

Land slide monitoring Hörbranz, Vorarlberg Austria

Mass movement during landslide in Hörbranz

In the Austrian municipality of Hörbranz in Vorarlberg, a slope has been moving since the end of April 2023. This has already led to the destruction of several houses. Engineers and construction companies are constantly at work: several tons of soil are removed every day to stabilize the situation and prevent further damage.

In control about the land slide movements

To actively monitor the landslide, metal rods were mounted in the ground layer at six strategically chosen positions. On each rod a Basetime's GNSS monitoring station called Locator One was placed to monitor the horizontal and vertical movement of that area. As a reference point, a virtual reference station (VRS) has been selected to use in this case.

So, how does the system work? Each Locator One logs Global Navigation Satellite System (GNSS) data every hour for a number of minutes to send to Basetime's cloud environment via an LTE-M network. With a minimal delay, a near real-time coordinate of the metal rod is calculated and presented in the dedicated land slide dashboard within Basetime's measurement management system called Parvamoti. Based on this, the (surveying) engineer could perform calculations, which can calculate the impact of the landslide and monitor the direction of movement. The more dependable the measurements, the better the prediction can be made and the more confident the client will be about the quality of the data.



Vorarlberg
unser Land

The Locator One gives us many insights into the movement of the land slide. It helps us monitor the environment and control the situation.

- Martina Mittelberger (State Office for Surveying and Geoinformation Vorarlberg, Austria)



For the first few months, the landslide appeared stable, with little visible movement in the ground layer. However, by mid-February 2024, new movement slowly began to emerge. Two of the six Locator One devices placed appeared to show significant movement, which slowly

accelerated. Over a period of about 12 hours, movement of 1.2 meters occurred at one point and nearly 5 meters at another point. With its high measurement accuracy and numerous functions, the Locator One monitoring system has proved indispensable for effectively monitoring the landslide in Hörbranz and minimizing damage to people and equipment.

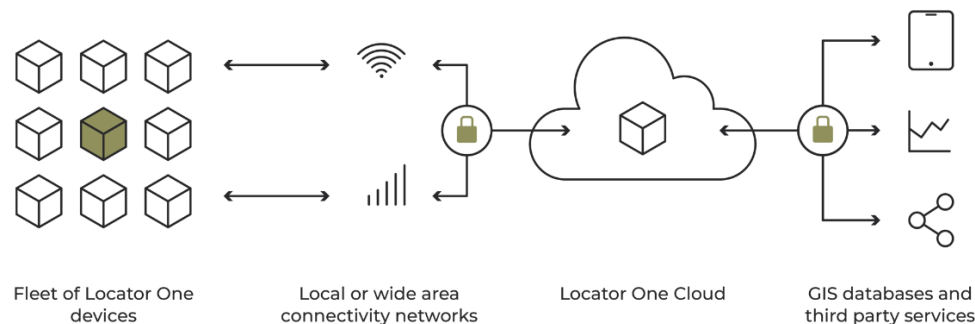
Sub centimeter accuracy

After the system is installed and initial measurements are taken, the monitoring can start. The Locator One measures up till 24 times a day and both the horizontal and the vertical positions are measured. The Locator One measures the exact position of the settlement rod with an accuracy of up to

The autonomous monitoring stations are an important addition to the previous measures and enable a proactive response to changes in the slope's behavior. It is not possible at this stage to say when the slope will definitively stabilize.

five millimeters in the vertical direction and 3 millimeters in the horizontal direction. The Locator One guarantees high precision, resulting in at least 95 percent of planned measurements resulting in reliable and precise data.

Locator One

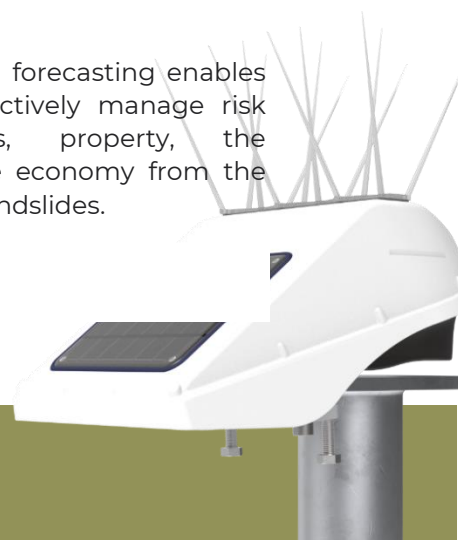


Prediction and impact

Landslide forecasting plays a crucial role in ensuring safety by facilitating timely evacuation and mitigating community impacts. It also protects property and infrastructure by implementing preventive measures to minimize damage. By preparing stakeholders for potential financial impacts, landslide forecasting

