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SUBMITTED ABSTRACT

0.	Paper Number	49
	Session Name	1. Characterization and standardization of environmental measurements - traceability assurance
1.	Title of the paper	Traceability and Calibration of Weather Radar Reflectivity Measurements by Means of a Target Simulator

2.	Institution	Palindrome Remote Sensing			
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4.	Abstract of the paper
	<p>An accurate estimation of the weather radar derived rain rate depends strongly on the quality of the calibration of the used radar. 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). To pursue an accurate weather radar calibration and to ensure the traceability of radar reflectivity measurements, Palindrome Remote Sensing developed a dual-polarization X-band radar target simulator (RTS). Using this system, the assessment of measurement errors of parameters like reflectivity, differential reflectivity, Doppler speed, differential phase shift and antenna pointing is facilitated. The RTS is an external transponder system that is set-up within the coverage of the radar. It receives radar pulses, applies a predefined Doppler shift and time delay and sends them back to the radar with a fraction of the received signal power. This emulates the presence of a virtual target placed at a user-defined distance from the radar. The ratio of the sent and received pulse power defines the radar cross section (RCS), which can be converted into radar reflectivity. The accuracy of the RCS of the virtual target is calibrated using an internal feedback loop, whose characteristics are measured with a vector network analyzer (VNA). Accuracy of VNA measurements is ensured by using specific calibration kits which can be traced back to the SI units Meter and Watt. The calibration chain leads to an absolute and differential radar reflectivity accuracy of 0.5 dB and 0.2 dB, respectively. The radar target simulator was installed during the Olympic Winter games in Korea in order to provide a common reference for the different weather radars employed during the WMO ICEPOP-2018 campaign. Two different X-band weather radars were calibrated with the RTS system and continuous long-term observations over several weeks were conducted with one radar.</p>