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# Formation of water and methanol ice on graphite at 180 - 213 K

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The formation of water, methanol and water-methanol ice on a graphite surface have been studied at temperatures from 180 to 213 K using a new molecular beam setup operating at pressures in the 10-2 mbar range. Elastic helium scattering has been employed to study the ice formation at sub-monolayer surface coverage, and light scattering has been used to detect the formation of ice structures with a thickness of more than 25 monolayers. A Quadruple Mass Spectrometer (QMS) also records the water and methanol intensities linked to the pressure above the surface, which indicates condensation rate, evaporation rate and composition of evaporated layers. Water does not wet the graphite surface under these conditions, in agreement with earlier results obtained below 180 K, while methanol readily forms a thin layer on the surface. The adsorption isotherm of methanol reveals details of the layer formation. From the results of methanol and water mixture experiments, it is found that methanol facilitates water ice nucleation, and influences the property of ice formed, both on initially bare graphite and on a partially water ice covered surface. Also, by investigating the combination of helium intensity, water intensity, methanol intensity and scattered laser signal in a couple of experiments, we may have a chance to answer some interesting questions, such as ‘Will methanol be embedded in water ice or always stay on the top layer when ice grows?’, ‘Will a methanol monolayer, on graphite, be remained when ice grows above it?’, ‘What is the difference between structures of water ice and methanol/water ice on graphite?’. In addition, molecular dynamics simulations are currently being performed and the result will be compared with the experimental data. The implications for atmospheric processes will be discussed.