Alemu Gonsamon jatko-opintojen ohjaus, Petri Pellikka, 2010 → …

Barnaby Clarkin jatko-opintojen ohjaus, Petri Pellikka, 2010 → …

Mika Siljanderin jatko-opintojen ohjaus, Petri Pellikka, 2010 → …

Miska Luoto ,

Remote sensing and GIS based models in biodiversity assessments, Miska Luoto, 01.01.2007 → 06.2011

Spatial modeling of aquatic vegetation and catchment scale water protection, Miska Luoto, 01.2007 → …

Modelling of high-latitude vegetation change, Miska Luoto, 01.01.2008 → …

Spatial modelling of water quality in river basins, Miska Luoto, 06.2008 → …

Activity layer of palsas, Miska Luoto, 11.2009 → …

Breeding habitat suitability modeling for endangered raptors in Finland, Miska Luoto, 01.01.2009 → …

Space use and habitat selection of the wolf (Canis Lupus) in human-altered environment in Finland, Miska Luoto, 01.2009 → 03.2011

Complex shoreline processes and vegetation changes on sandy uplifting beaches., Miska Luoto, 04.2010

Spatial modelling and mapping of underwater biota and habitats,, Miska Luoto, 08.2010

Pauline Stenberg ,

Supervisor of PhD thesis, Pauline Stenberg, 2005

Supervisor of PhD thesis, Pauline Stenberg, 2006

Prizes and awards

Petri Pellikka ,

Suomalaisen Tiedeakatemian jäsenyys, Petri Pellikka, 2010 → …, Finland

Pauline Stenberg ,

Scientific Achievement Award, Pauline Stenberg, 1995 → …

Cajander Bronze Medal, Pauline Stenberg, 2009

Matti Mõttus ,

Group of Eight European Fellow, Matti Mõttus, 01.08.2008 → 30.11.2008

Miina Rautiainen ,

Best doctoral dissertation 2005, Miina Rautiainen, 2005

Award for a prominent young researcher 2006, Miina Rautiainen, 2006

Doctrix ultima 2008, Miina Rautiainen, 2008

Maria Salonen ,

ProGIS ry:n opinnäytepalkinto (2009), Maria Salonen, 2009, Finland

Editor of research journal

Petri Pellikka ,

GIMMEC/Pellikka

Boreal Environmental Research, Petri Pellikka, 01.08.2005 → 31.08.2005

Computers and Geosciences, Petri Pellikka, 01.12.2005 → 31.12.2005, United States

Fennia, Petri Pellikka, 01.03.2005 → 31.03.2005, Finland

Journal of Environmental Management, Petri Pellikka, 01.06.2005 → 30.06.2005, United States

Photogrammteric Journal of Finland, Petri Pellikka, 01.01.2005 → 31.12.2005, Finland

Terra, Petri Pellikka, 01.10.2005 → 31.10.2005, Finland

Kuwait Journal of Science and Engineering, Petri Pellikka, 01.08.2006 → 31.08.2006, Kuwait

Photogrammetric Engineering & Remote Sensing, Petri Pellikka, 01.06.2006 → 30.06.2006, United States

Photogrammteric Journal of Finland, Petri Pellikka, 01.01.2006 → 31.12.2006, Finland

Tellus B, Petri Pellikka, 01.12.2006 → 31.12.2006

Terra, Petri Pellikka, 01.12.2006 → 31.12.2006, Finland

Ecological Indicators, Petri Pellikka, 01.01.2007 → 31.12.2007, United States

Journal of Applied Earth Observation and Geoinformation, Petri Pellikka, 01.01.2007 → 31.12.2007, United Kingdom

Proceedings of the 9th Scandinavian Research Conference on Geographical Information Science, Petri Pellikka, 01.01.2007 → 31.12.2007, Norway

Remote Sensing of Environment, Petri Pellikka, 01.01.2007 → 31.12.2007, United States

SENSORS, Petri Pellikka, 01.01.2007 → 31.12.2007

The Photogrammetric Journal of Finland, Petri Pellikka, 01.01.2007 → 31.12.2007, Finland

The Photogrammetric Journal of Finland, Petri Pellikka, 01.01.2007 → 31.12.2007, Finland

