NEW TECHNOLOGY IN MOBILE TEM - the LOUPE SYSTEM

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Loupe is a new transient electromagnetic (TEM) instrument designed for profiling and mapping electrical conductivity to a depth of around 30 meters below surface. The system is mounted on two backpacks and data acquisition is continuous at walking pace. The transmitter and receiver are carried by separate operators in a Slingram or ‘out-of-loop’ mode.

Since presentation of initial results using the Loupe TEM system at SAGEEP in 2018, field tests have confirmed the utility of the system to a range of near-surface electrical conductivity mapping applications in Australia, Europe, North America and South Africa. Many of the applications that have been trialed involve the 3-D mapping of aquifers. The ability to rapidly deploy the system means that multi-temporal surveys are easily conducted, showing changes with time due to flooding or drought. Such surveys will be especially useful on small islands where changes in sea level may impact on the freshwater lens beneath the island. Examples of Loupe conductivity sections over a riverine wetland and an inhabited coral island will be shown.

Loupe produces high quality TEM data in urban and industrial areas by virtue of the real-time signal processing built-in. Raw signals on the 3 receiver coils are recorded to flash memory and fully processed to stacked and windowed decays in real-time. VLF station interference can be digitally filtered from the TEM data and the VLF signals can be separately recorded as a by-product of the survey. Good quality data has been collected in close proximity to houses, mine-site infrastructure, underground power and infrastructure, electric fences in farm settings and directly under large powerlines. Because there is good noise rejection, high quality data can be collected at mine sites where there is often many sources of electromagnetic noise.

Some examples of mapping seepage from mine tailings impoundments will be shown. A further application is detection of UXO. A field test of the Loupe system over a UXO test site showed the system can be used to detect all the small ordnance in the top 2 to 3 meters at this site. Currently the electronics and data acquisition software in Loupe is being deployed in variations of the Loupe system on carts and drones.