

# Leica Geosystems Solution

## Surveying with Leica GPS1200 in Antarctica



Working in the most deserted place on Earth, in potentially the worst weather and the roughest site conditions - makes equipment selection one of the top priorities in the expedition's preparations. It is therefore no coincidence that during the selection process of the topographic survey equipment Leica Geosystems was contacted by the International Polar Foundation (IPF).

- when it has to be **right**

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Leica Geosystems and the IPF came to an agreement in using the Leica Geosystems 1200 differential GPS system on Antarctica for the Belare Site Survey of 2004. The equipment, designed and built to the toughest MIL specifications provides the highest standard of accuracy, flexibility and user friendliness required for this mission. The results, being most successful during the first site surveying expedition in November 2004 at Antarctica, strengthens both parties' conviction to extend future collaboration, use Leica Geosystems equipment and know how to support the design and construction process of the new Antarctic base in the next years.

#### **Leica GPS1200 in Antarctica!**

Using a GPS-system in the harsh conditions of Antarctica obviously poses some practical problems: fierce katabolic winds blowing at speeds of more than 10 m/sec make it difficult to position a tripod exactly over a fixed point, not to mention uncovering hands to fix the cables and initialise the instrument.

Due to these extreme conditions, the easy use of the GPS1200 system is essential, since every minute lost during setup builds up the human strain. A tedious preparation allowed for a fast execution of the tasks and the Leica Geosystems instrument was particular suited to do so.

Wrong connections are easily made, one can forget to connect a cable or make errors in the setup. But the GPS1200 layout is easy to understand even in such difficult circumstances.

The tripod's position at the geostatic reference point on the ridge summit was secured by means of extra guy-wires. It was not removed before the end of the expedition. The ridge area (approximately 12000m<sup>2</sup>) was measured in manual mode with precision. The larger area was measured from a moving Ski-Doo with an offset of 40 cm to compensate the vehicle's height. At every 25 m a measurement was taken.

Leica Geosystems RTK processing has a major advantage in Polar Regions. Many cycle slips do occur and the real-time processing guaranteed by the efficient radio contact has the major advantage that the user is always assured of the necessary accuracy.

Johan Berte, IPFs leading Antarctic Project Manager, was very pleased with the use of Leica's GPS1200 and their close cooperation with Leica Geosystems: "We achieved excellent results and more importantly, we got it fast and very efficiently! The performance, user-friendliness and versatility of the Leica GPS1200 allowed my team to collect the data that was absolute top priority during the Belare Site Survey 2004 expedition: Mission accomplished!"

#### **Background information: The Belare project**

In 2004, the Belgian government commissioned the International Polar Foundation to design and construct a new research base in Antarctica to become

operational during the International Polar Year at the end of 2007. The project is being developed in co-operation with other Antarctic Treaty countries, such as Japan, Sweden, Germany and Norway, who have offered their expertise in logistics and various technical areas.

Belgium has a long history of scientific activity in Antarctica, dating back to the first over-wintering in 1897, from which the Belgian Antarctic Expedition returned with an important scientific harvest: bathymetrical and hydrological soundings, numerous botanical and zoo-logical samples, a large amount of oceanographical, meteorological, geomagnetic, glaciological and geological observation data.

Belgium returned to the Antarctic sixty years later to build the Baudouin Station, which operated until 1967. This was part of Belgium celebrating the 1957-58 International Geophysical Year (IGY), a key event for international scientific collaboration that led to the signing of the Antarctic Treaty in 1959.

The new research station will house twenty people during the summer season and will be based between the Russian station Novolazarevskaya and the Japanese Station, Syowa, in the Dronning Maud Land Region. The first site survey expedition was carried out in November 2004 and during this mission Leica Geosystems' surveying equipment has been used for intensive topographical studies. By doing so a lasting place for the construction of the Ice Station was determined.

The International Polar Foundation will use the development and construction process to pursue the objectives of the Foundation: to educate and inform on research in the Polar Regions, on climate change and on sustainable development. Sponsors and technology partners, like Leica Geosystems, have been sought to equip the station with cutting-edge materials and technologies.

Materials and technologies selection will accord with eco-construction principles, aiming to reduce the environmental impact of establishing the new base. Renewable energy sources will be used to meet most energy requirements.

Wastewater treatment methods will be studied to determine the most effective treatment methods to minimize environmental contamination.

After its construction the new research base will be maintained and operated by Belgian Federal Science Policy Office (BELSPO). They will elaborate the science program and select the teams of scientists. IPF will be involved as a privileged partner taking the lead on related public outreach and educational activities.

In November 2005 IPF's Polar-team will revisit Antarctica for the second

phase of the Belare project and Leica Geosystems' high quality-surveying equipment will again play an important role during this 2<sup>nd</sup> mission.

For more information on IPF's Belare "Ice Station at Antarctica"-project please visit:  
<http://ipf.polarfoundation.org/>

For more information on Leica System1200 please visit:  
[www.leica-geosystems.com/system1200](http://www.leica-geosystems.com/system1200)

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