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HYPER-I-NET
Hyperspectral Imaging Network

Research Training Network

D9.1 – Report of dissemination results

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1 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document intends to provide an overview of the achievements of the dissemination of results from the Hyper-i-net project halfway the duration of the project (February 1st, 2009).

Since most of the participants of the Hyper-i-net project already knew each other from joint meetings or research projects in the field of hyperspectral remote sensing, communication and dissemination of results amongst partners is going smoothly. This is supported by the following measures:

- Information exchange through e-mail;
- Information exchange at meetings of the management board and distribution of the minutes of these meetings;
- Intranet facility for Hyper-i-net partners with minutes of meetings, discussion and background papers, reports to the commission, etc.
- Official website for the Hyper-i-net project: <http://www.hyperinet.eu/>;
- Joint participation at the Hyper-i-net summer schools;
- Joint participation at the Hyper-i-net workshops (midterm and final).

Dissemination of results is a key characteristic of doing research. Therefore, special attention is paid to the dissemination of scientific research results in the training of all ESRs. This training includes participation in discussion groups, workshops, conferences, and the writing of papers. For this purpose a document called "Hyper-i-net ESR training plan guidelines" has been compiled based on the example of Wageningen University. This document is given in the Annex.

This technical report tries to provide a listing of all outcomes of the Hyper-i-net project as a means of dissemination of the project results.

1.2 DOCUMENT STRUCTURE

The document includes the following sections:

Section 1 - Introduction

The present section.

Section 2 – Technical reports

Section 2 provides a listing of all technical reports produced either internally (restricted to the programme participants) or externally.

Section 3 – Publications

Section 3 provides an overview of all publications, other than technical reports. These other publications can be subdivided in peer-reviewed scientific papers, non-refereed scientific papers, book chapters, professional publications and popular publications. Moreover, it is relevant to subdivide each category into publications produced directly within the consortium (mainly with a contribution from the appointed ESRs and

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Section 4 – Educational materials

ERs) and publications produced by consortium members directly relevant for the Hyper-i-net project and produced during the runtime of the project.

Section 4 provides a listing of the educational materials produced within the project. The main effort in this respect has been the production of e-lectures that have been made available through the Hyper-i-net e-learning system. This system has been described in technical report D8.1 "E-Learning Platform Manual".

Section 5 – Participation to and organization of workshops and conferences

Section 5 provides an overview of workshops and conferences where the Hyper-i-net project has been presented or where results from the project have been presented in order to provide communication to the scientific world.

Section 6 - Website

Section 6 provides a description of the Hyper-i-net website.



2 TECHNICAL REPORTS

2.1 INTERNAL REPORTS

Gamba, P., 2007. Network quality assurance plan. Hyper-i-net technical report D1.3, 7 pp.

Gamba, P., 2007. E-learning platform manual. Hyper-i-net technical report D8.1, 10 pp.

Gamba, P., 2007. Guidelines for e-learning content development. Hyper-i-net technical report D8.2, 17 pp.

Gamba, P., 2008. Distance learning platform. Hyper-i-net technical report D8.3, 10 pp.

Gamba, P. & K. Bakos, 2008. Processing chain definition report. Hyper-i-net technical report D4.1, 89 pp.

Plaza, A.J., 2008. Technical document archive prepared. Hyper-i-net technical report D1.1, 5 pp.

Plaza, A.J., 2008. Project intranet and extranet. Hyper-i-net technical report D1.2, 5 pp.

Plaza, A.J., 2008. Lecture material and school report. Hyper-i-net technical report D7.1, 14 pp.

D'Odorico, P. 2008. Calibration and validation inventory. Hyper-i-net technical report D5.2, 82 pp.

Bachmann, M. & S. Holzwarth, 2008. Campaign plans, fielddata collection plans. Hyper-i-net technical report D2.1, 31 pp.

Huber, S., J. Clevers & M. Schaepman, 2008. Lecture material and report #2. Hyper-i-net technical report D7.2, 7 pp + annex.

Gamba, P., K. Bakos, B. Waske & A.J. Plaza, 2008. Processing chain implementation report. Hyper-i-net technical report D4.2, 23 pp.

2.2 EXTERNAL REPORTS



3 PUBLICATIONS

3.1 PEER-REVIEWED SCIENTIFIC PAPERS

3.1.1 Project papers

Fauvel, M., J.A. Benediktsson, J. Chanussot & J.R. Sveinsson, 2008. Spectral and spatial classification of hyperspectral data using SVMs and morphological profiles. *IEEE Transactions on Geoscience and Remote Sensing* 46(11): 3804-38014. DOI: 10.1109/TGRS.2008.922034.

Moussaoui, S., H. Hauksdottir, F. Schmidt, C. Jutten, J. Chanussot, D. Brie, S. Douté, J.A. Benediktsson, 2008. On the decomposition of Mars hyperspectral data by ICA and Bayesian positive source separation. *Neurocomputing* 71: 2194-2208. doi:10.1016/j.neucom.2007.07.034.

