

DEMO : Atmospheric deposition measurement and validation of deposition into regional models

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Deposition is one of the major terms controlling the mass budget of the atmospheric particulate matter far from its sources. However, this term is always poorly constrained in regional aerosol transport models mainly because the number of relevant deposition measurements is very limited. This project aims to test the deposition field as simulated by models by comparing it with new deposition measurements performed in similar conditions and obtained over sites distant from 2000 km.

The strategy is based on the measurements of Saharan dust deposition over the Western Mediterranean Sea and South of France. The special interest given to this species is mainly due to their low atmospheric reactivity and to the high intensity of dust events which made deposition measurement quite easy. Moreover, the trajectory of dust events over the Mediterranean and the South of France are well known allowing to define a precise sampling strategy. Lastly, this dust is very often responsible for the goings beyond of threshold in PM₁₀ observed at least in the south of France. A specific and automatic collector (CARAGA) developed within the framework of this project has been deployed on six sites where the data complementary to interpretation of the collected data and the validation of the models (optical thickness, concentrations in PM₁₀, size distribution) are available (MOOSE network, MERA stations, stations of Lampedusa, Corsica Observatory).

This project has benefited from the context of ChArMEx, a component of the MISTRALS Program, which provided complementary data and allowed to extent the duration of the deposition measurements. The sampling was performed simultaneously and identically by using the CARAGA samplers has allowed to obtain a unique data set in order to study the spatial and temporal variability of the occurrence and intensity of Saharan dust deposition (over the period 2011-2013). The pulsed nature of the Saharan events is observed with 10 major deposition events collected in Lampedusa and 6 in Mallorca over a period of one year. Moreover, the south-north gradient in the intensity of these deposits has been quantified (maxima observed: 2.66 g m⁻² to Lampedusa 0.54 gm⁻² in Mallorca, 0.33 gm⁻² at Frioul, 0, 16 gm⁻² at Le Casset). Finally, simulated fields of dry and wet deposition obtained with the chemistry-transport model CHIMERE have been compared to this dataset and the relevance of the existing parameterizations for deposition processes are discussed.

Key-words: *Deposition, measurement, models, Mediterranean Sea, Saharan dust*