Postdoctoral researcher at Météo-France/CNRM

"Monitoring the effect of a new park on the urban climate of Toulouse"

Applications are invited for a postdoctoral position dealing with the monitoring of the effect of a new park on the urban climate of Toulouse.

Duration: at least 24 months

Closing date for application: 1st June 2020

Expected start of contract: 1st September 2020

Salary: The gross monthly salary is between 3,280 and 4,025 Euros, depending on qualification.

Location: Météo-France/CNRM, Toulouse, France.

Project objectives and partners

Due to the prevailing regional climate, Toulouse Metropolitan Region in southern France is particularly sensitive to extreme weather conditions like heat waves and droughts. The urban agglomeration aggravates these conditions due to the well-known urban heat island effect. In the context of the projected regional climate change, it is necessary to adapt Toulouse to more severe heat waves. One of these efforts is the ongoing transformation of the heavily built-up Ramier river island located close to the city centre into a large park and recreational area. This should make the centre of Toulouse more resilient and adapted to the increasing air temperature.

The EU LIFE programme funded project *Generate REsiliENt actions agaiNst the HEat islAnd effect on uRban Territory* (LIFE Green Heart) is coordinated by the Toulouse municipality and structured around the transformation of Ramier island. The LIFE Green Heart project comprises four operational objectives to respond to the causes and consequences of the UHI effect.

- Increase the amount of green space by 15 hectares by 2024, including riverside vegetation, using adapted plants and planting methods.
- Restore biodiversity by consolidating the green and blue infrastructure.
- Limit air and noise pollution by developing routes for "soft" modes of transport across a 5 km area, as part of a circular economy initiative.
- Create tools to help make long-term predictions for the Metropolis's urban development policy, in accordance with the need to adapt the region to climate change.

The potential benefits (e.g. reduction of the urban heat island intensity or increase in local biodiversity) due to the accomplishment of the operational project objectives will be scientifically monitored in the course of the project by the project partners from various disciplines including urban planning and governance, urban climatology, biology, and sociology.

Objectives of the postdoctoral researcher

The successful candidate will be leading the quantification of the effect of the new park on the river island via a real time monitoring and a numerical modelling approach. The existing urban climate observatory of Toulouse (50 meteorological stations already in place) is currently densified in the vicinity of the new park and will remain in place for at least 10 years. These observations will allow to monitor the long-term benefits of the newly planted vegetation. An obstacle resolving version of the atmospheric model Meso-NH (Lac et al., 2018; Auguste et al., 2019) will be applied by the successful candidate to quantify the effect of the new park on the air temperature and wind field on

Ramier island and in the adjacent dense urban areas. The focus will be on hot summer situations with low to moderate wind speed. A synthesis between the simulated and monitored benefits from the new park shall be made. The results from the obstacle resolving simulations will be compared with simulations at the mesoscale (e.g. 100 m resolution) in which the buildings are not explicitly resolved but represented using a drag force approach. It shall be investigated whether the results from the obstacle resolving simulations can be used to improve the modelling approach for the computationally more cheap mesoscale simulations. Technical tasks will be to improve the description of the obstacles (buildings and urban vegetation) in Meso-NH and to implement a detailed description of the transformation of the Ramier island. The successful candidate will contribute in close collaboration with other team members in the enhancement of the obstacle resolving version of Meso-NH, e.g. to better represent the thermal and radiative exchanges between the atmosphere and the 3D obstacles.

Required qualification and skills

A PhD thesis and a proven record of peer-reviewed scientific publications is required. A strong professional experience in the fields of fluid dynamics, urban modelling, and atmospheric numerical model development is required for the position. Technical skills must include python or R, and Fortran 90.

Application

To apply for the announced position, send a cover letter and a complete scientific Curriculum Vitae including education, professional experience, technical skills, list of publications, conference presentations, and contact details for two referees to:

elisabeth.gerard@meteo.fr; robert.schoetter@meteo.fr; valery.masson@meteo.fr

The object of the application email shall contain the statement “LIFE Green Heart / Application”.

References

Auguste, F., G. Réa, R. Paoli, C. Lac, V. Masson, and D. Cariolle, 2019: Implementation of an Immersed Boundary Method in the Meso-NH v5.2 model: Applications to an idealized urban like environment, Geoscientific Model Development, 12, 2607-2633.

Lac, C., and Coauthors, 2018: Overview of the meso-nh model version 5.4 and its applications. Geoscientific Model Development, 11 (5), 1929–1969, doi:10.5194/gmd-11-1929-2018, URL https://www.geosci-model-dev.net/11/1929/2018/.