Levelogger 5 Is Here!

Our Commitment to Providing the Best in Water Level Datalogging

NEW Levelogger 5 – the 5th generation Levelogger brings over 20 years of engineering and design experience with it. Everything about the new Levelogger 5 focuses on providing high-quality water level data our customers can rely on, with all of the accuracy and ease of use expected from Solinst.

What You Can Expect

- Accurate and reliable temperature compensated water level data, with increased memory capacity

- New optical communication interface with improved datalogger connectivity

- Durable double sealed construction using high-grade 316 stainless steel with PFAS-free corrosion-resistant coating

- Backwards compatibility adaptors to work with 3rd and 4th generation Leveloggers

- DataGrabber 5 and Levelogger 5 App Interface available for in-field data transfer and easy programming

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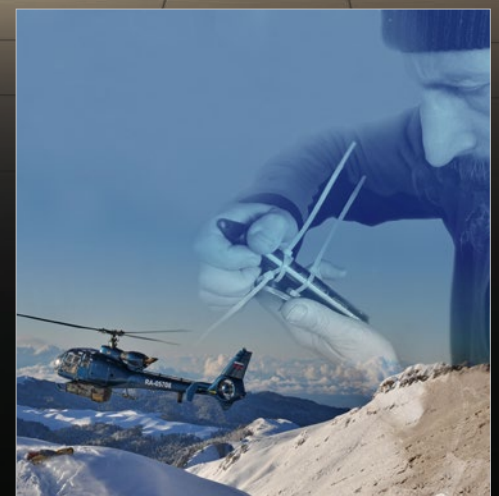# Levelogger Data Collected from the Deepest Caves on Earth

Lithuanian speleologists (cavers) are using Solinst Leveloggers to collect water level data from some of the deepest caves on Earth!

Between 2008 and 2012, cavers completed four expeditions to the Krubera Cave—the world's deepest.

During an expedition in 2008, two Leveloggers were deployed more than 1700 metres below Earth's surface. In 2009, previously recorded data was downloaded, and three new Leveloggers and Barologgers were installed even deeper at over 2000 metres.

Two more expeditions took place in 2010 and 2012, where more data was collected and new Leveloggers deployed. The trek in 2012 set a world record for deepest cave descent by the Lithuanian cavers.

Collecting water level data from these depths serves two primary purposes, the first and most important being safety. Actual hydrometric measurements taken within the cave systems provide information on the extent, interaction, and seasonal variability of flooding in the caverns.

Knowledge of the water level patterns allows explorations to be planned safely around periods caves are known to flood.

Levelogger Data from the Deepest Caves on Earth

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Another benefit of gathering water level data is to add to the more-in-depth examination of these under-explored cave environments. The resulting data sheds some light on the complex hydrodynamic life in the caves and provides a model for cave geometry and hydroactivity.

In 2018, through Solinst's Lithuanian representative Bernardas Paukštys, Solinst donated two sets of dataloggers to the Lithuanian Speleologists' Club Aenigma.

In December 2018, Lithuanian cavers joined an international expedition to the Arabika mountain plateau in Gagra District, Georgia .

This time the exploration took place in the Sarma Cave, which is currently the third deepest cave in the world at over 1830 metres deep.

It was during this exploration that Lithuanian caver, Gintautas Švedas, installed the new Solinst Leveloggers.

The winter expedition was made more difficult and risky due to complicated access to the cave. Only a navigation mast installed during the summer marked

the entrance to the cave. In addition, the weather was not ideal for flying the helicopters required to reach the remote location.

During the expedition, a subset of cavers worked on the surface to set up and maintain the infrastructure and security. A canopy prevented snowfall into the cave. Igloos were built for standby/ emergency equipment storage and to house the expedition participants. Cavers at the surface were in charge of managing the hanging equipment and ropes at the top of the cave.

Exploration of the cave took place between December 3rd and 23rd, with a total of 12 days spent underground!

Within one to three years, there are plans for a new expedition to retrieve data and the Leveloggers from the cave.

For more details, read the full post in our **ON THE LEVEL Blog.**

Solinst thanks Gintautas Švedas of the Lithuanian Speleologists' Club Aenigma and Bernardas Paukštys of Vandens Harmonija, the exclusive distributor of Solinst products in Lithuania, for providing the details of these projects.

