Geofizički odsjek,
Prirodoslovno-matematički fakultet,
Sveučilište u Zagrebu,
Horvatovac 95, 10000 Zagreb
Tel. (+385 1) 46 05 900, fax: (+385 1) 46 80 331

Zagreb, 08. 11. 2017.

OBAVIJEST

Dana **13.12.2017.** u **13:15 sati** održat će se na Geofizičkom odsjeku PMF-a sljedeće izlaganje:

Dr Richard Toro Araya

(Departamento de Química, Facultad de Ciencias, Universidad de Chile)

Drones to measure pollutants in height-technological tools to study the urban air pollution of Santiago Chile

ABSTRACT: Recent decades have witnessed a global trend toward air quality degradation in different urban areas across the world that is mainly associated with high concentrations of particulate matter (PM). Despite technological advances and growing awareness, countries continue to struggle against this global trend. Urban areas across the world such as Beijing, Guangzhou, Seoul, Milan, Athens, Mexico City, Lima and Bogota have significant levels of air pollution. The increased atmospheric pollution of recent years highlights the urgent necessity of efficient monitoring of particulate pollution in the atmosphere, which continues to be a difficult task due to the spatiotemporal heterogeneity of aerosol concentrations in the atmosphere. Most observations of atmospheric particles in urban areas are made at ground level, however, controlling, preventing and modeling pollution requires an understanding of the pollution distribution not only near the surface (2D) but also with respect to altitude, i.e., in three dimensions (3D), within the lower troposphere and, in particular, during thermal inversions that restrict the vertical dispersion of pollutants.

Unmanned aerial systems (UAS), also known as drones, unmanned aerial vehicle`s (UAV`s) or remotely piloted aircraft (RPA) have been developed and used almost exclusively for military purposes. In the last decade, UAVs have also been used in the meteorology of the PBL as flexible and affordable sensor platforms. This research explores the atmospheric stratification dynamics, the vertical transport of size-segregated PM within the mixing layer and up to the top of the thermal inversion(s) during critical episodes of air pollution in the urban area of Santiago, which is used as a study model. A drone equipped with suitable sensors will perform systematic measurements of meteorological variables that determine atmospheric stability (e.g., temperature, humidity, mixed layer altitude) that are expected to quantify size-segregated PM between different atmospheric layers as its diurnal and seasonal variability during air pollution critical episodes. The study will also evaluate the magnitude, persistence and diurnal and seasonal variability of thermal inversions at ground level and subsidence during the development of critical events of pollution. Therefore, it will be possible to evaluate the real carrying capacity of the atmospheric basin studied. Finally, this study aims to validate the use of

the WRF model to estimate the mixing layer height by comparing model simulations with measurements of vertical temperature and humidity profiles.

In the current stage of research progress, we have adapted a drone as a platform for sensors of meteorological variables (Temperature, relative humidity, barometric pressure) and concentration of size-segregated PM using a portable aerosol spectrometer. During the winter of this year we have measured the first vertical profiles of the variables mentioned in the flight platform over the urban area of Santiago. These preliminary results that will serve as a basis for the systematic measurements campaigns that allow studying the diurnal and seasonal variability of size-segregated PM in height. In addition, we expect that the data allow evaluating the performance of computational simulations under conditions of stagnation of air mass during development and evolution of critical episodes of air pollution in Santiago.

Pozivaju se studenti, apsolventi i svi zainteresirani da prisustvuju predavanju, koje će se održati u predavaoni br. 2 Geofizičkog odsjeka PMF-a, Horvatovac 95, Zagreb.