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Chemistry, a detective tool in atmospheric aerosol science

Chemistry is an important discipline in all geoscience domains, including the atmosphere. This presentation will focus on atmospheric aerosol science and will show how chemistry has been used as a detective tool in this field. As an example, the aerosol chemical composition helps to identify the contributions of the various aerosol sources, especially the discrimination of anthropogenic and natural sources, as well as their evolutions with time. The chemical composition is also decisive in determining the aerosol impact on health. Comparison of the chemical composition at the Jungfraujoch with observations at lower altitude helps in determining chemical aging processes during transport from the point of emission to a remote site. Next, the chemical composition together with physical properties such as size governs the interaction of aerosol particles with radiation as well as with clouds, and is therefore important in defining the impact of aerosols on climate. Highly time resolved chemistry measurements are also important to elucidate physical processes. The latter include for example vertical transport processes, important for mixing of air from the planetary boundary layer to the free troposphere, or the formation of new particles from gaseous precursors.