CORS Program FY08

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What is CORS?

- A number of products and services that directly support NGS's mission:
  Defining, maintaining and providing access to the National
  Spatial Reference System (NSRS) for the civilian sector of
 the US government.

How:

- Each CORS station provides the most basic information (code and phase data) needed to calculate its coordinate and velocity. The relationship of the coordinates and velocities at CORS with the International Terrestrial Reference Frame (ITRF) is used to define the geometric component of the NSRS (lat, lon, ellip. ht).

- Collect data, calculate orbits, coordinates + velocities, establish guidelines, provide post-processing applications, provide training
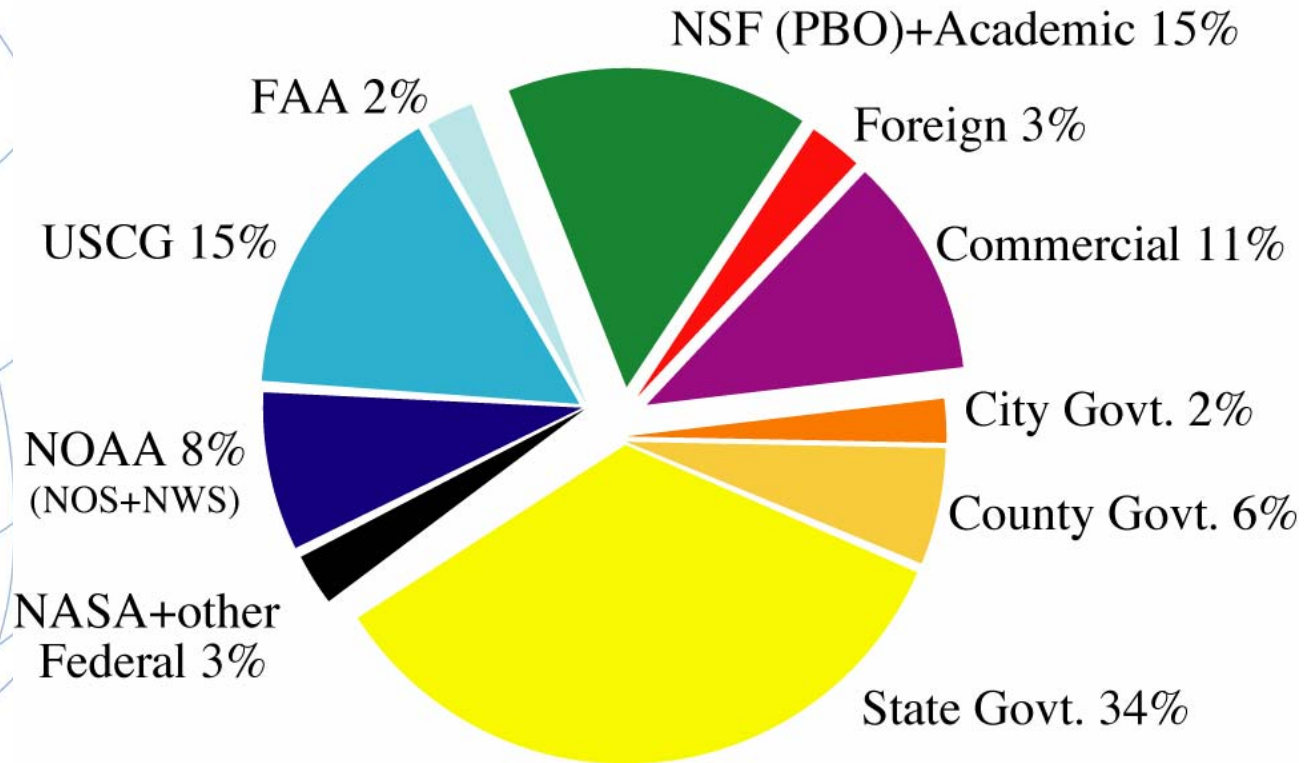
CORS
September 2008

