

Surveying, Mapping, and Geosciences Session

- Three talks
 - Giovanni Sella – CORS status
 - Neil Weston – Opus
 - Dave Doyle – Adjustment and Geoid12A
- Short 15 min break
- Open discussion

CORS Program Updates FY2011- 2012

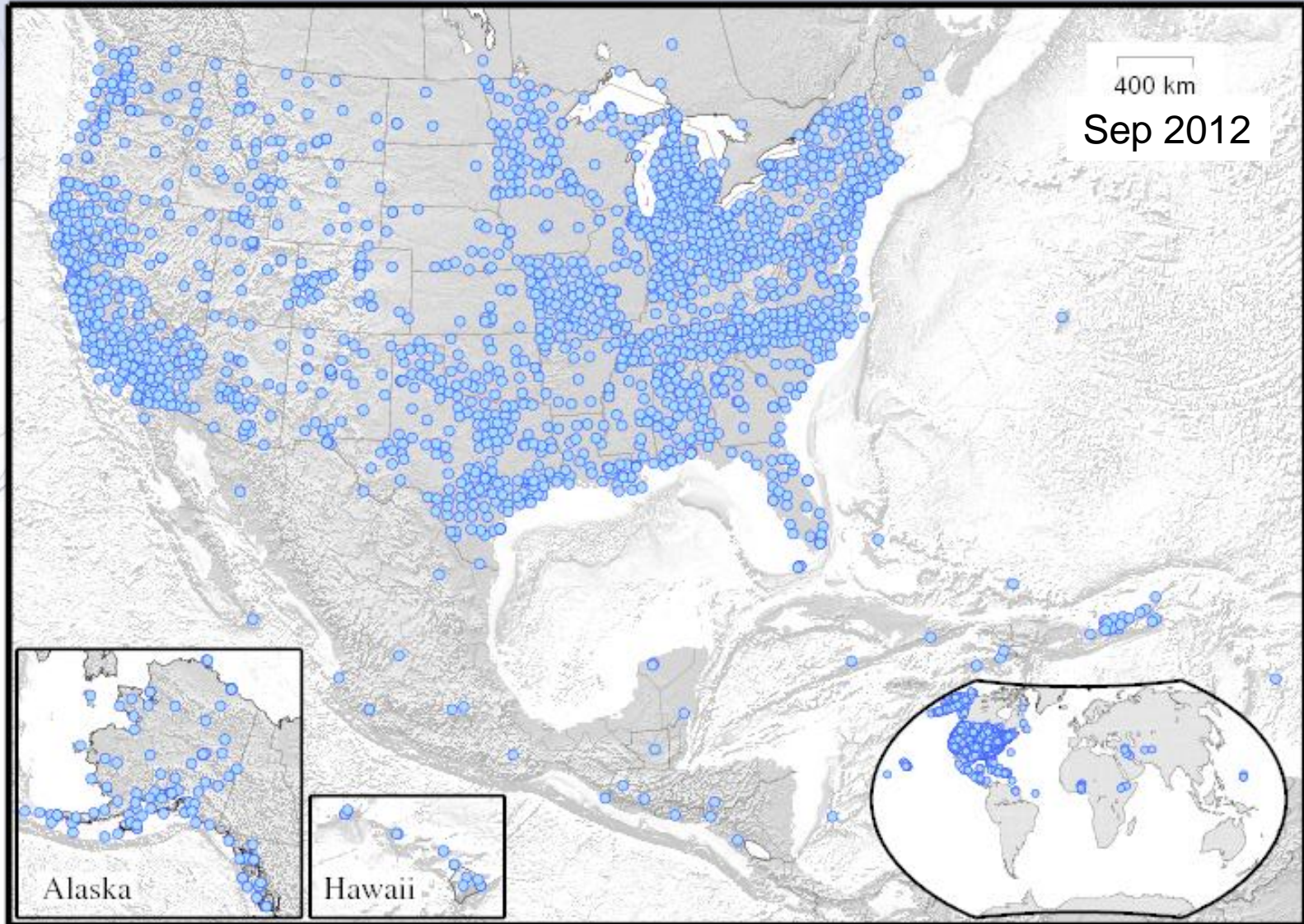
Giovanni Sella
CORS Program Manager
NOAA-National Geodetic Survey

CGSIC – Nashville, TN
17 September, 2012

CORS News for FY11-12

- New CORS coordinates released 6 September 2011
- New absolute antenna calibrations released same time
- On 1 July 2012 updated the NGS IDB with new CORS coordinates, new passive network coordinates, new geoid
- Released new HTDP 3.2.3
- Growth continues to be strong!

