

Post-doctoral position

**Adaptation strategies to climate change during future heat waves:
impact on air quality**

Hosting laboratory: Laboratory of Geophysical and Industrial Flows (LEGI), University Grenoble Alpes, Grenoble, France

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Keywords: Climate change - Urbanized valley - Heat waves - Temperature mitigation scenarios - White city, green city - Air quality

Project duration and expected start date: 12 months + 18 months from October 2023

Proposal

The frequency and intensity of heatwaves will increase in the future because of climate change. This leads cities to develop strategies to reduce local temperatures, in order to maintain their habitability. These strategies generally consist in increasing the albedo of the roofs ("white city"), to vegetalize these roofs and to increase the green areas ("green city"). A key requirement of these adaptation strategies is to mitigate temperature while preserving air quality. Indeed, albedo increase also increases solar radiation which may promote ozone formation thereby worsening air quality. As well, the increase of green areas may stabilize the atmosphere, reducing vertical pollutant transport. The effect on air quality of adaptation strategies to climate change during heat waves should therefore be assessed. It is equally important that the design of these strategies is conducted in conjunction with scenarios of emission inventories in order to preserve (and improve) air quality.

The Grenoble metropolis is considered in our team. Grenoble is located in a valley implying that, during heat waves, the valley configuration further increases local temperatures. Strategies of temperature mitigation in the Grenoble valley are currently designed and simulated by a PhD student, for projected heat waves around 2050 and 2070.

The purpose of the present proposal is to address the impact of these strategies on air quality for different emission scenarios. The scenarios will be built in collaboration with the local air quality agency and local public authorities. This work will also be carried out in close collaboration with Dr Charles Chemel, from the University of Leeds in the UK, who is an expert in numerical modelling of atmospheric dynamics coupled with chemistry.

This proposal is part of the project ClimAir ("Climate change and air pollution in an urbanized area: health and socio-economic impact of mitigation scenarios") supported by the French Research Agency (ANR) which just started for a 4-year period.

Funding

The candidate should apply to the MOPGA (Make Our Planet Great Again) French program for a 12-month funding. The deadline for application is January 16, 2023. The MOPGA application will be prepared in close collaboration with the host team.

It will be possible to extend these 12 months of funding by a further 18 months already available under the ClimAir project. This additional 18-month work will focus on feedback scenarios provided by economists, social science scientists and epidemiologists who are all partners of the ClimAir project.

Knowledge and skills required from the applicant

- atmospheric boundary layer (ABL) dynamics
- numerical modelling of atmospheric dynamics (preferably with WRF) coupled with chemistry
- good command of English

Further requirements, as imposed by the MOPGA program

The applicant

- should not hold French citizenship
- must have held a PhD for less than 5 years (must have passed their thesis defense between December 2017 and January 2023)
- has not resided in France after September 1st 2022 (for more than 90 days)

(see <https://www.campusfrance.org/en/mopga-2023>)

Applicants should send their CV (including the title of their PhD, a list of publications and the names of 2-3 reviewers) to chantal.staquet@univ-grenoble-alpes.fr by December 15, 2022. Their motivation should be briefly explained.