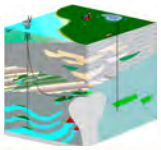


Advanced broadband array electromagnetic (MT & CSEM) for hydrocarbon exploration

K. Strack[1,2,3] , T. Hanstein [1] , Z., Jiang[1]

1: KMS Technologies, Houston, Tx, USA 2: University of Houston, Tx, USA 3: Mahidol University, Thailand

Objective: NEW array electromagnetics addresses some issues for shale resources & reservoir monitoring by extending bandwidth to higher & lower frequencies.

Array acquisition system (KMS-820)

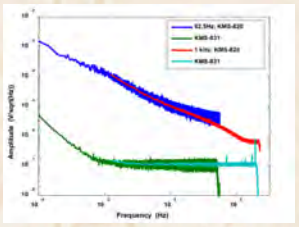
- 24/32 bit, 6 analog channels, low power
- **Communication:** wireless, WiFi, USB
- Data storage SD card
- **High bandwidths** DC to 40 kHz
- GPS: location & timing, internal
- **Sensors:** induction coils HF (1 Hz-70 kHz) & LF (0.1 mHz-1 kHz), fluxgate magnetometer, electrodes, 3 component geophone for **micro-seismic**
- **Digital Input channels & programmable scheduler**

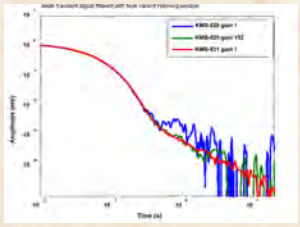
Additional channels with KMS-831

KMS-820 + KMS-831 + digital FGM

6 analog channels	+	3 digital channels	+	3 component FGM
HF: Bx,By,Bz,Ex,Ey		BB: Bx, By, Bz		LF: Bx, By, Bz
Lemi-118, Lemi-701		Lemi-120		KMS-029

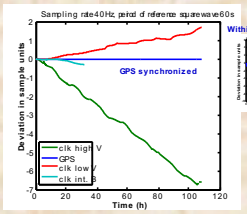
Setup all sensors & acquire all bandwidth with programmable task scheduler

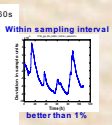


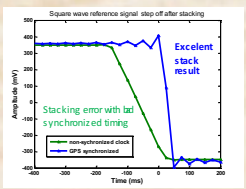


Excellent low noise performance of KMS-831 due to chopper amplifier) and up to 1 kHz sampling rate

GPS synchronized timing accuracy



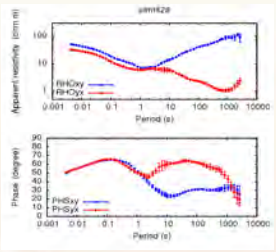




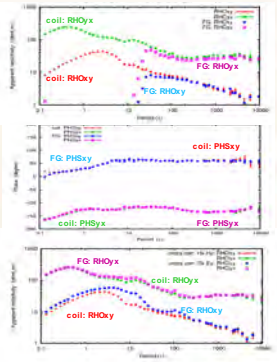
Important for CSEM & stacking of transients

MT applications

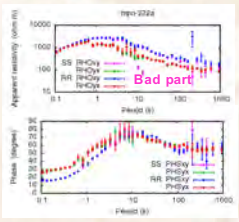
in Kenya



in China with FGM



in Thailand with RR



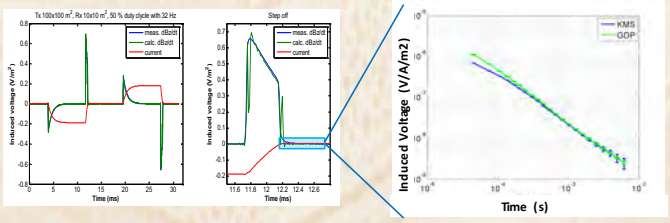
RHO with FGM is downward biased for periods < 20 s, improved by advanced processing, phase is unbiased.

Distance of remote station (RR) to local station (SS) is 560 km.

With HIGH power CSEM transmitter

- **100 kVA (150/200 optional)**
- Controlled by KMS-820
- Use ANY 3 phase AC generator
- GPS time synchronized
- 50 & 100 % duty cycle (Lotem)
- CSEM up to 1 kHz tested
- Dipole or loop

& with loop TEM transmitter (3rd party)



Fast sampling 80 kHz to measure full wave form TEM. Current of 100 m x100 m Tx-loop is recorded over shunt, Rx measurements are consistent with GDP-32 II results.

Acknowledgement:

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