

New sensors for improved disaster warning systems and geodetic measurements

KOBAYASHI, Taro^{1*} ; PAROS, Jerome M.² ; OI, Takuma³

¹Paroscientific, Inc., ²Quartz Seismic Sensors, Inc., ³Toho Mercantile Co., Ltd.

New Quartz Crystal Resonator pressure sensors, accelerometers, and tiltmeters have been developed for disaster warning systems and geodetic measurements. Earthquake, tsunami, and extreme weather warning systems require high-resolution, high-speed, high-range sensors to measure events occurring from a fraction of a second to many hours. Nano-resolution technology allows the measurement of water level fluctuations to microns with absolute deep-sea depth sensors, acceleration and Earth's gravity to nano-g's, tilt to a fraction of a nano-radian, and absolute barometric pressure fluctuations to nano-bars for infrasound detection. Uplift, subsidence, and the slow strain build-up leading to earthquakes, tsunamis and volcanic eruptions require long-term geodetic measurements stable to better than 1 cm/year. These long-term measurements are now possible with new in-situ calibration methods for pressure sensors referenced to atmospheric pressure and triaxial accelerometers referenced to Earth's 1 G gravity vector.

Keywords: extreme events, tsunami, earthquake, eruption, geodesy