Supporting Information

Overlapping Photodegradable and Biodegradable Organic Nitrogen in Wastewater Effluents

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Detailed Information SI-1: Discussion on Light Attenuation

Suspended and colloidal particles, carbon content, depth (pathlength), and photobleaching are major contributors to light attenuation. A study reported that removing larger particulates and colloidal particles, that contribute towards absorption and scattering of light, decreases light attenuation.[1] The samples in this study were filtered to remove suspended particles and a majority of colloidal particulates, light attenuation from these two sources should not be a major issue.

The light attenuation correction factor (CF) is known to increase as the concentration of organic matter increases.[2] Grandbois et al.[2] chose not to correct their data for high organic matter concentrations (> 50 mg C/L) using the correction factor because it was greater than 2. However, they observed minimal attenuation at low carbon contents (< 17 mg C/L) as in the case of this study.

The pathlength of quartz beakers used in this study could affect light attenuation. The CF value was calculated using an equation provided by Grandbois et al.[2]. The equation takes into account the effect of pathlength of the quartz beaker on light attenuation. The CF value was not used to correct the results for two major reasons. First, the CF value was 0.8, which is close to 1, for the samples from both treatment plants. Secondly, the samples were well mixed at 80 rpm which should provide equal light exposure throughout the samples during the experiment.

Photobleaching is the reduction in absorbance due to light absorption by organic matter[1] which could affect light attenuation during the study. However, there has been no established method for calculating light attenuation due to photobleaching.

REFERENCES

(1) Gao, H.; Zepp, R. G. Factors influencing photoreactions of dissolved organic matter in a coastal river of the southeastern United States. *Environ. Sci. Technol.* **1998**, *32*, 2940–2946.

(2) Grandbois, M.; Latch, D. E.; McNeill, K. Microheterogeneous concentrations of singlet oxygen in natural organic matter isolate solutions. *Environ. Sci. Technol.* **2008**, *42*, 9184–9190.

