

Urban Physics

and interactions across the Scales

Spring School 2012

An International specialised Workshop
for doctoral students and postdoctoral researchers

13-18 May 2012, Limassol, Cyprus

For further information and registration go to <http://www.urbanphysics2012.org>



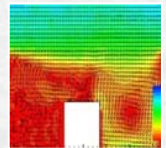
Background/Area image: Panagiotou, Linden, Neophytou (2010)

Organizers:

Marina NEOPHYTOU (UCY, Cyprus)
Bert BLOCKEN (TU/e, The Netherlands)
Jan CARMELIET (ETH/Empa, Switzerland)

Invited speakers

BRITTER Rex, MIT/Cambridge University
FOKAIDES Paris, University of Cyprus
KYPRIANOU Andreas, University of Cyprus
LELIEVELD Jos, Max-Planck Institute in Mainz
MARKIDES Christos, Imperial College
MOONEN Peter, ETH
SANTAMOURIS Mattheos, University of Athens



Scope:

The global trend towards urbanization is the direct cause for many environmental issues and presents a great risk for human comfort and health. It has been observed that urbanized areas can become up to 10 K warmer than their surrounding rural hinterland - a phenomenon called the Urban Heat Island (UHI). This largely affects human comfort, and has an adverse effect on the energy demand for cooling. Additionally, air pollution from industry, traffic and other anthropogenic and natural sources deteriorate air quality and increase the risk of impacts on human health. In order to propose countermeasures, a fundamental understanding of the underlying physical processes is crucial. The spring course aims at providing the necessary background, from fundamentals to the most recent advances, to researchers and doctoral students in the field. To this extent, the course has been composed as a unique combination of theory, workshops and exercises, covering a wide range of topics including building aerodynamics, turbulence, coherent structures, active and passive scalar transport, numerical modelling and experimental data acquisition techniques. The idea is to bring the participants in contact with leading researchers in the field, to provide a platform for a constructive and open dialogue as well as to incite collaborations between theorists, computational modellers and experimentalists at an international level.



An event under the dissemination activities of the research project ANABAΘMISH/ΠAΠIO/0308/33 funded by the Cyprus Research Promotion Foundation

Lectures

Atmospheric Dynamics & Climate Change: Observational and theoretical analysis of motion systems of meteorological significance. Global scale circulations. Chemistry - climate interactions. Interpreting environmental indicators.

Urban & Building Physics: Physics of the atmospheric boundary layer, multi-scale phenomena. Urban wind flow and Air Pollution Dispersion.

Turbulence: Turbulence fundamentals, scales in turbulent motion, statistical description, turbulence in the atmosphere, recent developments in the understanding of turbulent fluid flows in the urban atmosphere.

Active and passive scalars: Transport of active (e.g. heat) and passive (e.g. moisture) scalars, as well as discrete particles (e.g. rain) in the air. Interaction between scalar transport in the air and heat and mass transport in porous media.

Simulation methods: Computational Fluid Dynamics (CFD), turbulence modelling and other advanced methods for turbulent flow simulation.

Experimental methods: Fundamentals of laboratory and field experiments design, advanced measurement techniques for determining instantaneous velocity fields and scalar concentrations, scope and application of operational models, analysis and simulations for operational purposes, uncertainty and model evaluation.

Multi – resolution analysis: Theory and applications in the urban Environment.

Materials: Materials in urban environment and their contribution to Urban Heat Island.

Workshops

Experimental Training:

Field measurements - Building Thermography, Field Wind measurements

Laboratory measurements - Practical training on 2-D and 3-D volumetric PIV measurements.

Applications: Taking the step towards current environmental issues like the heat island effect, urban air pollution, outdoor thermal comfort, emergency responses and building energy demand. Problem assessment and methodology to design remedial actions.

Course information:

The format of the course includes morning sessions, where the theory is taught by experienced researchers, and afternoon sessions, where theory is applied through practical exercises and workshops. All lectures will be given in English. Lecture notes will be provided.

	13 May Sunday	14 May Monday	15 May Tuesday	16 May Wednesday	17 May Thursday	18 May Friday
08:30-10:00		LELIEVELD Atmospheric Dynamics & Climate change	BLOCKEN CFD for Urban Fluid Dynamics	LaVision GmbH PIV practice	KYPRIANOU Multi- resolution analysis	SANTAMOURIS Materials
10:00-10:15		Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
10:15-11:45		LELIEVELD Atmospheric Dynamics & Climate change	BLOCKEN CFD for Urban Fluid Dynamics	LaVision GmbH PIV practice	KYPRIANOU Multi- resolution analysis	SANTAMOURIS Materials
11:45-12:00		Coffee Break	Coffee Break	Coffee Break	Coffee Break	Coffee Break
12:00-13:30		NEOPHYTOU Urban Fluid Dynamics	MARKIDES Experimental Design and Data Extraction	LaVision GmbH PIV practice	BRITTER Turbulence in the Urban atmosphere	FOKAIDES Thermography
13:30-15:00		Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
15:00-16:30	Participant arrival	CARMELIET Building Physics	MOONEN Lab expts: Wind tunnel modelling	Cultural exploration	MARKIDES Turbulence & Heat transfer processes	Field measurements practice
16:30-16:45	icebreaker	Coffee Break	Coffee Break		Coffee Break	Coffee Break
16:45-18:15		CARMELIET Active & Passive scalars	MOONEN Lab expts: Wind tunnel modelling		NEOPHYTOU UHI Field observn & apps	Field measurements practice
18:15-19:00				Tutorial Time		

Image: Markides, Fokaides, Neophytou (2010)

Registration:

Participants can register online via the course website (<http://www.urbanphysics2012.org>) until March 15, 2012. The school fee is 500 euro per person, and covers registration, course material, accommodation and full board. Payments have to be made in advance upon receipt of invoice. A letter of confirmation will be sent to the registered participants after payment has been received. The number of participants is limited to 25.

Accommodation:

Participants will stay at the Kanika Pantheon Hotel at Limassol/Cyprus. The hotel is situated in the heart of Limassol overlooking to Enaerios Square. At the Enaerios Square there are charming walkways, wooden decks, cycling paths, gardens and park benches where you can take a break. Since only a limited number of single rooms is available on-site, room sharing is encouraged. The registration form has an option to specify the name of some- one you wish to share with. For single rooms a surcharge has to be paid. Lunch and dinner are buffet meals with drinks and coffee included. The first meal is an evening meal on Sunday the 13th and the last meal is lunch on Friday 18th.

Background image: Blocken, Persoon, Carmeliet (2008)