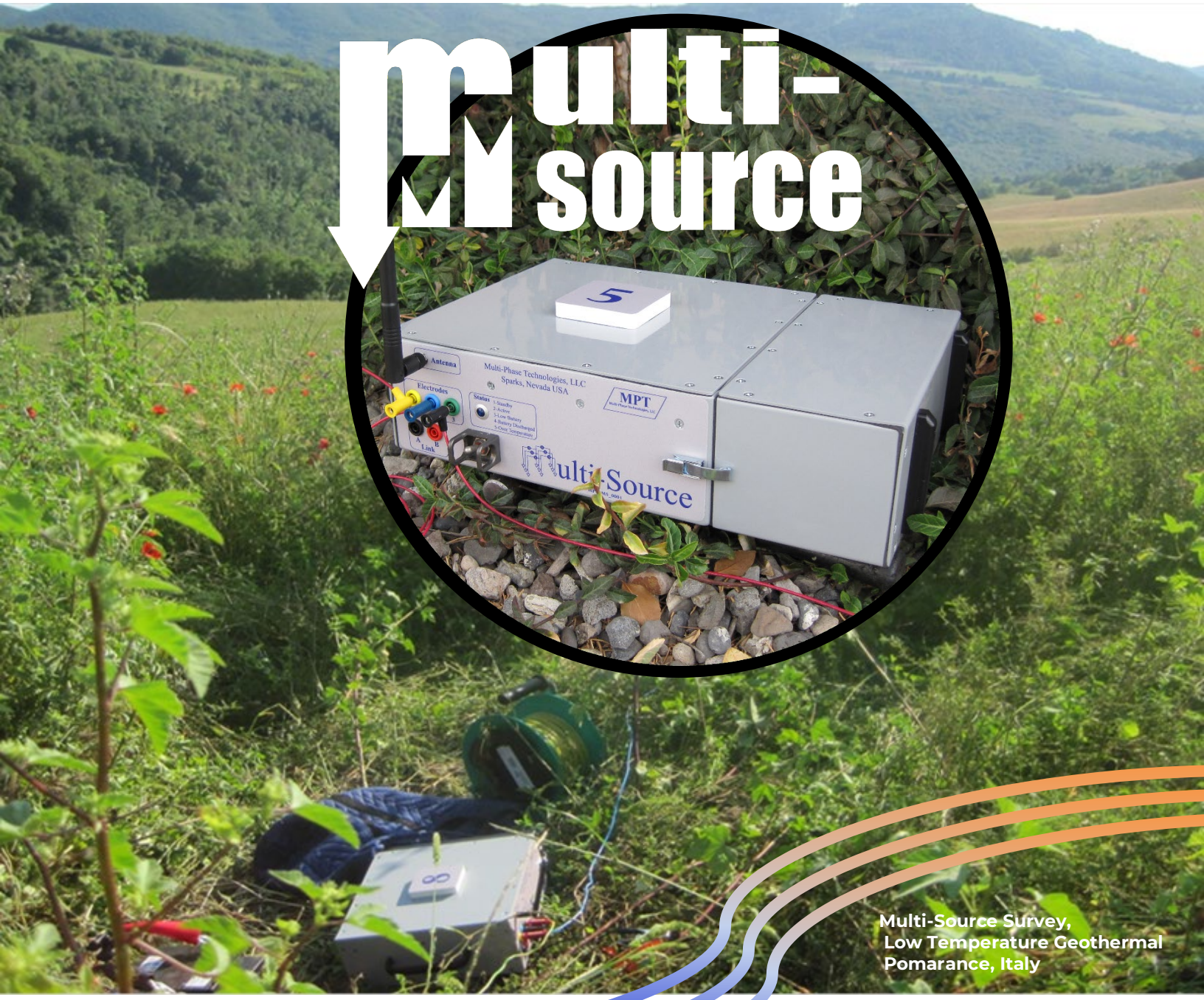
MPT-IRIS Inc.

