Geophysical Research Abstracts, Vol. 11, EGU2009-5254, 2009 EGU General Assembly 2009 © Author(s) 2009



## Inelastic Neutron Scattering of Nitric Acid Hydrates

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The IPCC report 2007 underlines the particular importance of aerosol particles for the water cycle and the radiation balance, and thus for the global climate.[1] The contribution of aerosols and clouds to radiative forcing might be comparable to the most important greenhouse gases like CO2 but is comparatively less understood. Nitric acid hydrates are important constituents of solid cloud particles in the lower polar Stratosphere (Polar Stratospheric Clouds) and the upper Troposphere (Cirrus clouds). The exact phase composition of these particles is still a matter of controversial discussion.[2] Especially, metastable modifications have, as recent measurements show, a particular relevance for the atmosphere, which has been ignored up to now.[3] Spectroscopic data for their detection are urgently needed and can be gathered with laboratory models.

Only recently we have recorded the FTIR and Raman spectra of all nitric acid hydrates, stable and metastable.[4,5] These data have been corroborated by X-ray diffraction measurements.[6] However, when interpreting the spectroscopic data it became evident that not all bands could be explained reasonably. Here, DFT calculations were extremely helpful,[7] but still the translational and librational bands were not fully understood. Hence, inelastic neutron scattering was employed in order to investigate this region.

The INS measurements were carried out with the instrument TOSCA at the ISIS of the Rutherford Appleton Laboratory, UK. The samples were prepared ex-situ in an amorphous state and were transferred into a helium-bathcryostat, where the sample has been annealed between 20 K and 220 K. Characteristic changes of translational and librational modes have been observed and have been correlated with phase transitions.

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