CORS Network Status



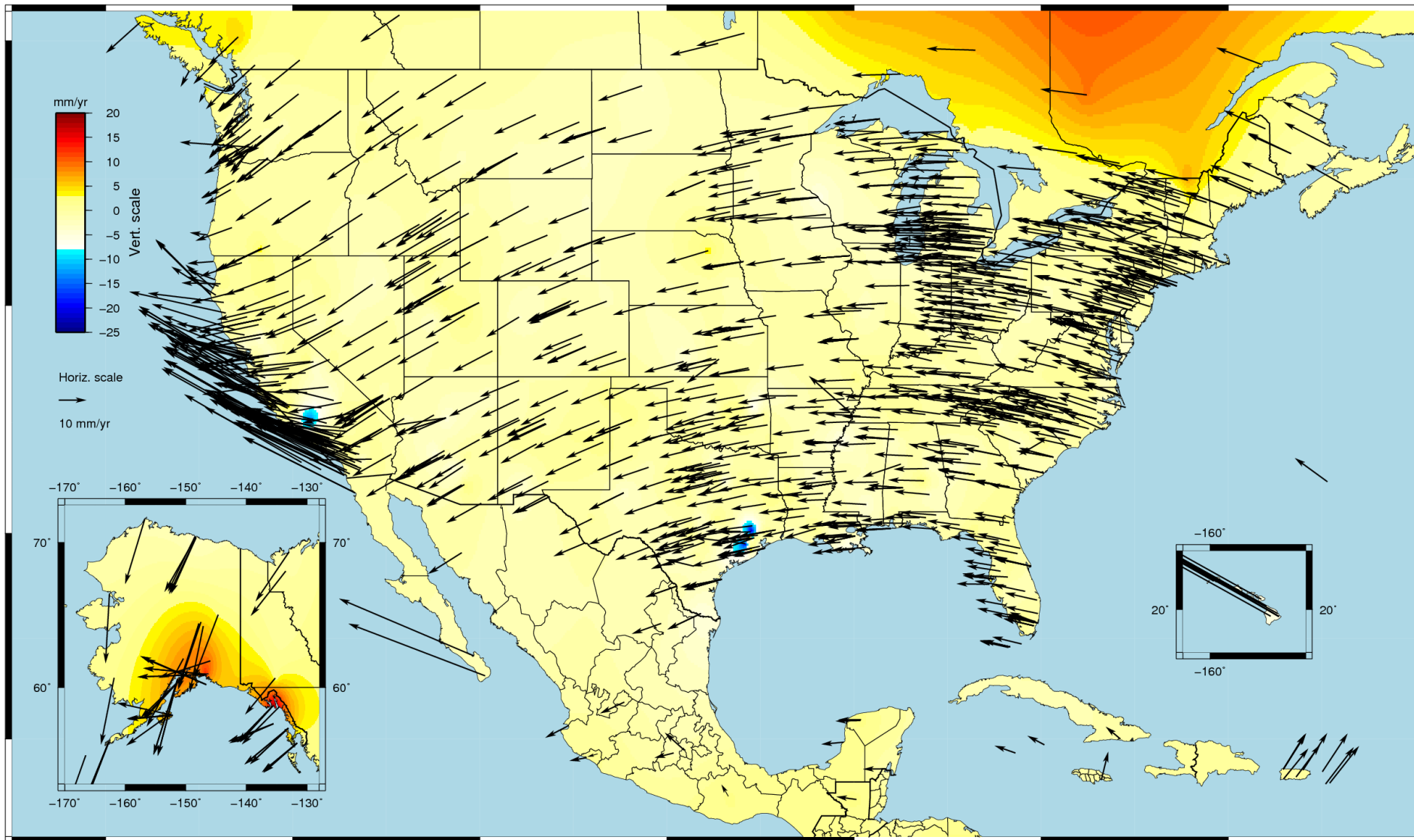
Reference Frame Definitions

- ITRF frame (global) multi-technique—vlbi, slr, doris, gnss
- IGS frame (global) GNSS only
- NAD frame (plate fixed) related to ITRF/IGS
- **Critical** to pay attention to **frame tags** and **epoch dates** and **antenna calibration values**

