perfiles ...YOUR GEOPHYSICAL NEWSLETTER

Arce Geofísicos, Lima-Perú, Medellín-Colombia **February-May 2011**

induced polarization-resistivity–self potential–magnetics–gravity-radiometrics-electromagnetics-seismics–downhole
MINING – GROUNDWATER – ENGINEERING - ARCHAEOLOGY

CHEERS!

Welcome to our first edition of *Perfiles* of 2011. We have started this year with several projects in various countries, which is the main reason for the delay in this newsletter.

We would like to announce you that Arce Geofísicos has a formally constituted branch office in Colombia, under the name "Arce Geofísicos Sucursal de Colombia", located in Medellín. Our decision to increase our infrastructure to Colombia was taken after four years of continuous projects, and a significant increment in surveys we are required to run. We are very proud to be working in Colombia and to be able to offer there our methods, technologies and experience, as well as the dedicated service that characterizes us.

José R. Arce

NEW INSTRUMENTS

We also have new additions for our comprehensive line of instrumentation. In the first trimester of 2011 we have added two new instruments. The first one is a multi-parameter probe for measuring magnetic susceptibility and electromagnetic conductivity in rock samples, model MPP-EM2S and manufactured by GDD Instrumentation in Quebec, Canada. With this new instrument we will be able to take some measurements on rock samples or cores prior to our field surveys to help better understand future results.

The second instrument is a transmitter/receiver combined unit for resistivity and induced polarization. The instrument, a Syscal Pro is manufactured in Orleans, France by Iris Instruments. The Syscal Pro has an integrated 10-channel Elrec Pro receiver and a 250W transmitter operating with an external battery. This new unit will be used mostly in geotechnical applications, but in case it is required, it can also operate with one of our seven more powerful external transmitters, as an additional IP crew.

Iris Syscal Pro
Transmitter/Receiver

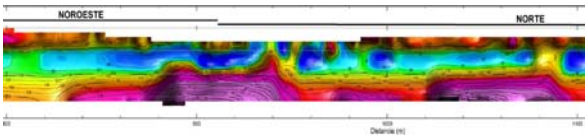
GDD MPP-EM2S Probe

DETAILED 2D RESISTIVITY

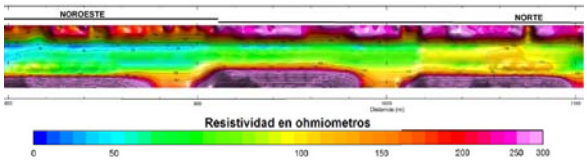
Electrical resistivity is a property that may be used in a variety of applications. We used it regularly together with chargeability and self-potential, as one of the properties measured in an induced polarization survey in most mining exploration campaigns. Resistivity depends fundamentally on the humidity content of rocks, which is why it is also widely used in groundwater exploration, particularly in alluvial deposits. One common application for resistivity is to study possible leaks in a dam structure. Very commonly it is applied together with the seismic tomography and MASW techniques to further assess stability of the dam, unless the scope of the study is to detect possible leaks zones.

The following example comes from the study of a dam which was starting to show a minor leak, possibly due to a problem that occurred while sealing the liner placed to further seal the dam from leakages. We repeated the same 2D resistivity tomography line, 10 months afterwards to analyze the changes after repairs were done. Electrode separation was 5 meters and the number of channels used was 7, and with the Pole-Pole array. Effective model penetration was around 30 meters.

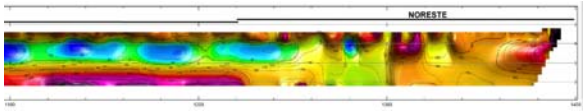
The following image shows a section of the dam which we interpreted as a problematic area with possible leakage zones. The first section is the resistivity prior to repairs, while the second section was taken several months after repairs were completed. In the top section we first noticed a surface response with very high resistivites (red-orange) representing a compact and dry top material. Below you could quickly notice an irregularly shaped lower resistivity layer, with several low resistivity bull's-eye centers (blue), followed by a deeper high resistivity mass representing bedrock under the dam.



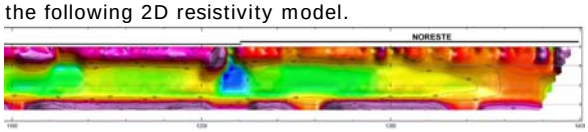
Once the repairs on the dam were finished, we repeated the same line with 2D resistivity measurements and the improvements can be readily seen in the next image. Here you have three very well defined layers. First, there is a shallow high resistivity compact material, followed by a relatively low resistivity layer formed by the dam's clay nucleus, overlaying a high resistivity bedrock.



If we analyze another section of the dam, we can also see a clear improvement in the resistivities, as the dam layering shows very evenly through most of the line. The next section was the initial measurement.



Several months after the repair, we obtained the following 2D resistivity model.



Until next time...

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