perfiles ...YOUR GEOPHYSICAL NESLETTER

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Induced polarization - resistivity – spontaneous potential – magnetometry – electromagnetics - seismics – well-logging
MINING – GROUNDWATER – ENGINEERING - ARCHAEOLOGY

CHEERS!

By mid 2002 we started using three-dimensional modeling techniques in IP & Resistivity surveys. Since then, there have been significant improvements in these methods, and with the use of various auxiliary tools we have been able to optimize their results.

We proudly see that several geophysical consultants have started using the first stages of these 3D applications this year, and we have marked a new step to follow in the application of geophysical techniques.

José R. Arce

INSTRUMENTS

We are pleased to announce that in the following weeks, our digital cesium vapor magnetometer Scintrex Navmag SM-5 will be upgraded with the addition of an external Gps unit that operates with the Omnistar satellite system, allowing sub-metric precision in topographical surveys done simultaneously with our high-resolution magnetometry.

NEW GEOPHYSICAL METHOD! - MASW

Shear wave velocity measurements have always been quite problematic to work with, from surface signal generation to their correct identification within a vast number of different wave types. The MASW (Multi-channel Analysis of Surface Waves) method was developed in the late 90s by the Kansas Geological Survey and by the Kansas University staff, and was perfected over the following years. We had been analyzing the possibility of applying this method in Perú for some time now and recently decided to complete all requirements to locally provide MASW.

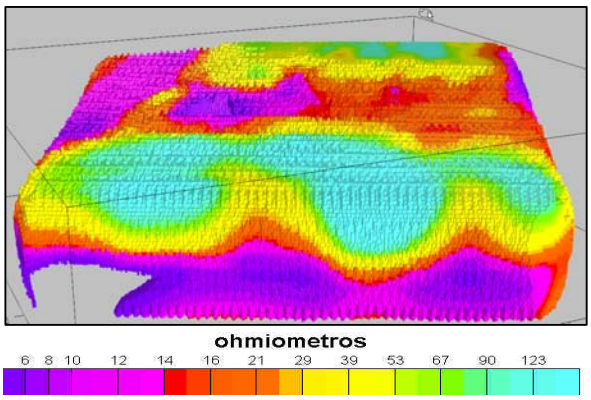
MASW's most attractive feature is the ability to model S-wave velocities from the dispersion of surface waves, which are normally eliminated from all standard processing techniques in refraction and reflection seismology surveys, but contain up to 98% of S-wave components. This makes surface waves ideal to invert shear wave velocities from their signal. By July we received our set of 4.5Hz geophones, necessary for MASW fieldwork, as well as the two main computer programs currently available to analyze and model surface wave information.

With this method we can now obtain vertical S-wave models on discrete locations or along a 2D profile, with standard surface impacts. This allows the construction of 2D section images for Poisson ratio, shear modulus, bulk modulus, Young modulus and natural resonance period through more reliable signal records and with higher-quality inversion modeling than with the previously available down-hole measurements.

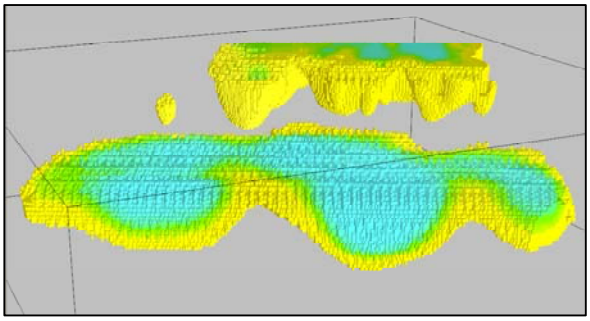
It is our intention to present an application of MASW in a near future edition of *Perfiles*.

RESISTIVITY & IP IN 3D

Three dimensional processing of IP & Resistivity information allows us to significantly increase precision in our resulting geophysical models, as well as expand our dataset visualization capabilities from any view point, section images, depth or elevation slices. As part of our routine presentation of results, we retrieve from the 3D model and include in our reports various depth slices and 2D sections that match field survey lines. As follow-up exploration continues, field geologists require different elevation slices and oblique sections, which we can now quickly provide. The following example is the resulting 3D Resistivity model of an alluvial deposit with disseminated mineralization. The objective was to define the extent of the alluvium mass and determine its approximate volume, which would eventually be removed with light machinery. With local geological knowledge we picked a 30 ohm-meter threshold (yellow) to be the contact between the alluvium and the deeper conductive sedimentary formations.



Once we remove all cells with resistivities under 30 ohm-meters, the image shown below is obtained. With this information we can then easily estimate the volume of alluvium mass to be 62 million cubic meters, approximately.



The same principles apply to chargeability modeling in mining exploration surveys, with the same analysis and visualization advantages.

Until next time...

Av. Petit Thouars 4380, Miraflores, Lima 18, Perú. T(51-1)4227205/2215406, F(51-1)4426946.
perfiles@geofisicos.com.pe http://www.geofisicos.com