Applied Optics, Petri Pellikka, 01.01.2008 → 31.12.2008, United States

Forest Ecology and Management, Petri Pellikka, 01.01.2008 → 31.12.2008

Hemispherical photography in Forest Science: Theory, Methods and Applications., Petri Pellikka, 01.01.2008 → 31.12.2008, Canada

International Journal of Applied Earth Observation and Geoinformation, Petri Pellikka, 01.01.2008 → 31.12.2008

International Journal of Applied Earth Observation and Geoinformation, Petri Pellikka, 01.01.2008 → 31.12.2008

Land Degradation and Development, Petri Pellikka, 01.01.2008 → 31.12.2008

Remote Sensing of Environment, Petri Pellikka, 01.01.2008 → 31.12.2008, United States

The Photogrammetric Journal of Finland, Petri Pellikka, 01.01.2008 → 31.12.2008, Finland

International Journal of Applied Earth Observation and Geoinformation, Petri Pellikka, 2010 → …

International Journal of Applied Geospatial Research, Petri Pellikka, 2010 → …

Photogrammetric Journal of Finland, Petri Pellikka, 2010 → …

Jan Hjort ,

Agricultural and Forest Meteorology, Jan Hjort, 01.01.2007 → 31.12.2007

Fennia, Jan Hjort, 01.01.2007 → 31.12.2007, Finland

Geomorphology, Jan Hjort, 01.01.2007 → 31.12.2007

Agricultural and Forest Meteorology, Jan Hjort, 01.01.2008 → 31.12.2008

Biological Conservation, Jan Hjort, 01.01.2008 → 31.12.2008

Pauline Stenberg ,

Agricultural and Forest Meteorology, Pauline Stenberg, 1999 → 2007

Tree Physiology, Pauline Stenberg, 2000 → 2007

Silva Fennica, Pauline Stenberg, 2002 → 2005

Scandinavian Journal of Forest Research, Pauline Stenberg, 2009 → 2012

Tino Petri Johansson ,

GIMMEC/Pellikka

Geographical Information Systems Applications for Schools – GISAS, Tino Petri Johansson, 15.11.2006, Finland

Review of International Geographical Education Online, Tino Petri Johansson, 2010 → …

Jari-Pekka Mäkiaho ,

Helsingin yliopiston tutkimusretkiraportteja 43, Jari-Pekka Mäkiaho, 01.01.2006 → 31.12.2006, Finland

Terra, Jari-Pekka Mäkiaho, 01.01.2006 → 31.12.2006, Finland

International journal of geographic information science, Jari-Pekka Mäkiaho, 01.01.2007 → 31.12.2007, Australia

Fennia, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, Finland

Global Change Biology, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, United States

International Journal of Geographic Information Science, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, Australia

Terra, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, Finland

Tuuli Kaarina Toivonen ,

Journal of Biogeography, Tuuli Kaarina Toivonen, 01.01.2008 → 31.12.2008, United Kingdom

Tarmo Virtanen ,

Entomologica Fennica, Tarmo Virtanen, 25.04.2005 → 31.12.2005, Finland

Remote Sensing of Environment, Tarmo Virtanen, 30.10.2005 → 31.12.2005, United States

Ecological Engineering, Tarmo Virtanen, 09.02.2006 → 31.12.2006

Remote Sensing of Environment, Tarmo Virtanen, 04.09.2007 → 31.12.2007, United States

Editor of research anthology/collection/conference proceedings

Petri Pellikka ,

Remote Sensing of Glaciers – techniques for topographic, spatial and thematic mapping of glaciers, Petri Pellikka, 2010 → …

Peer review of manuscripts

Petri Pellikka ,

Applied Geography, Petri Pellikka, 05.06.2010 → 15.06.2010

Ecological Indicators, Petri Pellikka, 22.05.2010 → 28.05.2010

Geoscience and Remote Sensing Letters, Petri Pellikka, 01.12.2010 → 20.12.2010

Int. J. of Applied Earth Observation and Geoinformation, Petri Pellikka, 14.04.2010 → 18.04.2010