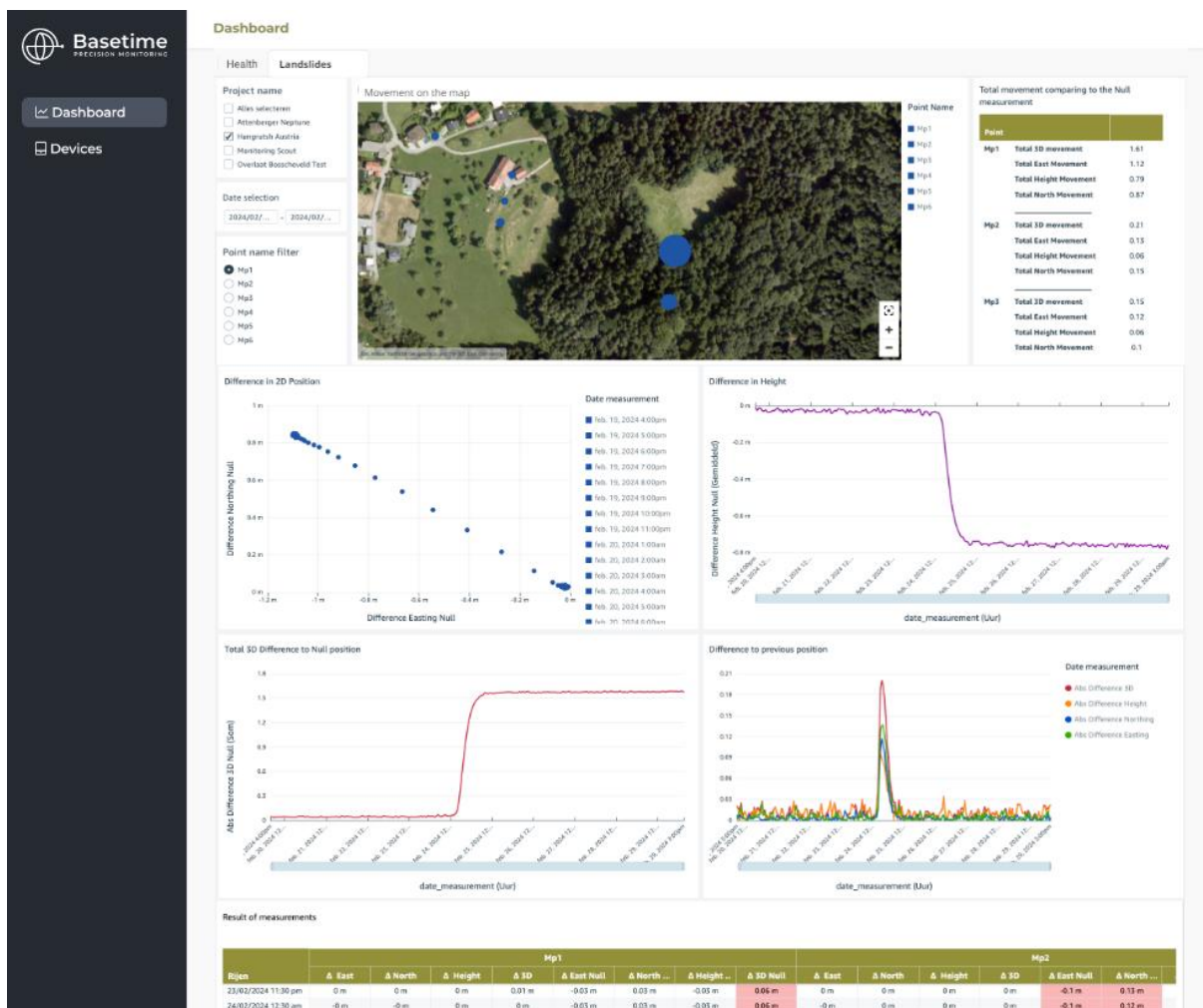
helps reduce economic losses associated with damages.

In summary, landslide forecasting enables communities to proactively manage risk and protect lives, property, the environment, and the economy from the damaging effects of landslides.



Other applications

Besides the monitoring of landslide in public spaces, there are also possibilities in monitoring of vital public transport assets like (rail)roads and stabilization monitoring of open pit mine slopes. The use of monitoring systems in these contexts contributes to proactive safety measures, minimizes the risk of human injury and property damage, and enhances overall societal resilience against landslides.



Parvamoti landslide dashboard