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Can a dewpoint hygrometer measure water potential at field capacity (-33 kPa)?

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Dewpoint hygrometers are common tools for measuring water potential of soil and plant samples. With this method, a sample is placed in a closed chamber and the equilibrium water activity (relative humidity) of the atmosphere in the chamber is measured as a function of the dewpoint temperature of the atmosphere in the headspace and the sample temperature. The Kelvin equation is then used to convert from relative humidity to water potential. Because the water potential is related to the logarithm of relative humidity, this method is particularly well suited to measuring water potential in the dry end of the moisture continuum but has serious failings at the wet end. Commercial dewpoint hygrometers can typically measure water potential with an accuracy of $\pm$100 kPa (rh = 0.00074). Our goal with this study is to improve the accuracy of a commercial dewpoint hygrometer (WP4T, Decagon Devices) to $\pm$33 kPa (field capacity). Factors that will be discussed include the addition of a new hydrophobic coating on the sample chamber surfaces, increased resolution and accuracy in temperature sensor electronics, and optimized calibration routines.