



Unmanned Aerial Systems as Versatile Tools for Atmospheric and Environmental Research

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Unmanned Aerial Systems (UASs) are increasingly recognized as versatile tools for different earth-sciences applications providing chiefly a link between in-situ ground based measurements and satellite remote sensing observations.

Based on the Autonomous Flying Platforms for Atmospheric and Earth Surface Observations project (APAESO) of the Energy, Environment and Water Research Center (EEWRC) at the Cyprus Institute (APAESO is co-financed by the European Development Fund and the Republic of Cyprus through the Cyprus Research Promotion Foundation: ΠΔ/Π/0308/09), we have acquired four CRUISERS (ET-Air, Slovakia) as UAS platforms and a substantial range of scientific instruments to be employed on these platforms. The APAESO platforms are aimed at the dual purpose of carrying out atmospheric and earth-surface observations in the (Eastern) Mediterranean. They will enable 3D measurements for determining physical, chemical and radiative atmospheric properties, aerosol and dust concentrations and atmospheric dynamics as well as 2D investigations into land management practices, vegetation and agricultural mapping, contaminant detection and the monitoring and assessment of hydrological parameters and processes of a given region at high spatial resolution. Currently, we are building up an Unmanned Airplane Facility at CyI.

In the process of reaching full operational capacity, we have initiated and carried out first test missions involving highly specialized and specifically adapted instrumentation for atmospheric investigations. The first scientific mission involves the employment of a DOAS-system (Differential Optical Absorption Spectroscopy) in cooperation with colleagues from Heidelberg and Mainz, Germany and has been successfully completed. More recently, we started work on a new collaborative project aimed at measuring vertical profiles of aerosols in the Eastern Mediterranean. The project involves colleagues from the University of Frankfurt, Germany as well as from the University of Tel Aviv and the Weizmann Institute, both in Israel. For this project, a specially designed multi-stage electrostatic aerosol collector is being placed on one of the APAESO UAS. Simultaneously, atmospheric aerosols size and concentrations will be measured with an optical aerosol spectrometer, mounted on the same platform. The collected samples will be divided into two parts for analysis in both the University of Frankfurt and the Weizmann Institute