



Fog monitoring using a new 94 GHz FMCW cloud radar

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A new solid state frequency modulated continuous wave (FMCW) cloud radar and its potential for monitoring the life cycle of fog and low stratus is presented. The radar operates at a frequency of 94 GHz, which is ideal for observing clouds as it lies within a part of the spectrum which experiences relatively low absorption in the atmosphere. With a wavelength of approximately 3 mm, scattering from cloud droplets is by Rayleigh scattering. So the new 94 GHz FMCW radar provides best resolution of cloud and fog in the lower troposphere. Due to the FMCW technique, the radar can detect clouds with a minimum range of ~ 30 m making it ideal for monitoring fog and low stratus. A vertical resolution of 4 m from the surface to 2 km permits fine vertical cloud structures to be resolved. The high temporal resolution of 10 seconds makes it highly suitable to capture and analyze the dynamics of fog development and its evolutionary stages. Since the radar reflectivity is strongly related to the cloud liquid water content within the respective scan level, it is possible to retrieve and analyze this essential microphysical cloud parameter with a high vertical and temporal resolution.

Only some studies investigated the profile of the liquid water content during fog events so far. Very few of them combined the vertical and the temporal component by investigating the variation of the liquid water content profile during different fog evolutionary stages. This is mainly due to the laborious measurement techniques using balloon-borne sensor platforms.

In this context the radar offers new insights into fog development and the associated liquid water content based on continuous profile measurements. Such a continuous monitoring of fog and its vertical structure has applications for aviation as well as for climatological and meteorological research.

The poster presents the vertical fog structure and its temporal dynamic for selected fog events and investigate the existence of distinct evolutionary stages as concluded from former studies.