

Trace-gas burial in growing ice

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Atmospheric ice is rarely in perfect equilibrium with water vapor but is constantly growing or evaporating. Trace gases impinging on growing ice surfaces can be buried in newly formed layers of ice, resulting in repartitioning from the gas to the ice phase and thus impacting on gas- and particle-phase composition and chemistry.

Whilst aircraft observations suggest that trapping takes place in cirrus clouds, there are few quantitative laboratory data describing this effect. We have investigated the trapping of a variety of trace gases on growing ice films with the goal of deepening our understanding of the trapping process and its dependence on environmental variables such as the ice growth rate, temperature and trace gas partial pressure. Data on the uptake of several organic traces gases and HCl were obtained using a low-pressure reactor connected to a chemical-ionisation mass-spectrometer. We present a parameterisation of the burial efficiency and compare this with reversible surface uptake.