CORS
~1250 Stations

This year added
~270

Scale

400 km

Hawaii

Alaska

National Oceanic and Atmospheric Administration
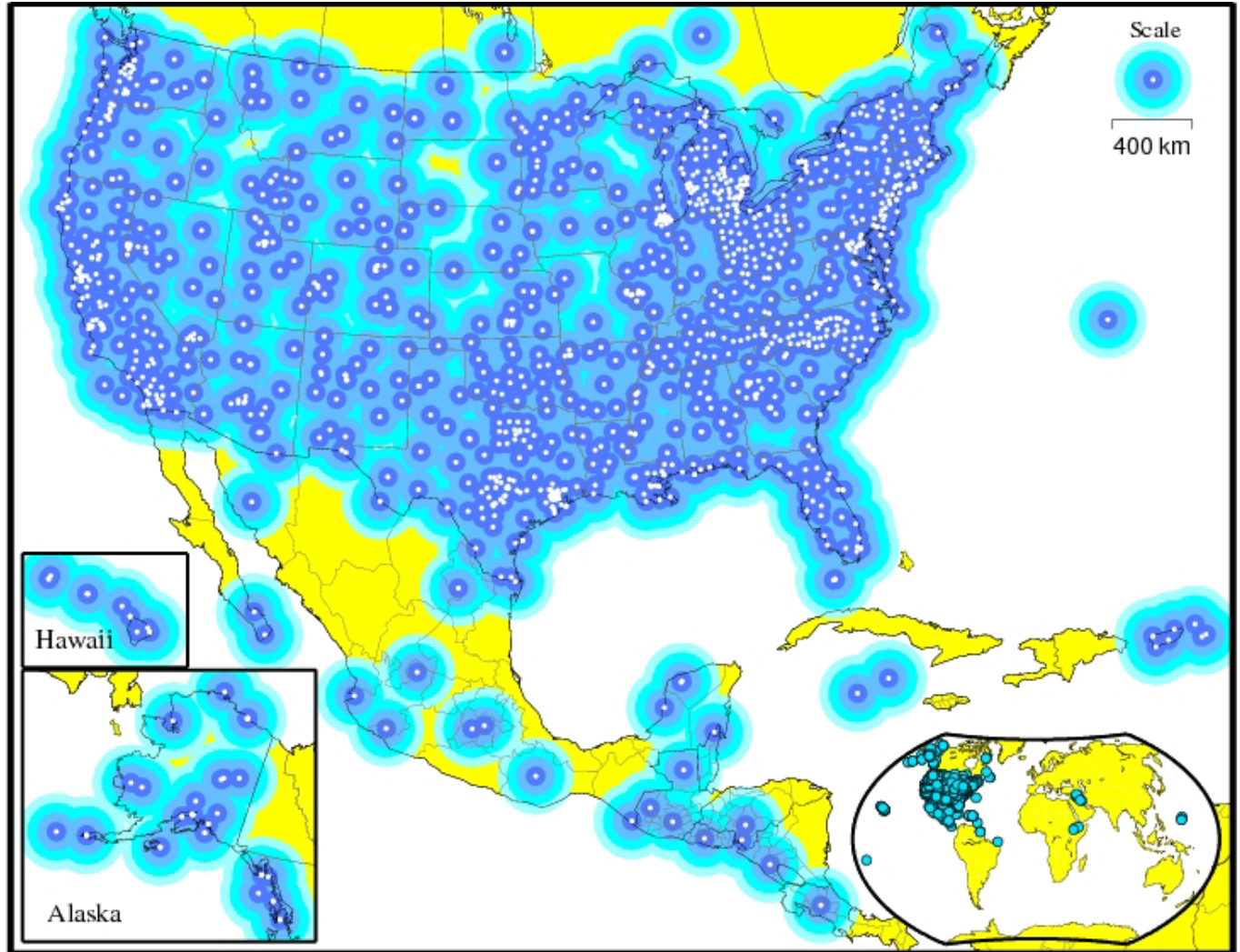
CORS = Partners

- CORS is > 98% volunteer (non-NGS)

CORS Activities FY 2008

- NGS GPS orbits reach 1 cm-level
- NGS is the IGS Analysis Center Coordinator. IGS orbit products (4yr term).
- HTDP 3.0 released especially important for the for the western US
- Re-analysis of all CORS data and orbits 1994-to date started
- Prototype CORS-realtime service operational (next talk by B. Henning)
- Added ~270 stations 3x as many as last year
- Antenna calibration transition from relative to absolute is starting
- OPUS-RS 65% increase in use
- OPUS-DB is an operational prototype
- Established 4 CORS in Ethiopia to support USAID
- Supporting new CORS in Iraq and Afghanistan

Key Issues Facing CORS

- Maintain and improve the NSRS (geometric component)
  - — Keep it consistent with the ITRF
- Support current CORS and add new CORS
  - —Streamline current data ingestion and computation
- Add new products
  - — Real time activities, GNSS

Maintaining/Improving the NSRS

Upgraded PAGES software and overhauled methods for computing coordinates and aligning them with ITRF (2.5 years)

WHY:

— Existing coordinates/plots are not consistent with the latest ITRF

— Processing software needed to conform to IERS standards/models

— Resolve the discrepancy in scale between VLBI and GPS. Mostly resolved by changing from relative to absolute antenna calibrations.

