

SKI RESORT

SNOW MANAGEMENT

SnowScan field crew measuring snow depth in Switzerland.

Ski resorts depend on high quality snow conditions to attract discerning skiers. Knowing the quantity and distribution of snow on the slopes determines when and where to move and/or make snow.

Overview

Both require costly resources to ensure a uniform snow base is in place for the maximum time each year. SnowScan systems in Hand Held and Groomer Mounted configurations are now in use at numerous resorts in North America and Europe. Example results provided by pioneering ski report snow managers show how easily map snow thickness can be monitored on a regular basis.

Problem

The annual snow making budget at a large ski resort is often over one million dollars. About one third of most snow making budgets are energy costs associated with lifting water, cooling water and compressing air. Systematic processes to manage snow distribution are needed to reduce the need for costly water and energy

Since energy needed is often generated via fossil fuel, reducing the amount of man-made snow has also become a 'green' activity.

GPR Contribution to Solution

Snow has long been known to be transparent to radio waves. Using GPR signals to detect the soil-ground boundary provides a novel way of determining snow thickness. Combining GPR with a positioning system, like GPS, allows the snow thickness distribution on a ski slope to be quickly and accurately determined.

SnowScan is used in two modes. When mounted on a snow groomer, the real-time display allows the operator to immediately see the snow thickness beneath the machine just like an echo sounder on a boat. The operator can then decide how best to move snow from thick zones to thin areas.

In the second mode, the snow thickness and location are saved in a database or map form and provided as data for playback in the field for placing snow guns or planning further grooming actions each day. As a result, each evening snow can be made and/or moved to ensure a uniform snow cover.

With SnowScan, less snow is required to ski and overall better conditions prevail. While no skier wants to hear and feel their new skis hit bedrock, most skiers cannot tell the difference between 30 cm and 100 cm of snowpack if the snow is well distributed.

Deer Valley Resort, Utah, is known for exceptional snow conditions. They have constructed one of the largest snow-making systems in Utah and plan each year to have plenty of snow through Easter. Scott Enos (Snowmaking Manager) says "It's easy, anybody can use SnowScan!!". After only two seasons using SnowScan Scott knows he can save energy. He now has the confidence and the data to report accurate conditions to skiers and create dependable contingency plans to management.

Story courtesy of Brian Herridge, 3DGeophysics.

Results & benefits

Now that SnowScan has been used at many resorts, the power of the GPR technique is becoming evident. Some key benefits of using SnowScan are:

- the system is a compact, portable and rugged
- configurations are available for groomer mounting or handski operation
- GPS integration is seamless
- the latest systems permit WIFI communications of data

Sensors & Software Inc.

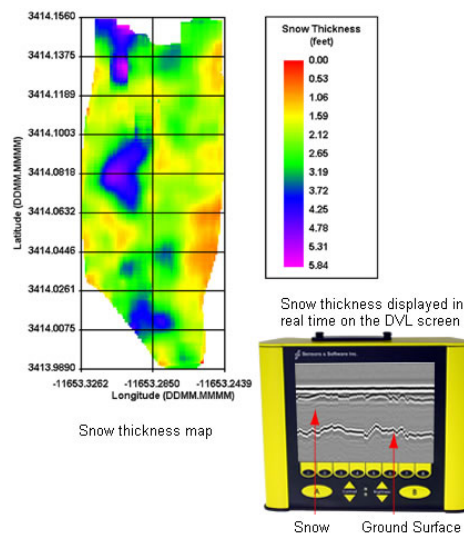
1040 Stacey Court
Mississauga, ON
Canada L4W 2X8

+1 905 624 8909
+1 800 267 6013

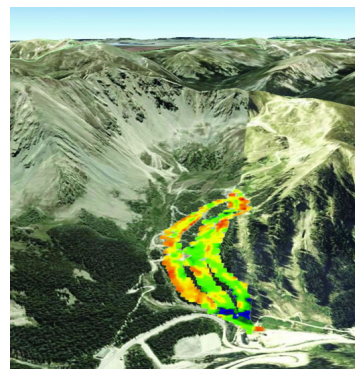
sales@sensoft.ca
www.sensoft.ca

- operation is simple and intuitive and almost transparent to the user
- once installed users are effective with virtually no training

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.



Example of graphical display of SnowScan GPR signals on the field data logger. Operating SnowScan with a GPS unit delivers data visualized in a colour map such as shown here using the QuickMap PC software.



SnowScan map from Arapaho Basin, CO showing thin snow as red and thick snow as blue. The map is superimposed on Google Earth.

**subsurface
imaging
solutions**