

## CHEERS!

Over the last few months we have noted an increasing interest in possible correlations between physical properties of surface samples and geophysical 2D and 3D modeling of field information. We understand that this kind of analysis should be carefully understood before considering its use. The main goal in this new *Perfiles* will be to provide some ideas to understand the difference between electrical and elastic properties of field rock samples and geophysical models.

José R. Arce

## INSTRUMENTS

During the first days of August, our new seismograph Geometrics StrataVisor NZXP arrived to Perú. This is the most advanced seismograph currently being built in the world and to this date it is the only one of its generation that is available in Perú. The main differences between our wonderful and reliable Strataview R24 and the new StrataVisor NZXP are operational improvements, as both units have the same 18bit signal resolution, which allows for highly detailed trace sampling. The StrataVisor has all the advantages of a state-of-the-art instrument, including a powerful operating system (Windows XP Professional), full S-VGA color screen for operation under sunny conditions, lots of memory and a high-speed processor, which allows a fast field data collection process as well as advantageous pre-processing features. This instrument is our latest addition to our complete line of state-of-the-art instruments for induced polarization, magnetometry, electromagnetics and Omnistar GPS, for application in most geophysical methods and techniques, and permanently stationed in Perú for all our clients.



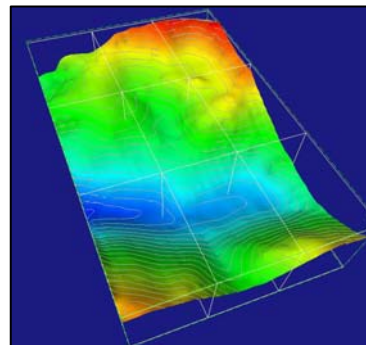
StrataVisor NZXP

On a previous edition of *Perfiles* we mentioned that our new Trimble Omnistar GPS antenna, originally purchased to operate with our Navmag Cesium vapor magnetometer, was ready to operate with our recently acquired data collector TDS Ranger 300X, with the advanced Solo Field and Solo Office mapping programs. This combination allows us to prepare our geophysical grids with sub-metric precision.



TDS Ranger 300X data collector,,  
Trimble AGgps114 Omnistar antenna.

Surface morphology  
obtained from a  
50mx50m  
topographic grid



## GEOPHYSICAL MEASUREMENTS ON SAMPLES

There are basically two types of physical properties that geophysicists measure: relative and absolute. Relative properties differ from absolute as they change over time and weathering processes. Even though there is no such a thing as a perfect absolute property in geophysics, some measurements such as chargeability and radiometry (where isotope decay processes are very long), do approach this condition. Some examples of relative properties in geophysics are those related to: magnetic intensity, Bouger gravity, resistivity and wave velocities.

Measuring electrical resistivity in a rock sample to try to correlate it to a particular geophysical 2D or 3D model is not acceptable and this may be understood with some basic reasoning. Resistivity is essentially a property closely related with humidity contained within rock pores. This is why a very compact rock has a high resistivity, while a highly porous rock such as clay has very low resistivity values. This, most certainly, does not apply to a perfect metallic mass (i.e. pyrite crystal), but we must keep in mind that metallic masses occur in nature as part of a matrix containing a variety of minerals, and the electrical resistivity field measurements consider the average value of this mineralized mass. Mineralization also happens during processes with extreme heat gradients, so their emplacements occur in rocks that are more altered and fractured than their host formations.

When a measurement is performed on a rock sample that has been removed from its original source location, such as a drill hole core or a surface rock sample, the result will vary drastically as the sample has been significantly altered by the removal process from its initial state and properties such as Resistivity or P-wave velocity will have considerable variations. This deviation from original physical measurements may be even more prominent on loose rocks since they have probably suffered significant mechanical damage by friction and transportation processes.

This property alteration processes are also very clear in seismic velocities, where measurements from rock samples may vary up to 70% from actual 2D tomograms, in some cases. Electrical Resistivity changes may be even more dramatic.

Until next time...

