



The dual-band search coil magnetometer: a new instrument for investigating wide band magnetic field fluctuations in space

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Due to their complementary performances search-coil and flux-gate magnetometers are commonly used in association onboard scientific spacecraft to measure magnetic field fluctuations. Flux-gates have an almost constant sensitivity from DC up to a few tens of Hz, meanwhile search-coils have a frequency dependent sensitivity, usually having a very flat minimum around a resonance frequency fixed by design. The sensitivities of these instruments cross over around 1Hz: search-coils have a much better sensitivity than flux-gates above this frequency, as low as a few fT/sqrt(Hz), and are usually designed to cover frequency bands extending over four to five decades. Frequency bands of ordinary search-coils can be chosen by design from typically [0.1Hz, 10kHz] to [10Hz, 100kHz]. We present the principle of a new instrument, the dual-band search-coil which has an effective frequency band from 0.1Hz to 1MHz. Two coils, one BF and one HF, share the same magnetic core owing to a mutual reducer which minimizes the effect of mutual impedance on each of the two transfer functions, BF and HF. An instrument of this type is part of the Plasma Wave Instrument onboard the Mercury Magnetospheric Orbiter of the ESA/JAXA BepiColombo mission.