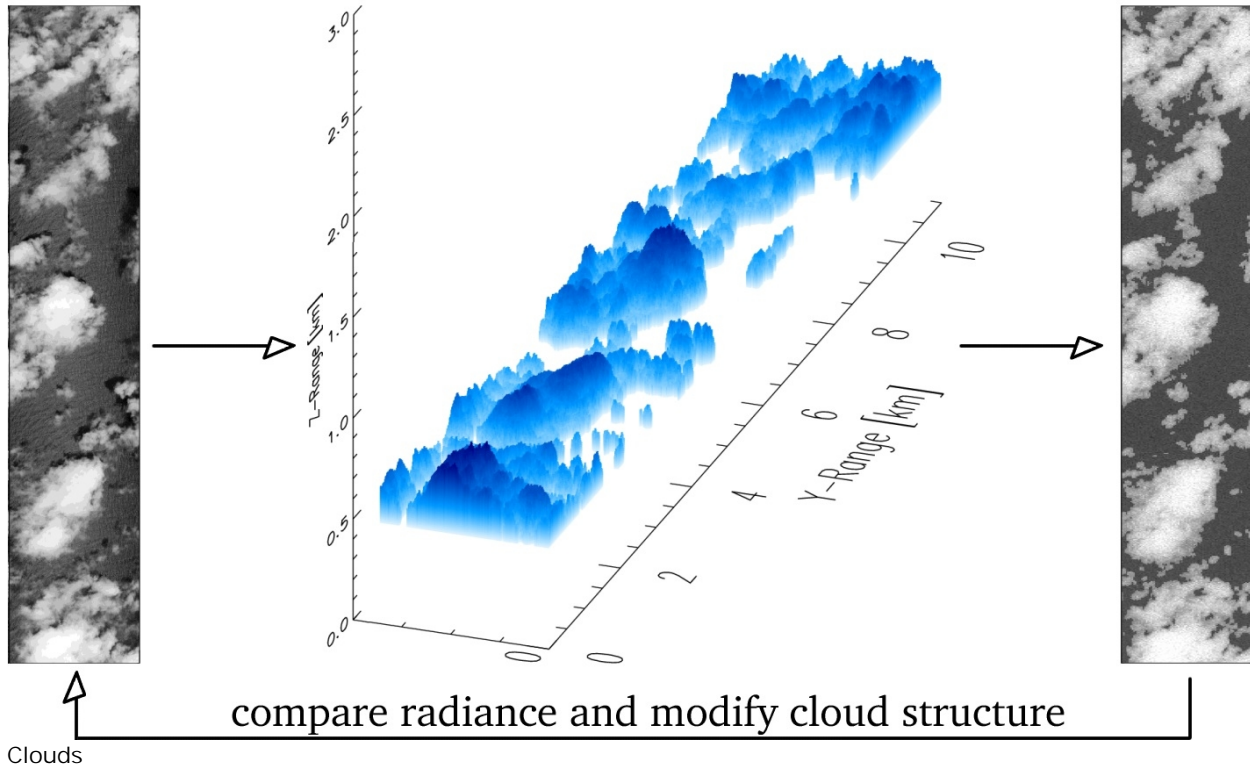


## Derivation of Realistic High-resolution Cloud Structure

CASI observation

3D cloud structure

MYSTIC simulation



Clouds with their three-dimensional structure are highly volatile objects to study. Currently there are no techniques to measure 3D fields of cloud properties. Various means of measuring them like airborne in-situ, ground-based cloud radar, passive and active satellite remote sensing can only provide a 2D cross section of their full 3D structure. At the same time, the clouds high variability in all three dimensions is a source of uncertainty for many algorithms that depend on assumptions (or simplifications) to overcome the informational gaps. Therefore, there is an urgent need for a numerical technique to derive realistic 3D cloud structure. This image illustrates a possible approach to fill the gap. It shows a numerical technique developed at the German Aerospace Center (DLR Oberpfaffenhofen) and recently reported at the ARM Cloud Properties Working Group Meeting (Annapolis, MD) by Tobias Zinner, a NASA/GSFC Climate and Radiation Branch visiting scientist and DFG (German Research Foundation) Fellow. An initial guess of the horizontal distribution of cloud liquid water and cloud top height is retrieved using standard remote sensing methods from a high resolution (15 m) image observed by a Compact Airborne Spectrographic Imager (CASI, data provided by Free University Berlin). An iterative process of corrections starts from this first guess. During the iterations, 3D simulated (right image) and originally observed (left image) radiation fields are compared. This leads to a cloud structure for which the simulated field best matches the observed one. The 3D radiative transfer process is simulated using the MYSTIC model developed by Bernhard Mayer (1999).

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