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## Nitric Acid Trihydrate (NAT) formation at low NAT supersaturation in Polar Stratospheric Clouds (PSCs)

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**Abstract.** A PSC was detected on 6 February 2003 in the Arctic stratosphere by in-situ measurements onboard the high-altitude research aircraft Geophysica. Low number densities ( $\sim 10^{-4} \text{cm}^{-3}$ ) of small nitric acid ( $\text{HNO}_3$ ) containing particles ( $d < 6 \mu\text{m}$ ) were observed at altitudes between 18 and 20 km. Provided the temperatures remain below the NAT equilibrium temperature  $T_{\text{NAT}}$ , these NAT particles have the potential to grow further and to remove  $\text{HNO}_3$  from the stratosphere, thereby enhancing polar ozone loss. Interestingly, the NAT particles formed in less than a day at temperatures just slightly below  $T_{\text{NAT}}$  ( $T > T_{\text{NAT}} - 3.1 \text{K}$ ). This unique measurement of PSC formation at extremely low NAT saturation ratios ( $S_{\text{NAT}} \leq 10$ ) constrains current NAT nucleation theories. We suggest, that the NAT particles have formed heterogeneously, but for certain not on ice. Conversely, meteoritic particles may be favorable candidates for triggering NAT nucleation at the observed low number densities.

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