Frame Name	Epoch	Antenna PCV*	Data Duration
ITRF2000	1997.00	Rel	1994.0-2002.0
ITRF00 (NGS's soln)	1997.00	Rel NGS	1994.0-present
NAD 83(CORS96,MARP00,PACP00)	2002.00	Rel NGS	1994.0-present
IGS08	2005.00	Abs IGS08	1997.0-2009.5
IGS08 (NGS's soln)	2005.00	Abs IGS08	1994.0-2011.5 (ongoing)
NAD 83(2011,MA11,PA11)	2010.00	Abs IGS08	1994.0-2011.5 (ongoing)

*PCV – phase center value; Abs-Absolute, Rel-Relative

CORS IGS08 Velocity Field



Reference Frames Used

- Basis is global frame inherited from ITRF2008 but not the same as ITRF2008
 - Name: **IGS08**
 - Epoch date: **2005.00** (same as ITRF2008, IGS08)
 - NGS has more discontinuities and weekly solutions than ITRF2008; and has applied IGS05_ATX -> IGS08_ATX corrections to be consistent with IGS08
- Related to ITRF, but plate fixed (NAD 83)
 - Name: **NAD 83(2011,MA11,PA11)**
 - Epoch date: **2010.00**
 - NAD 83(CORS96,MARP00,PACP00) to NAD 83(2011,MA11,PA11) identity transformation (i.e. same axes)
 - NAD 83(2011) axes origin different (~2meters) from ITRF/IGS08/WGS84(G1674) (expect reconciliation ~2022)

Changes with New Frames

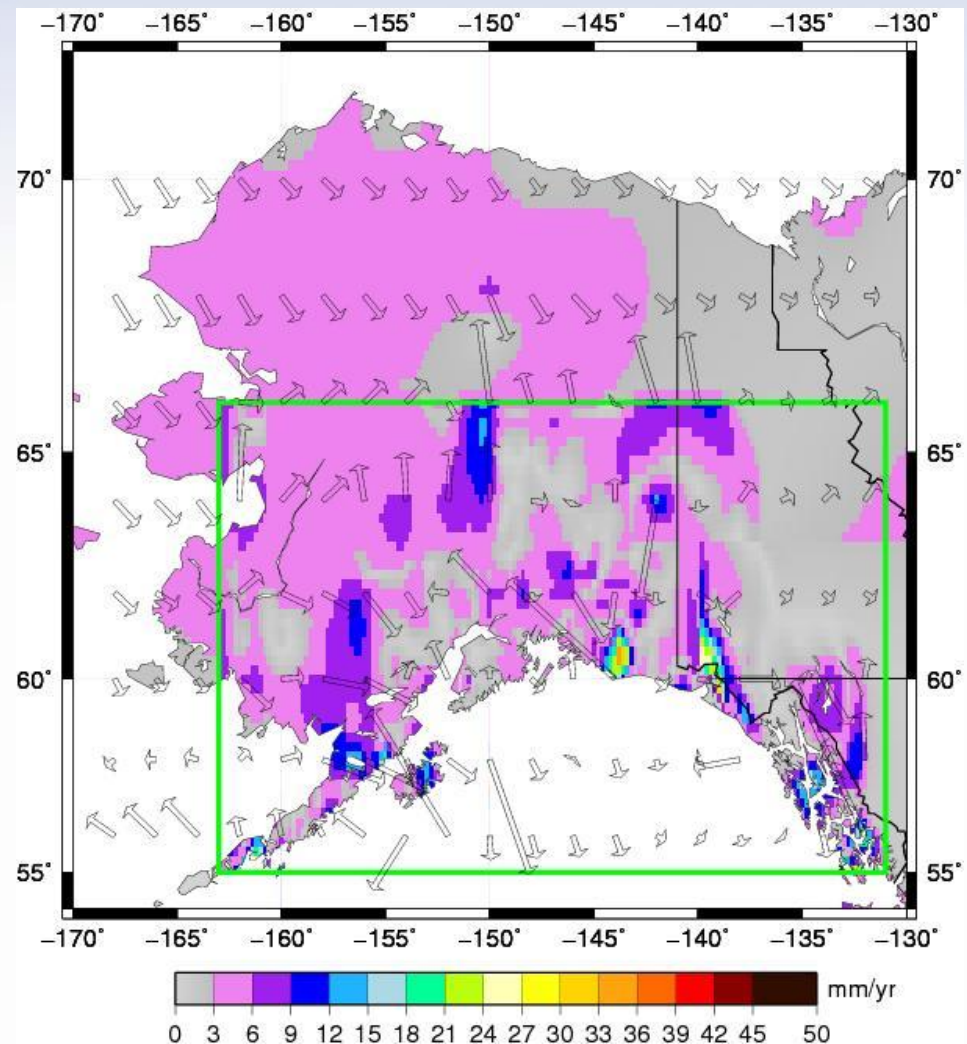
- Change from relative to IGS08 absolute antenna phase center values (PCV)
- The global frame (IGS08) pos/vel are aligned to full global frame >100 sites
- Change in epoch from 2002.00 to 2010.00 in NAD 83(2011/MA11/PA11)
- Coordinates change by ~1.5 cm horizontal ~1cm vertical in Easter USA
- No longer support coordinates in ITRF00 or NAD 83 (CORS96,MARP00,PACP00)
- What amount of change/tolerance are permitted?
 - No change 2 cm horizontal, 4 cm vertical

