

Spring 3-10-2011

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Gabriela Contreras[^]

Department of Biological Sciences, University of Texas at El Paso., gcontreras8@miners.utep.edu

Vanessa L. Lougheed^{*}

Department of Biological Sciences, University of Texas at El Paso., vlougheed@utep.edu

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Recommended Citation

Contreras[^], Gabriela and Lougheed^{*}, Vanessa L., "Changes in Dissolved Organic Carbon (DOC) in Arctic Tundra Ponds Over the Past 40 Years" (2011). *COURI Symposium Abstracts, Spring 2011*. Paper 4.

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Changes in Dissolved Organic Carbon (DOC) in Arctic Tundra Ponds Over the Past 40 Years

Gabriela Contreras[^] and Vanessa L. Lougheed*

University of Texas at El Paso, Department of Biological Sciences, El Paso, TX, 79968

With a warming Arctic, degradation of permafrost is expected to release organic and inorganic materials into aquatic ecosystems; however, there are few long-term datasets with which to test this prediction. The Arctic tundra ponds at the International Biological Program (IBP) site in Barrow, Alaska, studied for the first time in the 1970s, represent one of the very few locations in the Arctic where long-term data are available on freshwater ecosystem structure and function. Dissolved Organic Carbon (DOC) is used to describe the thousands of dissolved compounds found in water that derive from organic materials. The objective of this study was to determine whether DOC concentrations had changed over time in the IBP ponds. Over the summer of 2010, we collected DOC samples from 5 IBP ponds, as well as several ponds in more isolated locations (BEO) and urban locations. We observed higher DOC concentrations in the IBP ponds in 2010, compared to the 1970's, when temperatures were lower. Urban sites tended to have higher DOC than non-impacted sites. This study will add to our understanding of DOC release into Arctic aquatic environments, and will increase our understanding of the impacts of Arctic warming and development on global carbon cycles.