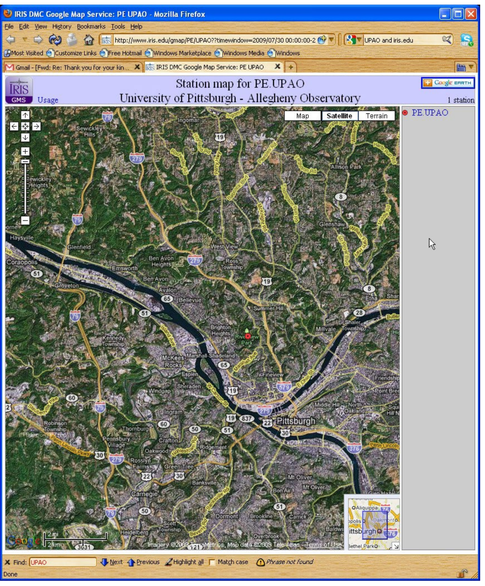
# UPISC UNIVERSITY OF PITTSBURGH INFRASTRUCTURE SENSING COLLABORATION WORKSHOP

The Instrumented City: Geo Observatory
William Harbert[1],
[1] Department of Geology and Environmental Science, University of Pittsburgh

NATIONAL ENERGY TECHNOLOGY LABORATORY



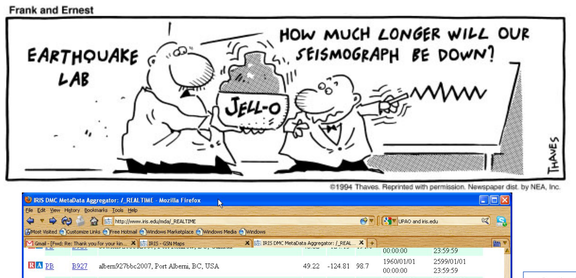

## *Using dark fiber can considerably improve seismic monitoring.*

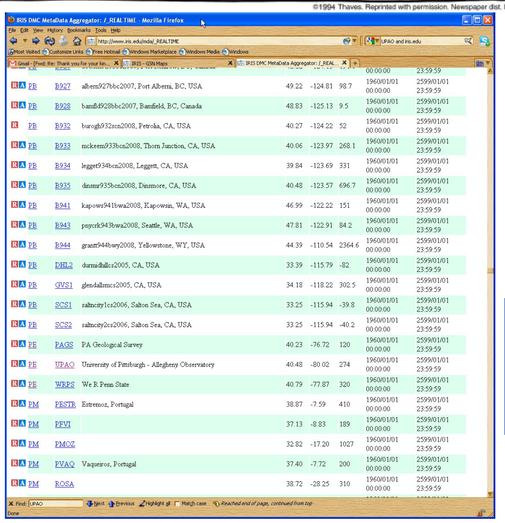
A three component seismograph is located at the University of Pittsburgh (UPAO) at the Allegheny Observatory. This represents a single monitoring point..

Maintained by the Department of Geology and Environmental Science in cooperation with the Pennsylvania State University.

This new seismic station is affiliated with the REALTIME and US_REGIONAL virtual networks maintained by the Incorporated Research Institutions for Seismology (www.iris.edu)

Installation of UPAO at the Allegheny Observatory. Shown are (left) Bobby Karimi, graduate student, Department of Geology and Planetary Science, and (right) Dr. Jordi Julià, Pennsylvania State University. The three component seismograph is shown on lower right of image. High precision time is also required—this is supplied by an associated Global Positioning Systems Base Station directly attached to this unit.



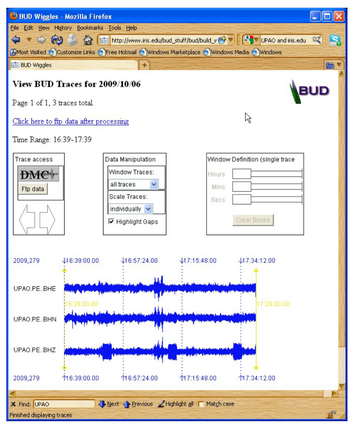




UPAO-3 Component Seismograph, University of Pittsburgh, affiliated with REALTIME and US_REGIONAL virtual networks

UPAO-3 Component Seismograph, University of Pittsburgh, affiliated with REALTIME and US_REGIONAL virtual networks.

Data is available in real-time.

Check it yourself!




## *Seismic Monitoring nodes part of a global seismic monitoring network*

**Determine internal high-resolution earth structure.**

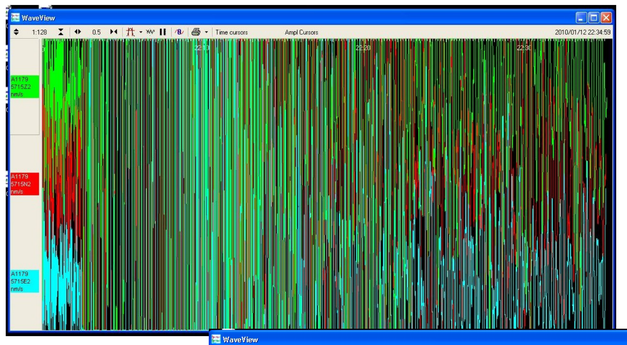
**Monitor earthquake and tsunami activity.**

