

Use of innovative technologies, materials and models in the aeronautical environment

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The aeronautical environment is often contaminated by environmental phenomena, such as extreme weather events, desert sands, dust and ash volcanic. These issues affecting the aeronautical sector often cause interruptions to operations and damage to structures.

The most common effect is the temporary operational interruption, which goes from flight cancellations to airport closings for periods of time ranging from hours to weeks generating huge economic losses. Added to these are the degrading impact they have on the materials used, causing damage to the aircraft.

With the aim of improving the quality of the forecasts relating to airspace and the deposit of volcanic dust on the ground, the development of an integrated modelling system aimed at providing data that allows to optimize airport operations when such phenomena occur, is shown. This system, based on the model Weather Research and Forecasting (WRF) coupled with chemistry (WRF - Chemistry), aims to integrate meteorological data from high-resolution models with volcanological data, in order to obtain both the forecast of phenomena atmospheric hazards, such as hail, turbulence and wind-shear, and quantitative estimates on the transport of desert sands and volcanic ash into the atmosphere and as a deposit on the ground.

To evaluate the performance of the system, data provided by Doppler radars and Lidar are used, as well as from data provided by mobile stations and drones equipped with sensors.

Furthermore, the information produced by the model will provide valuable support both to airport management companies affected by these environmental problems and to other local stakeholders such as public administrations (for example Civil Protection, Agro-information services, etc..).