Horizontal Time-Dependent Positioning (HTDP)

- Estimate horizontal crustal velocities at a point
- Estimate horizontal crustal displacements from one date to another
- Transform positions and velocities (coordinates) from one reference frame to another and/or from one date to another

Just released HTDP 3.2.3

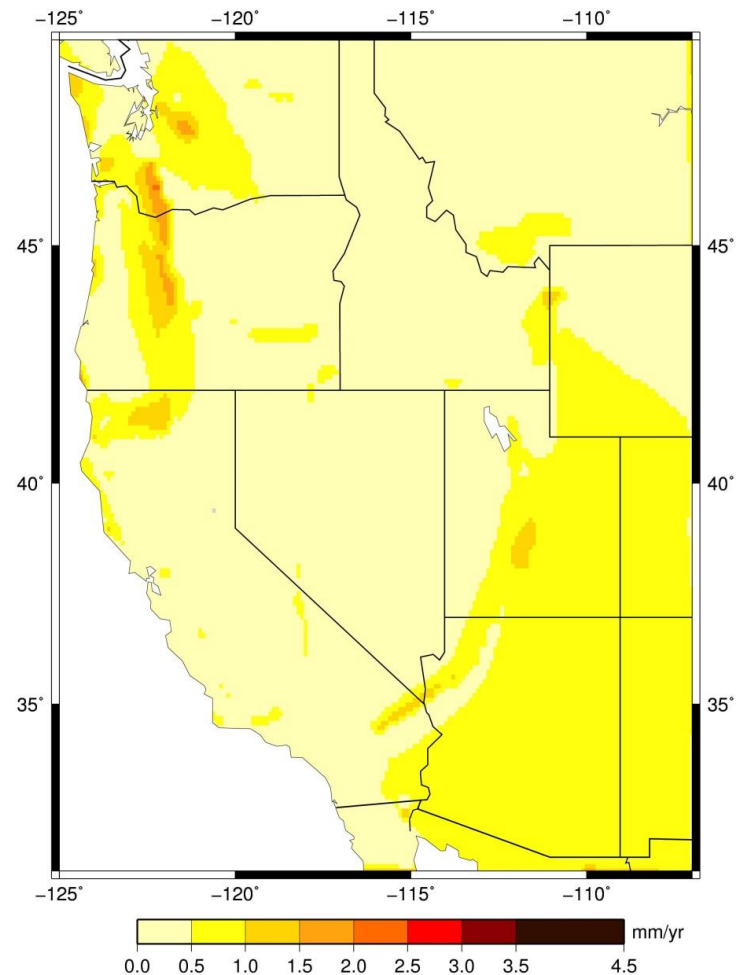
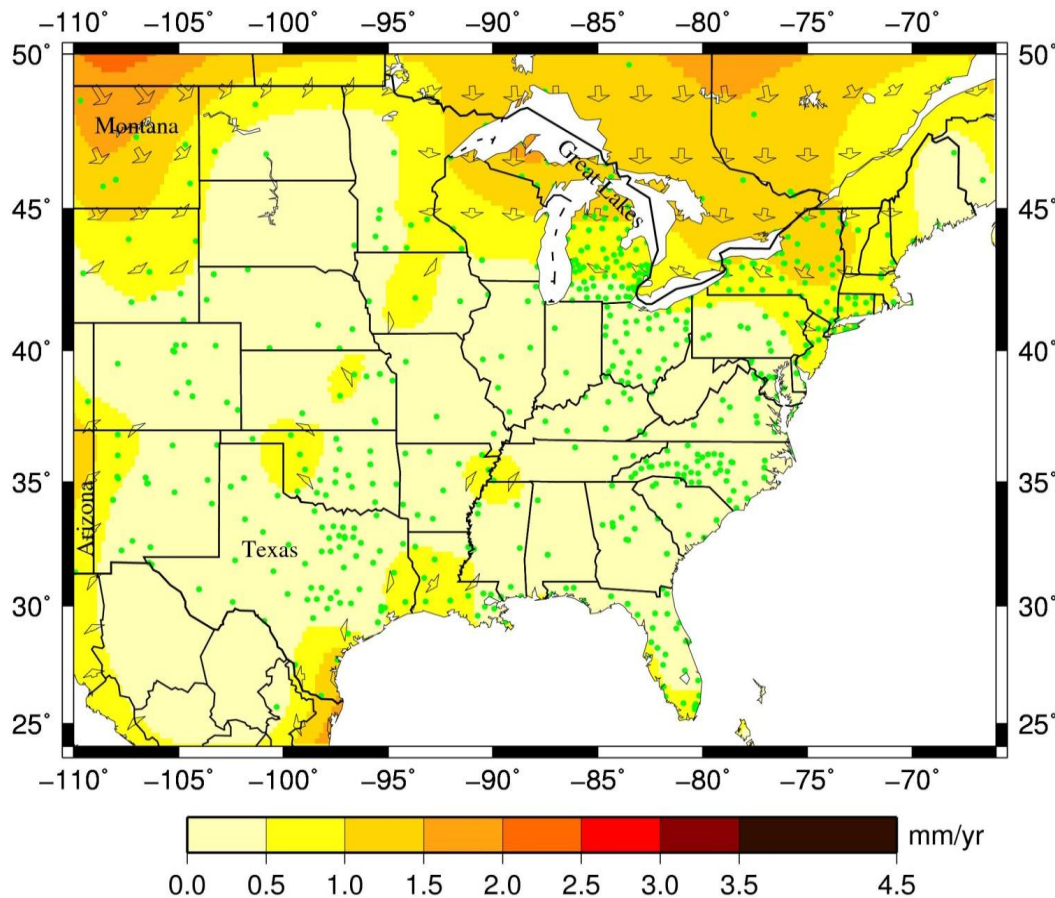
- A new velocity field and block model for Alaska
- A model for the postseismic motion associated with the 2002 (M7.9) Denali earthquake



