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The ESA Cloud_cci project: generation of multi-decadal, consistent, global data sets of cloud properties with uncertainty information

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In 2010 the ESA Climate Change Initiative (CCI) Cloud project was started along with 12 other CCI projects covering atmospheric, oceanic and terrestrial "essential climate variables (ECV)". The main goal is the generation of satellite-based climate data records that meet the challenging requirements of the Global Climate Observing System. The objective target within the ESA Cloud_cci project is the generation of long-term coherent cloud property datasets covering 33 years that also provide mathematically consistent uncertainty information following the optimal estimation (OE) retrieval theory. The cloud properties considered are cloud mask, cloud top level estimates, cloud thermodynamic phase, cloud optical thickness, cloud effective radius and post processed parameters such as cloud liquid and ice water path.

In this presentation we will discuss the benefit of using an optimal estimation retrieval framework, which provides consistence among the retrieved cloud variables and pixel-based uncertainty estimates based on different passive instruments such as AVHRR, MODIS and AATSR. We will summarize the results of the project so far along with ongoing further developments that currently take place. Our results will be compared with other well-established satellite data records, surface observations and cloud climatologies (e.g., PATMOS-X, ISCCP, CLARA-A2, MODIS collection 6, SYNOP). These inter-comparison results will indicate the strengths and weaknesses of the Cloud_cci datasets. Finally, we will present long-term time series of the retrieved cloud variables for AVHRR (1982-2014) that enable global, multi-decadal analyses of clouds.