



The high supersaturation puzzle

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The discovery of massive supersaturations with respect to ice in upper tropospheric cloud-free air and inside cirrus clouds calls into question our understanding of the physics of ice cloud formation. These findings represent potentially important modifications in our characterization of upper tropospheric and stratospheric water and energy budgets, with implications for cloud formation, for fluxes of water and radiation, and for atmospheric chemistry.

At the core of understanding processes in cirrus clouds is the requirement for accurate measurements of water vapor and total water concentrations under field and laboratory conditions. Currently applied and newly developed instruments with improved sensitivity and time resolution require elaborate calibration procedures. However, recent observations of unexpectedly high supersaturations using different kinds of instruments warrant close scrutiny of the various hypotheses put forward as explanations by laboratory experimentalists, cloud modelers and ice theoreticians.