www.mptech3d.com

Multi-source



Multi-Source Survey,
Low Temperature Geothermal
Pomarance, Italy

MPT-IRIS Inc.
1430 Greg St., Suite 503, Sparks NV 89431 U.S.A.
Phone 775-356-7844 Fax 775-356-7988
www.mpt3d.com
inquiries@mpt3d.com

MPT-IRIS Inc.

www.mptech3d.com

MPT-IRIS Inc. is proud to announce the next generation electrical resistivity imaging system based on Multi-Source Technology (US Patent US 9151861 B2). The **Multi-Source system** consists of 2 to 255 transceivers. Each transceiver has two receiver channels and its own 375 Watt transmitter powered by an internal 240 Watt-hour replaceable battery. Each transceiver can also run on an external 12 Volt battery. The transceiver has a GPS module for location and timing and a wireless module for communications.

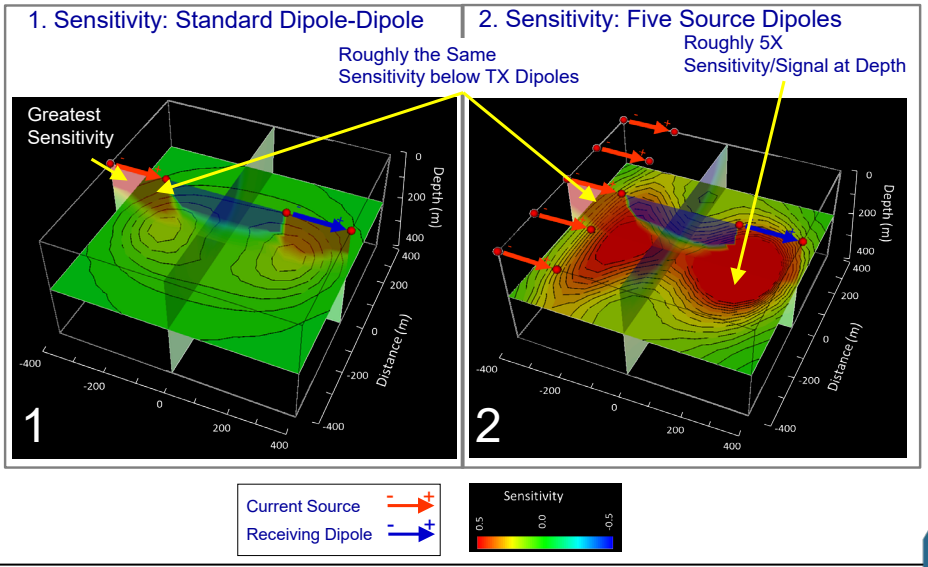
The **Multi-Source system** got its name from the unique feature to transmit simultaneously from multiple transceivers. Using this feature, the system can achieve signal levels and depths of penetration comparable with systems that depend on high power motor driven generators and can be used to optimize the resolution of deep targets.

What is Multisource?

The **Multi-Source system** represents a new approach for performing mid-to large-scale resistivity and induced polarization surveys. The system uses a series of transceivers each of which contains a pair of receivers and a transmitter/current source. Each transceiver has a global position system (GPS) module used for module timing and for providing location information. The transceivers are connected to a central controller using a wireless communication module. Each transceiver can operate independently, allowing data to be collected in places that would be inaccessible with normal resistivity systems. For example, the transceivers can operate in urban areas, along roads, in medians, or around buildings without running cables across roadways. The units can also be linked together to allow traditional resistivity surveys such as Schlumberger or Wenner arrays.

Our research has shown that manipulating the pattern of current flow from multiple simultaneous transceivers allow us to manipulate sensitivity patterns for subsurface targets, improving both resolution and depth of penetration. Although this is a cutting-edge technology still in the verification phase, all of the multi-source trials to date show substantial improvements over traditional approaches.

