Jewell Instruments

Volcano Monitoring

- **Objectives:** Study active volcanoes
- **Solution:** Electrolytic **700 Series** and **LILY Model 500**
- **Benefits:** High-precision and long-term durability
- **Results:** Continuous and accurate data collection

Overview

Tiltmeters have long been used to study active volcanoes by monitoring their changing shape precursory to and during eruptions. When pressurized magma enters the magma chamber beneath a volcano, the ground is forced upward and causing the slopes of the volcano to tilt away from the center of uplift. Before an eruption occurs, magma flows toward the surface, deflating the magma chamber and causing a reversal in the tilt directions. This characteristic behavior, coupled with measurements of earthquake frequency and magnitude, is used successfully by volcanologists around the world to predict eruptions hours to days before the actual event.

Model 701 Tiltmeter being installed at Soufriere Hills Volcano, Montserrat (Courtesy of USGS)

Because surface tilt magnitudes can be very small, high-precision tiltmeters such as the Jewell Instruments 700 Series are used to make these measurements. In addition, the LILY Model 500 high-precision electrolytic tiltmeter can deliver resolutions to 5 nano radians; the dynamic range is ±330 µradians. The LILY Model 500 sensors also feature a ±10 deg. leveling range for easy installation downhole. These platform, surface mount, and borehole tiltmeters have submicroradian sensitivity and are among the most widely used instruments for measuring volcanic ground deformation.

Tiltmeter measurements complement and are commonly combined with GPS and other survey data in volcano studies. The output strings from Jewell Instruments' digital tiltmeters can be read directly by many precision GPS receivers, providing a powerful and convenient method for integrating the two technologies.

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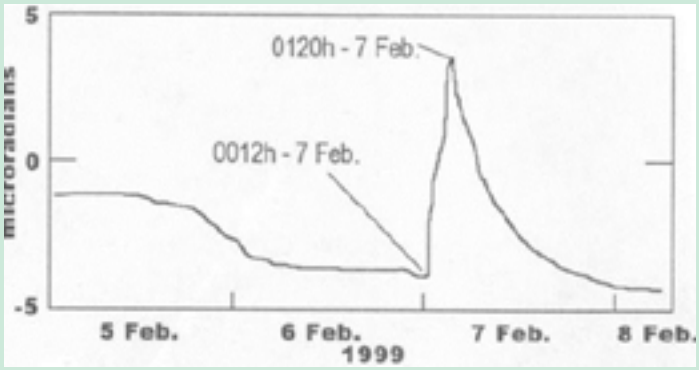

Measured tilt on Kilauea. Eruption began at 0200 hours.
(Courtesy of Hawaiian Volcano Observatory, USGS)

Our Tiltmeters Were Used At:

- Kilauea Volcano, Hawaii
- Mt. Etna, Sicily
- Mt. Pinatubo, Philippines
- Mt. St. Helens, Washington
- Soufriere Hills, Montserrat
- Augustine Volcano, Alaska
- Gunung Merapi, Indonesia
- Stromboli, Italy
- Rabaul, Papua New Guinea
- Mt. Vesuvius, Italy
- Popocatepetl, Mexico
- Guagua Pichincha, Ecuador
- Tungurahua, Ecuador
- Mt. Erebus, Antarctica
- Galeras, Columbia
- Fuego de Colima, Mexico
- Mt. Unzen, Japan
- Fuego, Guatemala
- Mishima Island, Japan
- Pacaya, Guatemala
- Miyakejima Island, Japan
- Soputan, Sulawesi (Indonesia)

About Jewell Instruments

Jewell Instruments is a world leader in the design, manufacture, and distribution of high-precision products. Our expertise includes acceleration and tilt sensors, electronic compasses, avionics components, solenoids, and panel meters. The extensive application knowledge we have obtained through decades of experience allows us to provide custom solutions for a diverse group of industries. In fact, customers from all over the globe contact us for solutions to aerospace, medical, industrial, and telecommunications applications - to name a few.

To find out more, visit our website!

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