



Clouds give important climate answers to extreme events

A unique EU-funded research project investigates how clouds even in the most remote places respond to changes in pollution. After measurements in the Arctic, the researchers will now explore the clouds above Mt Helmos in Greece.

Unpredictable weather, extreme rainfall or snow increasingly leads to challenges for people and nature. Paradoxically, less air pollution and cleaner clouds could lead to more extreme events. To understand how clouds will respond to changes in pollution is key for the world's ability to plan for the future, and this is at the heart of the EU-funded research project CleanCloud.

An important part of this project is about monitoring what happens inside the clouds. That demands a great deal of handling extreme conditions in remote areas, explained Dr. Athanasios Nenes, professor of atmospheric processes at the Ecole Polytechnique Federale de Lausanne (EPFL) in Switzerland and associate researcher at the Institute of Chemical Engineering of FORTH in Patras. Dr Nenes is one of two project coordinators of CleanCloud.

Since the project was launched in January, CleanCloud researchers have observed the clouds and how they respond to particles in the air – aerosols – during spring and summer in North Greenland (81°36' N, 16°40' W).

The Arctic is warming up to 4 times faster than other regions of the globe, leading to rapid ice melting. This gives a drastic change of the sources of aerosols and their impact on clouds. Measurements of aerosol-cloud interactions in this remote region are particularly valuable for models, and CleanCloud is expected to fill important knowledge gaps, said Dr. Ulas Im, a senior scientist at Aarhus University, Department of Environmental Science, and coordinator of the CleanCloud project.

The measurements are being analyzed and the results will be published. However, some of the findings so far indicate that clouds may be affected by particles that come from far away. They also show a presence of biological particles, which may mean that there can be an increase of rain and snow in the future.

Having successfully conducted measurements in the Arctic, CleanCloud researchers will begin their observations of aerosols and clouds from the top of the Mount Helmos in Greece on October 1st. The Greek mountain top is considered ideal for cloud and climate research. It sits at the crossroads of many different air streams and is in a “climate hotspot”, which like the Arctic, is changing much faster compared to the global average. This allows particles of almost any kind to interact with clouds, from wildfire smoke to pollution and highly processed particles from continental Europe, to sea salt from the Mediterranean and dust from Sahara, to pollen, bacteria and fungal spores transported from thousands of kilometres away or the forest below.

The researchers expect to be able to directly observe how cloud properties change with the particles in the air and by that contribute to the understanding of future climate impacts. CleanCloud involves researchers from 20 institutions in 12 European countries and will conclude its work in 2028.

