

EGU21-7236

<https://doi.org/10.5194/egusphere-egu21-7236>

EGU General Assembly 2021

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## Next generation of Automated Low Investment Cost Evaporimeters (ALICE)

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Research of evaporation height is curtailing for measuring of the water balance in small catchments and for proper and efficient running of irrigation systems.

Ongoing project to develop the simple and reliable, easy to reproduce evaporation measuring device. Core part of the device are measuring of the water level in field in cheap form. 3D printed design in combination with open-source cheap electronics is utilised. Methodology and results of the ongoing research project will be presented. Project investigates the affordable and simple technical measures that have a potential to increase the number of opportunities for the measuring of evaporation.

Continuously the theories are developed and tested, subsequently conclusions are implemented into the next generation of the device. Seven generations of 3D printed part have been done, and now the research focus on the water supply part of the device. Durability and reliability of the device is tested in field, in three locations. All plots are monthly checked by research staff and data is saved and later compared with data measured by device. Refilling of the evaporation pan is done automatically.

Prototype seven uses the experience of all previous prototypes. The construction is equipped with 50 individual electrodes, each electrode is 1 mm shorter than previous. Another 2 electrodes serve as a negative collector. The total measuring range is 50 mm. The whole structural part of prototype seven is designed as a printout on a 3D printer, electrodes are printed from conductive material. Above the electrodes there is a printed circuit board carrying the microelectronics control.

The principle of measurement consists in measuring of capacity of capacitors joined in parallel. Charge goes through the capacitors to needles, then through water environment to negative collector needle and to negative terminal. Because different lengths of the needles, change of water depth, changes the number of submerged needles and thus number of connected capacitors. So, water depth is directly related to measured capacity.

A commonly used evaporation unit is mm of water column per day. It is therefore necessary to analyze a long time series, at least longer than one day, and covering the entire day from 00:00 to

23:59. On the other hand, there is need for redundant data, so measuring step six hours is chosen.

The sites are the grounds of the CTU Faculty of Civil Engineering in Dejvice, the experimental sites of the CULS in Prague Suchdol and the Water Research Institute in Prague Podbaba.

The research is funded by the Technological Agency of the Czech Republic (research project TJ02000351 - Development of Tools and Methods Improving Estimation of annual Evaporation Balance).