***Monitor local region for unusual seismic activity.***

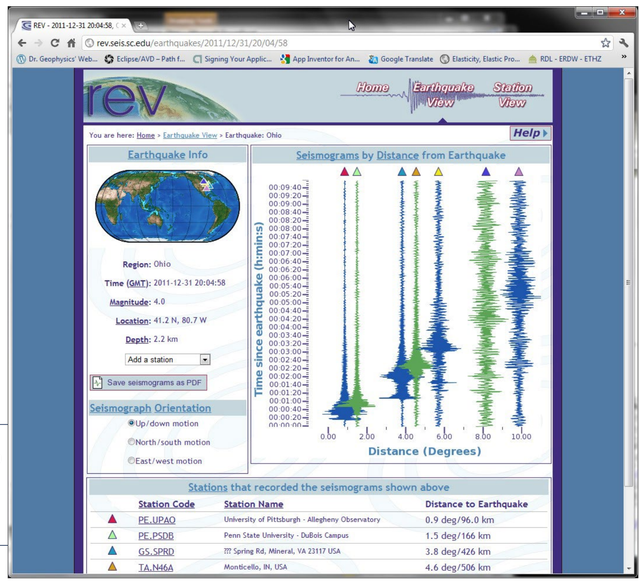
***Estimate local ground acceleration.***

***Monitor atmospheric and hydrological storm activity.***

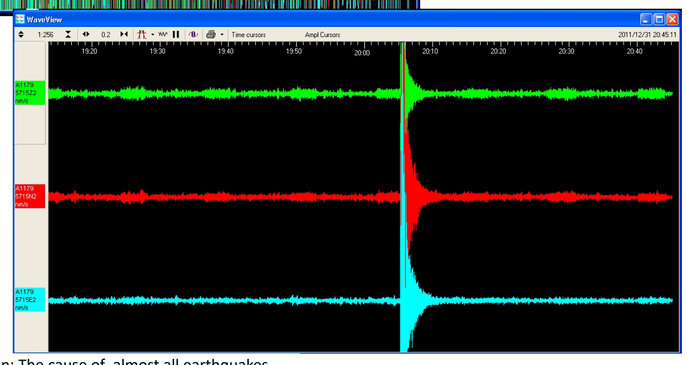
**Understand the earth system better.**

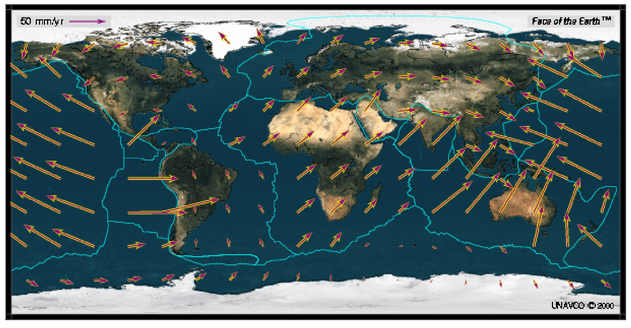



Record from a "relatively close", but actually quite distant, Magnitude 7.9 earthquake




Ohio 4.0 Event: Pitt UPAO 3 Component Seismograph Horizontal scale = UTC Hour:Minute




## Pittsburgh CORS GPS Station: PAAP

IGS08 POSITION (EPOCH 2005.0)
Computed in Aug 2011 using data through gpswk 1631.
X = 847547.512 m latitude = 40 26 40.28542 N
Y = -4786614.561 m longitude = 079 57 32.14728 W
Z = 4115876.376 m ellipsoid height = 312.536 m
IGS08 VELOCITY
Computed in Aug 2011 using data through gpswk 1631.
VX = -0.0150 m/yr northward = 0.0027 m/yr
VY = 0.0003 m/yr eastward = -0.0147 m/yr
VZ = 0.0011 m/yr upward = -0.0015 m/yr

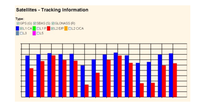
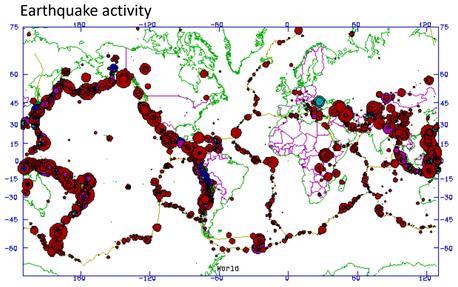
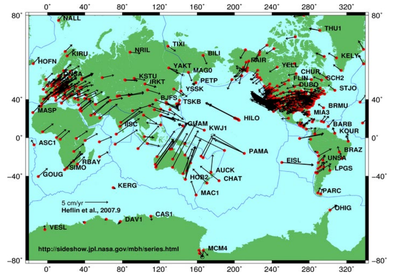
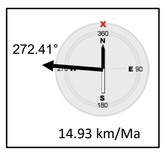


Plate tectonic motion: The cause of almost all earthquakes
Earthquake activity



Global Positioning Satellite (GPS) Plate Motion Data




North America
Tectonic Plate motion
Pittsburgh

Rate of movement
**14.93 (mm/yr)**
**(*1.24 mm/mo*)**

Direction of movement
**272.41°**