

Web resources for Integrating GPS and InSAR Geodesy Data into Undergraduate Courses

Data Portals

You may wish to have the data portals open during the webinar so that you can do some of the small interactive exercises that are suggested.

1. Global Positioning System (GPS)

- a. UNAVCO GPS Velocity Viewer [beta version – sometimes loads slowly]
<http://www.unavco.org/software/visualization/GPS-Velocity-Viewer/GPS-Velocity-Viewer.html>
 - i. Velocity vectors for thousands of GPS stations around the globe.
 - ii. NAM08 and IGS08 reference frames show Plate Boundary Observatory (PBO) stations and can be an access point to the actual station location time series data (not just velocity vectors)
 - iii. Other reference frames show all the internationally released station vectors but only velocities are available (not time series locations).
 - iv. More on reference frames at
<http://www.unavco.org/software/visualization/GPS-Velocity-Viewer/GPS-Velocity-Viewer-frames.html>
 - v. Tips
 1. Always need to click “Draw map” to update map with changes made to the tool bar.
 2. To see all available stations, select that option on the bottom of the tool bar.
 3. If you want to download .cvs files, select “station names and data download”. Once the station names are showing, you can click the label to access the station webpage.
- b. UNAVCO Plate Boundary Observatory (PBO) GPS network page
<http://www.unavco.org/instrumentation/networks/status/pbo>
 - i. Another way to access PBO data that automatically displays all the stations and makes it easy to search nearby stations.
- c. University of Nevada Reno Geodetic Laboratory
<http://geodesy.unr.edu/billhammond/gpsnetmap/GPSNetMap.html>
 - i. Time series data from all available stations globally. Mostly IGS08 reference frame. North American stations also in NA12 (which is similar but not exactly the same as NAM08 that UNAVCO uses)

2. PBO H2O – Plate Boundary Observatory for hydrogeology applications

- a. <http://xenon.colorado.edu/portal/>
- b. Snow depth, vegetation, soil moisture, water loading
- c. Tips
 - i. Easy to download .cvs files to manipulate in Excel
 - ii. To quickly plot multiple years together, make a new “decimal year” column that equals the year + day-of-year/365 (ex. 43rd day-of-year 2013 = 2013.1178)

3. **Visible Earthquake – modeling earthquake ruptures with InSAR data**
 - a. <http://www.3ptsience.com/earthquake>
 - b. Tips
 - i. Getting started page is very helpful
 - ii. Works best when students also sketch out a block model of the fault so they can connect the tool with a real fault.

More Resources

0. General geodesy resources
 - a. UNAVCO researcher data portal (comprehensive but not for the faint of heart) <http://www.unavco.org/data/gps-gnss/data-access-methods/dai2/app/dai2.html#>
 - b. UNAVCO's Educational Resources page has many resources for educators from a variety of teaching levels <http://www.unavco.org/education/resources/educational-resources/educational-resources.html>
 - c. GETSI (GEodesy Tools for Societal Issues) – new project which will be developing modules featuring a variety of geodesy methods including InSAR, LiDAR, GPS, gravity, and sea level altimetry. <http://serc.carleton.edu/getsi/>
 - d. Science Education Resource Center's (SERC) Cutting Edge collection has a "Teaching Geodesy" collection that brings together in one place, the activities contributed by community members related to the topic of geodesy. <http://serc.carleton.edu/NAGTWorkshops/geodesy/index.html>
1. GPS teaching resources
 - a. Introductory
 - i. Analyzing Plate Motion Using EarthScope GPS Data <http://serc.carleton.edu/eet/platemotion/index.html>
 - ii. Measuring plate motion with GPS <http://www.unavco.org/education/resources/educational-resources/lesson/gps-measuring-plate-motion/gps-measuring-plate-motion.html>
 - iii. Graphing of GPS Data <http://www.unavco.org/education/resources/educational-resources/lesson/introduction-to-graphing-data/introduction-to-graphing-data.html>
 - iv. Exploring plate motion and deformation in California with GPS <http://www.unavco.org/education/resources/educational-resources/lesson/gps-california-plate-motion/gps-california-plate-motion.html>
 - v. GPS Data and Earthquake Hazard: Cascadia <http://www.unavco.org/education/resources/educational-resources/lesson/gps-earthquake-hazards/gps-earthquake-hazards.html>
 - b. Majors-level
 - i. Infinitesimal strain analysis using GPS data: Module for structural geology or geophysics course http://www.unavco.org/edu_outreach/resources/gps-strain/majors-gps-strain/majors-gps-strain.html

2. PBO H2O Other Resources
 - a. GPS Spotlight Outreach Portal <http://xenon.colorado.edu/spotlight/>
 - b. More detailed overview presentation about reflection GPS
https://www.unavco.org/community/meetings-events/2012/sciworkshop12/plen3_small.pptx

3. InSAR Teaching Resources
 - a. InSAR investigations to better understand earthquake faults – beta-version activity. More complete version will be released in October 2015 by GETSI (see above, 0c)
<http://www.unavco.org/education/resources/educational-resources/lesson/visible-earthquake-insar/visible-earthquake-insar.html>