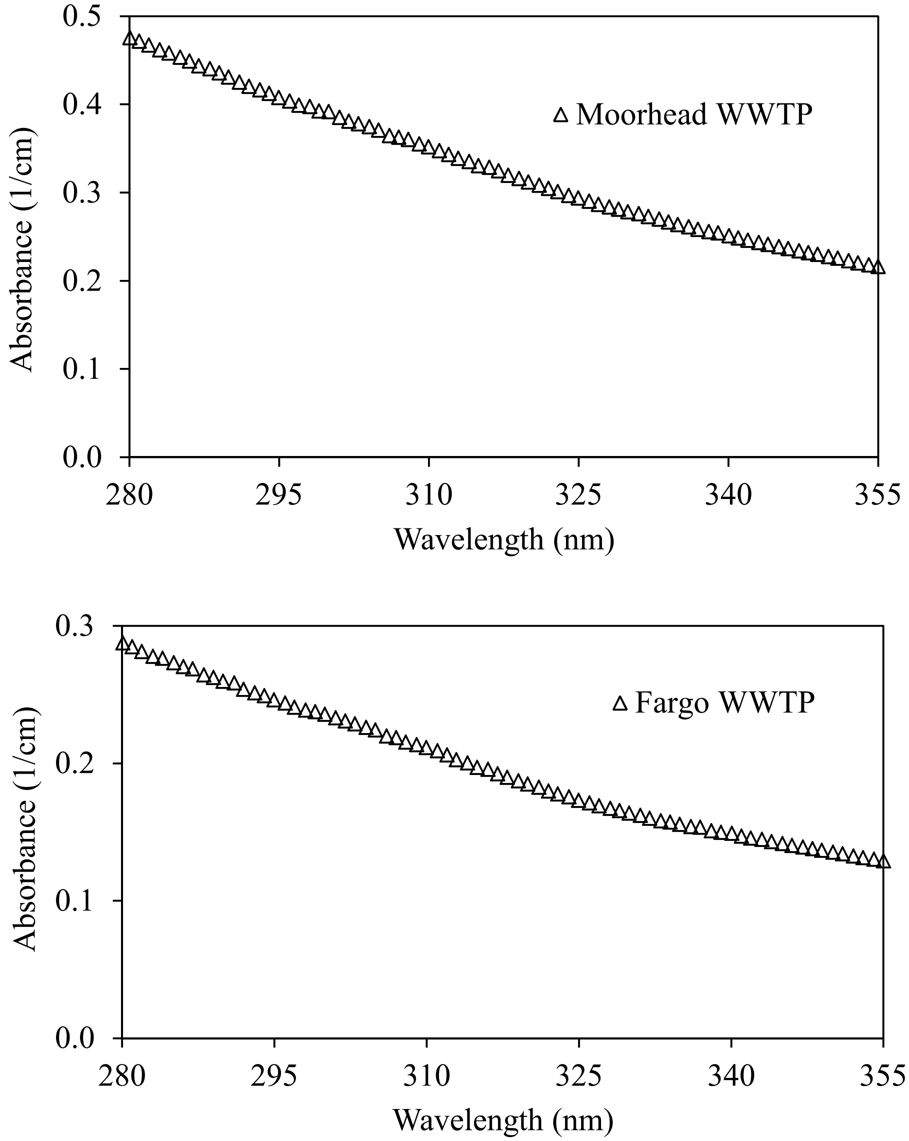

Figure SI-1. UV-visible spectra absorbance for final effluent samples.

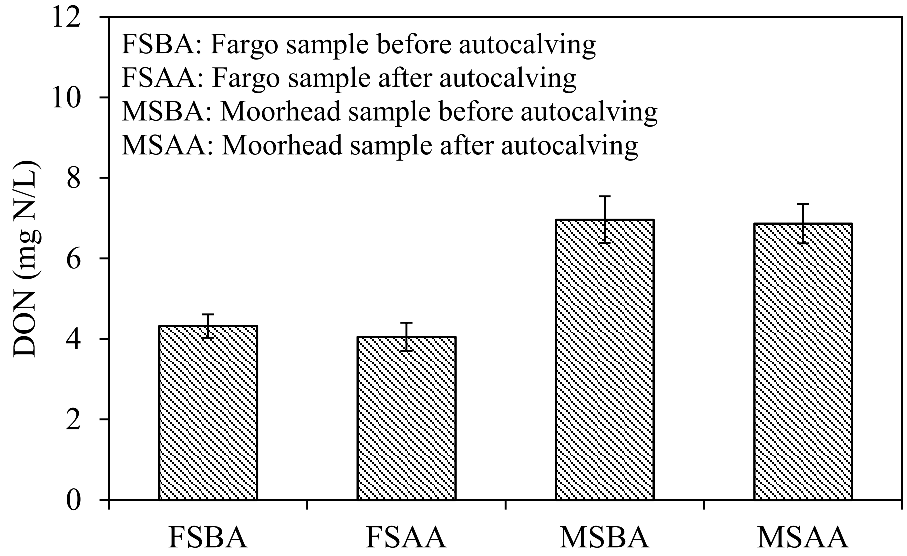

Figure SI-2. DON before and after autoclaving for final effluent samples from the City of Fargo and City of Moorhead WWTPs (error bars are standard deviations based on triplication).

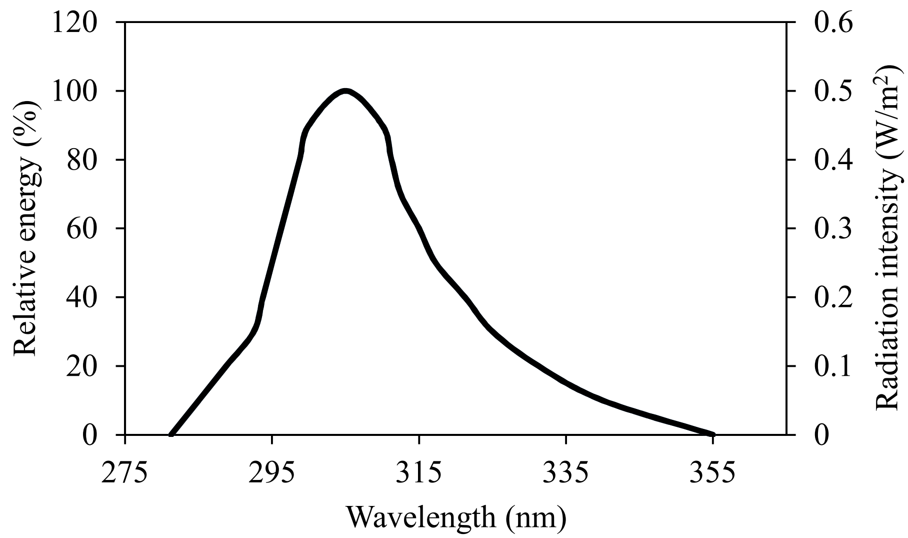

Figure SI-3. Spectrum of the UV light used in the study.

