Submitted Abstract

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Title	Phenomenology Of The Dust Atmospheric Deposition In A High-Altitude National Park In Southeast Of The Iberian Peninsula: Saharan Dust Fluxes Contribution.
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Abstract

National Parks are usually areas with unique ecosystems protected by regulations due to their geological/biological richness. Sierra Nevada, in the southeast of the Iberian Peninsula, is one of the high-altitude National Parks of the Spanish network. Due to its geographical position, this area registers a sub-tropical climatic context and have an ideal location considering the role of distance to the Saharan dust as a source of mineral particulate matter to the atmosphere. The deposition fluxes of these natural particles can contribute significantly to the ecosystems by providing elements of biogeochemical relevance, such as N, Ca, Mg, K, P and Fe.

Atmospheric deposition is recorded from November 2017 to October 2021 in a high mountain station (SNS, 37.10ºN, 3.39ºW, 2500 m asl), belonging to the Andalusian Global ObseRvatory of the Atmosphere (AGORA), in the Sierra Nevada National Park, at around 20 km from Granada city (680m asl). Wet, dry and bulk deposition for the entire period is analysed in this study to discern the impact of African dust in the overall deposition flux. To this end, North African events (NAF) have been identified and their contributions have been quantified.

The annual atmospheric bulk deposition in SNS account between 10-20 g/m2.year. This atmospheric particle contribution is influenced by the number and intensity of the NAF events. The high number of NAF events in Sierra Nevada (25-35 % of the days) and the intensity of these events, explain the elevated annual dust load registered. Furthermore, the phenomenology of the dust deposition is also an important controlling factor of the deposition mode contribution. The annual contribution by dry-deposition mode accounts around 6-8 g/m2.year whereas the wet-deposition mode can vary from 5 to 12 g/m2.year. The large variability observed in the contribution of the wet-deposition mode is mainly related to the number of the rain events. Despite the annual precipitation mean in SNS is around 500 mm, differences from 1000 mm to 400 mm of precipitation has been registered in the study period.

The larger recurrence of the dry-deposition mode in SNS affect the insoluble/soluble species relation. In SNS the insoluble fraction account for 65-70% of the total mass deposited, while the soluble fraction only account 30-35%. NAF events can contribute 4-5 g/m2.year to the insoluble fraction whereas in periods without NAF events, the contribution decrease to 0.3-0.4 g/m2.year.

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