

12.540 Principles of the Global  
Positioning System  
Lecture 21

Prof. Thomas Herring

<http://geoweb.mit.edu/~tah/12.540>

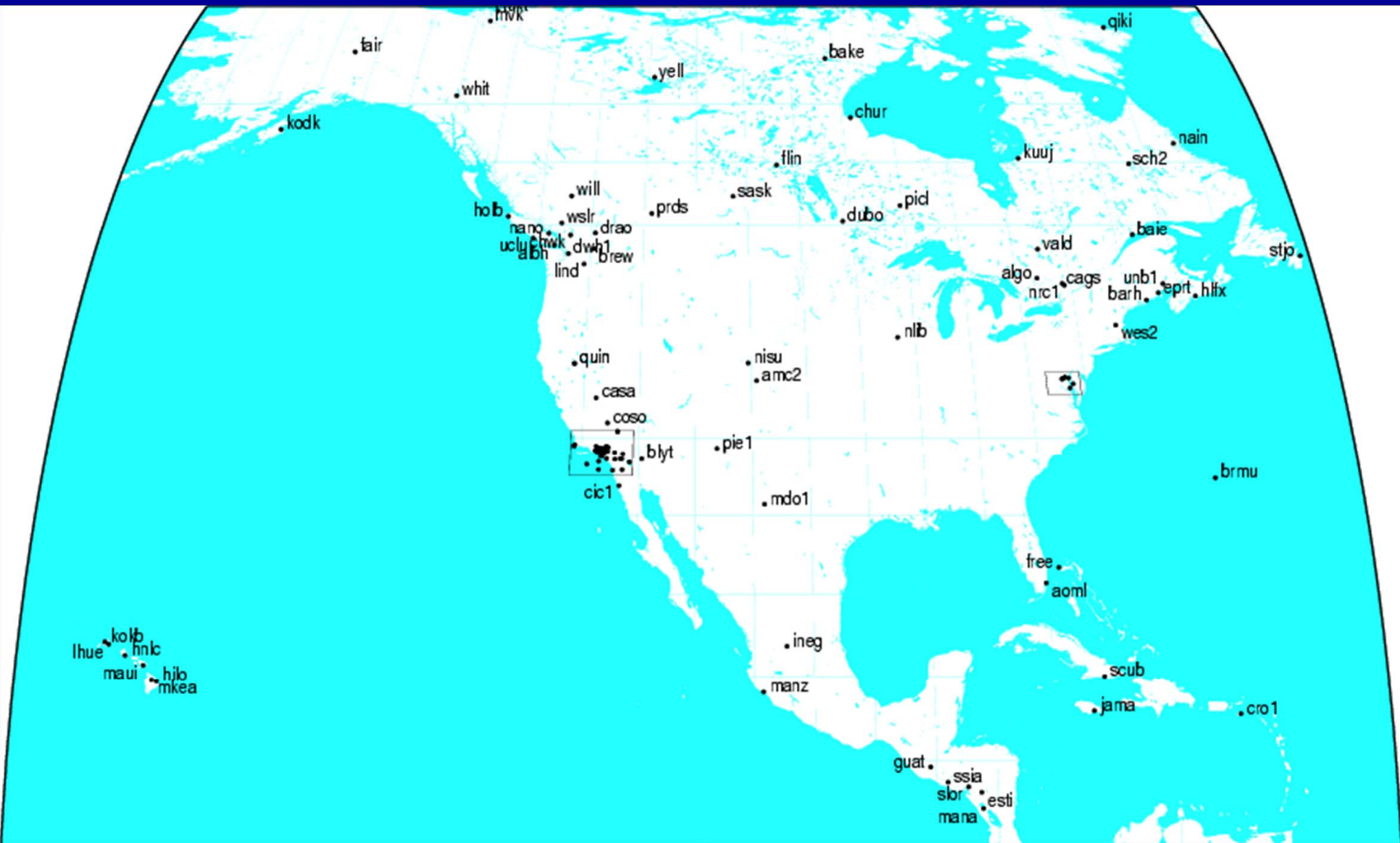
# Summary

- Sources of GPS data and results
  - Major international organizations involved in GPS
  - Examine access to GPS data
  - Examine access to GPS results

