Calibration of non-catching precipitation sensors

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Generic needs for measurement parameter

- Measurement is globally understood and accepted
- Definition of measurement parameter is uniform
- Measurement requirements are harmonized
- Measurement is standardized
- => WMO guidelines
- => ICAO requirements
- => International standards
- => National regulation

Measurement uncertainty



Internal use

Motivation

 Continue with global field tests, but at the very same time speed up testing in laboratory conditions

- Looking for continuous improvements precipitation measurement calibration methods
 - Interest for standardized calibration methods
- Specific need for low intensity testing methods
 - Small droplet size
 - Controlled droplet distribution over large range

WXT series – Impact detector

 Kinetic energy of raindrops falling with terminal velocity generate mechanical impluses





Fig. 4 Terminal velocity as a function of the equivalent diameter of the spherical drop.

PWD series – Forward scattering

- Scattered light from particles like water droplets and snow flakes, which have a diameter in the order of the magnitude of the light waveleght
- Capacitive sensor to detect liquid water content



Internal use

Old Rain lab





New Rain lab



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Internal use



Drop size distribution



Theoretical capabilities of the simulator

- Fully automated rainfall simulation system with precise control of within 1 % for intensity rates ranging from 0 to ~220 mm/h
- Drop former produces average drop size of 4.5 mm. The redistribution screen reworks drops to produce DSD similar to natural rainfall with intensities ranging from at least 10 to 160 mm/h
- Rainfall simulation system is installed at height of 14 m permitting rain droplets of 4.3 mm diameter and smaller to reach 95 % of their respective terminal velocities

	intensity range	Natural DSD	mcrement	кереатаршту	Terminal velocity
	0 – 220 mm/h	10 – 160 mm/h	0.0035 mm/h	Within 1 %	95 % for 4.3 mm drops and smaller
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Optical reference measurement



Summary

- Type calibration in different rain type events requires extensive laboratory and global field testing in co-operation with end-users
- Standardized testing and calibration methods are under continous improvement practice
 - Precipitation test field: better monitoring tools
 - Rain laboratory: better control, better optical reference
- To calibrate catching type of precipitation sensors at field is relative straigthforward, but special challenges to calibrate non-catching type of precipitation sensors at field

Thank you