Dynamic NanoTEM (DNT) Hardware

With funding from the ESTCP program, Zonge has assembled a multi-dimensional NanoTEM system for use in characterization and hazards mapping. A block diagram of the system is shown in the figure on the right. As a Fast TEM System, Dynamic NanoTEM has a number of unique capabilities:

- 3-Channel Data Acquisition permits acquisition of 3 orthogonal field components.
- Early Time Data Acquisition - The system is able to acquire data over 3 decades of time ranging from microseconds to milliseconds.
- Profile (Gated) and Burst (Equal Interval) Modes of data acquisition.
- Fast Repeat Rate (32 Hz) with ultraprecise and precise time stamps for each recorded transient permit accurate position tracking when using RTK GPS positioning.

The DNT Hardware is an transistor array with multi-channel, multi-mode, multi-dimensional acquisition. The DNT system is a transmitter that can be installed within the latest generation Zonge transmitters.

Dynamic NanoTEM Data Processing

The DNT system acquires an unprecedented amount of data during the course of even a short survey. To handle these data, we have implemented a software system for processing and display of the data. The figure to the left shows the major functional elements of the DNT data processing system. The processing capability is built around Oasis Montaj in which we have added a number of custom GIS, DLI, and loosely coupled proprietary programs. Two of the programs deserve special mention.

DNT_Reduce (Pre-Processing)

DNT_Reduce provides the interface between raw data as it is collected in the field and the utilities within Oasis Montaj. As suggested in the figure to the left, DNT_Reduce accepts up to 4-trial data streams including raw receiver data, GPS data, antenna attitude data (when measured), and configuration data. These data streams are merged and generate two output files: one that are easily read into Oasis Montaj and the other that are easily read into Oasis Montaj, and can also be used as input to Zonge software. Zonge performs basic QC within Oasis several custom GIS along with standard utilities supplied by Geosoft.

The Evolution of NanoTEM

The DNT system is based on the nanosecond-scale current impulse phenomenon that was observed in the 1980s. This phenomenon is known as the secondary magnetic field transient, and is characterized by the rapid rise (nearly instantaneous) and collapse of the current impulse. The current impulse is typically less than 1 microsecond in duration. The secondary magnetic field transient is observed within microseconds after the rapid current impulse.

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