



## Profil de recrutement Ingénieur d'étude

### Assistant Researcher

#### “Modelling of subsurface drainage in French context”

#### **Irstea**

IRSTEA (Institut National de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture) is a public research institute. Irstea has built a multidisciplinary and systemic approach to three domains – water, environmental technologies and land – which today form the basis of its strength and originality. **Irstea** works on major issues of a responsible agriculture and territories sustainable planning, water management and related risks, drought, floods, inundations, the biodiversity and complex ecosystems study in their interrelation with human activities. Multidisciplinary research, appraisal and support to "agri-environmental" public policies ", partnership with territorial authorities and actors of the economic world, such are the characteristics of Irstea, qualified "Carnot Institute". In the continuity of the research model of Cemagref, every day our engineers and our researchers put a lot of themselves into their mission: to take up the challenge of global change comprehension for a sustainable and environmentally friendly development.

The Continental Anthropized Hydrosystems: Resources – Risk – Restoration Research Unit (HYCAR) has focused a large part of its research effort on hydrology, soil science and water chemistry for many years with several teams involved. One of the unit's main lines of research is the functioning of Agro-Hydrosystems in links with drinkable water resource preservation. The ARTEMHYS team focuses on 3 main methodologies: monitoring, understanding and modeling the transfer of agricultural pollutants in order to propose and test mitigation strategies based on ecological engineering and nature based solution (buffer zones, hydraulic management, constructed wetland) for water resource protection. ARTEMHYS team has several collaborations with local authorities such water agencies, cities, collectivities, for implementation and evaluations of water, land management to preserve the chemical quality of the raw water before water purification plant in accordance with Water Framework Directive requirement.

## Context

Subsurface drainage, a hydraulic technic to control winter water excess in waterlogged soil, was largely implemented in France during the 80's in order to optimize crop production under climatic and soil constraints. Nowadays, about 10% of arable lands are equipped in France, mainly for winter cereal. Current issues are more focused on environmental impacts of subsurface drainage on water quality of waterbodies. Prediction of discharges and agricultural fertilizers and pesticides in drained water are crucial to better manage and control non point source pollution at plot outlet. In this context, ATREMHYS team developed some concepts and simplified approaches and translated them into models named SIDRA (Lesaffre and Zimmer), SIDRA-RU, and Pestdrain, which required a parsimonious numbers of parameters (4 for the soils to simulate drained flow, and 4 for pollutants to simulate concentration in drained flow). We proposed to test the robustness of those simplified models at the level of France where subsurface drainage was implemented, based on large observed experimental data set, and improved the model using intensive monitored data (crop practices, high frequency monitoring) of one typical French soil.

## Missions

Contributions are expected in:

- Robustness of SIDRA modelling at national scale
- Improvement of crop and intercrop evapotranspiration in recharge term of RU module
- Statistical analysis of drainage period at national scale
- Pesticide transfer via subsurface drainage by coupling pesticide fate with surface module (to be developed) and transfer function through drained soil (already described in Branger et al., 2009).

## Skills

We are looking for a junior graduate with

- Hydrology and soil science background
- Solute transport processes knowledge
- Modelling soil hydrodynamic
- Numerical (Phyton, Fortran, C++, R package) and statistical bases
- Fluent English required and group research sharing

## Salary

According to standard of "Ingénieur d'Etude" from French Public Research Institute standard.

Net salary around 1700€ per month.

## Duration

18 months starting during the 2d of November, 2018 (according to administrative delay)

## **Application deadline and requirements:**

To be considered for this position, applications must address the selection criteria above, and attach a CV and a motivation letter sent separately (up to 2 p., including a list of 2 referees).

Please send your application before September the 1 of 2018 by Email at: [julien.tournebize@irstea.fr](mailto:julien.tournebize@irstea.fr)

## **Location**

Irstea, Centre d'Antony

1 rue Pierre Gilles de Gennes CS 10030

92761 ANTONY cedex, France

## **Contact :**

Julien TOURNEBIZE, leader of ARTEMHYS group

Email: [julien.tournebize@irstea.fr](mailto:julien.tournebize@irstea.fr)

Phone: +33 1 40 96 60 68