**Title**: *Passive Remote Sensing of Clouds Using Measured Solar Spectral Radiation*

**Abstract**: A selection of passive remote sensing methods to retrieve cloud optical thickness and particle effective radius using reflected or transmitted solar spectral radiation measurements is presented. Several cloud types are investigated: (a) Mixed-phase clouds in the Arctic and tropics, and (b) shallow trade wind cumuli have been observed by aircraft and helicopter-borne cloud reflectivity measurements, (c) Cirrus and warm boundary layer clouds have been studied by ship-based cloud transmissivity measurements. With regard to airborne observations, much emphasize is put on the validation of the retrieval results by collocated in-situ measurements of the microphysical cloud properties. Examples of results of the retrievals are presented. As an illustrative application, the Twomey effect for shallow trade wind cumuli is discussed in more detail.