Water Level Data Critical for Successful Coastal Wetland Restoration

Over 90 per cent of historical coastal wetlands in South Central California have been lost due to development. One such area is the former upper arms of the Devereux Slough. In the 1960s, the wetland was filled to create a golf course.

The Cheadle Center for Biodiversity and Ecological Restoration (CCBER) took the lead in a project to restore the wetlands. Officially named The North Campus Open Space Restoration Project (NCOS), the entire undertaking comprises 100 acres.

2 Useful Functions – 1 Probe

105 Well Casing & Depth Indicator

Made durable for the field, the 105 Well Casing & Depth Indicator is a must-have tool for every driller and hydrogeologist! Ideal for determining where metal casing ends and starts in new or existing constructions, useful when installing downhole instrumentation, and simple to use when measuring well depths.

• Magnetic assembly for detecting metal well casing
• Ground detector for measuring total well depth
• Probe is submersible to 500 m (1650 ft)
• Measurements read from durable laser marked flat tape
• Standard tape lengths to 600 m (2000 ft)
• Replacement tapes interchangeable with other Meters
• Robust field instrument with 3 year warranty

Leveloggers Help Establish Long-Term Flood Data Collection Method

With flood events and destructive downpours intensifying—the need for more detailed flood data is growing. The USGS Arizona Water Science Center is one agency working to establish new methods for recording accurate, long-term flood data to facilitate sounder decisions. They are developing the Continuous Slope-Area (CSA) method.

The CSA method involves setting up a stretch where continuous water level data is collected in a stream. Three or more water level dataloggers are installed in the stretch.

Surveys and field data are used to determine the geometry and slope of the channel, which is required to calculate stream discharge along with the water level measurements.

Levelogger water level dataloggers are being utilized in this project.

The dataloggers are set to record water level readings every five minutes, for up to one year. In addition to annually, the data is downloaded after each major flow event.

The continuous data recorded by the Levelogger water level dataloggers provides complete flood hydrographs. This allows the reconstruction of the entire flow event—not just the peak.

With the known geometry of the stretch, the flow depths recorded by the Leveloggers can be used to calculate discharge during the rise and fall of the floodwaters. So far, field trials of this method have provided favourable results.

The new data provided by the CSA method is used to calibrate existing stage-discharge ratings and compare to past flows. The data is used to predict future flows and effects of flood events, as well as provide more accurate

information on which to base immediate actions.

Overall, the CSA method provides more accurate measurements and reporting on stream flow events. With unstable weather inevitable into the future, the continuous long-term data will be a valuable resource moving forward.

For more details, read the full post in our **ON THE LEVEL Blog.**

Sustaining Groundwater Resources in a Unique Region of South Africa

Just 200 km north of Cape Town, South Africa, you'll find a unique area that boasts a wide range of landscapes—from rugged mountains to lush river valleys.

Steep sandstone formations, appearing rusted from iron oxide and etched with ancient rock art, makeup parts of the Cederberg Mountains. Rugged trails wind through other sections, with over 70,000 hectares of protected wilderness for outdoor adventurists to enjoy.

At the base of the Mountains, the Olifants River Valley features fertile soil, perfect for growing rows of citrus belonging to some of the country's most successful

orchards. The area's variable topography and climate provide the ideal conditions for many other crops, including grapes, and large expanses of colourful wildflowers.

Groundwater Feeds the Region

Located in the Valley at the base of the Mountains, Citrusdal is described as "a bustling rural village set amongst lush green citrus orchards". The small town in Western Cape, South Africa is dominated by agriculture—most notably the citrus farms that give the town its name.

Groundwater feeds this agricultural region. Recently, demand on the high-quality resource has increased.

There are over 50 relatively high-yielding groundwater abstraction wells used by the rural community.

Managing the Groundwater Supply

The rise in groundwater usage initiated the implementation of a groundwater monitoring program. Groundwater consulting company GEOSS runs the project, which focuses on managing groundwater resources for several farms spread throughout the Citrusdal valley.

Overseeing the several pumping wells is a challenge as each provides a vital resource to the groundwater user. Some wells are isolated, while others may be hydrogeologically connected—groundwater usage at one farm could affect another.

