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Title

Application of Terahertz Radiation to Soil Measurements: Initial Results

Source

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Abstract

Developing soil sensors with the possibility of continuous online measurement is a major challenge in soil science. Terahertz (THz) electromagnetic radiation may provide the opportunity for the measurement of organic material density, water content and other soil parameters at different soil depths. Penetration depth and information content is important for a functional soil sensor. Therefore, we present initial research on the analysis of absorption coefficients of four different soil samples by means of THz transmission measurements. An optimized soil sample holder to determine absorption coefficients was used. This setup improves data acquisition because interface reflections can be neglected. Frequencies of 340 GHz to 360 GHz and 1.627 THz to 2.523 THz provided information about an existing frequency dependency. The results demonstrate the potential of this THz approach for both soil analysis and imaging of buried objects. Therefore, the THz approach allows different soil samples to be distinguished according to their different absorption properties so that relations among soil parameters may be established in future.