— Simplify and improve NGS's coordinate and velocity calculations and ensure alignment with ITRF is easier and more robust.

HOW:

— Recalculate orbits and coordinates for all CORS using new orbits from 1994-current (will require 2 yrs).

— Begin discussion on how to define the next NSRS (geometric i.e. NAD83) and reconcile with previous ones.

Support Current CORS and Add New CORS
meta data are AS IMPORTANT as the data

WHY:

— Continue to have a number of internal software/hardware and network problems. Very serious problem mid-May to mid-July on distribution server in SS.
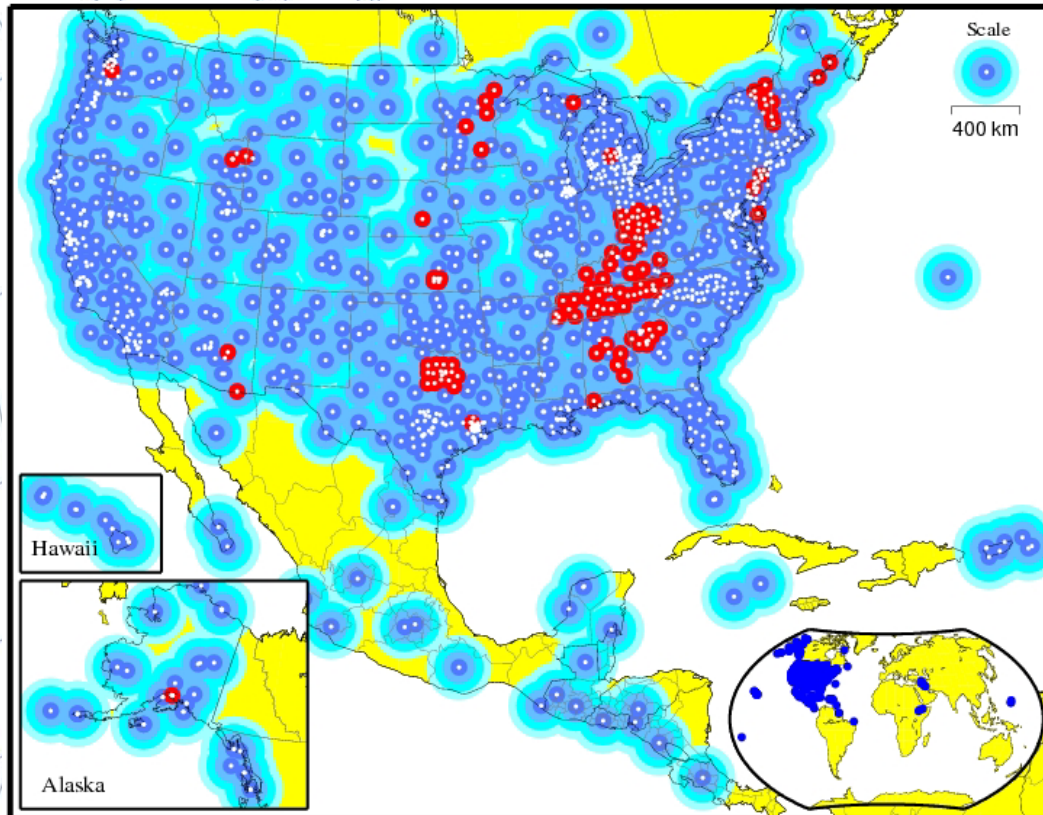
WHAT:

— Continued improving data ingestion and associated alternate facility in Boulder.

— Updated/restructured hardware to accommodate re-analysis and improve data storage (much more needs to be replaced).

— Numerous additional steps to be taken.

- Added ~270 stations to the network.
- Merge COOP CORS with National CORS in accordance with the 10 year plan
- New CORS must conform with guidelines

  www.ngs.noaa.gov/CORS/Establish_Operate_CORS.html

Supporting New Products

Real time - essential that CORS/NGS supports this activity.(Next Henning)

GNSS: add GLONASS and new GPS frequencies to online storage in 2009

OPUS (Online Positioning User Service)

OPUS - A collection of web services

OPUS-S (static) what was called OPUS

OPUS-RS (rapid static) 65% increase in number of users compared to last year.

