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Putting Technology to Work in Science - How to Select Unmanned Aerial Vehicles (UAV) and their Instrumentation for Atmospheric and Earth Surface Observations

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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 is aimed at the dual purpose of carrying out atmospheric and earth-surface observations in the Mediterranean. The APAESO platforms will offer the unique potential to determine physical, chemical and radiative atmospheric properties, aerosol and dust concentrations, atmospheric dynamics, surface morphology, vegetation and land use patterns as well as ocean surface properties (biology, waves, currents) and to carry out archaeological site reconnaissance and contaminant detection at high spatial resolution.

The first phase of APAESO was dedicated to the preliminary design and the selection of an Unmanned Aerial Vehicle (UAV) as the backbone of the APAESO infrastructure.

Selection of a UAV suitable for the many research objectives as outlined above is challenging because the UAV technology is new and rapidly evolving. This notwithstanding, a very large number of systems, mostly utilized for defense purposes, are currently available. The major challenge in the selection process lies in considering the trade-off between different platform characteristics (e.g. payload weight, endurance, max. altitude for operation and price) and in optimizing the potential performance of the UAV.

Based on the required characteristics for the UAV platform, a survey of possible UAVs and suitable sensors was prepared based on various data sources. We used an elimination process in order to consider only a few models for the final selection process out of about 1000 commercially available UAV models that were initially investigated.

The presentation will discuss the main scientific objectives that determine the specification of the UAV platform, major considerations in selecting best available technology for our needs and will briefly describe the next phases of the project.