C3sar - Cloud 3D Structure and Radiation

The main goal of the Research Unit C3SAR is to better understand the role of 3d cloud variability. Furthermore, we want to provide robust tools in cloud remote sensing and cloud radiative forcing parameterization that account for 3d radiative effects in a feasible and realistic manner. Thereby, we will combine the research expertise on cloud resolving atmospheric and radiative transfer modelling as well as ground- and satellite based remote sensing and radiative flux observations. This cooperative approach can provide the required data, methodologies and tools to realistically account for 3d radiation transports. Thus, C3SAR will, allow us to correct biases in climate modelling and cloud remote sensing, that have been a result from oversimplifications of the complex geometrical nature of clouds.

To do this, typical three-dimensional cloud shapes from detailed cloud modelling and synergistic satellite observations will be used. Combined with radiative transfer models of different complexity this will enable to quantify the consequences of cloud structure simplifications and to establish physically based cloud-radiation correlations. Long-term, high-quality ground-based observations of clouds and radiation provide the validation of these relations by means of radiative closure studies. Both current and new generations of satellite sensors will provide the corresponding closure at the top of the atmosphere.