
S1-11 Monitoring mineral dust in the Sahel to constrain the mass budget in regional simulations.

Beatrice Marticorena*¹, Féron Anaïs¹, Cécile Gaimoz², Franck Maisonneuve, Guillaume Siour³, and Jean-Louis Rajot^{4,5}

¹LISA UPEC – Université Paris XII - Paris-Est Créteil Val-de-Marne (UPEC) – LISA, UMR CNRS 7583, UPEC, UPD, IPSL, 61 avenue du Général de Gaulle, 94010 CRÉTEIL cedex, FRANCE, France

²Laboratoire Interuniversitaire des Systèmes Atmosphériques – UMR-CNRS 7583, Université Paris-Est Créteil et Université Paris Diderot, Institut Pierre Simon Laplace, – Laboratoire Interuniversitaire des Systèmes Atmosphériques (LISA) UMR CNRS 7583 Faculté des Sciences et Technologies 61 Avenue du Général de Gaulle, 94010 CRETEIL Cedex France, France

³Laboratoire inter-universitaire des systèmes atmosphériques (LISA) – CNRS : UMR7583, INSU, Université Paris VII - Paris Diderot, Université Paris-Est Créteil Val-de-Marne (UPEC) – 61 Av du général de Gaulle 94010 CRETEIL CEDEX, France

⁴Institut des Régions Arides de Médenine (IRA) – 4119 Médenine Route du Djorf km 22,5 TUNISIA, Tunisie

⁵Institut d'écologie et des sciences de l'environnement de Paris (IEES) – Institut National de la Recherche Agronomique : UMRA1392, Université Pierre et Marie Curie - Paris 6 : UM113, Université Paris-Est Créteil Val-de-Marne - Paris 12, Centre National de la Recherche Scientifique : UMR7618 – UPMC, campus de Jussieu - Bât A - Paris (75005)UPMC, campus de Jussieu - Tour 56/66 - Paris (75005)AgroParisTech-INRA - Grignon (78)INRA - Versailles (78)IRD - Bondy (93)U-PEC - Créteil (94), France

Résumé

In the last century, aeolian erosion in the Sahel has fluctuated significantly, in connection with irregular precipitation and variability of the vegetation cover and an increasing anthropogenic pressure. In the dry season, the Harmattan flow transports large amounts of mineral dust emitted from Saharan sources. In the wet season, very high surface wind speeds associated with convective systems produce intense local dust emissions. The Sahel region is thus a region of emission and deposition of mineral dust. A precise estimation of the net mass budget of mineral dust requires to account for the strong inter-annual variability of the dust atmospheric load in this region.

Since 2006, a set of stations dedicated to the monitoring of mineral dust are operating in the Sahel as part of the INDAAF network. Simple and robust instrumentation allows to monitor simultaneously the atmospheric dust load, the concentration of particles smaller than 10 μm , the total and wet deposition fluxes.

The dust concentrations, the aerosol optical depths and the deposition fluxes all exhibit persistent seasonal cycles. The variability of the dust concentrations is driven by the variability of the dust transport in the Harmattan season and by local dust emissions in the

*Intervenant

Monsoon season. The seasonal cycle of the dust AODs is impacted by the variability of the dust layers thickness and altitude. The seasonal cycle of the deposition fluxes is very sensitive to the contribution of the wet deposition.

From these results, it is clear that reproducing simultaneously the dust concentrations, AODs and deposition fluxes in the Sahel is a challenge for regional models. The data from the Sahelian INDAAF stations will be used as validation data sets in the frame of the European DUSTCLIM project (ERA4CS) to evaluate long-term regional dust simulations and to estimate the benefit brought by the assimilation of satellite data.

Mots-Clés: Sahel, Dust monitoring, Dust deposition, Mass budget, Regional modelling.