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Organic aerosols and dust as contributors to ice nucleating particles formation in the marine atmosphere

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Atmospheric Ice nuclei particles regulate in cloud properties such as, cloud lifetime, precipitation rates and cloud's radiative properties due to their ability to trigger ice heterogenous formation. Particles ejected into the atmosphere during bubble bursting through the sea surface microlayer, which is enriched in organic matter, are considered as the major precursors of INPs over the ocean. In addition, mineral dust particles that are considered as the most important precursor of INP in the mixed-phase cloud regime globally and terrestrial bioaerosols that have been also shown to have INP activity are transported over the ocean and contribute to the INP in the marine environment.

In the present study we present results from the global 3-D chemistry transport model TM4-ECPL that accounts for INPs concentrations from marine organic aerosols, terrestrial bioaerosol and K-rich feldspar and quartz mineral dust particles. The simulated distribution of INP concentrations over the global ocean agrees with currently available ambient measurements. The relative contribution of the various INP precursors in the different compartments of the marine atmosphere is discussed on the basis of simulated 3-dimensional number concentrations of INP, providing insight to the cloud glaciation processes in the marine environment.

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