Land Degradation and Development, Petri Pellikka, 01.11.2010 → 10.11.2010

Land Degradation and Development, Petri Pellikka, 02.08.2010 → 06.08.2010

Landscape and Urban Planning, Petri Pellikka, 01.09.2010 → 09.09.2010

Remote Sensing of Environment, Petri Pellikka, 20.11.2010 → 25.11.2010

Remote Sensing of Environment, Petri Pellikka, 01.10.2010 → 13.10.2010

Miska Luoto ,

Global Change Biology, Miska Luoto, 08.2010 → …

Global Ecology and Biogeography, Miska Luoto, 09.2010 → …

Journal of Biogeography, Miska Luoto, 03.2010 → …

Pauline Stenberg ,

Agricultural and Forest Meteorology, Pauline Stenberg, 2005

Canadian Journal of Remote Sensing, Pauline Stenberg, 2005

IEEE Transactions on Geoscience & Remote Sensing, Pauline Stenberg, 2005

Silva Fennica, Pauline Stenberg, 2005 → 2010

GIMMEC/Pellikka

Canadian Journal of Remote Sensing, Pauline Stenberg, 2007

Remote Sensing of Environment, Pauline Stenberg, 2007 → 2010

Functional Plant Biology, Pauline Stenberg, 2008

Annals of Forest Science, Pauline Stenberg, 2009 → …

Canadian Journal of Forest Research, Pauline Stenberg, 2010

Janne Heiskanen ,

International Journal of Remote Sensing, Janne Heiskanen, 2006

Ecological Informatics, Janne Heiskanen, 2008

International Journal of Digital Earth, Janne Heiskanen, 2008

Journal of Applied Geography, Janne Heiskanen, 2008

Journal of Geophysical Research-Biogeosciences, Janne Heiskanen, 2008

European Journal of Forest Research, Janne Heiskanen, 2009

Geophysical Research Letters, Janne Heiskanen, 2009

International Journal of Remote Sensing, Janne Heiskanen, 2009

Journal of Environmental Management, Janne Heiskanen, 2009

Journal of Geophysical Research-Biogeosciences, Janne Heiskanen, 2009

Remote Sensing, Janne Heiskanen, 2009

Remote Sensing of Environment, Janne Heiskanen, 2009

Silva Fennica, Janne Heiskanen, 2009

European Journal of Forest Research, Janne Heiskanen, 2010

Journal of Environmental Management, Janne Heiskanen, 2010

Remote Sensing of Environment, Janne Heiskanen, 2010

Tino Petri Johansson ,

Geographica Pannonica, Tino Petri Johansson, 15.01.2009 → …, Serbia

European Journal of Geography, Tino Petri Johansson, 01.05.2010 → …

Matti Mõttus ,

External reviewer for Journal of Quantitative Spectroscopy and Radiative Transfer , Matti Mõttus, 01.07.2007 → …

External reviewer for Agricultural and Forest Meteorology, Matti Mõttus, 01.07.2009 → …

External reviewer for IEEE Transactions on Geoscience and Remote Sensing, Matti Mõttus, 01.07.2009 → …

External reviewer for International Journal of Remote Sensing, Matti Mõttus, 01.07.2009 → …

External reviewer for Remote Sensing of Environment, Matti Mõttus, 01.07.2009 → …

External reviewer for Silva Fennica , Matti Mõttus, 01.07.2009 → …

External reviewer for Plant, Cell & Environment, Matti Mõttus, 01.10.2010 → …

Miina Rautiainen ,

Forest Ecology and Management, Miina Rautiainen, 2005 → 2010

Journal of Environmental Management, Miina Rautiainen, 2005 → 2010

Remote Sensing of Environment, Miina Rautiainen, 2005 → 2010

Proceedings of the Estonian Academy of Sciences: Biology, Miina Rautiainen, 2006 → 2010

Boreal Environment Research, Miina Rautiainen, 2007 → 2010

Geophysical Research Letters, Miina Rautiainen, 2007 → 2010

International Journal of Remote Sensing, Miina Rautiainen, 2008 → 2010

GIMMEC/Pellikka

Silve Fennica, Miina Rautiainen, 2009 → 2010

Membership or other role in research network

Nina Himberg ,

Kehitysmaatutkimuksen ja -opetuksen koordinaattori, Nina Himberg, 09.2010 → 12.2011, Finland