Fauvel, M., J. Chanussot & J.A. Benediktsson, 2008. Adaptive pixel neighborhood definition for the classification of hyperspectral images with support vector machines and composite kernel. *IEEE ICIP'08 - International Conference on Image Processing*, October 2008, San Diego, USA.

Benediktsson, J.A., J. Chanussot & M. Fauvel, 2007. Multiple classifiers in remote sensing: from basics to recent developments. *MCS'07 - 7th International Workshop on Multiple Classifier Systems*, pp 501-512, May 2007, Prague, Czech Republic.

Tarabalka, Y., T. V. Haavardsholm, I. Kåsen, and T. Skauli, 2008. Real-time anomaly detection in hyperspectral images using multivariate normal mixture models and GPU processing. *Journal of Real-Time Image Processing*, 2008, pp. 1-14. DOI 10.1007/s11554-008-0105-x.

Plaza, A, 2008. Parallel Processing of Remotely Sensed Hyperspectral Imagery: Full-pixel versus Mixed-pixel Classification. *Concurrency and Computation: Practice & Experience*, vol. 20, no. 13, pp. 1539-1572.

Plaza, A, 2008. Parallel Techniques for Information Extraction from Hyperspectral Imagery Using Heterogeneous Networks of Workstations. *Journal of Parallel and Distributed Computing*, vol. 68, pp. 93-111.

Zorteza, M., and A. Plaza, 2009. Spatial Preprocessing for Endmember Extraction. *IEEE Transactions on Geoscience and Remote Sensing*, accepted for publication, in press.

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3.1.2 Related papers

Clevers, J.G.P.W., Heijden, G.W.A.M. van der, Verzakov, S., & Schaepman, M.E., 2007. Estimating grassland biomass using SVM band shaving of hyperspectral data. *Photogrammetric Engineering and Remote Sensing* 73(10): 1141-1148.

Schaepman, M.E., Wamelink, G.W.W., van Dobben, H., Gloor, M., Schaepman-Strub, G., Kooistra, L., Clevers, J.G.P.W., Schmidt, A., & Berendse, F., 2007. River floodplain vegetation scenario development using imaging spectroscopy derived products as input variables in a dynamic vegetation model. *Photogrammetric Engineering and Remote Sensing* 73(10): 1179-1188.

Clevers, J.G.P.W., L. Kooistra & M.E. Schaepman, 2008. Using spectral information from the NIR water absorption features for the retrieval of canopy water content. *International Journal of Applied Earth Observations and Geoinformation* 10: 388-397.

Itten K.I., F. Dell'Endice, A. Hueni, M. Kneubühler, D. Schläpfer, D. Odermatt, F. Seidel, S. Huber, J. Schopfer, T. Kellenberger, Y. Bühler, P. D'Odorico, J. Nieke, E. Alberti, K. Meuleman, 2008. APEX - the Hyperspectral ESA Airborne Prism Experiment. *Sensors*: 8: 6235-6259.

Spinetti, C., Carrère, V., Buongiorno, M. F., Sutton, A. J. & Elias, T., 2008. Carbon dioxide of Pu`u`O`o volcanic plume at Kilauea retrieved by AVIRIS hyperspectral data. *Remote Sensing of Environment* 112: 3192-3199.

Hueni, A., Biesemans, J., Meuleman, K., Dell'Endice, F., Schläpfer, D., Adriaensen, S., Kempenaers, S., Odermatt, D., Kneubuehler, M., Nieke, J. & Itten, K., 2009. Structure, components, and interfaces of the APEX processing and archiving facility. *IEEE Transactions on Geoscience and Remote Sensing* 47(1): 29-43.

Plaza, A., J. A. Benediktsson, J. Boardman, J. Brazile, L. Bruzzone, G. Camps-Valls, J. Chanussot, M. Fauvel, P. Gamba, J.A. Gualtieri, M. Marconcini, J. C. Tilton and G. Trianni, 2009. Recent Advances in Techniques for Hyperspectral Image Processing. *Remote Sensing of Environment*, accepted for publication.

Plaza, A., D. Valencia and J. Plaza, 2008. An Experimental Comparison of Parallel Algorithms for Hyperspectral Analysis Using Homogeneous and Heterogeneous Networks of Workstations. *Parallel Computing*, vol. 34, no. 2, pp. 92-114.

Plaza, A., R. Perez, A. Plaza, P. Martinez and D. Valencia, 2008. Parallel Morphological/Neural Processing of Hyperspectral Images Using Heterogeneous and Homogeneous Platforms. *Cluster Computing*, vol. 11, no. 1, pp. 17-32.

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Plaza, J., A. Plaza and C. Barra, 2009. Multi-Channel Morphological Profiles for Classification of Hyperspectral Image Data Using Support Vector Machines. *Sensors*, vol. 9, no. 1, pp. 196-218.