# GPS Groups/IGS

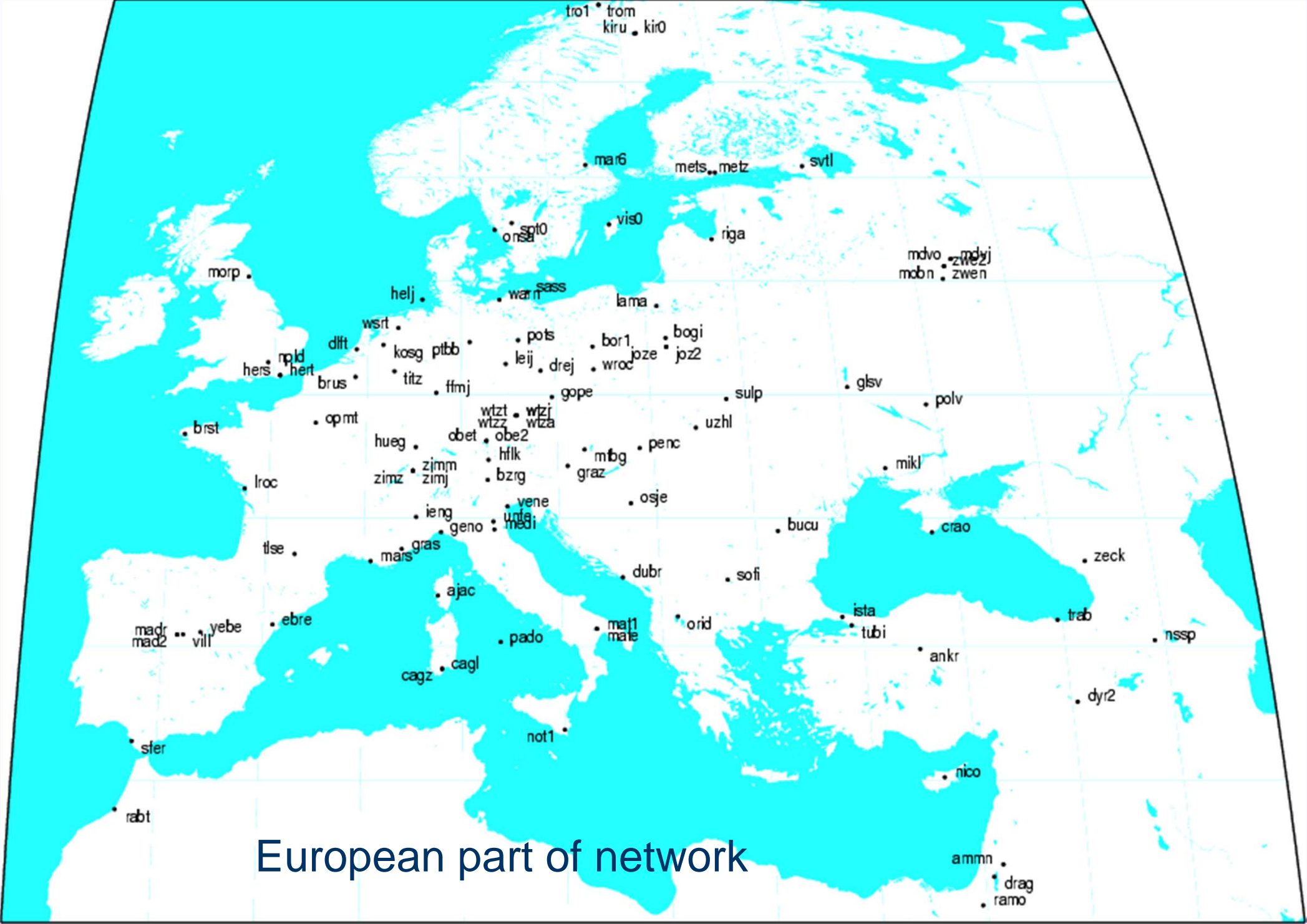
- There are many international and national groups involved in the deployment of GPS.
- The international organization is the International GPS Service (IGS)
- Started as pilot project by the International Association of Geodesy (IAG) in 1992.
- Involves:
  - Data collection (standards for stations)
  - Data dissemination (through several archives)
  - Data analysis (IGS analysis centers)
  - Analysis improvements (working groups and standards)





North American Portion of network  
Image courtesy of NASA.

GMT Apr 30 17:23:34 2005



European part of network

Image courtesy of NASA.

# IGS

- Data for each IGS station is openly available usually within <1 day of collection. Some sites are available hourly.
- The central bureau of the IGS is located at:  
<http://igscb.jpl.nasa.gov/>
- Explore site for structure: Web site index gives an overview of page content.

# US Groups

- There are a number of large US groups that run GPS networks.
- Largest array in the US is the Plate Boundary Observatory (PBO)  
<http://pbo.unavco.org>
- Other groups in the Western United States have networks of 20-50 stations. In all over 1600 geophysical class stations in Western US and Alaska.
- Many other stations, often transmitting in real-time (1-sec latency) are available from local governments and private companies.



# Plate Boundary Observatory (PBO)

- Installation of 875 new GPS stations across the Pacific-North America plate boundary and a large number of bore-hole strain-meters and 5 long baseline strain-meters.
- Project part of NSF funded Earthscope project with contributions from USGS and NASA.
- Started in late 2003 and will be completed November 2008.
- Web site: <http://pbo.unavco.org/>

# National Geodetic Survey CORS

- Main reference frame of the United States.
- Continuously Operating Reference Stations (CORS)
- <http://www.ngs.noaa.gov/CORS/>
- Serves the geodetic control needs of the US.
- About 300 GPS sites currently in the network many of them shared with other institutions.

# Western US Groups

- Networks in the Western United States
  - Plate Boundary Observatory (PBO)  
<http://pboweb.unavco.org/>
  - BARD (Bay Area Regional Network)
  - PANGA (Pacific Northwest Geodetic Array)  
<http://www.panga.cwu.edu/>
  - For list of arrays see:  
<http://sopac.ucsd.edu/cgi-bin/dbShowArraySitesMap.cgi>
- Explore these web sites.

# Availability of processed GPS data

- Many of the network groups put analyzed results on their web pages as well as access to data.
- IGS also sponsors 8 global analysis groups (funding comes from other sources).
- SCIGN uses three analysis groups:  
<http://sideshow.jpl.nasa.gov/mbh/series.html>  
<http://reason.scign.org>  
<http://geoapp03.ucsd.edu/gridsphere/gridsphere>

## Other important groups

- University Navstar Consortium (UNAVCO) facility and corporation  
<http://www.unavco.org>
- Unavco is installing the Plate Boundary Observatory (PBO).
- Supports a variety of applications of GPS. Initially tectonic deformation but now Antarctic Research and low-precision GIS applications
- Supports US Universities in installing GPS through out the world for geophysical studies.

# Summary

- Data from thousands of GPS stations are collected and processed each data
- Largest single array is in Japan (>1400 stations) with PBO following closely (1100)
- GPS developments are like the internet development: Many active contributors but often quality is debatable.
- Examine the nature of these networks for the remainder of the lecture.

MIT OpenCourseWare  
<http://ocw.mit.edu>

12.540 Principles of the Global Positioning System  
Spring 2012

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.