Univ. Grenoble Alpes
Université de l'innovation

FICHE NAVETTE: DOCTORANTS IDEX

SECTOR **:** Higher Education Institution

LOCATION: France, Grenoble

RESEARCH FIELD (cf mots clefs sur Euraxess Jobs): Environmental science, Engineering, Geosciences, Computer Science (modelling tool)

RESEARCHER PROFILE:
    □ *First stage researcher,*

INSTITUTION: Univ. Grenoble Alpes, University of Innovation

One of the major research-intensive French universities, Univ. Grenoble Alpes**[1] enjoys an international reputation in many scientific fields, as confirmed by international rankings. It benefits from the implementation of major European instruments (ESRF, ILL, EMBL, IRAM, EMFL*[2]). The vibring ecosystem, grounded on a close interaction between research, education and companies, has earned Grenoble to be ranked as the 5th most innovative city in the world. Surrounded by mountains, the campus benefits from a natural environment and a high quality of life and work environment. With 7000 foreign students and the annual visit of more than 8000 researchers from all over the world, Univ. Grenoble Alps is an internationally engaged university.

A personalized Welcome Center for international students, PhDs and researchers facilitates your arrival and installation.

In 2016, Univ. Grenoble Alpes was labeled «Initiative of Excellence ". This label aims at the emergence of around ten French world class research universities. By joining Univ. Grenoble Alpes, you have the opportunity to conduct world-class research, and to contribute to the social and economic challenges of the 21st century ("sustainable planet and society", "health, well-being and technology", "understanding and supporting innovation: culture, technology, organizations" "Digital technology").

* ESRF (European Synchrotron Radiation Facility), ILL (Institut Laue-Langevin), IRAM (International Institute for Radio Astronomy), EMBL (European Molecular Biology Laboratory), EMFL (European Magnetic Field Laboratory)

Key figures:

- + 50,000 students including 7,000 international students
- 3,700 PhD students, 45% international
- 5,500 faculty members
- 180 different nationalities
- 1st city in France where it feels good to study and 5th city where it feels good to work
- ISSO: International Students & Scholars Office affiliated to EURAXESS

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[1] Univ. Grenoble Alpes

CDP TITLE: MOBILAIR
SUBJECT TITLE: Pollution in the Grenoble valley : a weather-type approach
SCIENTIFIC DEPARTMENT (LABORATORY'S NAME): Laboratory of Geophysical and Industrial Flows (LEGI)
DOCTORAL SCHOOL'S: Earth-Universe-Environment (ED 105)
SUPERVISOR'S NAME: Chantal STAQUET, Chantal.Staquet@univ-grenoble-alpes.fr

SUBJECT DESCRIPTION:

1. Background and motivations
Urban air pollution is a major health issue. Most of the health effects are currently attributed to fine particles with a diameter less than 2.5 µm, or PM2.5. In Grenoble the yearly concentration distribution of PM2.5 estimated from dispersion models calibrated with actual measurements was in the 17 - 20 µg/m^3 range (2012 estimates), no threshold existing below which pollution has no health effect (WHO 2013).
    This thesis work is part of the interdisciplinary MobilAir project on air pollution in Grenoble. MobilAir's objectives are to propose novel methods for measuring and estimating pollution, to determine its impact on prenatal health and to understand the obstacles to changing modes of travel (or mobility) by inhabitants that would reduce pollution.

2. From PM2.5 emission to concentration: the key role of meteorology
Population exposure to PM2.5 depends on the local concentration of particles. Moreover, as epidemiological studies showed it, the impact on health is much more influenced by long-term PM2.5 concentrations, of the order of the year, than by specific episodes of high pollution (Report of the High Council of Public Health, 2012).
    Estimating the health impact of PM2.5 therefore requires the knowledge of PM concentration field on a local scale, ideally at street level, and over a long period.
    This concentration field depends on PM2.5 emissions and meteorology. Like concentration, of which it is the driver, meteorology must be modelled on a fine spatial scale and over a long period of time.
    However, even at a horizontal scale of 100 m, current computer capacities do not allow the computation of meteorological fields to be carried out beyond a time window of a week. A new approach has therefore to be designed for a computation over a year to be carried out, from which the concentration fields can be calculated and population exposure estimated. This is the core of the PhD work.

