

# GPR FOR LATERITIC NICKEL

Survey crew conducting common offset GPR reflection profiling. Lower frequency GPR is essential to successful deep sounding in environments with large scale heterogeneity.



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## Overview

Nickel laterite deposits are formed by tropical weathering of ultramafic rocks. Nickel is leached from the rock resulting in an overburden that has a high (up to 2-3%) nickel content.

## Problem

The overburden vertical profile in the deposit areas normally has an upper soft sediment-like (limonitic) zone over a saprolitic zone (nickel rich serpentinite boulders encased in limonite) over unweathered host rock. Deposit evaluation for mining potential needs definition of the thickness of the two zones.

## GPR Contribution to Solution

The survey area was found to be very transparent to GPR signals and exploration depths in excess of 70m were achieved in some area. The broad area cover with GPR aGPR combined with exploration drilling were evaluated as a means to defining stratigraphy. At first assessment, the use of GPR in such an environment would be limited. Weathered rock in tropical settings is often clay rich and electrically conductive making the ground opaque to GPR signals.

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While the detailed mineralogical explanation is complex, GPR penetration has been substantially greater than expected. Exploration depths of up to 50 m have been reported in some projects.

The original GPR success is illustrated in the data shown here. Data were acquired at the Loma Carribe deposit in the Dominican Republic. Common offset reflection profiling

with a pulseEKKO IV provided GPR data that was interpreted by correlation with borehole control. Both 25 and 100 MHz center frequency antennas were tested with the 100 MHz data being limited to about 10m depth while the 25 MHz data reached the bedrock in many areas.

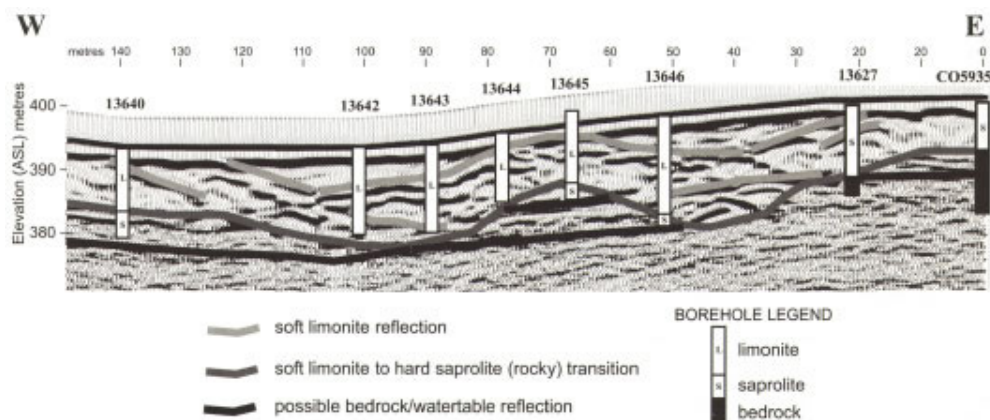
## Results & benefits

The value of GPR evaluating for lateritic nickel has been demonstrated many times since the study data were reported. Some key observations are:

- Low frequency GPR is needed to probe these complex heterogeneous environments
- Clay-like environments in areas of heavy rainfall can be surprisingly transparent to GPR
- GPR can sense the major stratigraphic units in lateritic deposits
- Light weight portable equipment is needed in these rugged often jungle-covered terrains

GPR responses vary greatly depending on the target being sought and the

host material. GPR response variability can be challenging to new GPR users. When learning about GPR, the best practice is to review several similar case studies to develop an understanding of variability. Check for other insightful information on the resources tab to learn more. Use Contact Us or Ask-the-Expert to reach our Application Specialists who can help you tap into Sensors & Software's vast array of technical information.



25 MHz GPR section with interpretation and drill results

References:

Watts, A., 1997, Exploring for nickel in the 90s, or "Til depth us do part", Proceedings of Exploration 97: Fourth Decennial International Conference on Mineral Exploration, edited by A.G. Gubins, 1997, p. 1003 - 1014

## Sensors & Software Inc.

1040 Stacey Court  
Mississauga, ON  
Canada L4W 2X8

+1 905 624 8909  
+1 800 267 6013

sales@sensoft.ca  
www.sensoft.ca

**subsurface  
imaging  
solutions**