Why Multiple Sources?



Multi-source

MPT-IRIS Inc.
1430 Greg St., Suite 503, Sparks NV 89431 U.S.A.
Phone 775-356-7844 Fax 775-356-7988
www.mpt3d.com
inquiries@mpt3d.com

MPT-IRIS Inc.

www.mptech3d.com

Case History

Astor Pass Geothermal Reservoir
Northern Pyramid Lake, Nevada, USA

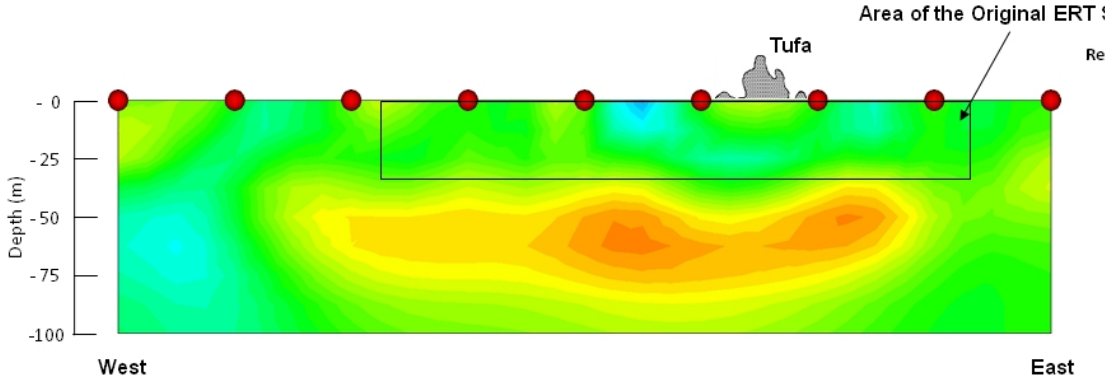
Tufa outcrop partially bisecting the survey site.

Highlights

- The Multi-Source system used 8 Multisource units in a grid pattern.
- Multisource units required transceiver-to-transceiver communication to collect data around the large (10 to 20 m height) tufa outcrop.
- Multisource was comparable to standard ERT and seismic refraction geophysical methods.
- Multisource depth resolution was 3 times deeper than standard ERT and 2 times deeper than seismic refraction.

Background

Staff and geologic consultants from the Pyramid Lake Paiute Tribe, the Desert Research Institute and the University of Nevada, Reno conducted previous geochemical and geophysical surveys including seismic refraction and well sampling at the Astor Pass Geothermal Reservoir site. MPT also conducted a surface ERT survey at the site prior to using the Multisource system. The depth of imaging for the ERT survey reached approximately 35 m depth, while the seismic fraction reached approximately 50 m depth, however, the multi-source system collected resistivity data (then processed to resistivity images) to a depth of 100 m (see figure below). The results of the Multisource system correlated with other geophysical method results.



Cross section of the 3-D image created by the Multisource and compared to the maximum depth of the previous standard ERT survey.

MPT-IRIS Inc.
1430 Greg St., Suite 503, Sparks NV 89431 U.S.A.
Phone 775-356-7844 Fax 775-356-7988
www.mpt3d.com
inquiries@mpt3d.com

MPT-IRIS Inc.

www.mptech3d.com

Case History

Golden Hope Mine
St-Magloire, Beauce, Québec, Canada

The map view of the surveyed area (in red). Map adapted from Google earth.

