Geophysical Research Abstracts
Vol. 15, EGU2013-10983, 2013
EGU General Assembly 2013

The performance of weighing gauges under laboratory simulated severe real world precipitation events

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The OTT Pluvio2 weighing type (WG) and the GEONOR T-200 vibrating-wire type (VWG) precipitation gauges were selected to compose the reference monitoring system of the WMO Solid Precipitation InterComparison Experiment field sites.
It has been largely demonstrated in past laboratory activities how the weighing type gauges do provide more accurate performance than other traditional sensors under steady state reference rainfall intensities (RI). On the other hand, it was not similarly straightforward to obtain reliable indications about the actual behavior of such instruments once installed in the field, due to the strong temporal variability of real precipitation events. In particular, the high resolution RI measurements are strongly affected by the WG dynamic behavior and the VWG high sensitivity to environmental conditions (such as the impact of the hydrometeors, temperature, wind induced vibrations, etc.) not only in case of light precipitation.
The noticeable advantage of a precision constant steps rainfall simulator as available at the WMO Lead Centre “B. Castelli” on Precipitation Intensity, at the precipitation measurement laboratory of the University of Genoa, is the possibility of testing the Pluvio2 and T-200 measurement performance in conditions that are closer to the real world precipitation phenomena. The tests are carried out by simulating different reference precipitation events, namely non-stationary rainfall intensity, using a suitably validated dynamic generator while neglecting here the wind induced rain under-catch. A selection of annual maxima measured at a 1-minute time resolution by a CAE tipping bucket rain gauge located at University of Genova (Villa Cambiaso) over the last 21 years of operation were corrected for systematic mechanical errors and used as reference events for the rain generator.
After a brief discussion of the specific sources of errors involved in the RI measurements performed by any tested instruments, the results of the rainfall events simulation is showed in a comparative form between the generated, WG and VWG distributions of the percentage relative errors from the 1-minute RI measurements.