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Spanish and Portuguese scientists join forces to monitor atmospheric aerosols with laser radar

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Ten scientific institutions from Spain and Portugal have joined forces to create the SPALINET lidar network, radars with laser technology intended to study the aerosols in the atmosphere. The aim of the team is to homogenise and enhance the quality of measurements in order to better understand the scattering of these particles in the sky over the Iberian Peninsula and the Canary Islands.

In March, the Geophysics Centre of Évora (Portugal) became the tenth scientific institution to join the Spanish and Portuguese Aerosol Lidar Network (SPALINET). This type of device works in similar fashion to a conventional radar, but instead of using radio waves, it emits optic waves (laser light), which is reflected by the particles and later redetected by an optical system.

The Lidar (Light Detection And Ranging) can be built into satellites (such as those carried by ICESAT and CALIPSO from NASA) or aim at the atmosphere from earth, from fixed or mobile stations. The latter is what SPALINET has done in the Iberian Peninsula and the Canary Islands.

"Satellites provide global coverage, but 10 must pass before returning to the same point, whereas coordinated ground-based lidar offer the high time and vertical resolution of each station and the space sample in the geographical area they cover simultaneously," Michaël Sicard, a member of the network and researcher at the Department of Signal Theory and Communications at the Universidad Politécnica de Cataluña (UPC) told SINC.

Sicard indicates that out of all the direct applications of the network, "it is worth highlighting the monitoring of atmospheric aerosol transport in Spain and Portugal, as well as the estimation of the impact of aerosols on the global radiative balance (solar radiation that absorbs and/or allows atmospheric aerosols to pass) and therefore the climate."

Some climate models related to the scattering of aerosols over the Peninsula, as well as the details of SPALINET, were published recently in *IEEE Transactions on Geoscience and Remote Sensing*.

The objective of this project is to investigate aerosols, solid particles in suspension of natural origin (volcano emissions, dust storms...) or caused by humans (burning of fuel). Their study is of great interest in order to analyse the dispersion of pollutants and test weather forecast models.

History of the Network

SPALINET was created in 2007 to reinforce and complement the European Aerosol Research Lidar Network (EARLINET), a voluntary association of European scientific institutions set up three years earlier to carry out research on atmospheric aerosols.

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The Spanish and Portuguese network maintains the quality control of lidar stations and establishes common regulations for operating the instruments and recording data. SPALINET also makes it possible to perform measurements in areas not covered by the European network, such as the Canary Islands, situated in a privileged location for the study of phenomena such as Saharan dust movement.

The team at the UPC, the Energy, Environmental and Technological Research Centre (CIEMAT), Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT), the Atmospheric Physics Group at the Andalucía Environment Centre (University of Granada and Andalucía Regional Government) are members of both networks.

In order to support EARLINET, the project EARLINET-ASOS (Advanced Sustainable Observation System) was created. This project is financed by the 6th Framework Programme of the European Union as an instrument to measure the distribution in space and time of aerosols at continental level. The teams that are promoting this initiative will meet next week in the Portuguese city of Évora.

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