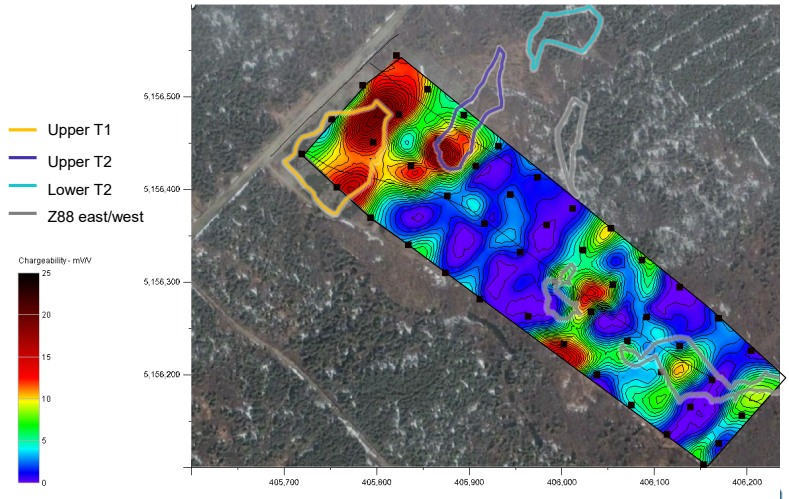
Highlights

- A comparison using standard surface roll-along ERT and the multi-source ERT proved that the multi-source approach was able to provide a deeper and more comprehensive view of the site.
- The Multisource system was able to provide chargeability images to a depth of 100 m.
- The IP data correlated very well with known gold bearing zones.
- Further investigations and knowledge of the site could feasibly provide data to depths of 200 m.

Background

MPT-IRIS Inc and Geostudi Astier srl. worked closely with MicroMentis staff to conduct roll-along ERT and Multi-Source wireless surveys at the Golden Hope Mine site, Bellechasse-Timmins Gold Deposit, St-Magloire, Beauce, Québec. The relatively high contact resistance on the site, often greater than 20,000 Ohms, limited current flow to a few milliamps for much of the survey.

For this survey, each unit operated independently, and the three electrodes were placed as a pair of co-linear 50 m dipoles. The units were placed in a grid-like pattern along four northwest-southeast lines (see figure above).



The map view of the wireless multi-source survey showing the chargeability of the Golden Hope Mine site at a depth of 25 m.

MPT-IRIS Inc.
1430 Greg St., Suite 503, Sparks NV 89431 U.S.A.
Phone 775-356-7844 Fax 775-356-7988
www.mpt3d.com
inquiries@mpt3d.com

MPT-IRIS Inc.
www.mptech3d.com

Case History

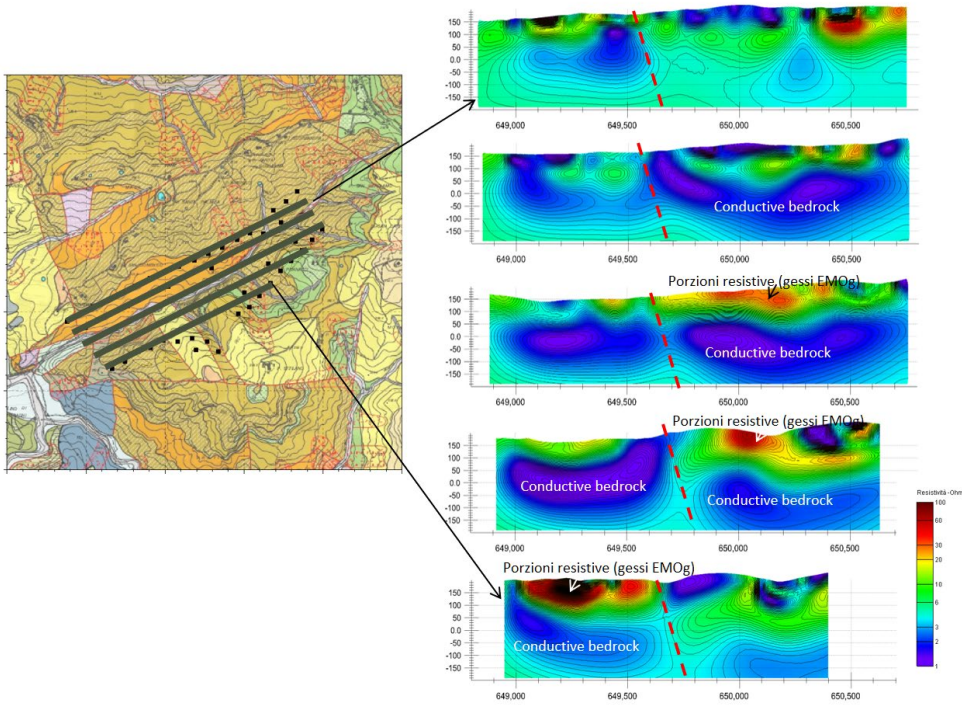
Low-Temperature Geothermal
Pomarance, Tuscany, Italy

