

Seminar über Microwavephysics and Atmospheric Physics

Referent: Dr. Marc Schneebeli, Palindrome Remote Sensing GmbH, 7214 Grüşch, Switzerland

Titel: Development and application of a radar target simulator for calibration purposes

An accurate estimate of the weather radar derived rain rate depends on a thoroughly calibrated radar. However, the continuous determination of the exact value of the radar constant is difficult for a variety of reasons (i.e., wet radome conditions, gain fluctuations etc). The goal of this project is to develop a tool that allows to calibrate the radar without interrupting its operation and to continuously assess variations of the radar constant under all weather conditions. A radar target simulator (RTS) is an external transponder system that is set-up within the coverage of the radar. It receives the radar pulses, applies a predefined Doppler shift and a time delay and sends them back to the radar with a fraction of the received signal power, where this fraction corresponds to a specific radar cross section (RCS). If the fraction of the re-emitted power is sufficiently accurate, the virtual target that appears in the radar display at the distance that corresponds to the applied time delay has a known RCS and can therefore be used to estimate the radar constant. A low-cost RTS prototype has been recently developed. Pulses are received via a standard gain horn and a receiver, which consists of an RF amplifier, three down-conversion stages and an A/D conversion. The digital data stream is sent over a high-speed connection to a host computer, where the signal processing, i.e., the application of the time delay and the Doppler shift, is performed. The data is then converted to analog pulses, up-converted to the target frequency over three stages, amplified and sent back to the radar via the same horn antenna. First laboratory tests with a pulse generator showed that the time, frequency and amplitude stability of the re-emitted pulses is sufficiently high for the foreseen application. For further tests, an old X-band marine radar has been employed. With this test it was confirmed that the RTS can cope with the varying carrier frequency of a magnetron based system. The system has recently been tested with two different magnetron based X-band weather radars. First results of these activities will be presented.

Zeit: Freitag, 10.03.2017, 10:15 Uhr

Ort: Hörsaal A97, Gebäude exakte Wissenschaften, Sidlerstrasse 5, Bern, Schweiz