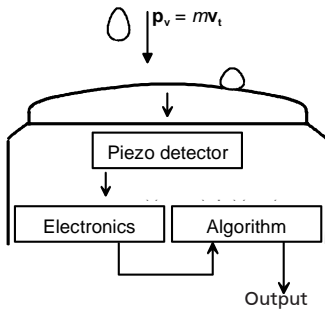


Vaisala RAINCAP® Sensor Technology

Vaisala RAINCAP® Sensor Technology is a new and unique approach to measuring precipitation. The RAINCAP® is an acoustic sensor that measures the impact of individual raindrops on a smooth stainless steel surface using a piezoelectric detector. The sensor provides real time information on rain intensity, duration, and accumulated rainfall. It also has the ability to distinguish between rain and hail. The RAINCAP® has no moving parts or components that need emptying or cleaning. It is essentially maintenance-free.

RAINCAP® theory of operation

The RAINCAP® sensor consists of a round stainless steel cover, approximately 90mm in diameter mounted to a rigid frame. A piezoelectric detector is located beneath the cover. The electronics of the system are mounted beneath the detector. This structure is illustrated in Figure 1.



P_v = vertical momentum
 m = mass of drop
 v_t = terminal velocity of drop

Figure 1. Structure of RAINCAP® sensor.

Raindrops hit the RAINCAP® sensor at their terminal velocity, which is a function of the raindrop diameter. Measurement is based on the acoustic detection of each individual rain drop as it impacts the sensor cover. Larger drops create a larger acoustic signal than smaller drops. The piezoelectric detector converts the acoustic signals into voltages. Total rain is calculated from the sum of the individual voltage signals per unit time and the known surface area of the RAINCAP® sensor. This information is also used to calculate intensity and duration of rain. The RAINCAP® sensor can also distinguish between hail and raindrops. The acoustic signature of hail is markedly different from that of rain and is easily detected. The RAINCAP® sensor reports intensity, duration, and accumulation of hail.

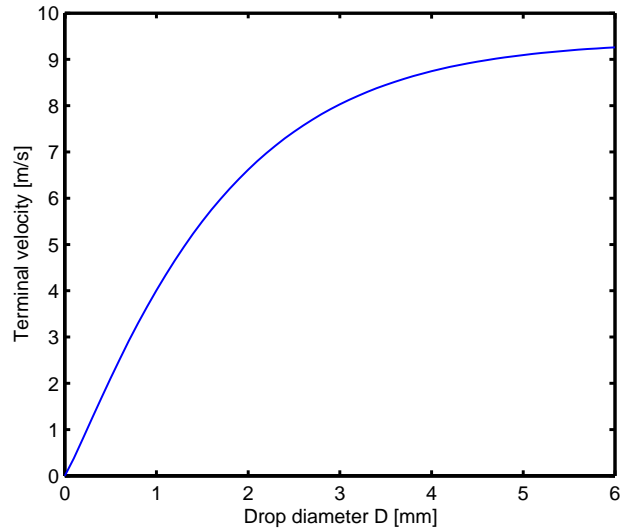


Figure 2. Relationship of terminal velocity to drop diameter.

The RAINCAP® sensor has been tested extensively at different sites in temperate and tropical locations. Comparisons made to tipping bucket gauges and weighing-recording gauges validate the measurement performance of the RAINCAP® sensor. See figures 3 and 4 for comparison data.

There is no obvious measurement accuracy advantage to any specific rain measurement method, but there are several unique advantages to the RAINCAP® technology. First, the RAINCAP® requires virtually no maintenance, therefore it is suitable for remote locations. Second, the RAINCAP® provides precipitation data in real time. Third, the RAINCAP® can distinguish between rain and hail and provide data for both types of precipitation.



Vaisala Weather Transmitter WXT510
with the Vaisala RAINCAP® Sensor.