3.2 NON-REFEREED SCIENTIFIC PAPERS

3.2.1 Project papers

Plaza, A.J., A. Muller, R. Richter, T. Skauli, Z. Malenovsky, J. Bioucas, S. Hofer, J. Chanussot, C. Jutten, V. Carrere, I. Baarstad, P. Kaspersen, J. Nieke, K. Itten, T. Hyvarinen, P. Gamba, F. Dell'Acqua, J.A. Benediktsson, M.E. Schaepman, J.G.P.W. Clevers, B. & Zagajewski, B., 2007. HYPER-I-NET: European research network on hyperspectral imaging. In: *Geoscience and Remote Sensing Symposium (IGARSS)*, Vol. 1 (pp. 4790-4793), 23-28 July 2007, Barcelona (Sp): IEEE.

Gamba, P., A.J. Plaza, J.A. Benediktsson & J. Chanussot, 2007. European perspectives in hyperspectral data analysis. In : *Geoscience and Remote Sensing Symposium (IGARSS 2007)*, Vol. 1 (pp. 4794-4797), 23-28 July 2007, Barcelona (Sp): IEEE.

Malenovsky, Z., Homolova, L., Cudlin, P., Zurita Milla, R., Schaepman, M.E., Clevers, J.G.P.W., Martin, E. & Gastellu-Etchegory, J.P., 2007. Physically-based retrievals of Norway spruce canopy variables from very high spatial resolution hyperspectral data. In *Geoscience and Remote Sensing Symposium (IGARSS)*, Vol. 1 (pp. 4057-4060). Barcelona (Sp): IEEE.

Fauvel, M., J. Chanussot & J.A. Benediktsson, 2007. A joint spatial and spectral SVM's classification of panchromatic images. *IEEE IGARSS'07 - International Geoscience and Remote Sensing Symposium*, July 2007, Barcelona, Spain.

Fauvel, M., J. Chanussot, J.A. Benediktsson & J.R. Sveinsson, 2007. Spectral and spatial classification of hyperspectral data using SVMs and morphological profiles. *IEEE IGARSS'07 - International Geoscience and Remote Sensing Symposium*, July 2007, Barcelona, Spain.

Fauvel, M., J. Chanussot & J.A. Benediktsson, 2007. How transferable are spatial features for the classification of very high resolution remote sensing data ? *URBAN'07 - 4th IEEE GRSS/ISPRS Joint Workshop on Remote Sensing and Data Fusion over Urban Areas*, April 2007, Paris, France.

Villa, A., M. Fauvel, J. Chanussot, P. Gamba & J. A. Benediktsson, 2008. Gradient optimization for multiple kernel's parameters in support vector machines classification. In: *IEEE International Geoscience and Remote Sensing Symposium (IGARRS)*, July 2008.



- Yanez, L., Homolova, L., Malenovsky, Z., Clevers, J.G.P.W., & Schaepman, M.E., 2008. Geometrical and structural parametrization of forest canopy radiative transfer by LIDAR measurements. In: Intl. Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences (ISPRS), J. Chen, J. Jiang & J. Van Genderen (Eds.), XXI ISPRS Congress, 3-11 July 2008, Beijing (Cn), pp. 45-50.
- Huber, S., Clevers, J.G.P.W., & Schaepman, M.E., 2008. 2nd HYPER-I-NET Summer School on Earth Science and Applications using Imaging Spectroscopy. Wageningen (NL): Wageningen UR (CD-ROM).
- Skauli, T., I. Kåsen, T. Haavardsholm, A. Kavara, Y. Tarabalka, and Ø. Farsund, 2008. Status of the Norwegian hyperspectral technology demonstrator. In: Proc. of NATO SET-130 "NATO Military sensing symposium", Orlando, Florida, USA, 2008, pp. F5-1-F5-6.
- Tarabalka, Y., T. V. Haavardsholm, I. Kåsen, and T. Skauli. 2008. Parallel processing for normal mixture models of hyperspectral data using a graphics processor. In: Proc. of IGARSS, Boston, USA, 2008.
- Tarabalka, Y., J. Chanussot, J. A. Benediktsson, J. Angulo, and M. Fauvel, 2008. Segmentation and classification of hyperspectral data using watershed. In: Proc. of IGARSS '08, Boston, USA, 2008.

3.2.2 Related papers

- Plaza, A., J. A. Benediktsson, J. Boardman, J. Brazile, L. Bruzzone, G. Camps-Valls, J. Chanussot, M. Fauvel, P. Gamba, A. Gualtieri, J. C. Tilton & G. Trianni, 2006. Advanced processing of hyperspectral images. In: Geoscience and Remote Sensing Symposium (IGARSS 2006), (pp. 1974-1978), July 31 - Aug. 4 2006, Denver (US): IEEE.
- Clevers, J.G.P.W., Kooistra, L., & Schaepman, M.E., 2007. Canopy water content retrieval from hyperspectral remote sensing. Proceedings 10th International Symposium on Physical Measurements and Spectral Signatures in Remote Sensing (ISPMSRS) (eds M.E. Schaepman, S. Liang, N.E. Groot & M. Kneubühler), Vol. XXXVI, Part 7/C50, p. 264-269. ISPRS, Davos (CH).
- Zurita-Milla, R., Gomez-Chova, L., Clevers, J.G.P.W., Schaepman, M.E., & Camps-Valls, G., 2007. Multitemporal unmixing of MERIS FR data. Proceedings 10th International Symposium on Physical Measurements and Spectral Signatures in Remote Sensing (ISPMSRS) (eds M.E. Schaepman, S. Liang, N.E. Groot & M. Kneubühler), Vol. XXXVI, Part 7/C50, p. 238-243. ISPRS, Davos (CH).



