perfiles

...YOUR GEOPHYSICAL NEWSLETTER

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

CHEERS!

Welcome to our May 2009 Perfiles. In this edition we will present the new application for engineering geophysics we have been working with for the last several months. This idea combines the results from two completely different seismic applications and yields more complete and detailed results.

We expect this new technique to be quite useful for our engineering geophysics clients, as well as for ongoing mining operations.

José R. Arce

NEW INSTRUMENTS

We have just placed an order for a natural gamma radiation spectrometer instrument from Pico Envirotec, to offer our clients radiometric measurements in mining exploration. This instrument has a 3"x3" NaI crystal, as well as a data collector and integrated GPS. The data readings stored in the data collector consist of the entire spectrum measured in 512 channels, offering direct measurements of total counts, Uranium, Thorium and Potassium as well. This new application will be available very soon and will complement our potential field methods.

POISSON'S RATIO AND ELASTIC MODULI

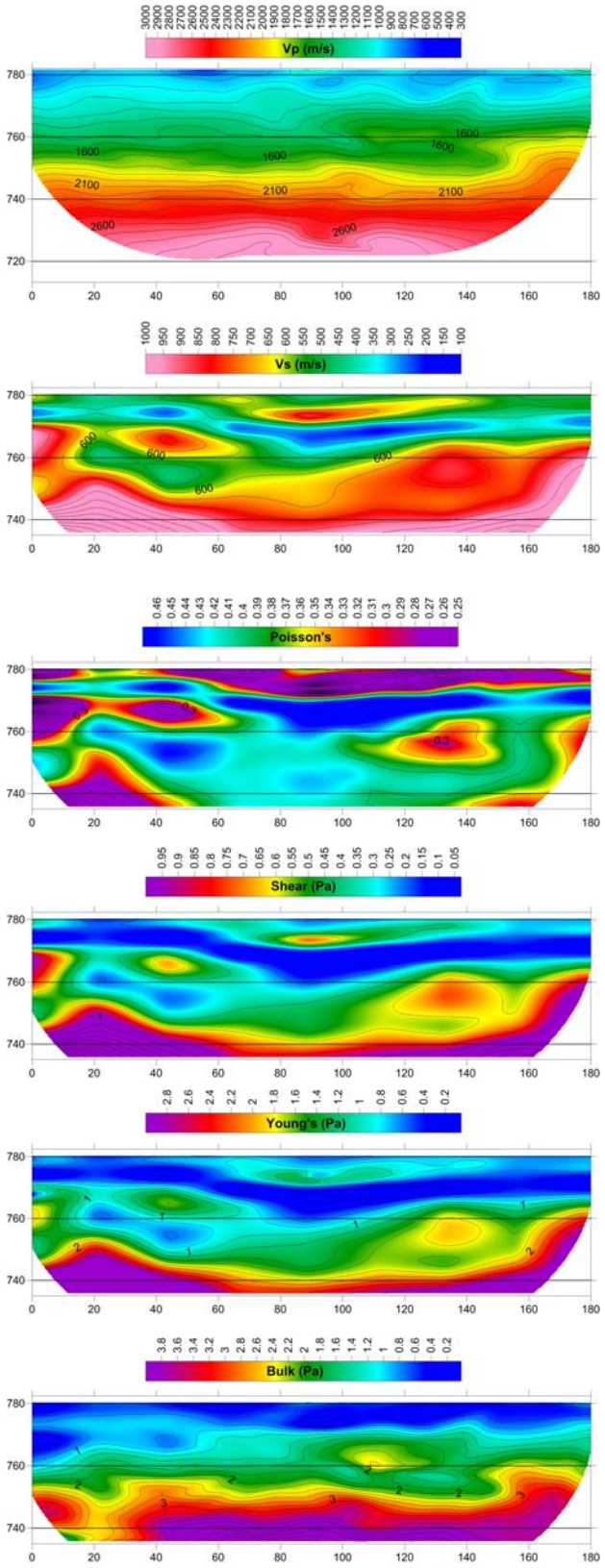
Over the last several years, geophysical methods for mining exploration have not been the only with significant improvements. First, seismic refraction tomography allowed us to reach completely new level of detail in P-wave velocity models. A couple of years later, the MASW method became available and allowed us to obtain S-wave velocities through the modeling of surface waves, in discrete stations. Considering an appropriate density of MASW stations, we can model an S-wave velocity section through the use of similar initial parameters on adjacent stations.

Having this information available in P-wave and S-velocity sections, we decided to combine both properties in a new application to generate 2D sections of Poisson's ratio, as well as the elastic moduli: shear, Young and Bulk.

With all this new information readily available as 2D sections, we can perform detail analysis of cases like the one presented next on a tailings dam, and for a uniform reference density of 1 gm/cc.

In the sections we can observe that the P-wave velocity (Vp) is quite uniform and with a clear tendency of increasing with depth, except on some discrete areas. This is not the case for S-wave velocity (Vs), which shows weaker less compact horizons in the dam, colored with blue. Poisson's coefficient shows the hardest materials colored in purple while the weaker in blue, so that during construction different compaction degrees were obtained. Also, the central dam core, colored in green-blue in the deep center of the section is obvious.

Young and shear coefficients enhance the presence of a lower compaction blue layer. Bulk modulus provides slightly more detailed information than P-wave velocity by itself. The values of the color scales in Pascals are referential.



Until next time...

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