Continuous Groundwater Level Monitoring

Critical to proper management, the program includes

continuous groundwater level measurements. GEOSS uses Solinst Leveloggers in a number of their applications, as such, Levelogger water level dataloggers are also used in the Citrusdal program.

At any given time, 30–40 boreholes in the area are equipped with Solinst Leveloggers. Leveloggers are installed in active pumping wells and monitoring wells. A Solinst Model 102 Water Level Meter with narrow cable is used to take periodic manual depth to water measurements.

Typically, the Leveloggers are set to record water levels every 15–30 minutes continuously. The Levelogger data is downloaded each month.

After the Levelogger data is barometrically compensated it is stored in excel spreadsheets for further examination.

GEOSS staff compares the previous month's data and interprets the monthly trends. Findings are shared with their clients.

Water Level Data Critical for Successful Coastal Wetland Restoration

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CCBER has been using Solinst Leveloggers throughout much of the planning and restoration process.

According to Ryan Clark, the Monitoring Coordinator at CCBER, Leveloggers were initially deployed to monitor water levels in key tributaries and the main creek that flowed through the former golf course. In 2015 through 2016, more Leveloggers were added to collect baseline data before restoration began in 2017.

Currently, the Leveloggers are installed to monitor surface water levels in the creeks and stormwater outflows that feed the upper Devereux Slough. Leveloggers are also measuring surface water levels within the slough and in a couple of freshwater ponds near the wetland. Most recently, LTC Leveloggers were added to begin monitoring conductivity, along with the water levels.

CCBER is interested to see how wetland reconstruction alters water levels during stormwater flows at the NCOS site.

Leveloggers help determine the elevation of water reached during storms. The known elevation of the Leveloggers is used to convert their water level readings to elevation (in feet NAVD88). Staff gauges set to elevation instead of absolute depth are used to crosscheck the data.

Water level data from similarly sized precipitation events, pre and post-restoration, are compared to determine the effect on flood levels. For example, the charts below show that the maximum water elevation recorded in Phelps Creek post-restoration is lower—just over 13 feet in 2018 versus over 17 feet in 2017

The results indicate that the methods to increase wetland capacity through expansion have so far been successful in reducing flood levels and supporting groundwater recharge.

In addition to stormwater flows, CCBER is monitoring how water levels fluctuate when the slough is connected to and receives tidal surge from the sea.

The Devereux Slough is intermittently tidal, meaning a sandbar separates it from the sea except for a few times each year when it is briefly breached due to high tides, wave action, and rainfall levels.

Recent results from monitoring water levels and precipitation show that more rainfall is required before the sandbar is breached—another sign that restoration measures are having a positive effect on wetland storage capacity.

Water level and quality data provide insight on the impacts, and ultimately the success of wetland restoration efforts. The data helps verify models and predictions made during planning and throughout the restoration process. Monitoring ensures restoration measures are on track, and the proper conditions are maintained for continued success.

Wetlands provide several valuable functions including flood control, water filtration, support high biodiversity and provide crucial habitat for flora and fauna. So far, the data collected by CCBER is showing positive results in all of these critical areas for the NCOS project.

For more details, read the full post in our **ON THE LEVEL Blog.**

Thanks to Ryan Clark, Monitoring Coordinator with CCBER, for providing the details on this project, and photos credited to Ryan, Eirik de Wit, and Jeremiah Bender.

Redesigned Model 102

The Solinst Model 102 Water Level Meter has a new narrow cable featuring a heavy-duty polyurethane jacket. The upgraded cable is extremely durable, with extra abrasion-resistance and flexibility. The yellow cable is distinctly laser-marked, offering more visibility in the field.

Sustaining Groundwater

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The data provides insights on when pumping needs to decrease, or if it can be increased.

Continuous groundwater level data helps provide a clearer picture of how the abstraction wells may interact with one and other, allowing better management at each borehole. Michael Holloway of GEOSS says, "The gathering of data in this project is important for the future management of increased groundwater use."

For a region that relies on groundwater for it's natural beauty, agriculture, livestock and other livelihoods, continued data collection is essential in ensuring sustainable management of the resource as demand increases.

For more details, read the full post in our **ON THE LEVEL Blog.**

Solinst thanks Michael Holloway, head of the GEOSS Monitoring Business Unit, for providing the details of this project.

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