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Organics in the Northeastern Pacific and their impacts on aerosol hygroscopicity in the subsaturated and supersaturated regimes

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Abstract. Aerosol samples were collected by aircraft during the summer of 2004 in the Northeastern Pacific and compared to measurements of aerosol hygroscopicity. Chemical speciation analyses of the samples revealed that a significant portion of the marine aerosols was organic, and on average 8% of the total aerosol mass was insoluble organic material, tentatively attributed to natural marine emissions. Two chemical models were explored in an attempt to achieve closure between the marine aerosol chemical and physical properties through reproduction of the observed aerosol growth, both in the subsaturated and supersaturated regimes. Results suggest that at subsaturated relative humidities, the nonideal behavior of water activity with respect to aerosol chemistry has an important effect on aerosol growth. At supersaturations, the underprediction of critical supersaturations by all models suggests the hypothesis that formation of a complete monolayer by the insoluble organics may inhibit the activation of aerosols to form cloud droplets.

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