Highlights

- Rugged Terrain
- 3-D Survey deploying multi-source units along two roughly parallel lines.
- Successful mapping of structural features and strongly conductive zones to 450 m.
- The survey mapped the geothermal area by applying only two lines of electrodes using the Multi-Source system.

Background

Staff from MPT and Geostudi Astier, srl carried out surveys near the town of Pomarance in Tuscany, Italy. The goal was to locate structural controls for low-temperature geothermal resources. The biggest challenge was the rugged terrain of the site. The multi-source results allowed us to identify fault-controlled structures to depths greater than 400 m. This was accomplished using handheld equipment with a four-person crew.



The map view of the surveyed area with survey lines (black dots) using Multisource and the resultant resistivity cross-sections.

MPT-IRIS Inc.
1430 Greg St., Suite 503, Sparks NV 89431 U.S.A.
Phone 775-356-7844 Fax 775-356-7988
www.mpt3d.com
inquiries@mpt3d.com

MPT-IRIS Inc.

www.mptech3d.com

Transceiver Specifications

User Interface	Windows compatible computer with a USB port
System Weight	Transceiver 18.6 lbs (8.5 kg) with 240 Watt-hour battery
Dimensions	10.25 x 16 x 4.5 inches (26 x 40.6 x 11.4 cm)
Timing	GPS: approximately 100 nanoseconds
Minimum Configuration	2 transceivers
Maximum Configuration	up to 255 transceivers
GPS	7 ft (2 m) (clear sky view)
Receiver Channels	2 Channels each with its own 24-bit A to D converter and microprocessor
Input Voltage	Auto gain range with manual override with four ranges: +/- 10.0, 2.0, 0.40 and 0.08 volts
Signal Averaging	Proprietary noise removal stacking routine with 2 to 255 stacks
Battery	Replaceable 240 Watt hour (standard) nickel metal hydride or external 12V
Maximum Output Power	350 Watts
Maximum Output Current	2.5 Amps (standard)
Measurement Precision	0.10%
Measurement Accuracy	0.20%
Communications	900 MHz (US) or 868 MHz (Europe) networkable 1800m/9km line of site
Internal Multiplexer	3 Outputs, 2 Inputs
Transmitter	Maximum power 350 watts, maximum current 2. Constant current: typical current control precision 0.1% or 100 microamps with auto calibrate
Resistivity/ TDIP Mode	13.5 (resistivity only), 7.5, 5, 4, 3, 2, 1.5, 1.0, 0.5, 0.25, 0.125, 0.0625, 0.03125 and 0.01562 Hz. Six pre-assigned window sequences plus one custom user window sequence with a maximum of 16 windows.
FDIP Measurements	Amplitude and Phase, 225, 112.5, 75, 37.5,25, 15, 7.5, 5,3,2.5,1.5,1.0,0.5, 0.25, 0.125, 0.0625, 0.03125 and 0.01562 Hz.

MPT-IRIS Inc.
1430 Greg St., Suite 503, Sparks NV 89431 U.S.A.
Phone 775-356-7844 Fax 775-356-7988
www.mpt3d.com
inquiries@mpt3d.com