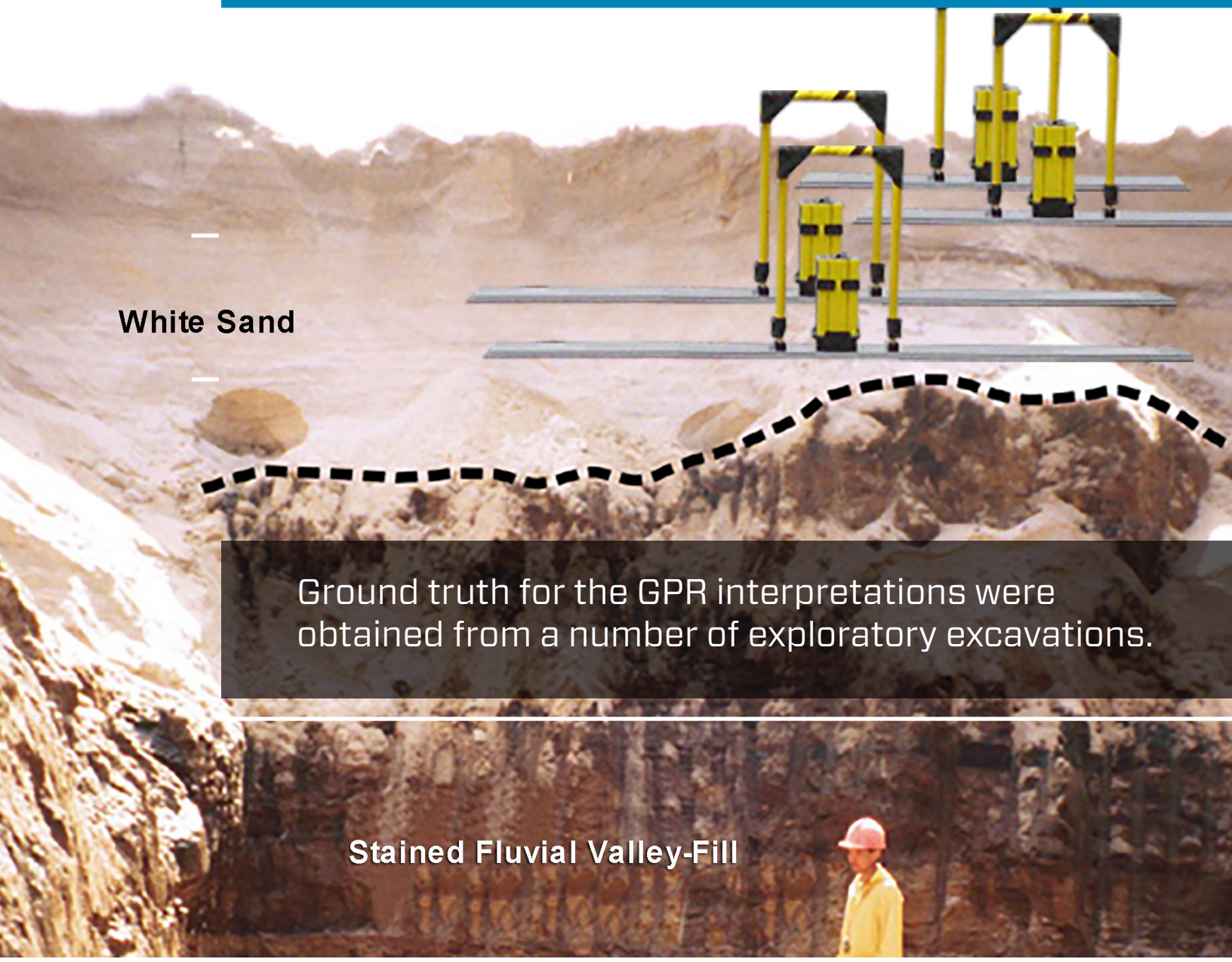
Sensors & Software

PLACER DEPOSIT EXPLORATION



Ground truth for the GPR interpretations were obtained from a number of exploratory excavations.

Overview

Vannessa Ventures Ltd sponsored this investigation which formed part of an MSc. thesis project at the University of Victoria. GPR surveys characterized the fluvial depositional structure of a buried paleovalley at Maple Creek, Guyana. A combination of 50 and 100 MHz GPR data were acquired on more than 40 kilometers of line; the GPR data defined the local stratigraphy enabling creation of an organized structure for the fluvial valley-fill sediments.