- Malenovsky, Z., Zurita-Milla, R., Homolova, L., Martin, E., Schaepman, M.E., Gastellu-Etchegory, J.-P., Pokorny, R., & Clevers, J.G.P.W., 2007. Retrieval of coniferous canopy chlorophyll content from high spatial resolution hyperspectral data. Proceedings 10th International Symposium on Physical Measurements and Spectral Signatures in Remote Sensing (ISPMSRS) (eds M.E. Schaepman, S. Liang, N.E. Groot & M. Kneubühler), Vol. XXXVI, Part 7/C50, p. 108-113. ISPRS, Davos (CH).
- Zurita-Milla, R., Kaiser, G., Clevers, J.G.P.W., Schneider, W., & Schaepman, M.E., 2007. Spatial unmixing of MERIS data for monitoring vegetation dynamics. Proceedings of Envisat Symposium 2007 (eds H. Lacoste & L. Ouwehand), Vol. SP-636, pp. 6. ESA, Montreux (CH).
- Gomez-Chova, L., Zurita-Milla, R., Camps-Valls, G., Guanter, L., Clevers, J.G.P.W., Calpe, J., Schaepman, M.E., & Moreno, J., 2007. Cloud screening and multitemporal unmixing of MERIS FR data. Proceedings of Envisat Symposium 2007 (eds H. Lacoste & L. Ouwehand), Vol. SP-636, pp. 6. ESA, Montreux (CH).
- Clevers, J.G.P.W., L. Kooistra and M.E. Schaepman, 2007. Estimating canopy water content using imaging spectroscopy. Proceedings 5th EARSeL SIG IS workshop "IMAGING SPECTROSCOPY: innovation in environmental research", 23-25 April 2007, Bruges, Belgium (Eds. J. Cools & I. Reusen), pp. 13 (CD-rom).
- Roy R., Launeau P., Carrère V., Gaudin A., Ducommun C., 2007. Weathering of surfaces in a temperate climate: Geological mapping using VNIR hyperspectral remote sensing. Proceedings 5th EARSeL SIG IS workshop "IMAGING SPECTROSCOPY: innovation in environmental research", 23-25 April 2007, Bruges, Belgium (Eds. J. Cools & I. Reusen), CD-rom.
- Verpoorter, C., Carrère, V. & Robin, M., 2007. Retrieval of physical properties of mudflat sediments from hyperspectral data using the Modified Gaussian Model and spectral curve fitting. Proceedings 5th EARSeL SIG IS workshop "IMAGING SPECTROSCOPY: innovation in environmental research", 23-25 April 2007, Bruges, Belgium (Eds. J. Cools & I. Reusen), CD-rom.
- Verpoorter C., Carrère V., Robin M., 2007. Mapping physical properties of mudflat sediments using hyperspectral DAIS7915 and ROSIS airborne spectrometer data, Bourgneuf Bay. In: Geoscience and Remote Sensing Symposium (IGARSS), 23-28 July 2007, Barcelona (Sp): IEEE.
- Clevers, J.G.P.W., L. Kooistra & M.E. Schaepman, 2008. Estimating canopy water content using hyperspectral remote sensing data. Proceedings 9th International Conference on Precision Agriculture, R. Khosla (Ed.), 20-23 July 2008, Denver, Co, 14 pp. CD-rom.
- Malenovsky, Z., E. Martin, L. Homolova, J.P. Gastellu-Etchegorry, R. Zurita-Milla, M.E. Schaepman, R. Pokorny, J.G.P.W. Clevers & P. Cudlin, 2008. Influence of woody elements of a Norway spruce



canopy on nadir reflectance simulated by the DART model at very high spatial resolution. *Remote Sensing of Environment* 112(1): 1-18.

Nieke, J., K. Itten, K. Meuleman, P. Gege, F. Dell'Endice, A. Hueni, E. Alberti, G. Ulbrich, R. Meynart, and the APEX team, 2008. Supporting Facilities of the Airborne Imaging Spectrometer APEX. In: IGARSS 08 Boston, p. 4.

Dell'Endice, F., 2008. Improving the performance of hyperspectral pushbroom imaging spectrometers for specific science applications. In: Proceedings of ISPRS, (Beijing, 2008).