Tutkimusasemakoordinaattori, Nina Himberg, 01.01.2010 → 31.05.2010, Kenya

Miina Rautiainen ,

Validation of Land European Remote Sensing Instruments (VALERI) network, Miina Rautiainen, 2003 → 2010

Nordic Network on Physically-based Remote Sensing of Forests (PHYSENSE), Miina Rautiainen, 2007 → 2008

Northern Eurasia Earth Science Partnership Iniative (NEESPI), Miina Rautiainen, 2008 → 2010

Membership or other role in national/international committee, council, board

Petri Pellikka ,

Bayerische Akademi der Wissenschaft, Kommission fur Glaziologie, Petri Pellikka, 01.01.2005 → 31.12.2005, Germany

The International Society for Photogrammetry and Remote Sensing, Petri Pellikka, 01.01.2005 → 31.12.2005

Bayerische Akademi der Wissenschaft, Kommission fur Glaziologie, Petri Pellikka, 01.01.2006 → 31.12.2006, Germany

COSPAR kansalliskomitea, Petri Pellikka, 01.01.2006 → 31.12.2006, Finland

GI Norden, Petri Pellikka, 01.01.2006 → 31.12.2006, Norway

Maantieteen kansalliskomitea, Petri Pellikka, 01.01.2006 → 31.12.2006, Finland

the International Society for Photogrammetry and Remote Sensing, Petri Pellikka, 01.01.2006 → 31.12.2006

COSPAR national committee, Petri Pellikka, 01.01.2007 → 31.12.2007

Commission for Glaciology of the Bavarian Academy of Science, Petri Pellikka, 01.01.2007 → 31.12.2007, Germany

Finnish Society of Photogrammetry and Remote Sensing, Petri Pellikka, 01.01.2007 → 31.12.2007

GI NORDEN, Petri Pellikka, 01.01.2007 → 31.12.2007, Norway

Geographical Society of Finland, Petri Pellikka, 01.01.2007 → 31.12.2007

International Society for Photogrammetry and Remote Sensing, Working Group VIII.8 Polar and Alpine Research, Petri Pellikka, 01.01.2007 → 31.12.2007

Commission for Glaciology of the Bavarian Academy of Science, Petri Pellikka, 01.01.2008 → 31.12.2008, Germany

Committee on space research (COSPAR) national committee, Petri Pellikka, 01.01.2008 → 31.12.2008, Finland

AISARES-tutkijakoulun johtokunta, Petri Pellikka, 2010 → …

Chairman of TERRA, Petri Pellikka, 2010 → …, Kenya

Devestun hallituksen jäsenyys, Petri Pellikka, 2010 → …

Director of Taita Research Station in Kenya of the University of Helsinki, Petri Pellikka, 2010 → …

Evaluator of a grant proposal, Petri Pellikka, 2010 → …

Evaluator of a grant proposal, Petri Pellikka, 2010 → …

Evaluator of a transnational access research proposal, Petri Pellikka, 2010 → …

Inspehtori Hämäläis-Osakunnassa, Petri Pellikka, 2010 → …

Jäsen Suomalaisessa Tiedeakatemiassa, Petri Pellikka, 2010 → …

Jäsenyys Baijerin Tiedeakatemiassa, Petri Pellikka, 2010 → …

Puheenjohtaja Hämäläisten Ylioppilassäätiössä, Petri Pellikka, 2010 → …

Tutkijakoulun johtokunnan jäsenyys, Petri Pellikka, 2010 → …

varajäsenyys UniPID:ssä, Petri Pellikka, 2010 → …

Miska Luoto ,

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GIMMEC/Pellikka

Geographical Society of Finland, Miska Luoto, 1998 → …, Finland

International Biogeography Society, Miska Luoto, 01.2007 → …

The International Permafrost Association, Miska Luoto, 11.2009 → …

EUCOP III International Organizing Committee, Miska Luoto, 06.2010, Norway

National Science Foundation USA, Miska Luoto, 01.2010 → …

Tino Petri Johansson ,

EUROGEO European Association of Geographers, Tino Petri Johansson, 05.09.2008 → 31.12.2008, Belgium

HERODOT (Network for Geography in Higher Education) / GIS Expert, Tino Petri Johansson, 01.01.2008 → 31.12.2008, United Kingdom