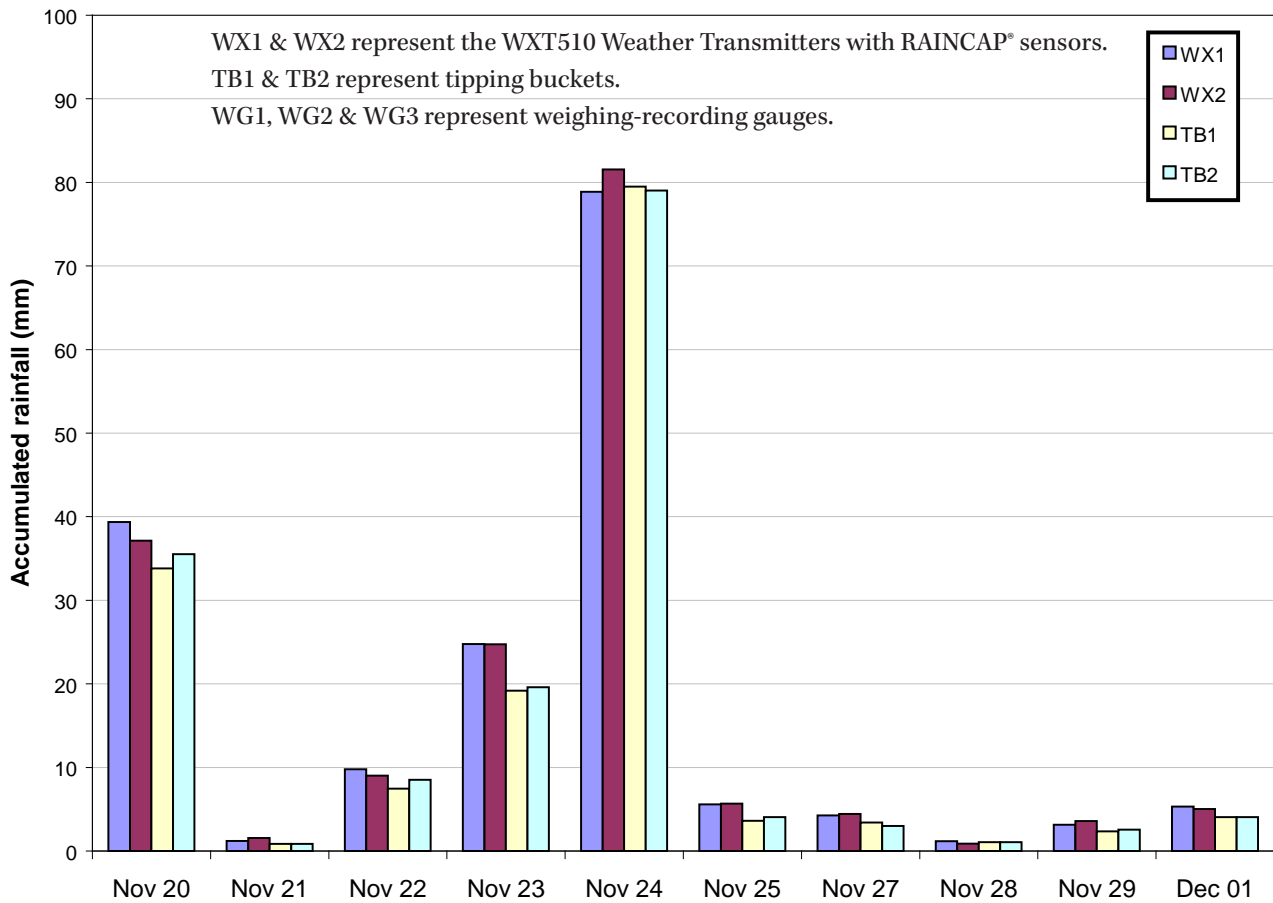


Figure 3. Daily accumulations during moderate and heavy rain events, recorded in Malaysia during November and December 2003.

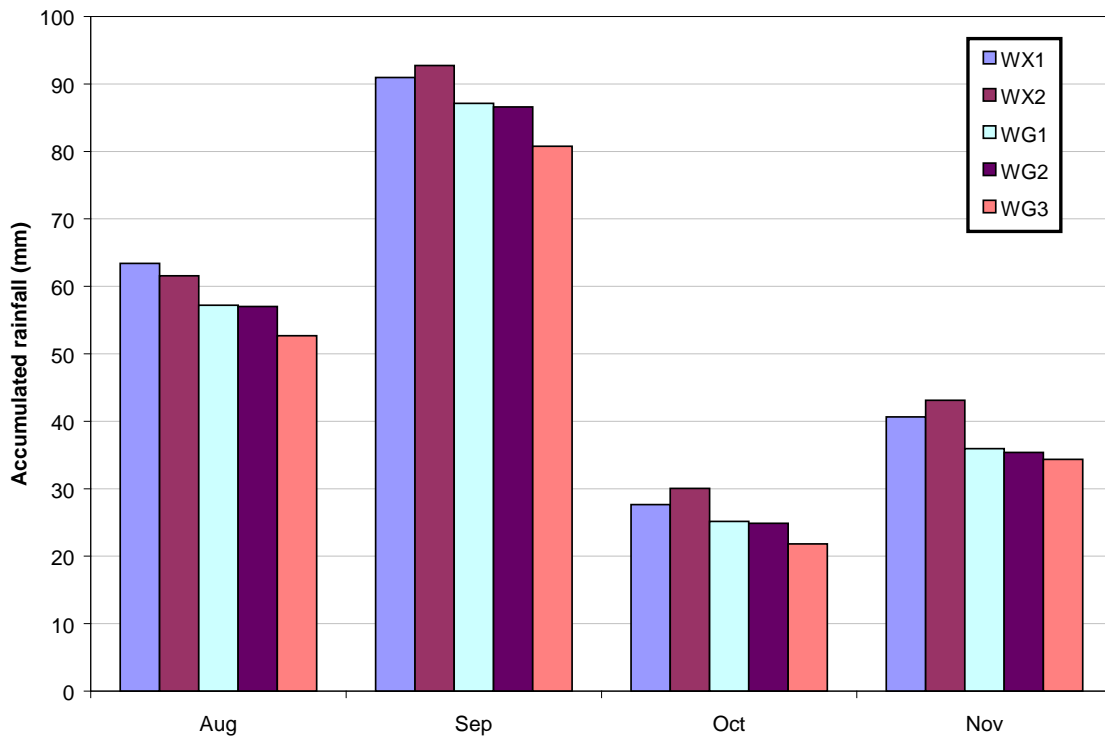


Figure 4. Monthly accumulations of light rain events, recorded in Finland during August through November 2004.