New nutrients (nitrogen and phosphorus) dynamic following a Saharan dust deposition

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Since the Mediterranean Sea is a nutrient depleted ecosystem during at least 6 months of the year, atmospheric deposition contributes to the input of new nutrients - such as mineral phosphate and anthropogenic nitrate - to this oligotrophic ecosystem. The aims of this study are to quantify (1) the processes that release phosphate and nitrate in surface seawater following a Saharan dust event, and (2) to follow the fate of these new nutrients in the water column while the lithogenic particles are sinking. Three distinct experiments have been performed by seeding dust at the surface of a 'minicosm' (polyethylene tank of 0.3m^3, with a surface of 0.36 m^2 and the height of 1.09 m). The minicosms were filled with filtered seawater (0.2μm) collected in clean conditions in the Bay of Villefranche (French Riviera) at three distinct seasons (winter mixing; after the spring bloom and an intermediate situation) inferring to the collected seawater distinct biogeochemical characteristics. The seeding mimicked a dust deposition of 10 $g.m^{-2}$, and it was performed with a 'dust analog' for wet deposition used previously in the DUNE project. The nutrients concentrations and the particles (size, numbers) were followed during six days after the seeding. We will present results showing that 1) the dissolution of DIP (dissolved inorganic phosphorus) and DIN (dissolved inorganic nitrogen) from the dust is controlled in part by the particles dynamic and more specifically by the specific surface area of mineral particles, 2) the release is time dependent with maximum occurring within the few first hours after the seeding 3) the evolution of nitrate and phosphate concentrations is linked to the amount and quality of DOM (dissolved organic matter). The knowledge of such processes in abiotic conditions, with a realistic particles dynamic, is a first step to understand the bioavailability of atmospheric nutrients and thus the biological responses after a Saharan event in oligotrophic environments.