HTDP 3.1 vs 3.2

Velocity Differences between HTDP_v3.2 and HTDP_3.1

- An improved model for estimating velocities in eastern CONUS (east of 107°W) and slightly improved model for estimating velocities in western CONUS

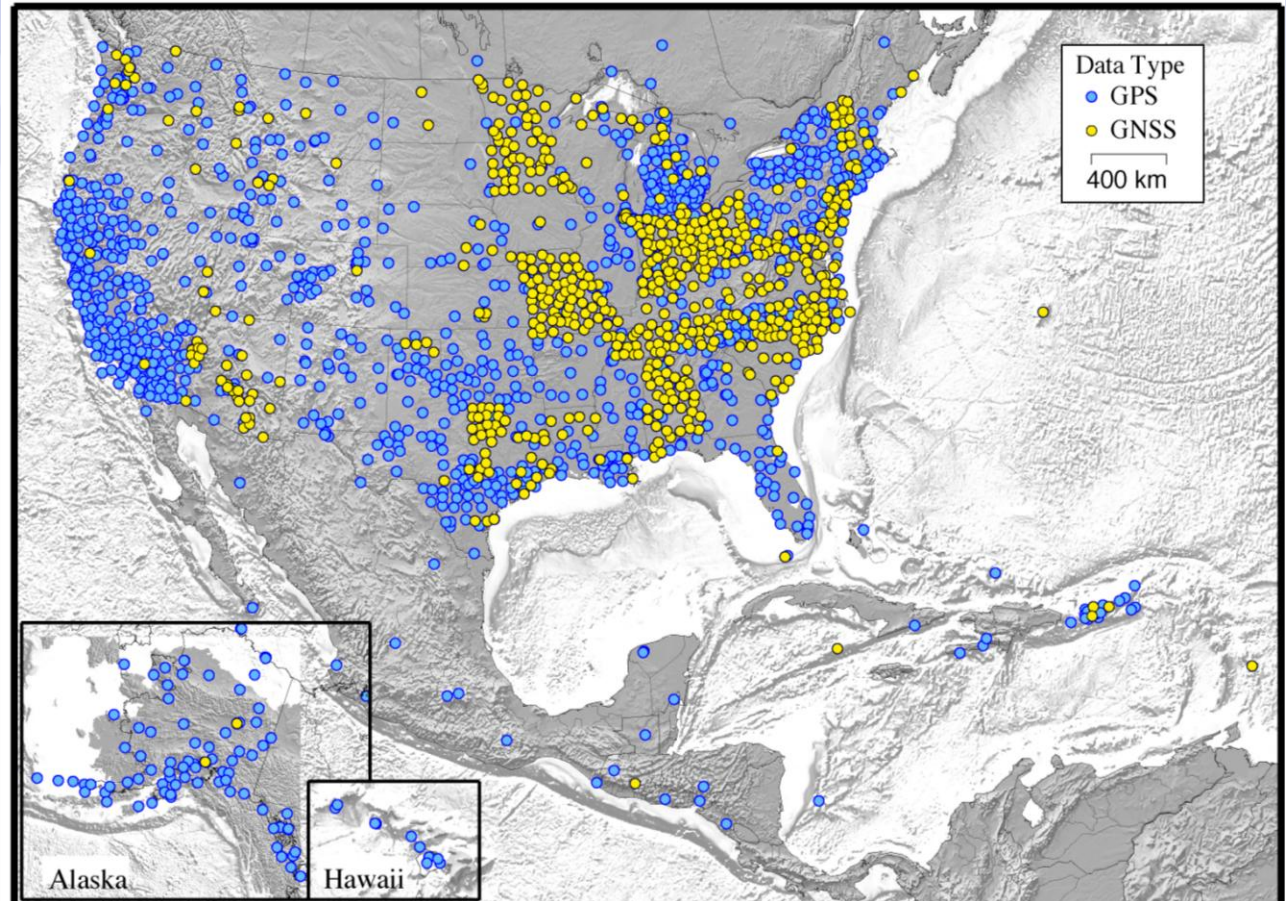


HTDP 3.2.3

- A model for estimating velocities on the Philippine Sea plate
- Improved models for estimating velocities for the following tectonic plates: Pacific, Caribbean, Juan de Fuca, and Cocos