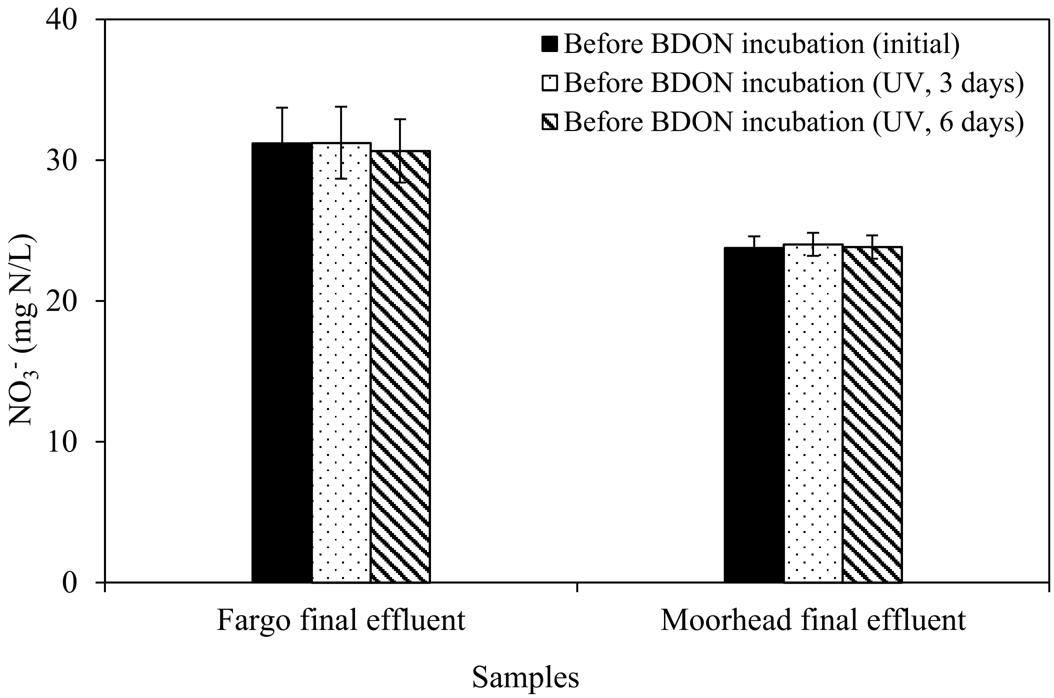

Figure SI-4. Nitrate before and after UV light exposure for samples from the City of Fargo and City of Moorhead WWTPs.

