

OFFRE DE BOURSE DE DOCTORAT

Le groupe de recherche Analyse Géospatiale (ANAGEO) de l'Institut de Gestion de l'Environnement et d'Aménagement du Territoire (IGEAT) de l'Université Libre de Bruxelles (ULB) offre une bourse de doctorat de 3 ans pour réaliser une thèse s'intégrant dans les recherches du groupe de recherche (cf. description ci-dessous) dans le domaine de la *détection, l'évolution, l'analyse et la modélisation de l'occupation / utilisation du sol* et utilisant principalement les *logiciels libres*. En plus de ses recherches le boursier devra participer à l'encadrement d'une formation annuelle de 4 mois en Systèmes d'Information Géographique Libres pour ressortissants de pays en développement.

Conditions requises:

- Titulaire d'une licence (4 ans), d'un master (5 ans) ou d'un DEA reconnu par la Communauté française de Belgique
- Pouvant faire valoir une expérience dans le domaine des Systèmes d'Information Géographique, en particulier des logiciels libres (GRASS, QGIS, POSTGIS)

Le montant de la bourse sera calculé selon les barèmes de la Communauté française de Belgique.

Les candidatures accompagnées d'un CV complet, d'un relevé de notes complet pour les deux dernières années de formation diplômante et d'un projet de thèse élaboré (max . 2 pages) doivent être envoyées **en format pdf avant le 15 octobre 2009** à Eléonore Wolff (ewolff@ulb.ac.be), ANAGEO/IGEAT, ULB.

Les meilleurs candidats devront présenter leur projet de recherche à Bruxelles (les frais de voyage éventuels étant à leurs frais).

ANAGEO, the Geospatial Analysis Lab of the Institut de Gestion de l'Environnement et d'Aménagement du Territoire (IGEAT) of the Université Libre de Bruxelles (ULB)

Who are we?

ANAGEO is the geospatial analysis lab of the Université Libre de Bruxelles, Belgium. Established in 1996 and located in Brussels, we are a team of dynamic and motivated contractual researchers working under the supervision of Dr. E. Wolff. Our financing comes from Belgian and international funds, and the number of researchers in the team varies according to financing opportunities. PhD students, who most of the times benefit from grants, are also part of the team. Moreover, each year we supervise the work of students who prepare their masters theses. Researchers as well as PhD students have a degree in geography, agronomy or other subjects, and all of us specialized during their studies in cartography, GIS and/or remote sensing.

Dealing with the range of research topics synthesized below, we develop a strategy of applied research alongside with a more fundamental approach. We generally do fundamental research in the framework of PhD theses, whereas we mostly do applied research at partners' request.

As part of the IGEAT and of the ULB, we benefit from numerous facilities, as well for logistics (equipment, premises, financial management, state-of-the-art computing and

printing centre) as for scientific matters (collaborations, opinions, advices and exchanges). From a scientific viewpoint, we closely collaborate with other ULB teams and more particularly with botanists, agronomists, IT engineers, image processing engineers and anthropologists.

In the framework of multidisciplinary Belgian and international projects, we are used to working with different types of partners i.e. other remote sensing and GIS labs, but also (inter)national institutions and business partners (WWF, EU Joint Research Centre, Belgian NGI, Deutsches Zentrum für Luft- und Raumfahrt-Wessling, Ecole Nationale Supérieure des Télécommunications-Paris, TRASYS Space, GIM, etc.).

From a technical viewpoint, we have expertise in image processing with various applications among which PCI Geomatica, eCognition, Idrisi (mostly for educational purposes) and MultiSpec. We are also specialized in the use of a number of GIS applications, among which ArcGIS, ArcView and Idrisi.

What is the guiding thread through all our research projects?

The major theme that links all our research projects is the mapping and analysis of the land use/land cover and the monitoring of its evolution. The land use/land cover changes in response to various pressures and constraints, and by analysing it and monitoring its evolution, we can diagnose the region under study and alert decision-makers in land planning, natural resources management and environment. These analyses particularly focus on urban and peri-urban areas (urban district types, green network, etc.).

We developed experience in European contexts, e.g. for monitoring the evolution of the Belgian coastal zones and of Greater Brussels, but also in developing countries, e.g. in African peri-urban settings and around refugee camps. The field of application of remote sensing and GIS is wide, particularly in developing countries where the topographic coverage is generally outdated. It is in this perspective that we use these techniques to support humanitarian action in favour of the displaced and refugees, and break new ground in humanitarian demining.

From a technical viewpoint, we map the land use/land cover on the basis of satellite images, aerial photographs and topographic maps, and analyse it by comparing the detected evolutions to economic and socio-demographic statistics integrated into a GIS. The improvement in the techniques we use is a continuous issue. Since 1999, very-high-resolution satellite images have been widely used in rural as well as urban contexts for the digital interpretation of the land use/land cover and this dramatic progress in terms of spatial resolution generates new challenges for digital interpretation.

Which are our major research areas?

From a technical viewpoint

Improving land-cover classifications of very-high spatial resolution images using object-oriented classification methods. Through different research projects where we use very-high spatial resolution images, we improve the interpretation of the land use/land cover by developing methods to achieve better image segmentation and better image classification thanks to an in-depth study of the land-use/land-cover classes and a careful selection of the most relevant interpretation parameters (texture, structure, shape, etc.). We perform this aspect of our research activities in urban, peri-urban and rural settings.

Developing decision-support tools and methods based on mapping:

- analysis of the end-user requirements;

- reflection on the geographic variables that should be mapped;
- creation of geographic databases;
- development of data-fusion methods for the output of synthesis maps.

Satellite images used: GEOEYE-1, QUICKBIRD XS and P, IKONOS XS and P, SPOT XS and P, LANDSAT TM, LANDSAT MSS

Airborne sensors: DAEDALUS, CASI

Main softwares used: Definiens, PCI Geomatica, ArcGIS

From a topical viewpoint

Evolution and modelling of the land use/ land cover in peri-urban settings in Europe and in Africa:

Mapping and analysis of spatio-temporal land use/land cover structures under anthropic pressure (urban growth, refugee migration, seaside tourism, etc.) using satellite images, aerial photographs and topographic maps.

Humanitarian aid: Use of space- and airborne remote sensing and GIS as decision-support tools in relation to setting up refugee camps, planning demining campaigns and reducing mine-suspected areas. Use of GIS and positioning systems for supporting humanitarian NGOs.

Green network: Identification of open spaces and vegetation types in urban areas, creation of databases with the characteristics of the green network, geographical analysis of the social green network and land planning.

Epidemiology: Mapping of the land use/land cover as a pre-requisite for modelling the relationships between the environment and the space/time dynamics of certain diseases.

For more information, please contact

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