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Atmos. Chem. Phys., 2, 93-98, 2002  
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## NAT-rock formation by mother clouds: a microphysical model study

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**Abstract.** Polar stratospheric clouds (PSCs) of type 1a or 1a-enh containing high number densities of nitric acid trihydrate (NAT) particles, can act as mother clouds for extremely large NAT particles, termed NAT-rocks, provided the air below the clouds is supersaturated with respect to NAT. Individual NAT particles at the cloud base fall into undepleted gas phase and rapidly accelerate due to a positive feedback between their growth and sedimentation. The resulting reduction in number density is further enhanced by the strong HNO<sub>3</sub> depletion within a thin layer below the mother cloud, which delays subsequent particles. This paper introduces the basic microphysical principles behind this mother cloud/NAT-rock mechanism, which produces 10<sup>-4</sup> cm<sup>-3</sup> NAT-rocks with radii around 10 μm some kilometers below the mother cloud. The mechanism does not require selective nucleation and works even for a monodisperse particle size distribution in the mother cloud.

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Citation: Fueglistaler, S., Luo, B.P., Voigt, C., Carslaw, K.S., and Peter, Th.: NAT-rock formation by mother clouds: a microphysical model study, Atmos. Chem. Phys., 2, 93-98, 2002. ▣ [Bibtex](#) ▣ [EndNote](#) ▣ [Reference Manager](#)



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