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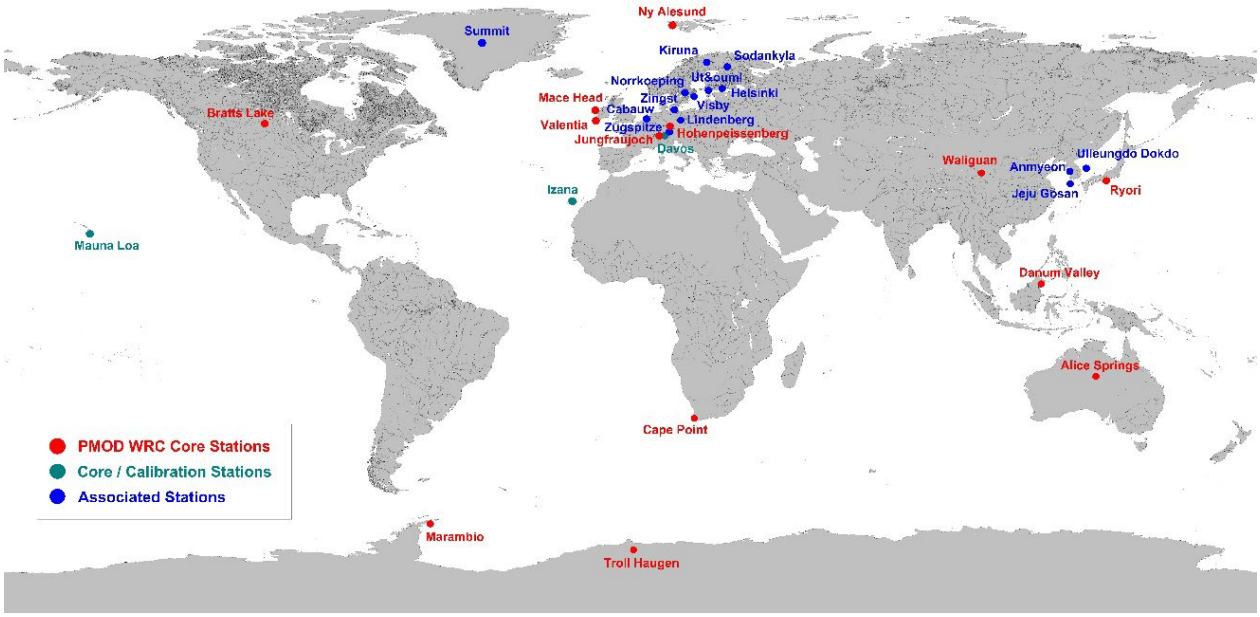
Research in Graubünden

International aerosol monitoring network

Important data for climate research

Only recently, there was a new climate record: September 2023 was by far the warmest in Switzerland since measurements began in 1864. Worldwide, too, with a few exceptions, temperatures were significantly above the long-term measured values. From a scientific point of view, it is now undisputed that we humans are contributing significantly to the ongoing warming. Nevertheless, there are still knowledge gaps and uncertainties in the field of climate research. For example, the effects of aerosols on climate are not yet fully understood. Aerosols are solid and liquid particles suspended in the air that come in a variety of sizes: From tiny molecules to particles visible to the naked eye, such as Saharan dust. They can spread over large distances, as happened on October 1, 2023, when aerosols from Canadian fires reached Graubünden. If they occur in the immediate vicinity of the Earth's surface, they can be inhaled and – especially if they are very small – affect our health.



A worldwide network for the measurement of aerosols. Image: Stelios Kazadzis

Environmental physicist Stelios Kazadzis of the Davos Physical Meteorological Observatory/World Radiation Center (PMOD/WRC) reports how the internationally recognized research institute is helping improve our understanding of the effects of aerosols on climate: "In particular, aerosols attenuate solar radiation and cool the atmosphere. However, their effects on clouds are among the greatest climate-related uncertainties. They can contribute to cloud formation, affect the lifetime of a cloud, and alter the cloud reflectance. Understanding changes in aerosols on a global scale requires measurements at locations that are not affected by local anthropogenic aerosol pollution. The PMOD/WRC operates

measurement stations for the Global Atmosphere Watch Programme of the World Meteorological Organization (WMO) at various locations around the world, including Davos and Jungfraujoch in Switzerland, Mauna Loa/Hawaii, Alice Springs/Australia, Cape Point/South Africa, Ny-Ålesund/Norway, Greenland, central China and elsewhere. The data are available to researchers and all interested parties on the website https://gawpfr.pmodwrc.ch/#/maps."

To measure the amount of aerosols from the Earth's surface to the top of the atmosphere (aerosol column), instruments called sun photometers are used. They collect sunlight of different wavelengths to study the light interaction with aerosols. A detector measures the light intensity in the selected wavelength ranges in real time. The data is analyzed to determine the optical thickness of the aerosol layer and its influence on the solar light. Regular calibration ensures accurate measurement results. The PMOD/WRC hosts the reference instruments for these measurements and is recognized by the WMO as the world center for sun photometer calibration. Aerosol monitoring helps policy makers take action to prevent health effects from aerosols and provides real-time detection of events such as forest fires and volcanic activity.

Stelios Kazadzis and Daniela Heinen

Stelios Kazadzis

About the PMOD/WRC
Since its beginning in 1907, the PMOD/WRC has been studying the influence of solar radiation on the Earth's climate. The observatory joined the Swiss Research Institute for High Altitude Climate and Medicine Davos in 1926 and has been a part of this foundation ever since. www.pmodwrc.chSponsored Content: Der Inhalt dieses Beitrags wurde von der Academia Raetica zur Verfügung gestellt: www.academiaraetica.ch.

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