

gPhoneX

GRAVITY METER



CODEVINTEC

Tecnologie per le Scienze della Terra e del Mare

MICROg
LACOSTE

A DIVISION OF LRS

Micro-g LaCoste is proud to introduce the gPhoneX gravity meter as the latest member of its land gravity meters. The gPhoneX gravity meter is based upon the LaCoste and Romberg technology that has dominated land gravity meters since 1939.

The gPhoneX gravity meter has a low drift so that it can be used to integrate periodic signals (like earth tides) for very long time periods (years). The gPhoneX also has excellent high frequency response so they can be used to monitor higher frequency non-periodic events such as earthquakes. The gPhoneX can be coarse-ranged over 7000 milliGal (worldwide, and has a 100 milliGal dynamic range during measurement.

The versatile gPhoneX gravity meter has a sophisticated data acquisition system synchronized by a rubidium clock that can be locked to GPS so that arrays of gPhoneXs can be used to give a wider area picture of seismic or long period gravity changes due to subsurface density changes. The instrument can be monitored and controlled via the internet for remote operation.

The principal behind the Micro-g LaCoste's gPhoneX is the patented L&R zero-length spring suspension system. The gPhoneX is based upon the G-Meter, but with significant upgrades:

- It has an improved thermal system, a double-oven, for more precise temperature stability.
- It has a true vacuum seal so that it is completely insensitive to buoyancy changes due to atmospheric changes.

The complete Micro-g LaCoste gPhoneX System is a light weight, compact system with a total weight including carrying case of 58 kg.

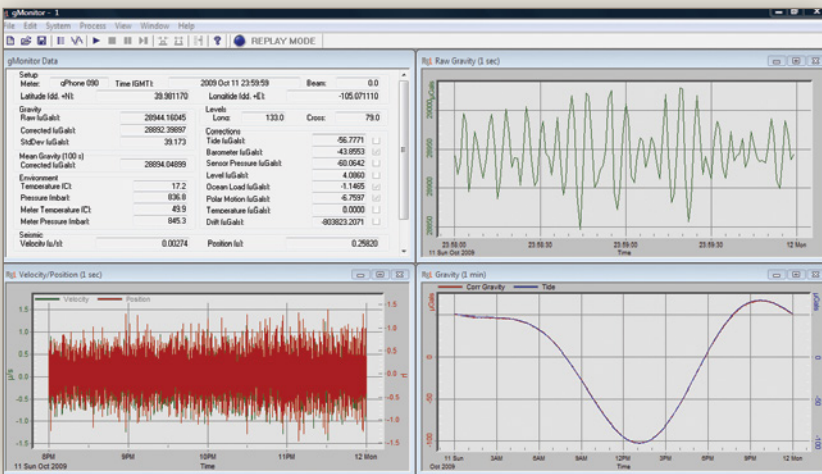
INSTRUMENT FEATURES

- Zero Length Spring Tension system ensuring world-wide gravity range.
- Sensor housed in an insulated double-oven ensuring accurate temperature control.
- Pressure and temperature are continuously monitored and can be used to correct gravity data in real time.
- Gravity and Level signals digitized by accurate 24 A/D converters and stable voltage references.
- Synchronizes GPS time with extremely accurate Rubidium timing.
- Uninterruptible Power Supply (UPS) insulates the system from power fluctuations.
- Three sealed chambers isolate the sensor from humidity and pressure changes.
- A built-in internet webserver allows the gPhoneX data logging screen to be accessed in real-time from the internet and permits authorized users to download data remotely.

gPhoneX APPLICATIONS

- Volcanic Monitoring
- Earth Tides
- Ground Water Monitoring
- Earthquake Monitoring
- Ocean Loading Studies

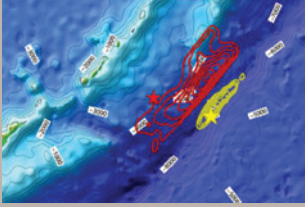
gMonitor SOFTWARE SCREENSHOT



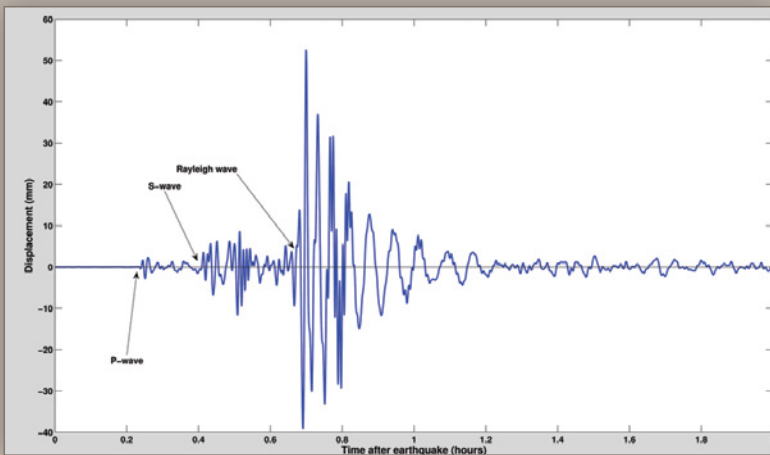
gMonitor main screen

- **Upper Left:** Setup parameters
- **Upper Right:** Raw Acceleration
- **Lower Left:** Integrated acceleration provides velocity and position
- **Lower Right:** Measured earth tide (red line) compared with modeled earth tide (blue line)