AGIT-GI_Forum conference programme committee member, Tino Petri Johansson, 2009 → 2011, Austria

Suomen Maantieteellisen Seuran hallituksen jäsen, Tino Petri Johansson, 01.01.2010 → …, Finland

Ylioppilastutkintolautakunnan apujäsen, Tino Petri Johansson, 01.05.2010 → …, Finland

Jari-Pekka Mäkiaho ,

Helsingin yliopiston Maantieteen laitoksen johtoryhmä, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, Finland

National Science Foundation, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, United States

Suomen Maantieteellinen Seura, Jari-Pekka Mäkiaho, 01.01.2008 → 31.12.2008, Finland

Tuuli Kaarina Toivonen ,

Geoinformatiikan neuvottelukunta, Tuuli Kaarina Toivonen, 01.10.2007 → 31.12.2007, Finland

Riksbankens Jubileumsfond, Tuuli Kaarina Toivonen, 01.01.2008 → 31.12.2008, Sweden

Membership or other role in public Finnish or international organization

Petri Pellikka ,

European Commission, tutkimushakemusten evaluaattori, Petri Pellikka, 19.09.2005 → 23.09.2005, Belgium

Slovakian Research and Development Support Agency, tutkimushakemusten evaluaattori, Petri Pellikka, 01.12.2005 → 31.12.2005, Slovakia

Estonian Science Foundation, tutkimushakemuksen arvioitsija, Petri Pellikka, 01.11.2006 → 30.11.2006, Estonia

Jan Hjort ,

Ylioppilastutkintolautakunnan maantieteen jaos, ylioppilaskokeen maantieteen kysymysten laadinta, Jan Hjort, 01.01.2008 → 31.12.2008, Finland

Miska Luoto ,

National Permafrost association (Finland), Miska Luoto, 11.2010 → …, Finland

Tino Petri Johansson ,

EU:n Sokrates/Minerva -ohjelman rajoittaman kolmivuotisen GISAS (Geographical Information Systems Applications for Schools) -hankkeen projektipäällikkö ja tutkija, Tino Petri Johansson, 01.10.2004 → 30.09.2006, Finland

Helsingin yliopiston koulutus- ja kehittämiskeskus Palmenia (opettajille järjestetty 5 op:n GIS-täydennyskoulutuskurssi), Tino Petri Johansson, 27.03.2006 → 28.04.2006, Finland

Paikkatietoasiain neuvottelukunnan tutkimus- ja koulutusjaos (TUTKO), Tino Petri Johansson, 01.01.2006 → 31.12.2006, Finland

Tuuli Kaarina Toivonen ,

Helsinki Greater Vision-kilpailu. Osallistuminen asiantuntijana hollantilaisen kilpailuryhmän työhön. Työ oli palkittujen joukossa jaetulla kolmannella sijalla., Tuuli Kaarina Toivonen, 01.05.2007 → 12.12.2007, Finland

Paikkatietoasiain neuvottelukunta, Tietopalvelut- ja yhteiskäyttöjaos, Tuuli Kaarina Toivonen, 01.01.2007 → 31.12.2007, Finland

Paikkatietoasiain neuvottelukunta, Tutkimus- ja koulutusjaos, Tuuli Kaarina Toivonen, 01.01.2007 → 31.12.2007, Finland

Ylioppilastutkintolautakunta, apujäsen, maantiede, Tuuli Kaarina Toivonen, 01.01.2007 → 31.12.2007, Finland

Opetushallituksen matematiikan ja luonnontieteiden neuvottelukunta, Tuuli Kaarina Toivonen, 01.01.2008 → 31.12.2008, Finland

Ylioppilastutkintolautakunta, apujäsen, Tuuli Kaarina Toivonen, 01.01.2008 → 31.12.2008, Finland

Membership or other role of body in private company/organisation

Petri Pellikka ,

ProGIS ry., Petri Pellikka, 01.01.2005 → 31.12.2005, Slovakia

ProGIS ry., Petri Pellikka, 01.01.2006 → 31.12.2006, Estonia

Tino Petri Johansson ,

Kirkkonummen Reserviupseeriyhdistys ry, Tino Petri Johansson, 01.01.2008 → 30.04.2011, United Kingdom

