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Saharan dust contribution to PM levels: The EC LIFE+ DIAPASON project

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The contribution of Saharan-dust advections to both daily and annual PM average values can be significant all over Southern Europe. The most important effects of dust on the number of PM exceedances are mostly observed in polluted areas and large cities. While a wide literature exists documenting episodes of Saharan dust transport towards the Euro-Mediterranean region and Europe in general, a limited number of studies are still available providing statistically significant results on the impact of Saharan dust on the particulate matter loads over the continent. A four-year (2001-2004) study performed in Rome (Italy) found these events to contribute to the average ground PM10 with about 15 ± 10 μg/m3 on about 17% of the days in a year. Since the PM10 yearly average of many traffic stations in Rome is close to 40 μg/m3, these events can cause the PM10 concentration to exceed air quality limit values (50 μg/m3 as daily average) set by the EU Air Quality Directive 2008/50/EC. Although the European legislation allows Member States to subtract the contribution of natural sources before counting PM10 exceedances, definition of an optimal methodology to quantitatively assess such contribution is still in progress.

On the basis of the current European Guidelines on the assessment of natural contributions to PM, the DIAPASON project ("Desert-dust Impact on Air quality through model-Predictions and Advanced Sensors ObservatioNs", recently funded under the EC LIFE+ program) has been formulated to provide a robust, user-oriented methodology to assess the presence of desert dust and its contribution to PM levels. To this end, in addition to satellite-based data and model forecasts, the DIAPASON methodology will employ innovative and affordable technologies, partly prototyped within the project itself, as an operational Polarization Lidar-Ceilometer (laser radar) capable of detecting and profiling dust clouds from the ground up to 10 km altitude. The DIAPASON Project (2011-2014) will be first implemented as a network of three stations in the Rome metropolitan area. However, the DIAPASON methodology to detect/quantify the Saharan dust contribution to PM will be designed to be easily applicable by air-quality and meteorological agencies. In fact, the possibility of manufacturing cheap, operational polarization lidar-ceilometers and scatter them on the territory will also represent a breakthrough in the detection and quantification of other atmospheric aerosol layers, as volcanic or wild-fire plumes, with further benefits in terms of meteo forecasts, flight security and air quality assessments.