Zagajewski, B., A. Jarocinska, 2008. Analysis of plant condition of the Bystrzanka catchment. Proceedings of the 28th EARSeL Symposium: Remote Sensing for a Changing Europe, Istanbul, Turkey, June 2-5 2008. Millpress Science Publishers.

Zagajewski, B., D. Olesiuk, 2008. SAM and ANN classification of hyperspectral data of seminatural agriculture used areas. Proceedings of the 28th EARSeL Symposium: Remote Sensing for a Changing Europe, Istanbul, Turkey, June 2-5 2008. Millpress Science Publishers.

3.3 BOOK CHAPTERS

3.3.1 Project contributions

3.3.2 Related contributions

Liang, S., Schaepman, M.E., & Kneubühler, M., 2008. Remote Sensing Signatures: Measurements, Modeling and Applications. In: Z. Li, J. Chen & M. Baltsavias (Eds.), *Advances in Photogrammetry, Remote Sensing and Spatial Information Science: 2008 ISPRS Congress Book* (pp. 127-144). London, UK: Taylor & Francis Group.

Liang, S., Schaepman, M.E., Jackson, T., Jupp, D., Li, J., Liu, J., Liu, R., Strahler, A., Townshend, J., & Wickland, D., 2008. Emerging issues in land remote sensing. In: S. Liang (Ed.), *Advances in Land Remote Sensing: System, Modeling, Inversion and Application* (pp. 485-494): Springer.

Schaepman, M.E., Malenovsky, Z., Múcher, C.E., Kooistra, L., & Thullier, W., 2007. Bridging Scaling Gaps for the Assessment of Biodiversity from Space. In: GEO Secretariat (Ed.), *The Full Picture* (pp. 258-161). Geneva (CH): Tudor Rose.

Schaepman-Strub, G., Schaepman, M.E., Martonchik, J.V., Dangel, S., & Painter, T., 2009 (in press). Terminology of Radiometry and Reflectance – From Concepts to Measured Quantities. In: T.A.



Warner, M. Duane Nellis & G. Foody (Eds.), The SAGE Handbook of Remote Sensing. London (UK): SAGE.

Schaepman, M.E., 2009 (in press). Imaging Spectrometers. In: T.A. Warner, M. Duane Nellis & G. Foody (Eds.), The SAGE Handbook of Remote Sensing. London (UK): SAGE.

Plaza, A., 2008. Parallel Spatial-Spectral Processing of Hyperspectral Images, In: Computational Intelligence for Remote Sensing. Edited by M. Graña and R. J. Duro, Series: Studies in Computational Intelligence, vol. 133, Springer Berlin, ISBN: 978-3-540-79352-6, pp. 163-192.

Plaza, J., A. Plaza, R. Perez and P. Martinez, 2008. Parallel Classification of Hyperspectral Images Using Neural Networks, in: Computational Intelligence for Remote Sensing. Edited by M. Graña and R. J. Duro, Series: Studies in Computational Intelligence, vol. 133, Springer Berlin, ISBN: 978-3-540-79352-6, pp. 193-216

3.4 PROFESSIONAL PAPERS

3.4.1 Project papers

3.4.2 Related papers

3.5 POPULAR PAPERS

3.5.1 Project papers

3.5.2 Related papers



4 EDUCATIONAL MATERIALS

The main effort in this respect has been the production of e-lectures that have been made available through the Hyper-i-net e-learning system. This system has been described in technical report D8.1 "E-Learning Platform Manual". The following lectures are available:

- Urban Remote Sensing (University of Pavia, Italy)
- Remote Sensing Measurements of Vegetation (Warsaw University, Poland)
- Retrievals of the ecosystem variables from the remotely sensed (hyper)spectral data (Institute of Systems Biology and Ecology, Czech Rep.)
- Quantitative remote sensing (Wageningen University, Netherlands)
- GIS Module (University of Zurich, Switzerland)
- Calibration and characterization of hyperspectral cameras (Norsk Elektro Optikk AS, Norway)
- High performance computing for hyperspectral imaging (University of Extremadura, Spain)
- Hyperspectral Imaging Techniques (Kayser-Threde GmbH, Germany)
- Campaign Planning and Operations (DLR – DFD, Germany)
- Hyperspectral Unmixing (IST, Portugal)
- Hyperspectral camera technology (FFI, Norway)
- Applications of hyperspectral imaging to geologic and coastal environments (CNRS, France)



5 WORKSHOPS AND CONFERENCES

- IGARSS'07: HYPER-I-NET Special Session, Barcelona, Spain. A special invited session entitled "HYPER-I-NET: European Research Network on Hyperspectral Imaging" was held as part of the IEEE International Geoscience and Remote Sensing Symposium (IGARSS'07) in Barcelona, Spain, on Friday 27th July 2007.
- 1st HYPER-I-NET School on Hyperspectral Imaging, 29-31 October 2007, Complejo Cultural San Francisco & Escuela Politécnica de Cáceres, Cáceres, Spain.
- 2nd HYPER-I-NET Summer School "Earth Science and Applications using Imaging Spectroscopy", 15-19 September 2008, Wageningen, Wageningen University, The Netherlands.
- Bogdan Zagajewski made a short presentation about ideas and goals of the project during the 19th Polish Conference on Photo-interpretation and Remote Sensing 'Application of remote sensing in environmental researches and protection', 23-25 September 2008, Warsaw Poland. It was a short overview of the project, the title of the talk was: 'Hyperspectral Imaging Network project'.



