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Correcting the temperature on capacitance probe using the temperature and capacitance probe diurnal wave

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The influence of the temperature on the dielectric constant of soil is the result of antagonist which depends on the soil composition and mineralogy. Moreover, the local properties (structure, soil material) in the probe volume of influence also influence the sensitivity of the capacitance probe signal to soil temperature. It is then necessary to develop correction strategies that must be implemented on probe by probe basis. In this paper, laboratory experiments were done with the SDEC HMS 9000 capacitance probes working at 35 MHz. An algorithm was designed to estimate the sensitivity to the soil temperature for every probe. It is based on the diurnal patterns of both the measured dielectric constant and the soil temperature. The underlying idea is to make some (reasonable) assumptions on the dielectric constant variations during selected time window in the day and then attribute any difference between expected measurement and observed measurements to the soil temperature. Such algorithm was implemented with a large number of experiments. It improves significantly the physical meaning of the temporal evolution of the soil moisture estimation through daily cycles for probes installed near the surface, or longer period for deeper probes