Tuuli Kaarina Toivonen ,

ProGIS ry, Tuuli Kaarina Toivonen, 01.01.2007 → 31.12.2007, Finland

Geoinformatiikan yliopistoverkosto FIUGINET, Tuuli Kaarina Toivonen, 01.01.2008 → 31.12.2008, Finland

Paikkatiedon yhdistys ProGIS ry., Tuuli Kaarina Toivonen, 01.01.2008 → 31.12.2008, Finland

Participation in interview for written media

Petri Pellikka ,

Helsingin Sanomat, Petri Pellikka, 14.01.2005 → 31.12.2011, Slovakia

Helsingin Sanomat, Petri Pellikka, 19.04.2005 → 31.12.2011, Slovakia

Mitä Missä Milloin 2006, Petri Pellikka, 01.10.2005 → 31.12.2011, Slovakia

Positio, Petri Pellikka, 19.04.2005 → 31.12.2011, Estonia

Suomen luonto, Petri Pellikka, 01.06.2005 → 31.12.2011, Slovakia

Suomen luonto, Petri Pellikka, 01.07.2005 → 31.12.2011, Slovakia

Tiede, Petri Pellikka, 01.01.2005 → 31.12.2011, Slovakia

Helsingin Sanomat, Petri Pellikka, 12.12.2006 → 31.12.2011, Estonia

Jan Hjort ,

Universitas Helsingiensis, Jan Hjort, 01.01.2007 → 31.12.2011, Finland

Yliopisto-lehti, Jan Hjort, 01.01.2007 → 31.12.2011, Finland

Tino Petri Johansson ,

Satakunnan kansa, Tino Petri Johansson, 05.12.2008, United Kingdom

Turun sanomat, Tino Petri Johansson, 29.11.2008, United Kingdom

Turvasanomat, Tino Petri Johansson, 29.11.2008, United Kingdom

Jari-Pekka Mäkiaho ,

Helsingin sanomien asuntomessuliite, Jari-Pekka Mäkiaho, 12.07.2006 → 31.12.2011, Finland

NYT!-liite 6/2006, Jari-Pekka Mäkiaho, 10.02.2006 → 31.12.2011, Finland

Espoon ympäristökeskuksen geologiaretken vetäjä, Jari-Pekka Mäkiaho, 02.09.2007 → 31.12.2011, Australia

Espoon kaupungin ympäristökeskuksen geologiaretki, Jari-Pekka Mäkiaho, 19.07.2008 → 31.12.2011, Finland

Tuuli Kaarina Toivonen ,

Haastattelu Tekniikka&Talous-lehteen, Tuuli Kaarina Toivonen, 26.09.2007 → 31.12.2011, Finland

Paikkatietomarkkinat, kutsuesitys Paikkatietoakatemiassa, Tuuli Kaarina Toivonen, 26.09.2007 → 31.12.2011, Finland

VALTAKUNNALLISET VIRTUAALIOPETUKSEN PÄIVÄT 2008, Tuuli Kaarina Toivonen, 26.11.2008 → 31.12.2011, Finland

Participation in radio programme

Matti Mõttus ,

Interview for daily news program, Estonian national radio, Matti Mõttus, 25.08.2010, Estonia

GIMMEC/Pellikka

Miina Rautiainen ,

Havumetsistä laadukasta tietoa satelliittikuvista (in English: "Valuable information on coniferous forests from satellite images", Miina Rautiainen, 2005, Finland

Participation in TV programme

Petri Pellikka ,

TV 2, Pallo hallussa, Petri Pellikka, 18.08.2005, Slovakia

Tarmo Virtanen ,

TV-uutiset, Tarmo Virtanen, 16.07.2005 → 31.12.2011, United States

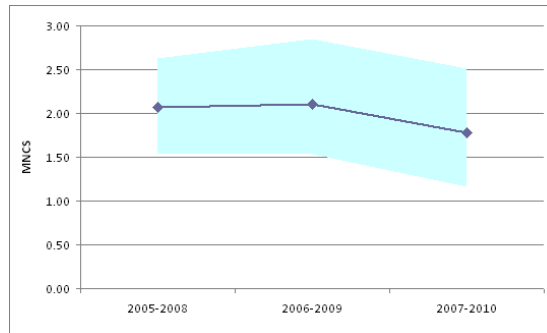INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING
AT THE UNIVERSITY OF HELSINKI

Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010
by CWTS, Leiden University, the Netherlands

Research Group: Pellikka P

Basic statistics

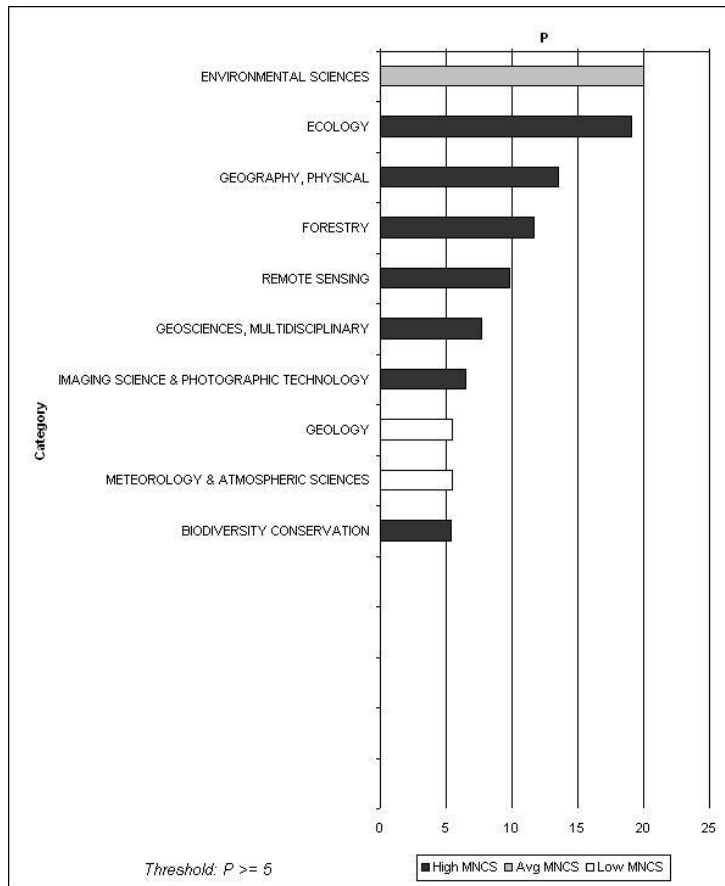|	
Number of publications (P)	124
Number of citations (TCS)	960
Number of citations per publication (MCS)	7.74
Percentage of uncited publications	27%
Field-normalized number of citations per publication (MNCS)	1.92
Field-normalized average journal impact (MNJS)	1.56
Field-normalized proportion highly cited publications (top 10%)	2.21
Internal coverage	.69

Trend analyses

MNCS
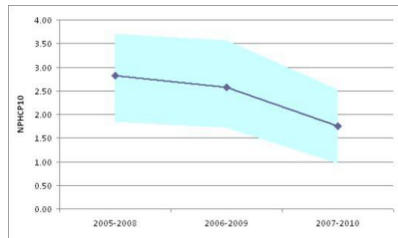
THCP10
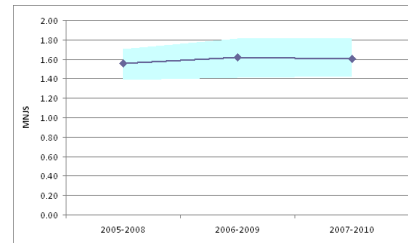
MNJS

Collaboration
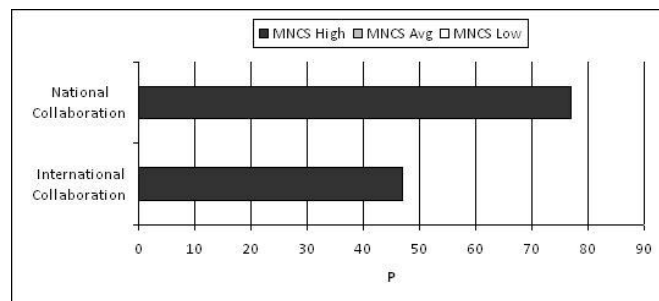
Performance (MNCS) by collaboration type

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by CWTS, Leiden University, the Netherlands

Research profile

Threshold: P >= 5

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UNIVERSITY OF HELSINKI