6 WEBSITE

An important tool for the dissemination of information on the Hyper-i-net project to researchers external to the consortium and to the general public is the official website: <http://www.hyperinet.eu/>. This tool has been described in the technical report D1.2 "Project intranet and extranet". The website provides the following information:

- Introduction and main objectives of the Hyper-i-net project;
- Overview of the members of the Hyper-i-net consortium;
- Overview of the research set-up;
- Overview of the general training activities;
- Detailed information on the appointed ESRs and ERs within the network. This information includes a curriculum vitae, a description of the research proposal of each ESR, the career development plan, realized training components and realized publications;
- Vacancy announcements;
- Publications directly resulting from the network;
- Events where the Hyper-i-net project is presented;
- News from the network;
- Links to important sites related to the network.



ANNEX

HYPER-I-NET ESR training plan guidelines

1. Introduction

Within the HYPER-I-NET project, a personal career development plan has to be defined for each appointed ESR. This plan will be based on a general training plan that can apply to each ESR. To assist in defining a personal career development plan and to have conformity between all ESRs, this document can be helpful.

This document is based on the guidelines used at Wageningen University. If other universities have similar guidelines, these may also be used.

2. The Wageningen PhD programme

Within Wageningen University the PhD programme is formulated, managed and facilitated by seven Graduate Schools. These Graduate schools are brought together in 'Wageningen Graduate Schools' (WGS).

The seven Graduate Schools of Wageningen University:

- C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC)
- CERES Research School for Resource Studies for Development
- Graduate School Experimental Plant Sciences (EPS)
- Mansholt Graduate School for Social Sciences (MG3S)
- Graduate School VLAG (Food Technology, Agrobiotechnology, Nutrition and Health Sciences)
- Graduate School Wageningen Institute of Animal Sciences (WIAS)
- Wageningen Institute for Environment and Climate Research (WIMEK)

The Graduate Schools of Wageningen University have three main tasks:

- To stimulate and co-ordinate the development of a coherent university research programme within the mission of the Graduate School.
- To safeguard, monitor and stimulate the quality and progress of academic research (PhD students, Postdocs and staff).

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- To co-ordinate, develop and facilitate post-graduate education.

Upon completion of the PhD programme, the PhD student is expected to be:

- Able to function as an independent scientist.
- Able to integrate his/her own work in the theoretical framework of his/her discipline(s) in a broader area of research and able to communicate this in a scientific or general setting.
- Competent in identifying priority areas of research and in formulating questions and experimental hypotheses pertinent to this research.

3. Admittance criteria

- **Equivalent of a Masters degree:** Master diploma from an institute of international education which is recognised as such by the Doctorate Board of Wageningen University.
- **Proficiency in the English language:** PhD candidates from non-Anglophone countries are required to submit an internationally recognised Certificate of Proficiency in the English Language (TOEFL or British Council, IELTS). This certificate is not a requirement for PhD candidates who have completed their higher education with English as the language of instruction.

<p>Requirements:</p> <p>IELTS: 7.0, with a minimum of 6.0 for each (academic) module.</p> <p>TOEFL: 600 points for the written TOEFL, 250 points for the computer based TOEFL and 100 points for the Internet based TOEFL. All are to be supplemented by results of the Test of Written English (academic TWE). The minimum score required for this test is 5.0</p> <p>Submitted test results must be dated within 24 months prior to an application to the PhD Programme.</p>
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4. Evaluation and go / no-go decision

After 1 year the supervisor(s) to which the PhD candidate is affiliated, will decide whether the PhD candidate can carry on with the PhD project or not. The performance of the PhD candidate and the progress of the PhD project will be evaluated by means of a number of criteria. In both cases (go or no-go) the graduate school should be informed.

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5. Training and Supervision Plan

Within six months following the appointment, the PhD student and his/her supervisor will formulate a Training and Supervision Plan (TSP), based on the regulations of the involved Graduate School. The education programme is formalised in the Training and Supervision Plan (TSP). This document contains agreements on educational activities, teaching duties and supervision. It is formulated by the PhD candidate and the supervisor(s) in consultation with the Graduate School and supervisors. In order to be approved, the document has to be signed by the candidate, supervisor(s) (promotor) and finally the chair of the Graduate School Education Committee. Once approved, rights and obligations can be obtained from the TSP by the PhD candidate and supervisor(s). However, it should be emphasised that the TSP is a plan, and subjects in the TSP can always be updated or adjusted in the course of the PhD Programme. A TSP form can be obtained at the Graduate School.