Problem

The exploration project focused on developing the methodology to characterize stratigraphy of the valley and define the organization of fluvial elements within the valley-fill sediments. Prior to this study, little was known about the subsurface stratigraphy of the area and the suitability of GPR as an investigation method was unclear.

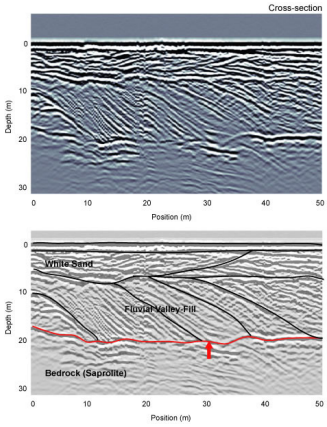
GPR Contribution to Solution

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 allowed a clear understanding of the valley architecture to be developed. Ground truth for the GPR interpretations were obtained from a number of exploratory excavations.

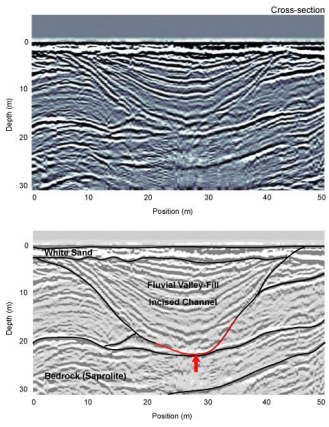
Two strong reflectors were observed over the area and these were interpreted to be major bounding surfaces. Trenching confirmed the lower surface (A) to be the bedrock-sediment interface or the boundary of the paleovalley. This strong reflector results from a contrast in the electrical impedance between the quartz-rich fluvial sand and the saprolitic kaolinized bedrock. The second major reflector (B) occurs at the boundary between the fluvial valley fill and overlying leached, white quartz sand.

The energy of fluvial deposition can be inferred from the detailed fine scale structure of the foresets in the interval between the major bounding surfaces. This information in turn suggests the optimal locations for mineral deposition.

Two examples of the valley fill architecture are presented.



Example 1 - Oblique parallel reflectors bounded above and below by laterally continuous reflectors represent a migrating feature such as a large scale mid-channel bar or pool fill. Potential buried diamondiferous and gold-bearing fluvial deposits are marked in red.



Example 2 - Divergent fill that represents an incised channel that has been filled with sediment. Potential buried diamondiferous and gold-bearing fluvial deposits are marked in red.

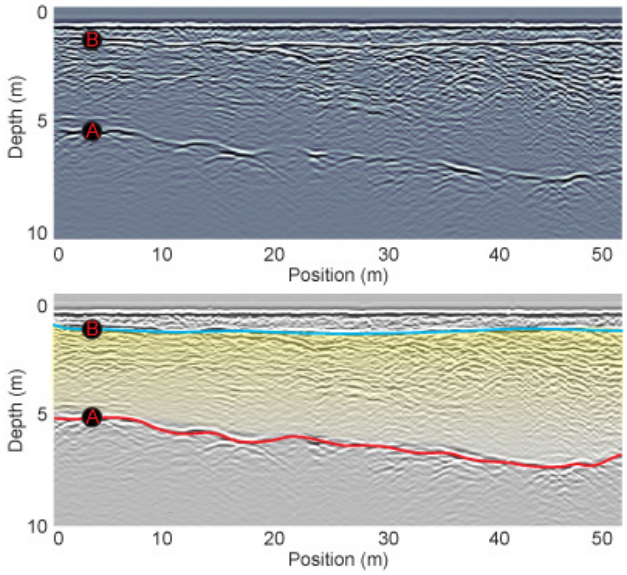
This project was the M.Sc. thesis of Adrian Hickin - University of Victoria and we thank both Adrian and Vannessa Ventures for permission to share this interesting case study.

Results & benefits

This study demonstrates the value of GPR for placer exploration. Some key features of this study are:

- The compact, portable and rugged pulseEKKO GPR was ideally suited for this type of survey
- Freshwater coarse grained soils are ideal environments for use of GPR
- GPR defines subtle variations in soil properties that identify depositional history
- Operation of the GPR is simple and intuitive and users can be effective in acquiring high quality data with only a few hours of training
- Digital data acquisition and post-survey analysis are critical to extracting the most from complex investigationsfanset & foreset bedding from a prograding delta

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.



Two major surfaces (A) bedrock-sediment interface and (B) fluvial valley fill - white sand were clearly imaged in the radar survey.

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