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Environment"

"Atmospheric and Near Space Sciences"
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Ice Nucleation Properties Over the Oceans

Presented by

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Summary

Primary marine aerosols represent an important source of atmospheric ice-nucleating particles (INPs), which influence cloud microphysical properties, precipitation formation, and the Earth's radiative balance. Despite their climatic significance, the mechanisms controlling the ice-nucleating ability of marine aerosols and their relationship with seawater properties remain insufficiently understood.

This study investigates the ice nucleation properties of primary marine aerosols generated from seawater samples collected during an oceanographic expedition in the Southern Ocean. Ice nucleation measurements were performed using the LED-based Ice Nucleation Detection Apparatus (LINDA), allowing INP concentrations to be determined as a function of temperature. The effects of heat treatment were examined to assess the contribution of biological ice-nucleating material. Temporal variability in INP concentrations was analyzed and compared between seawater and aerosol samples.

The results demonstrate significant variability in INP concentrations across different water masses and sampling periods. Elevated INP concentrations were occasionally observed simultaneously in seawater and sea spray aerosol samples, suggesting the transfer of ice-active material from the ocean surface to the atmosphere. For different sample types, heat treatments altered the INP concentration which indicated the possible contribution of biology to the ice nucleating processes in the atmosphere.

Abstract

Primary marine aerosols represent an important source of atmospheric ice-nucleating particles (INPs), which influence cloud microphysical properties, precipitation formation, and the Earth's radiative balance. Despite their climatic significance, the mechanisms controlling the ice-nucleating ability of marine aerosols and their relationship with seawater properties remain insufficiently understood.

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