6. The PE&RC Training and Supervision Plan (TSP)

The programme of education of the C.T. de Wit Graduate School for Production Ecology and Resource Conservation (PE&RC) comprises of a minimum of 32 ECTS and maximum of 35 ECTS to be obtained in the PhD appointment.

Below, information on the specific terms of the programme of education as stated in the TSP are given:

Term 1: The Project

- Review of literature
- Writing of project proposal
- Laboratory training and working visits

Term 2: Courses

- Post graduate courses
- Deficiency, refresh, brush-up courses
- Competence strengthening/skills courses

Term 3: Scientific exposure / discussions / meetings

- Discussion groups, local seminars and other scientific meetings
- PE&RC annual meetings, theme-days, seminars and the PE&RC weekend

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- International symposia, workshops and conferences

TERM 1: THE PROJECT

The (educational) activities listed under term 1 of the programme of education are all closely related to the research project of the PhD candidate. These activities comprise of a literature review, writing of a project proposal and laboratory training or working visits. The literature review is compulsory for all PhD candidates of PE&RC, the other activities are optional.

- 1a. Review of literature
- 1b. Writing of project proposal
- 1c. Laboratory training and working visits

1A. REVIEW OF LITERATURE

Status: compulsory

Minimum number of ECTS: 4.3

Maximum number of ECTS: 5.6

At the start of their project, PhD candidates will write a theoretical study as introduction to and background for their own research. This study, which is based on their project description, formulates objectives of the research, discusses methodological/theoretical issues and integrates the work into a larger scientific framework. The study is presented as a colloquium to colleagues within the research group or department to which the candidate is affiliated or in a discussion group in which the candidate participates.

Objectives:

- To become proficient in the oral presentation of scientific information.
- To gain experience with the use of scientific literature, to place a specific research topic in a general context and to formulate specific research questions.

1B. WRITING OF PROJECT PROPOSAL

Status: optional

Minimum number of ECTS: 0.0

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Maximum number of ECTS: 7.0

When the PhD project proposal that has been submitted to PE&RC has been written by the PhD candidate, additional ECTS points will be given for this effort. By signing the TSP form, the supervisors provide a statement that the project proposal is written by the PhD candidate.

1C. LABORATORY TRAINING AND WORKING VISITS

Status: optional

Minimum number of ECTS: 0.0

Maximum number of ECTS: 4.3

At the discretion of the supervisor, PhD candidates may be given the opportunity to undergo a special training (technical, theoretical, etc.) in another research institute.

Objectives:

- To gain technical experience in a specific research area.

TERM 2. COURSES

PE&RC PhD candidates are obliged to participate in a number of courses in order to fulfill the requirements of the PE&RC education programme. These courses comprise of post graduates courses and competence strengthening/skills courses. Participation in deficiency, refresh and brush-up courses is not mandatory, but the graduate school strongly recommends PhDs to participate in these courses as they provide general academic knowledge necessary for the PhD project.

2a. Postgraduate courses

2b. Deficiency, refresh, brush-up courses

2c. Competence strengthening / skills courses

2A. POSTGRADUATE COURSES

Status: compulsory

Minimum number of ECTS: 2.8

Maximum number of ECTS: 7.0

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Postgraduate courses are courses in which PhD candidates actively participate through presentations and discussions and which aims at an advanced academic level of education. PE&RC PhD candidates are required to participate in at least 2 of these types of courses. The postgraduate course can be followed anywhere in the world but must be of post-academic level and comply with PE&RC goals and requirements for post-graduate education as stated below. Post-graduate courses organised by the graduate school PE&RC are posted on its website.

Objectives:

- To learn to discuss results of a scientific study.
- To critically evaluate results presented.
- To update new information in the area of research.

PE&RC goals and requirements for post-graduate education:

1. Intensive and active participation of the PhD students.
2. Advanced academic knowledge and education.
3. Goal: mastering of essential skills.

Ad 1: in the course the knowledge taught should be interactively studied by means of discussion (for instance with statements) in small groups, and/or practical exercises, workshops, intensive short courses of some days to some weeks.

Ad 2: continuation of basic academic knowledge and education of the undergraduate. Hereby the subject treatment must:

- be clearly more advanced than that of undergraduate education;
- offer result of recent developments (publications) in the subject;
- form a coherent series in case of more (guest) lecturers.

Ad 3: continuation of basic training in essential skills from the undergraduate. The skills should relate to the individual research programme as much as possible (for instance: discussion on presentation techniques based on presentations of research results and draft publications; statistical treatments based on research results).

2B. DEFICIENCY, REFRESH, BRUSH-UP COURSES

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Status: Optional

Minimum number of ECTS: 0

Maximum number of ECTS: 2.8

Deficiency, refresh and brush-up courses are courses of a more general nature or courses that cover a specific scientific field or skill that doesn't reach post-academic level. These can be undergraduate courses necessary to obtain knowledge essential for the PhD work, courses necessary for the progress of the research and courses which will broaden scientific capabilities. These courses can be followed at graduate school PE&RC, other graduate schools, universities or research institutes. Deficiency, refresh and brush-up courses organised by PE&RC are posted on its website.