3. Thesis work
This approach relies on identifying the types of weather over the Grenoble valley, from a classification obtained from standard statistical tools. Such weather types could for example include "wintertime anticyclonic regime". Statistical classification tools are to be used at this step. For each weather type, the meteorological fields will be modeled numerically over a few days, which is generally the duration of the weather type; the WRF (Weather Research and Forecast) three-dimensional community model will be used for this purpose. The validity of the meteorological fields thus obtained numerically for each weather type should be evaluated in relation with wind and temperature measurements in the Grenoble valley. A detailed analysis of these fields can then be carried out, involving the identification of "ventilation" zones and of "stagnation" zones within which pollution emissions should be avoided.
    The computation of the meteorological fields will allow that of the PM concentration field using the emission inventory prepared by the air quality agency of the Auvergne Rhône-Alpes region, which will be implemented in the numerical model WRF. The calculation of these concentration fields will make it possible to estimate the most critical areas from the point of view of air quality, which will depend on the weather type considered and on which effort should be focused in a pollution reduction policy.
    In collaboration with the air quality agency of Région Auvergne Rhône-Alpes (Atmo AuRA) and MobilAir's researchers, the thesis work will also allow to refine the knowledge of the population exposure to PM2.5 at an even smaller scale, about 10 m.

4. In the longer term
If time permits, the approach followed during the thesis will be implemented in the context of climate change, to estimate the concentration fields in the Grenoble urban area in 2050 for various emission scenarios.

The PhD work will benefit from a number of collaborations:
-with the University of Hertfordshire, UK: Charles Chemel (co-advisor)
-within the MobilAir project: Jean-Luc Jaffrezo (Institute of Geosciences of the Environment), Rémy Slama (Institute of Advanced Biosciences)
-with the air quality agency of Région Auvergne Rhône-Alpes : Florence Troude, Camille Rieux
-with the Institute of Geosciences of the Environment: Hubert Gallée, Olga Zolina

Références :
High Council of Public Health 2012 Particulate pollution in ambiant air. Synthesis and recommandations to protect health (in French).
Largeron Y, C. Staquet 2016 The atmospheric boundary layer during wintertime persistent inversions in the Grenoble valleys. *Frontiers in Earth Science* **4**, 70.
Morelli X., C. Rieux, J. Cyrys, B. Forsberg, R. Slama 2016 Air pollution, health and social deprivation: A fine-scale risk assessment. *Environmental Research* **147** 59–70.
World Health Organisation 2013 Review of evidence on health aspects of air pollution – REVIHAAP project: final technical report.

Profile of the candidate: the candidate should have a good knowledge of atmospheric dynamics and experience in computer programming. Knowledge of standard statistical tools would be a plus. He/she should also have a good knowledge of English and, if possible, of French as well.

ELIGIBILITY CRITERIA
Applicants:
- must hold a Master's degree (or be about to earn one) or have a university degree equivalent to a European Master's (5-year duration),

Applicants will have to send an application letter in English and attach:
- Their last diploma
- Their CV
- A one-page cover letter explaining their interest in the PhD subject and why their qualifications make their application suitable
- Two recommendation letters, preferably from the supervisors of their Bachelor and Master thesis.

Address to send their application: chantal.staquet@univ-grenoble-alpes.fr and c.chemel@herts.ac.uk

SELECTION PROCESS
Application deadline: **8 June 2018** at 17:00 (CET)
Applications will be evaluated through a three-step process:

1. Eligibility check of applications on 11 June 2018
2. 1st round of selection: the applications will be evaluated by a Review Board on 14 June 2018. Results will be given on 15 June 2018.
3. 2nd round of selection: shortlisted candidates will be video-interviewed on June 18-20, 2018. Final results will be given on **21 June 2018**.

TYPE of CONTRACT: temporary-3 years of doctoral contract
JOB STATUS: Full time
HOURS PER WEEK: 35
OFFER STARTING DATE: 8 April 2018
APPLICATION DEADLINE: 8 June 2018
Salary: between 1768.55 € and 2100 € brut per month (depending on complementary activity)