



The Droplet Spectrometer - an instrument for detailed rain characterisation

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The Droplet Spectrometer is a new mechanical rain-measuring instrument which has been developed since 2005 by Sebastian Glasl and Magnus Anselm. It combines a compact piezoelectric Sensor and the analyse software "Rainalyser". In the first step droplets fall on the surface of the sensor and compress the piezoceramics which produces an over plus of the electric charge. On the basis of the electric charge and its voltage, which are recorded as an audio signal, "Rainalyser" can determine the momentum of each single drop. Furthermore the size and the mass of the drops can be approximately calculated by Rainalyser because of the fact that each droplet reaches a top speed which depends on their mass. This calculation can be applied for small droplets larger than $\sim 0,5\text{mm}$ in diameter up to larger raindrops with maximum 5mm in Diameter. The reason for the upper limit is that large drops ($>3\text{mm}$ in diameter) change their shape into a kidney and begin to oscillate. Consequently the air drag coefficient grows and even varies during the fall - raindrops larger than 5mm in diameter can only be calculated with reduced accuracy. Small droplets $<0,5\text{mm}$ in Diameter have a very low mass and velocity, thus wind can manipulate their top speed to strong for calculations of the size. Finally, after the analyse process, each single measured droplet is listed and can be visualized in a droplet size/momentum distribution and a size/momentum-time-diagram. These visualisations are essential for a detailed characterisation of rain and open a large spectrum of possible applications. The fact that the momentum is measured directly and independent of calculations makes the Droplet Spectrometer especially attractive for applications that deal with the physical effects of rain - for example the erosive potential. Up to now the Droplet Spectrometer has been presented twice at "Jugend forscht" and was already used by the GSF - "National Research Center for Environment and Health" to explain Na-24 Isotope concentrations

in rainfall.