Geodesy: The measurements behind early warning

Measuring Earth's signals to support timely decisions.

The Earth is constantly changing

Geodesy continuously measures changes in the position and height of the Earth's surface. These observations provide critical evidence for hazard monitoring, risk assessment, and emergency decision-making.

From measurement to decision

Volcanoes: Monitoring Unrest

GNSS and satellite radar detect deformation as magma moves beneath a volcano. Changes in the rate and magnitude of deformation help volcanologists assess increasing activity and advise authorities on alert levels, access restrictions, or evacuation.

Earthquakes: Rapid Assessment

GNSS measures sudden ground displacement within seconds to minutes. The observations help determine earthquake's impacts and provide information for tsunami assessment and emergency response.

Landslides: Detecting Acceleration

Geodetic observations reveal slow or accelerating ground movement. This information helps identify unstable slopes and supports decisions on increased monitoring, road closures, access restrictions, or evacuation.

Tsunamis: Supporting Warning

GNSS measurements of earthquake-induced ground motion can rapidly improve tsunami assessment, helping warning authorities make faster and more reliable decisions. Together with seismic and ocean observations, they support warning centres in deciding whether warnings should be issued, updated, or cancelled.

Floods: Assessing Exposure

Accurate geodetic heights provide the reference for flood models and water-level measurements. They help authorities identify areas at risk and plan warnings, evacuations, and emergency response.

Geodesy provides the evidence, authorities make the decisions

Geodesy does not predict every disaster or issue warning by itself. It provides accurate, timely measurements that enable scientists and authorities to assess changing conditions and make better-informed decisions.

Measure → Detect Change → Assess → Inform → Decide → Act

Geodesy turns Earth's movements into information that supports decisions when every minute matters.

Through the ***International Association of Geodesy (IAG)*** and its ***Global Geodetic Observing System (GGOS)***, the global geodetic community works together to provide the measurements, reference systems, services, products and essential geodetic variables that help science and society understand our changing Earth and build a safer, more resilient world.

https://geodesy.science/ggos/