

Development of an urban morphology database and evaluation of the MORUSES urban canopy model in the tropics: case study of Singapore

Speaker: Dr Andrés Simón-Moral
Department of Geography, National University of Singapore

Chair: Assoc Prof Matthias Roth
Department of Geography, NUS

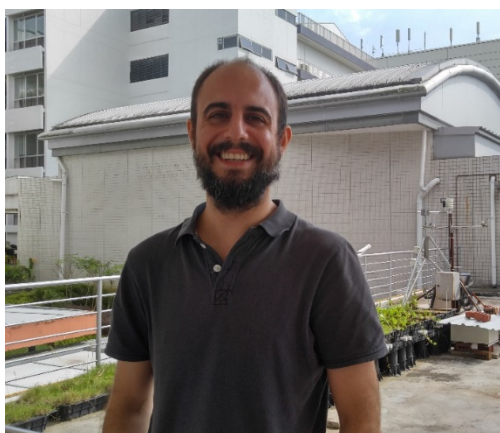
Date/Time: Friday, 2 February 2018, 3pm – 4.30pm

Place: Earth Lab, AS2-02-03, NUS

Abstract

Urban areas produce complex interactions with the atmosphere. Some of the consequences of this interactions are a decrease in natural ventilation and an increase in the air temperature with respect to its rural counterparts. This can produce undesirable impacts on the population. Quantifying and reproducing the impacts of urban structures on the atmosphere is needed to help urban planning to improve the livability of cities. Numerical modelling is a promising technique, however intensive model evaluations need to be carried out to generate trustable results. In order to represent cities in atmospheric models, urban canopy parametrizations are developed which represent the effects of buildings on the atmosphere in an averaged way. By simplifying the urban morphology, they can cover the entire city, providing a general view of the urban area and representing a good compromise between simplicity and accuracy. In this study, an evaluation of the Met Office Unified Model (MetUM) with the MORUSES (Met Office Reading Urban Surface Exchange Scheme) urban canopy parametrization is performed over Singapore. Singapore, due to its complex morphology, represents a challenge for numerical modelling. In the first part, a new morphological dataset is developed to be used as input in the model. Second, the ability of the model to represent the surface energy fluxes and temperature is evaluated against observational data. The capability to reproduce the surface energy fluxes shows the potential of the model to represent not only the climate within the city but also the impacts of the urban areas on the atmosphere. In addition, correctly distinguishing between different urban morphologies makes this model a suitable tool to provide guidelines for urban planning applications.

About the Speaker



Dr. Andrés Simón Moral is a post doctoral fellow in the geography department at the National University of Singapore. He started his career working with air quality models, with a special interest in traffic pollutant emissions inside urban streets (urban canopy). He also worked modelling and measuring thermal comfort in his home town, Bilbao. Moved by his interest in atmospheric modelling, he obtained a PhD in the Complutense University of Madrid (Spain) where he improved an urban canopy parametrization aimed to reproduce the impact of buildings on the wind and temperature within urbanized areas. His work represents the characterization of the microscale flow properties into coarser resolution models. During his stage in the department, he has been involved in the project “Assessing the impact of urbanization on key climate processes over Singapore”, a collaboration with the Center for Climate research in Singapore (CCRS). As contribution to the project he has developed an urban morphology database of Singapore and is evaluating the capacity of an urban canopy parametrization coupled into a regional model to accurately reproduce the surface energy balance and temperature in different neighbourhoods.

ADMISSION IS FREE – ALL ARE WELCOME