



The Effect of UV-B Radiation on Dissolved Organic Matter and Nitrogen Biogeochemistry in Aquatic Environments

E.C. Suddick (1,2), G. Uher, (2), M.E. Woodward (3), R.C. Upstill-Goddard (2), S.W. Gibb (1)

(1) Environmental Research Institute of the North Highland College, UHI Millennium Institute, Thurso, KW14 7JD, U.K., (2) School of Marine Science and Technology, University of Newcastle, Newcastle-upon-Tyne, NE1 7RU, U.K., (3) Plymouth Marine Laboratory, Prospect Place, The Hoe, Plymouth, PL1 3DH, U.K. (emma.suddick@thurso.uhi.ac.uk / Phone: +44 (0)191 2225091

We conducted irradiation experiments using natural sunlight and a solar simulator in order to investigate the photochemical release of ammonium from freshwater and marine dissolved organic matter (DOM) together with concurrent modifications of the spectral absorbance and fluorescence properties of coloured DOM (CDOM). Samples were taken from a variety of aqueous environments predominantly from Northern Scotland peatland freshwater catchments but also from the River Tyne, North East England and from the Iberian Coast, Atlantic Ocean, covering the a_{350} range 0.3 to 50 m^{-1} . Photochemical ammonium release was observed in all samples irradiated between four and ten hours, where either linear production or a three step production process was observed. Preliminary data indicate that ammonium photo-production is independent of dissolved oxygen. We discuss implications of these findings with regard to the possible mechanism of ammonium photo-production. The progressive loss of CDOM and subsequent decrease in absorbance at 350 nm (a_{350}) known as photo-bleaching was observed as well as changes in fluorescence excitation-emission matrix (EEM) measurements throughout irradiations. We discuss possible consequences of photo-chemically induced nitrogen release biogeochemistry and nutrient limitation of freshwater environments.