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Studying the cloud radiative effect using a new, 35yr spanning dataset of cloud properties and radiative fluxes inferred from global satellite observations

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Understanding the role of cloud radiative effects in the Earth's climate system is of fundamental importance for improving our knowledge about cloud feedbacks in a changing climate. Besides atmospheric models, global observations are needed to study the impact of clouds on the radiation depending on the clouds' properties. This requires reliable data of both cloud properties and radiative fluxes at the top of the atmosphere and at the surface, ideally collocated at the spatial scales of clouds.

Recently, the ESA Cloud_cci project generated v3.0 of a multi-decadal cloud property dataset based on the polar-orbiting, passive imaging AVHRR sensor. This new version is characterized by increased quality and extended temporal coverage (1982-2016). In addition to cloud properties, radiative fluxes at the surface and at the top of the atmosphere have been added to the product portfolio. With this, all tools are available to perform in depth studies on the cloud radiative effect, as important contributor to the Earth's radiation budget, and its sensitivity to changes in cloud properties over multiple decades.

In the presentation we will demonstrate the importance of this topic and motivate the need for a new observational dataset to achieve advanced insights. The main focus of the presentation will be on using the new dataset for quantifying the cloud radiative effect and describing the dependence of that on multiple cloud properties. We will also give an outlook on how the new data can and will be used for assessing cloud radiative feedbacks depending on cloud properties, frequencies and region.