

The Laboratoire des Sciences du Climat et de l'Environnement (LSCE) has an opening for a

PhD student in the analysis of atmospheric CO₂ measurements at Mexico-City

This PhD study aims at analyzing atmospheric CO₂ observations in Mexico City with a high resolution model in order to reduce uncertainties on surface emissions. The thesis will be part of a scientific collaboration between LSCE (<https://www.lsce.ipsl.fr/>) and UNAM (<https://www.atmosfera.unam.mx/>) which are leading the French/Mexican project MERCI-CO₂ (Mexico City's Regional Carbon Impacts). This research project (www.epr.atmosfera.unam.mx/Merci-CO2/) funded for 3 years, aims to define, set up and interpret an atmospheric CO₂ measurement network to quantify the effectiveness of CO₂ emissions reduction strategies. The thesis topic will focus on the analysis of atmospheric CO₂ measurements in Mexico City, in order to characterize the observed gradients as a function of weather conditions, and their relationships with other species (NO_x, CO) which can be used as tracers of specific processes. A high-resolution 3-D atmospheric transport model using city-wide CO₂ emission maps based on socio-economic data for different sectors will be used to understand atmospheric dynamics linking surface emissions and atmospheric measurements. The modelling framework will be organized by ARIA Technologies (<http://www.aria.fr>), a company specialized in computation of pollutant dispersion and air quality modeling. The student will analyze in detail the comparison of simulations and observations to identify the key processes related to the meteorology, and to the areas that influence the measured concentrations. This step will indicate the conditions under which model performance is sufficient to be used in inverse modeling. Inversion of CO₂ gradients by a Bayesian inversion method will then be used to reduce Mexico City's uncertainty on CO₂ emissions.

Job description and tasks:

- Analysis of the observed CO₂ time series, together with meteorological and air quality observations
- Application of inverse modelling to observational data from high and low precision surface sensors, and total column spectrometers
- Interpretation of the results in cooperation with scientists and engineers from LSCE, UNAM and ARIA Technologies

Required skills:

- Master degree in chemistry, physics or meteorology or related discipline
- Knowledge in atmospheric transport modelling
- Programming skills (R, python, FORTRAN, Linux)
- Excellent written and oral communications skills in English

For further information about the position please contact Michel Ramonet (michel.ramonet@lsce.ipsl.fr)

Applications must be submitted before **1st May 2018** by email to M.Ramonet and shall comprise a CV, a letter of motivation and addresses of two referees. The position is available from September 2018.