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UV impact on dissolved organic matter availability in marine waters : subsequent effects for bacterial cycling

R. Sempéré (1), M. Tedetti (1), B. Charrière (1), M. Abboudi (1), F. Joux (2), D. Nerini (1), W. Miller (3), K. Mopper (3), C. Panagiotopoulos (4)

(1) LMGEM, UMR CNRS/INSU 6117, Case 901, COM, 13 288 Marseille Cedex 9 France, sempere@com.univmed.fr

(2) LOBB. Université Paris 6, CNRS UMR 7621. Banyuls-sur-Mer, France

(3) Department of Marine Sciences University of Georgia Athens, GA 30602-3636, USA

(4) Department of Chemistry and Biochemistry, Old Dominion University, Norfolk, VA, USA

Here we report results related to the UVECO program which evaluates the effect of ultraviolet radiation (UVR) on microbial communities and on dissolved organic matter (DOM) in the northwestern Mediterranean Sea. Our results showed that UV-B induced a production of OH radicals of 15-20 and 40-45 nM/day in early spring and early summer, respectively. When 30 μM of nitrate are added, these productions are enhanced up to 50-65 and 60-75 nM/day. Our results also indicate that in spring, natural sunlight irradiation of 0.2 μm filtrated seawater stimulates bacterial production (BP) by 80% in full sun compared to dark conditions and by 150% in full sun condition compared to dark when NO3- are added in the DOM-solution. By contrast in summer, natural sunlight irradiation of DOM-solution induced a decrease in BP by 30% in full sun compared to dark conditions whatever the nitrate concentration added before irradiation. Similarly, laboratory experiments indicated significant production of dicarboxylic acids and related polar compounds as well as slight production of monosaccharide after irradiation of a solution of freshly produced dissolved organic matter mixed with nitrates. Therefore, these results suggest that UV irradiation of coastal seawater might periodically change bacterial DOM cycling according to the nitrates inputs.