

## A portable, high-frequency susceptometer and its application to rock magnetism

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A novel type of magnetic susceptibility meter was developed, for the measurement of high-frequency susceptibility from 10 kHz to 2 MHz. This instrument has high sensitivity, comparable with conventional susceptometers, and is also portable, easy-to-use, and battery-driven, thus making it suitable for use not only in laboratory but also in the field. These features are achieved with the state-of-the-art induction sensor technology and digital front-end processors. The fast measurement time, from several to tens of milliseconds, allows continuous measurements, which would enable scanning the surface of a sample or an outcrop in the field. The high frequency susceptibilities measured with this device provide the information useful for quantifying SP particles more precisely than in the conventional way using the frequency dependence index, or  $f_d$ , from two lower frequencies by Bartington's susceptometer. It is also noted that susceptibilities in the high-frequency range over 1 MHz demonstrate anomalous behaviors with some materials. For example, while pure water is weakly diamagnetic below c. 500 kHz, its susceptibility gradually increases toward zero with frequency and, above 500 kHz, it becomes positive, or paramagnetic, and keeps rising slowly until 2 MHz.

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