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>> SYNTHESIZE MOUNTAINS OF KNOWLEDGE <<

Submitted Abstract

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Abstract

Frequency of dust deposition events has increased steadily in the Mediterranean region in the past few decades. While Saharan aerosols reduce transparency of freshwater systems, they are also important sources of macro- and micronutrients in oligotrophic high mountain lakes. Thus, the net effect of dust input on these systems is still unclear. To quantify the overall impact of dust as a global change driver, field mesocosm experiments were conducted in La Caldera, an oligotrophic high-mountain lake in the Spanish Sierra Nevada. Sampling design included setting up in-situ mesocosms with natural lake water and a gradient of five different dust concentrations in two-fold increases (0-320 mg/L). Mesocosms were replicated three times, and each contained 1000L of lake water extending down the water column. Samples were collected every week for two months (July 22-September 23, 2021). Physicochemical and biological factors such as light attenuation, nutrients, chlorophyll, and phytoplankton and bacterial abundances were measured. Overall, there was a direct correlation between Saharan dust concentration, inorganic nutrients and chlorophyll a. Chlorophyll a peaked after 1-2 weeks for all dust treatments, and reached five-fold higher concentration in the maximumdust-enriched treatment. There was a progressive delay in the response of chlorophyll a with increasing dust treatment. These results suggest there is a dust concentration threshold above which the beneficial effects of nutrient input overwhelm the damaging effects of shading by dust particles, resulting in an overall positive impact on the community.

This work is part of Smart EcoMountains, the Thematic Center on Mountain Ecosystems of LifeWatch-ERIC.