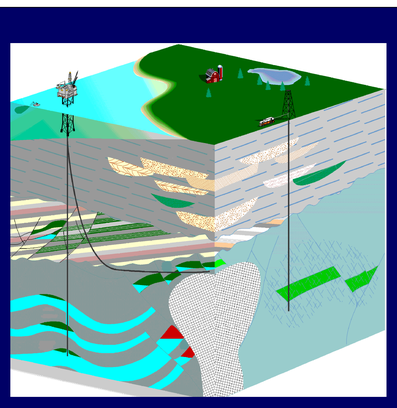

New applications with KMS820

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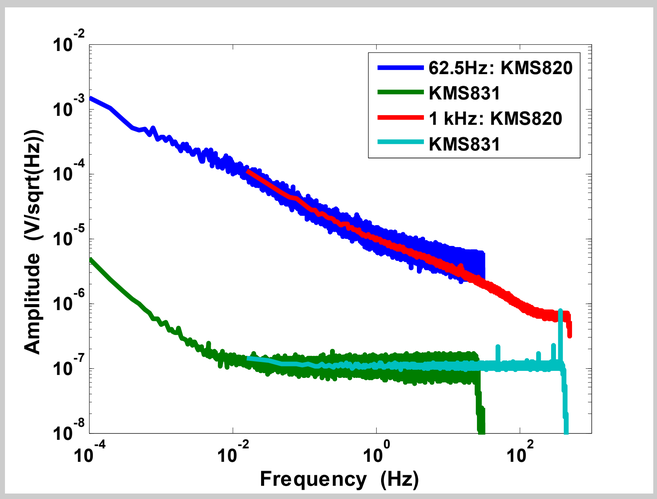
Abstract

The KMS820 is an acquisition system, designed for general EM measurements. The main application is MT and tlast year he system was in operation for Geothermal exploration in Kenya run by Geothermal Development Company and in Thailand run by Mahidol University (Bangkok) using a far remote reference station in 1000 km distance.
With the new grounded dipole transmitter the KMS820 is also applied for controlled source EM. The high sampling rate of the system has been tested also for the use of fast TEM as for in-loop configuration.
The additional digital channels can be connected to KMS820 with the new KMS831 device.

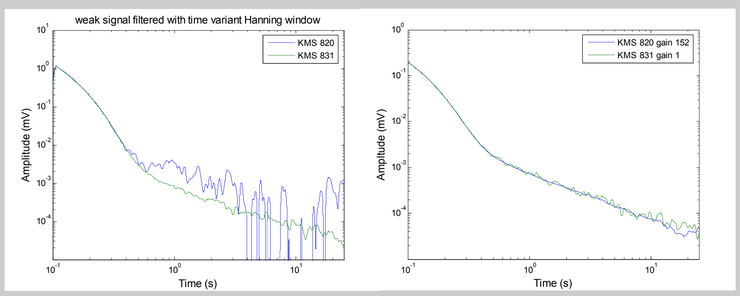
Improvements in firmware & software

An check during recording against saturation due to strong drifts in the data can be activated. If frequency of saturation is above a defined level within a time interval, the system will restart automatically with updated offset compensation and if necessary reducing the gains. The elevation of the site recorded by GPS and stored in the binary header.
The MT processing software extended EDI-files with more information from the system and EDI-files with different sampling frequencies can be combined.
A MT-1D inversion is now also included in the software.

Additional channels with KMS 831

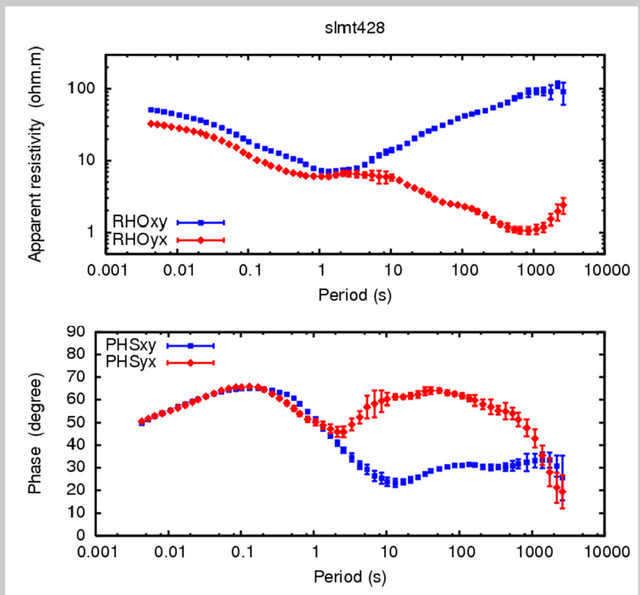


The KMS820 has an additional digital channel input to connect the unit with the digital fluxgate magnetometer Lemi-029 or now with the KMS831. This digital device has excellent low instrumentation noise level due to 32 Bit ADC with an integrated chopper amplifier. The data out is here 24 Bit (optional 32 Bit). The turn over point where the 1/f noise is dominating begins at 0.02 Hz for the KMS831, maximum noise ratio between both ADUs is about 120.