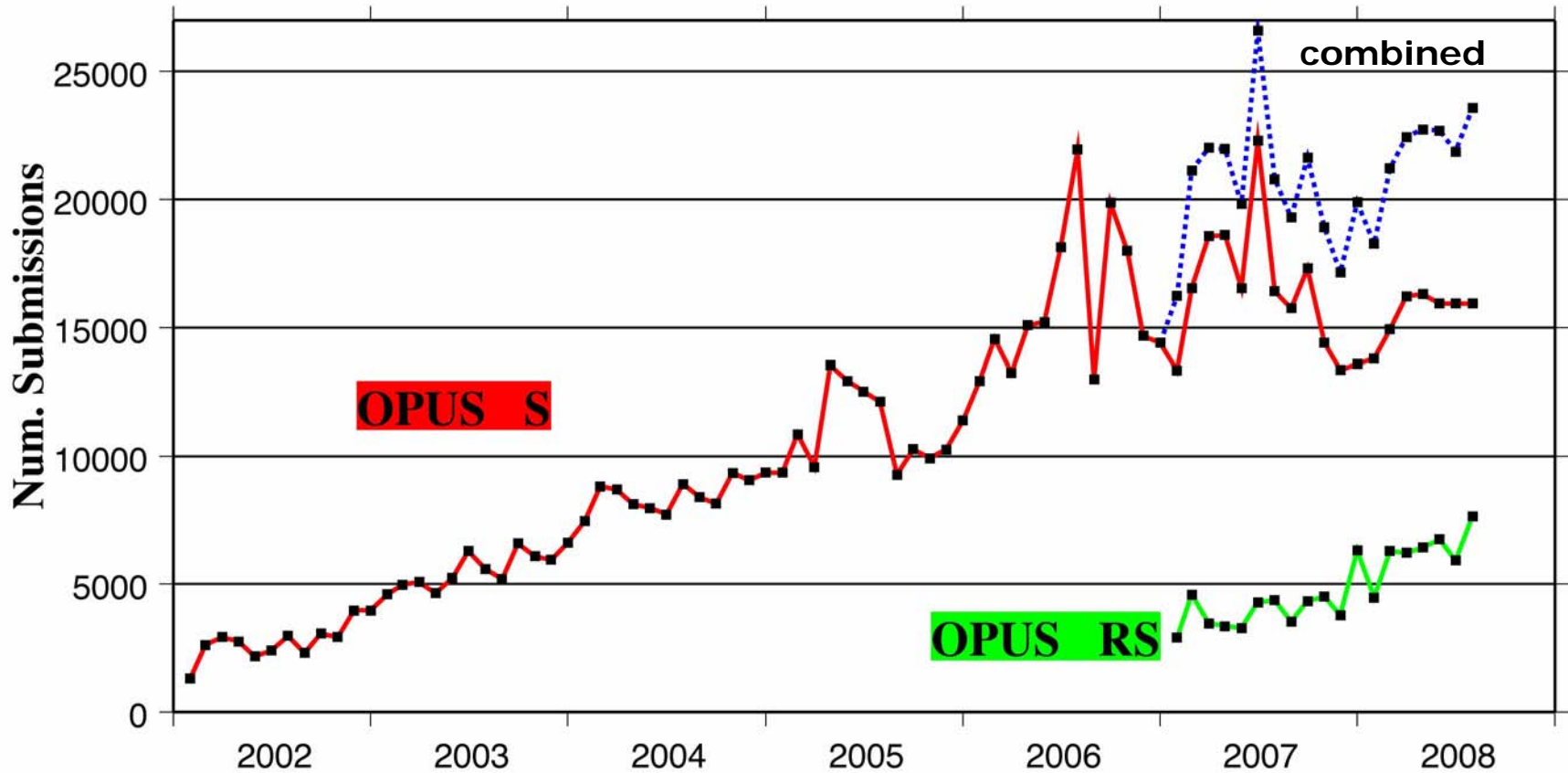OPUS-DB currently available as operational prototype

Other OPUS "flavors" under consideration development (NO timeline)

OPUS-Mapper (single frequency)
OPUS-Projects (multiple sites all adjusted simultaneously)

OPUS (Online Positioning User Service)

Monthy OPUS Submissions

Horizontal Time-Dependent Positioning (HTDP)

Applications

- Predict velocities
- Predict displacements
- Update positions
- Update observations
- Transform positions between reference frames
- Transform velocities between reference frames

New in HTDP 3.0

- Introduced new model for crustal velocities in western CONUS
- Introduced a model for the motion associated with 2002 Denali earthquake in Alaska

Updated model for crustal velocities

An analytical model representing
horizontal crustal motion was
developed by Dr. Robert McCaffrey
using DEFNODE

- Incorporates all major active
  faults in a single model.

