Multi layer retrievals of cloud and aerosol from passive radiometers

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A widely recognised shortcoming of visible-infrared cloud retrievals is the common assumption of a single cloud layer, multi-level clouds account for approximately 60% of all cloudy scenes; assuming a single layer model in these situations will result in biases in retrieved cloud properties. Similarly the recent volcanic eruptions have shown that it is necessary to be able to accurately retrieve volcanic ash properties when the aerosol is located above a cloud layer.

Passive radiometers are useful for their global coverage and long time series. Multi layer retrievals of the vertical structure of clouds is needed for the development of better cloud products and the subsequent comparison of cloud fields with climate models. Multi layer retrievals can also be employed when thick aerosol overlays a lower cloud layer.

In this presentation I will demonstrate an advanced multi layer model which benefits from an optimal estimation frame work, which has been applied to both MODIS and SEVIRI data to retrieve multi layer cloud and volcanic aerosol over cloud. The results have been compared with the traditional single layer model and validated with collocated Calipso and Cloudsat data. The potential for application to other scenarios and future ECVs will be explored.