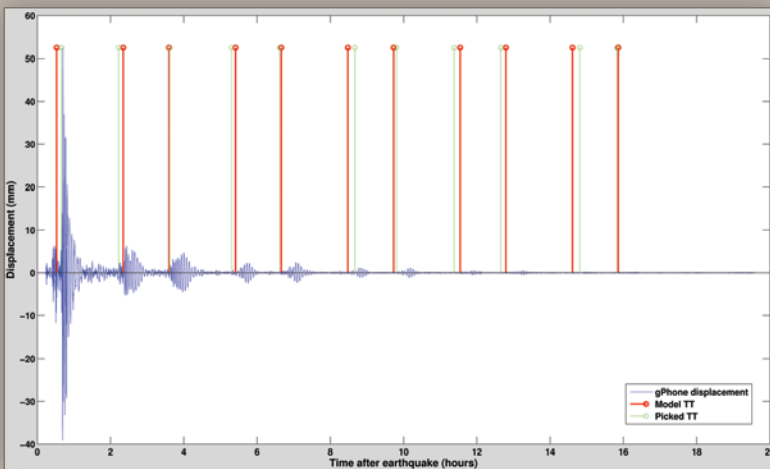
2007 KIRIL ISLANDS EARTHQUAKE



The January 13, 2007 earthquake (M8.2) off the coast of the Kiril Islands was detected by the gPhone gravity meter at the Micro-g LaCoste facility in Colorado. These data demonstrate that gPhones are capable of recording extremely precise vertical acceleration, velocity, and displacement during quiet periods as well as during period of high seismic activity.



Kiril Islands earthquake recorded in Lafayette, CO USA. Displacement due to P, S, and Rayleigh waves recorded with gPhone (data sampled at 1s).

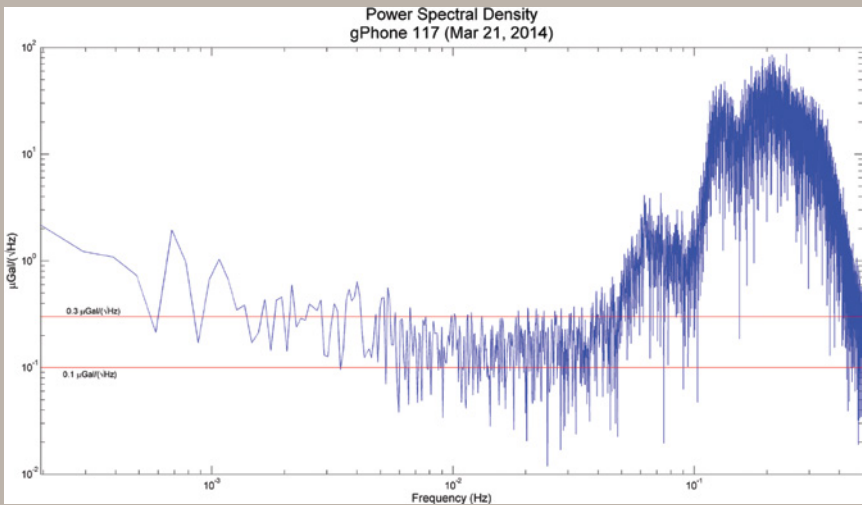


The above graph displays repeat wave arrivals as detected by the gPhone. These Rayleigh waves traveled around the globe eleven times after the earthquake.

PERFORMANCE SPECIFICATIONS

RESOLUTION	0.1 μGal
PRECISION	1 μGal
SYSTEM NOISE	0.1 to 0.3 $\mu\text{Gal}/\sqrt{\text{Hz}}$
RANGE	7000 milliGal uncalibrated (worldwide)
FEEDBACK RANGE (DURING MEASUREMENT)	+/-100 milliGal
INSTRUMENT DRIFT	1.5 milliGal/month, typically <500 $\mu\text{Gal}/\text{month}$

POWER SPECTRA COMPARISON



Shown above is a typical power spectrum for a gPhoneX running in our factory test room. Note that the noise level is between 0.1 and 0.3 $\mu\text{Gal} / \sqrt{\text{Hz}}$ at 0.01 Hz.

SYSTEM POWER

INPUT TO UPS SYSTEM (Must be selected at purchase time)	110 or 220 VAC
TOTAL SYSTEM POWER (25°C)	Steady State Load: 100 Watts Maximum Load: 330 Watts
UPS UPTIME IN POWER OUTAGE Conditions: <ul style="list-style-type: none"> • UPS fully charged prior to blackout • Load on UPS is timing box and meter only • Ambient temperature 27°C • Meter temperature is at steady state at time of the blackout 	4 hours

WEIGHT & DIMENSIONS

COMPONENT	WEIGHT	DIMENSION
METER HOUSING	13kg	31 x 32.5 x 25.2 cm (meter leg height 9 cm)
ELECTRONICS BOX	30kg	42.5 x 51 x 20.5 cm
LAPTOP COMPUTER	3kg	26.5 x 32.5 x 4 cm
CARRYING CASE	12kg	48.8 x 51.2 x 48 cm
TOTAL	58kg	



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