- **Input data include**
  - 4,890 GPS-derived velocities
  - 170 fault slip rates from
    paleoseismic & paleomagnetic
    studies
  - 258 fault slip vectors taken from
    earthquakes and geologic
    studies
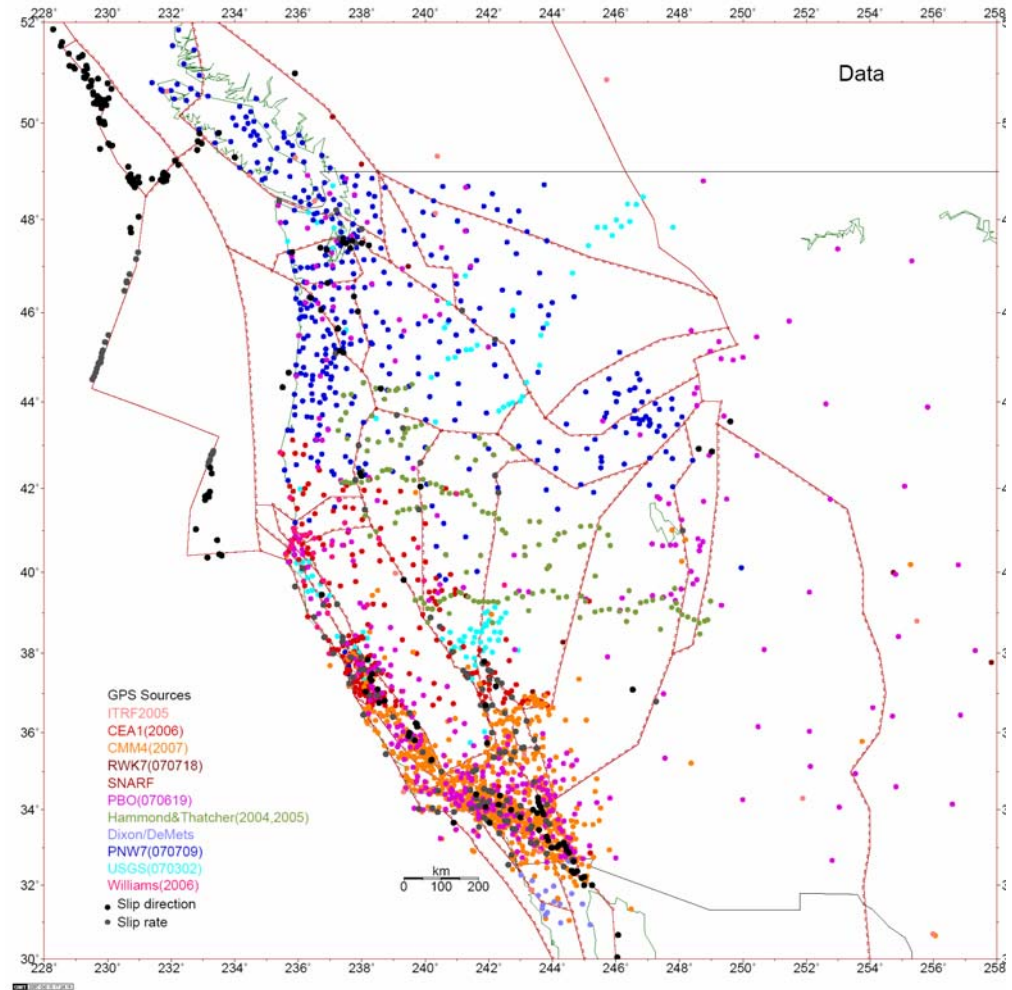
Plans for FY 2009

- Complete all of re-analysis of orbits and get more than 50% of all CORS data
- Plan for new NSRS
- Storing and distributing GNSS data
- Start work on HTDP for Alaska
- Continue to work with our partners to improve existing stations and add new ones
- Continue major overhaul of data management tools to improve coordinate computation
- Making UFCORS and OPUS available from Boulder as alternate location
- Socio-economic valuation of the CORS program