



A novel optimal estimation algorithm for consistent cloud property retrieval from multiple sensors

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An integral part of the ESA Cloud CCI project is the development and further improvement of an optimal estimation (OE) cloud retrieval algorithm based on ORAC (Oxford and RAL Aerosol and Cloud) algorithm. The algorithm is available to other interested scientists as a community retrieval scheme.

The retrieval is capable of deducing micro- and macro-physical cloud properties i.e the cloud optical thickness, effective radius, cloud top pressure etc. from visible and infrared channel measurements of passive satellite sensors. The advantages of the optimal estimation method are that it enables rigorous error propagation and the inclusion of all measurements and any a priori information and associated errors in a rigorous mathematical framework. A specific advantage of this algorithm over other algorithms is that it uses all channels, and derives all parameters, simultaneously hence the algorithm provides a measure of the consistency between retrieval representation of cloud and satellite radiance. The characteristics of the approach are not only beneficial for single sensor applications but also lead to a more uniform and general treatment of input data from multiple sensors, facilitating the subsequent processing of the data and increasing the retrieval's potential applicability to a range of polar orbiting and geostationary sensors. In Cloud CCI the algorithm will be applied to the AVHRR heritage channels of AATSR, AVHRR and MODIS. As a result of using a common algorithm and applying the latest calibration information the new time series are expected to be of high stability and homogeneity combined with high temporal and spatial sampling due to the multi sensor approach. From those features climate monitoring and climate modelling will potentially benefit through a new cloud climatology aiding in the analysis and understanding of the role of clouds in the climate system. Initially this global climatology will cover the years 2007 to 2009 but will be extended in a second project phase.