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Probing the Structure of Natural Organic Matter Adsorbed on Carbonaceous Surfaces using Atomic Force Microscopy HOWARD FAIRBROTHER, JUSTIN GORHAM, Johns Hopkins University — Relatively little is known about the adsorbate layers formed by Natural Organic Matter (NOM) on carbonaceous surfaces in aquatic environments. Developing a microscopic understanding of these adlayers would contribute to the development of more accurate and realistic models of surfaces in the environment. Additionally, this information may have ramifications for water treatment strategies where the adsorptive capacity and effective lifetime of activated carbons (ACs) are reduced by adsorbed NOM. We report on the adsorbate structures formed by NOM from the Great Dismal Swamp on highly ordered pyrolytic graphite (HOPG) as a function of pH using Atomic Force Microscopy (AFM). At pH 3.1, the HOPG is covered with adsorbed NOM molecules. Despite the high density of species, spherical structures within the adsorbate layer with average widths on the order of 40 - 100 nm and heights approx. 1.5nm can still be resolved. Based on the 2-dimensional symmetry and the size of these adsorbates, we believe that these structures are individual NOM molecules. At higher pH discrete patches (or islands) of what are believed to be aggregated NOM molecules can be resolved. Within these NOM aggregates, numerous voids or "holes" are also evident, indicating regions where the HOPG substrate remains exposed at the liquid/solid interface. In other NOM aggregates, singular "lighthouse" features are observed. Additional results on the effects of increasingly higher pH on the structure of the adlayer formed by NOM on HOPG will also be presented.

Howard Fairbrother
Johns Hopkins University

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