Objectives:

- To obtain general academic knowledge necessary for the PhD project.

2C. COMPETENCE STRENGTHENING / SKILLS COURSES

Status: compulsory

Minimum number of ECTS: 1.4

Maximum number of ECTS: 4.2

These courses are broadening and strengthening skills and competences needed as a scientist in general. They are important for PhDs from different scientific disciplines and focus on the PhD candidate as a person. These courses are highly beneficial to the post-doc career as they teach the PhD candidates what their individual strengths, needs and priorities are. Wageningen Graduate Schools (the combined graduate schools of Wageningen) organise such courses for PhDs. These courses can be found on the WGS courses site under the headings: Career Oriented Courses, PhD assessments and Skills courses. The language related courses organised by WGS are part of the deficiency, brush-up and general courses.

Objectives:

- To obtain general skills, competences and views as a scientist.



Term 3: Scientific exposure / discussion / meetings

PhD candidates are obliged to participate in a variety of scientific meetings and discussion groups, both nationally and internationally. It is a means to get acquainted with state of the art knowledge in the PhD candidate's own scientific field as well as the research field covered by the graduate school. Scientific interaction with peers also will help the candidate in solving problems regarding his/her PhD project.

3a. Discussion groups, local seminars and other scientific meetings

3b. PE&RC annual meetings, (theme days) seminars and the PE&RC Weekend

3c. International symposia, workshops and conferences

3A. DISCUSSION GROUPS, LOCAL SEMINARS AND OTHER SCIENTIFIC MEETINGS

Status: compulsory

Minimum number of ECTS: 4.2

Maximum number of ECTS: 7.0

Discussion groups consist of a group of scientists who discuss a variety of scientific issues, including PhD manuscripts and proposals and new developments in relevant scientific theory. Within PE&RC, a number of discussion groups exist that can be found at its site. The function and format of PE&RC discussion groups is listed below. PhD candidates that are abroad for most of the time can also obtain ECTS points by participating in regular discussion groups or scientific meetings of a local institute or university as long as this is recognised by the supervisors. Other scientific interaction with peers at home institutes that broaden the PhD candidate's scientific scope are also allowed under this heading. Note that research group meetings will not be credited.

The objective is to develop a critical view on presentation and discussion of research results and to improve one's capability of the preparation of scientific articles.

Function of PE&RC discussion groups:

1. to obtain information, ideas and insight on research
2. discuss key articles to obtain insight in current ecological/agricultural theory
3. to present research plan and data during various stages of the PhD appointment
4. to learn to present research results, both orally and written

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5. all phases of the PhD project (preparation, collection of data and literature, data analysis and oral and written presentation) should be considered in the discussion groups.

Format for discussion groups:

Groups should come together once or twice a month for 2 to 3 hours. The meeting can be split up into 2 main segments:

1. Discussion of approximately an hour in which a paper, congress presentation, experimental design or topic on theory is presented and discussed.
2. The second hour is reserved to discuss smaller issues. PhDs bring forward questions, problems or ideas regarding their own research (e.g. statistical design and analysis, methods, literature) after which the group can respond to help solve the issue. This is especially useful to solve day to day research issues.

Other remarks concerning discussion groups:

- New participants start by giving a presentation of what they will be studying.
- The composition of discussion groups should be a mixture of PhDs from all different stages of research.
- Discussion group leaders are responsible for taking into account all above mentioned issues during meetings.


3B. PE&RC ANNUAL MEETINGS, (THEME DAYS) SEMINARS AND THE PE&RC WEEKEND

Status: compulsory

Minimum number of ECTS: 1.0

Maximum number of ECTS: 2.8

Graduate School PE&RC organises annual meetings on challenging and "hot" scientific issues, which have a broad basis of interest within the Graduate School. The PE&RC PhD student's platform is organising this yearly event. Besides this, PE&RC organises seminars on a regular basis. These seminars cover scientific issues of the graduate school. The PE&RC weekend is an annual occurring event in which various aspects (pitfalls, challenges, drawbacks and advantages) of performing a PhD are highlighted. Participation in this weekend is especially recommended to starting PhD candidates as it provides a lot of practical information. Current events under this heading are posted on the website.

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Objectives:

- • To become familiar with current research in Production Ecology & Resource Conservation.
- • To become familiar with the graduate school PE&RC.

3C. INTERNATIONAL SYMPOSIA, WORKSHOPS AND CONFERENCES

Status: compulsory

Minimum number of ECTS: 2.8

Maximum number of ECTS: 7.0

Each PhD candidate should attend at least one international meeting during his/her PhD study and present a lecture or poster on her/his works. The graduate school recommends it's PhDs to participate in 3 international meetings when financial resources are available.

Objectives:

- To broaden the knowledge about current trends in one's research field and to effectively present and discuss research results for an international audience.

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