Submitted Abstract

ID IMC22-FSAbstr- 903

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Organisations	University of Granada, Spain
Country	Spain
Region	Western Europe
Title	Chemical And Biological Aerosol Monitoring In Sierra Nevada Mountains.
Keywords	Aerosols, Saharan Dust, Sierra Nevada
Type	List Of Focus Session
Focus Session ID	48

Abstract

Sierra Nevada (Spain) constitutes the main physical barrier met by Saharan dust traveling to Europe. Saharan dust intrusions and Atlantic fronts that reach Sierra Nevada have clear seasonal, synoptic, and climatic patterns that affect the quantity and quality of the atmospheric deposition. Saharan dust, whose deposition is about 11 g m-2 y-1 in Sierra Nevada, contains a wide variety of soluble ions that supply important elements for biogeochemical cycles such as phosphorus, calcium and iron. The high calcium content, about 39 mmol m-2 y-1, provides an important acid buffer capacity to the water and can supply the needs of vegetation in siliceous soils. Saharan aerosols are also known to transport significant amounts of small soluble organic carbon. Furthermore, billions of viruses and millions of bacteria per square meter and day, attached to Saharan dust particles and marine organic aggregates, are deposited above the atmospheric boundary layer in the terrestrial and aquatic ecosystems of the Sierra Nevada Mountains. This microbial atmospheric deposition expands their biogeographic ranges and generates a global seed bank of microorganisms to face future environmental changes. In a broader context of bioaerosols, the analysis of pollen content in the air of Sierra Nevada can provide information to assess the intensity of the impact that climate change is exerting on terrestrial ecosystems. Monitoring and characterization of the atmospheric pollen spectrum will allow to identify the origin of the pollen-emitting sources, natural or exotic, local or distant, or transported to the area through different processes of atmospheric dynamics, including Saharan dust events. The intrinsic relationship between pollen emissions and environmental conditions will make it possible to understand the evolutionary dynamics and behavior of terrestrial communities in situations of changeable environmental conditions. The capacity of the pollen grains and sub-particles derived from them to act as cloud condensation nuclei (CCN) and ice nuclei (IN), and the impact that this can have on the climate and precipitation of the area are other relevant factors to be considered. In the context of Smart EcoMountains, The Thematic Center on Mountain Ecosystems of LifeWatch-ERIC, we will measure on a weekly basis the wet and dry deposition of atmospheric aerosol and bioaerosols over Sierra Nevada by means of two wet-dry collectors and two Hirst-type samplers installed in the north and south face of Sierra Nevada, integrated in the stations of the Global Change Monitoring Network of the Sierra Nevada National Park.