2 years post-doctoral position

IGN, Nancy, France

Development of multisource forest inventory methods for regional-level applications in France

In the framework of the project IFM-GT "Multisource forest inventory: towards the development of forest information systems to optimize regional forest management strategies" funded by the French Environment and Energy Management Agency (ADEME), the Forest Inventory Laboratory (LIF) of the French National Institute of Geographic and Forest Information (IGN) seeks candidates for a **two years** **postdoctoral position to develop multisource forest inventory methods based on National Forest Inventory (NFI) field data and auxiliary VHR remote sensing sources and maps**.

Context of the project

French forests are experiencing a fast evolution since 2 centuries. Forest area has increased by 60% in a century while the growing stock has doubled in half the time. However these trends show large disparities among regions. The highest increases in both area and stocks are generally localized in areas of little forestry tradition. Additionally, climate changes introduce another source of disparity by modifying tree species growth in directions and magnitudes which varied largely across space and time.

This unprecedented situation of the French forest generates needs for a better knowledge of the forest resources at a regional level to assist the development of management strategies adapted to the specificities of each territory. However there is no regional forest inventory survey in France, where the reference data about forest resources are collected on a yearly basis by IGN in the framework of the National Forest Inventory (NFI) program. These data provide detailed information of forest states (area, volume, increment, fellings, etc. by species and diameter classes) and their evolution at the national level. However, downscaling countrywide estimates at the regional scale generates an important loss of precision, because the performance of the statistical estimators is directly related to the number of sample plots in the domain of interest.

While increasing the sampling rate is prevented by cost consideration, alternative solutions have to be developed. One of them consists in associating NFI field data with auxiliary information from maps and remote sensing data using appropriate statistical methods. Such approaches have been introduced in the late 80s in Finland and are currently operational in Northern European countries as well as in the US. They have never been applied or tested in France so far, mostly because high resolution signals are required to address the high level of diversity of land uses, tree species composition and fragmentation of the French forests.

The context is now different. Auxiliary data sources are more and more available and diversified. Technical progresses realized in the field of very high resolution remote sensing make it possible to

develop these methods in France. Based on this statement, the main objectives of the project IFM-GT are:

- To develop, for the first time in France, multisource forest inventory methods, enabling a detailed assessment of forest resources (area, growing stock, wood production, ...) at the scale of forest territories based on NFI field plots and VHF remote sensing sources and maps;
- To test the concept of flexible regional forest information systems, as decision making tools for optimizing forest management strategies of forest territories.

Job description

The postdoctoral fellow will be in charge of developing the multisource forest inventory methodology on the project's test area (~ 7500 km2). Under this objective the successful candidate will be involved in:

- The preprocessing and quality control of the auxiliary data. These will include detailed forest maps, Landsat imagery, aerial photographs and/or very high resolution imagery, Lidar and photogrammetric 3D models;
- The development of data processing routine and algorithms to extract variables from auxiliary data;
- The development of multisource estimators, using both parametric (regression estimators) and non-parametric k-nn approaches;
- The assessment of the performance of the estimators derived from different types and combinations of auxiliary data (i.e., assessing the gain of using 3D models).

Qualifications

The ideal candidate shall have a PhD in forest inventory statistics, forest remote sensing, forestry or related discipline. Preference will be given to those candidates with proven experience in statistical estimations for forest inventory and forest inventory applications of remote sensing. Skills on computing will be highly valued.

We encourage application of highly motivated candidates, with an important capacity of carrying out innovative research and a strong interest and efficiency in both producing applied outputs and leading peer-review publication.

Proven skills in both oral and written scientific English and the ability to work in a French speaking environment and project are required.

How to apply?

Applicants should submit a CV including a publication list and a short description of previous research, current research interests and other activities of relevance for the position. A copy of the PhD diploma, copies of no more than three publications, and telephone numbers and e-mail addresses of up to three references should be given.

Applications are to be sent to Dr. Cédric Véga: cedric.vega@ign.fr

Applications will be accepted until the position is filled.

Start date: November 2016- January 2017

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