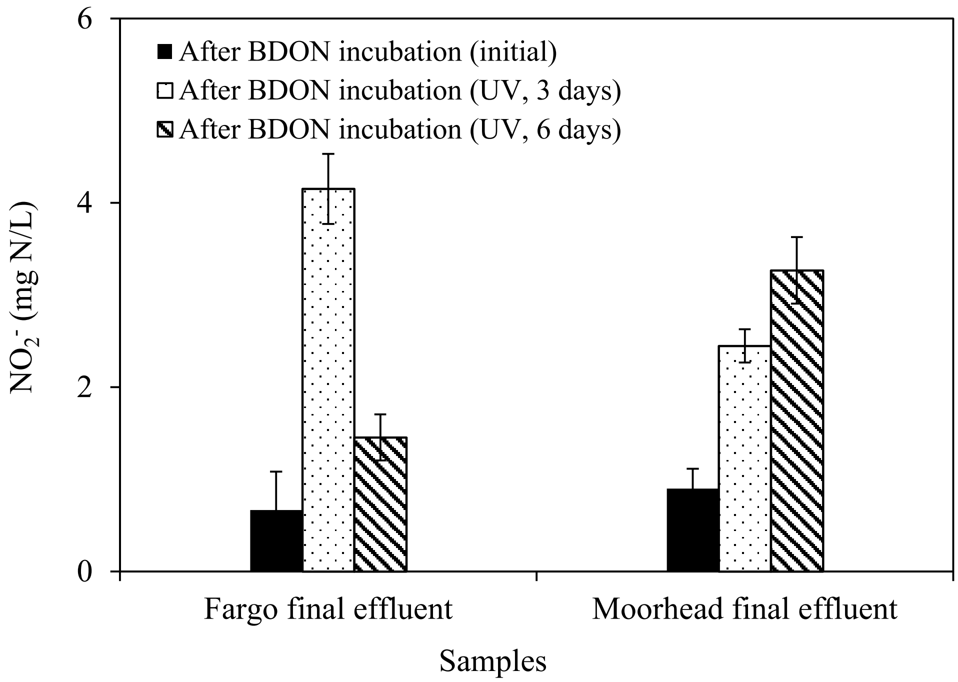

Figure SI-5. Nitrite after BDON incubation for samples from the City of Fargo and City of Moorhead WWTPs.

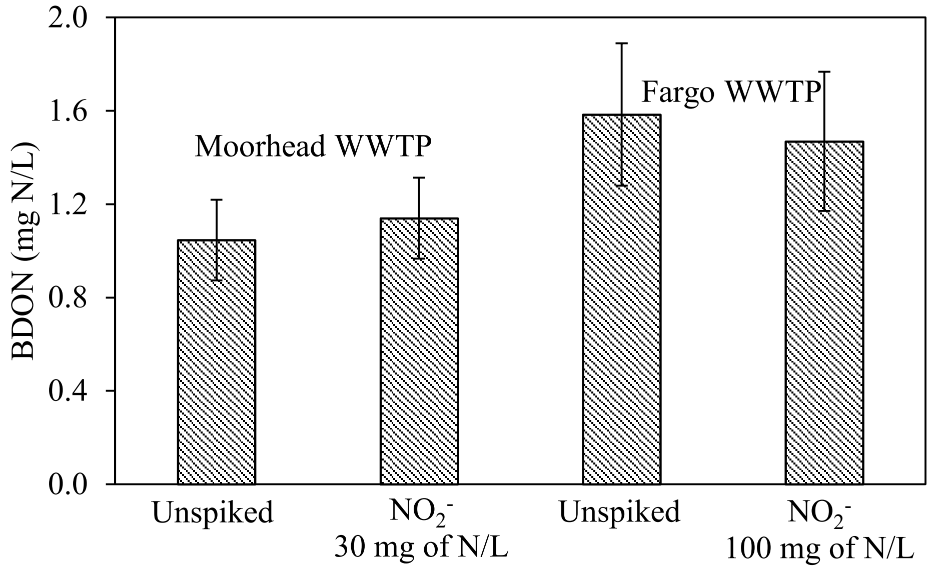

Figure SI-6. BDON in final effluent samples from the City of Fargo and City of Moorhead WWTPs spiked with nitrite (error bars are standard deviations based on triplication).

Table SI-1. Data for UV light control experiments. Differences in indicated parameters in mg N/L between 6-day light experiments and corresponding dark experiments (standard deviations are based on triplication).

	NH_3-N	NO_2-N	NO_3-N	TDN	DON
Fargo sample	0.0033	0.0034	0.0848	0.1320	0.0405
Standard deviation	0.0011	0.0015	0.0122	0.0165	0.0082
Moorhead sample	0.0024	0.0017	0.1108	0.1628	0.0479
Standard deviation	0.0019	0.0006	0.0104	0.0094	0.0049

Table SI-2. Nitrogen balance in mg N/L before and after UV exposure.

	NH_3-N		NO_2-N		NO_3-N		DON		TDN	
	Before	After	Before	After	Before	After	Before	After	Before	After
Fargo sample	0.90	1.30	0.90	5.50	30.79	30.64	6.45	1.83	39.04	39.27
Moorhead sample	0.37	1.00	0.34	3.54	23.76	23.83	6.10	2.37	30.66	30.73