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Erwin Schrödinger Lecture

Martina Krämer/ University of Mainz

Ice clouds over the Asian monsoon and their role in the global climate

Wednesday, October 23, 2024, 17:00

Boltzmann Lecture Hall

Erwin Schrödinger Institute



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Martina Krämer is a leading scientist in the field of cloud and aerosol physics focusing on observations and simulations of ice clouds. Prof. Dr. Martina Krämer headed the working group "Water Vapour and Clouds" at the Research Centre Jülich (FZJ) at the Institute for Energy and Climate Research: Stratosphere (IEK-7) for more than twenty years. She has been a member of the Gutenberg Research College at the Johannes Gutenberg University Mainz since 2019, and is a honorary professor at their Institute of Atmospheric Physics since 2022.

Abstract

The Asian Summer Monsoon is the most pronounced atmospheric weather system during boreal summer, consisting of a large-scale anticyclone extending from Asia to the Middle East. Moist air masses are transported via strong convection or general tropical upwelling to altitudes where the coldest temperatures in the atmosphere are found. Thin cirrus clouds that consist only of ice crystals form at these cold temperatures. In addition, thick ice clouds are carried into the upper troposphere in deep convective thunderstorms. The ice clouds over the Asian monsoon can have either a warming or a cooling effect. Also, they affect the amount of water vapour in the tropical upper troposphere, from where the water vapour is further transported into the stratosphere as far as the Arctic Circle. Because water vapour is a strong greenhouse gas, it causes a warming directly in the tropics up to the Arctic stratosphere.

Understanding the overall effect of ice clouds on this chain of processes is a focus of recent research. Here, unique aircraft-based observations of ice clouds and water vapour over the Asian monsoon are presented. In particular, ice cloud properties, formation and evolution will be shown and investigated based on simulations.

The Erwin Schrödinger Lectures are directed towards a general audience of mathematicians and physicists. In particular it is an intention of these lectures to inform non-specialists and graduate students about recent developments and results in some area of mathematics or physics. The lecture will be followed by a reception.

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