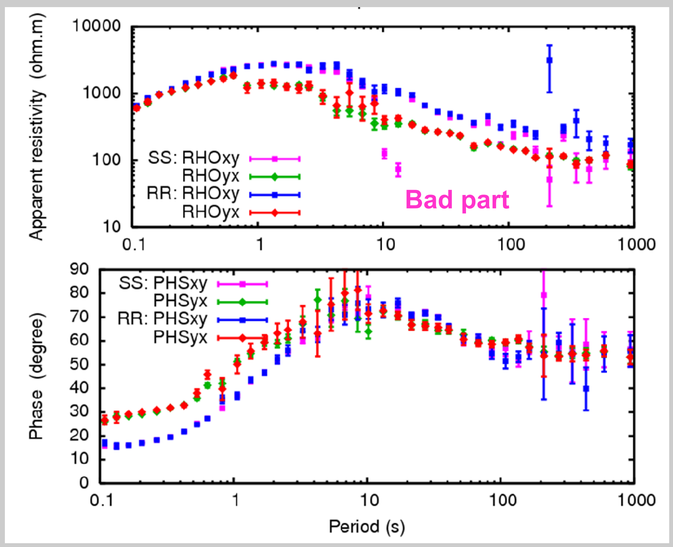
The step response of a high pass is used to demonstrate the advantage of the lower noise level. In this example the signal is quite weak with a peak of 2 mV. The input voltage range is ±2.5 V. The processing consists the stacking of 40 transients and a time variant Hanning window has been applied with a varying window width of 0.1 x time at the time point.

MT applications



During the training for Geothermal Development Company, we run MT survey inside and around the caldera of Silali in the northern part of Kenya.

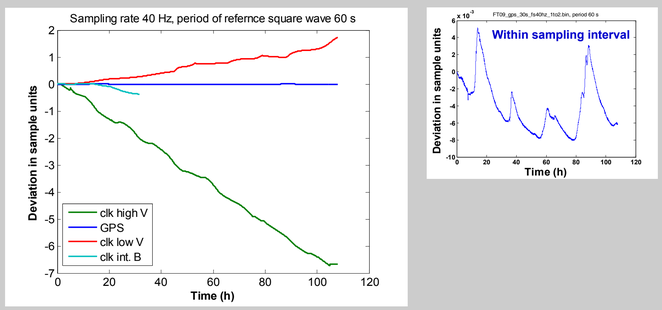
Remote reference in Thailand



This field work has been operated by Mahidol University and the target area are different sites in the northern part of Thailand. Since there was already some experience with the high cultural noise level, a remote reference at a magnetic observatory in the south part of Thailand was set up and run daily by given time schedule with different sampling rates. Although the RR station was influenced by cultural noise, some of the data could be remarkably improved.

GPS synchronized time

The time of the internal clock of the KMS820 is synchronized with the seconds of the GPS time signal. This gives a very accurate time. Here we analyzed the situation when the GPS signal is not available, how accurate and stable is the clock?

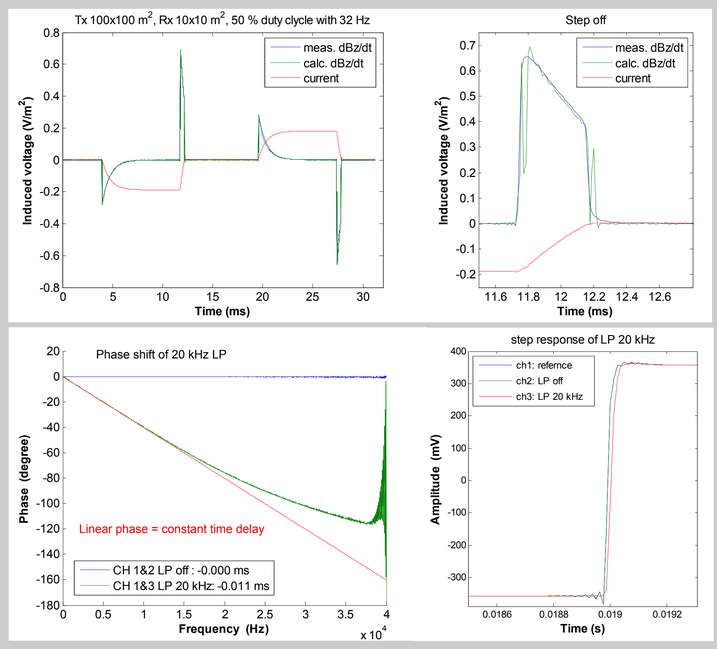


As reference we used an external GPS clock from IGM Cologne which is in the field for the LOTEM soundings. A square wave with a period of 60 s is recorded. All the zero crossing are analyzed in reference to the first, after GPS has been switch off in the KMS820.

Grounded dipole TEM transmitter

This summer we run the new KMS-5100 TEM transmitter at our Hockley field test site near Houston with a rental generator. The maximum power output is 100 kW, controlled with a linear fast ramp. The input is 3-phase AC. This transmitter will be in operation during a reservoir monitoring project with Time Domain EM in Thailand.

In-loop TEM



The use of KMS820 for the TEM with inductive sources with short offsets and different transmitters systems from Zonge has been investigated. The highest sampling rate is 80 kHz. The configuration is in-loop with 100 m x 100 m transmitter loop and a 10 m x 10 m receiver loop. The timing is done by an external GPS clock or the direct measurement of the Tx current over a shunt resistor. The data are stacked over 50 % duty cycle wave with a period of 32 Hz. A slow step on and a fast step off response is shown in the upper graph. From the current record the induced voltage of the primary field at the receiver has been calculated. Comparing the results with data recorded with Zonge systems, an additional delay of 2-3 sample points can be observed. The delay of about sample interval can be explained by the 20 kHz LP for anti aliasing, which is determined over the linear phase shift between channels with and without LP.

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