- More accurate resolution of the tectonic plate boundaries
- The capability to transform coordinates between the new WGS 84(G1674) reference frame and other popular reference frames

Inclusion of GNSS in CORS Network

Increasing
upgrade from
GPS only to
GNSS equipment



- By the of this fiscal year GNSS observations will be made available through the CORS online storage

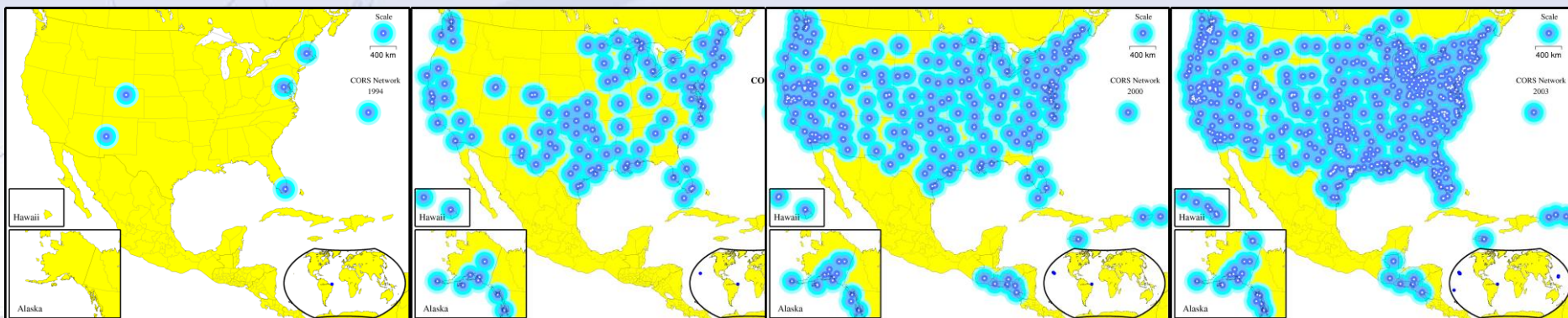
Growth of CORS Network

1994 (<10)

1997 (~150)

2000 (~300)

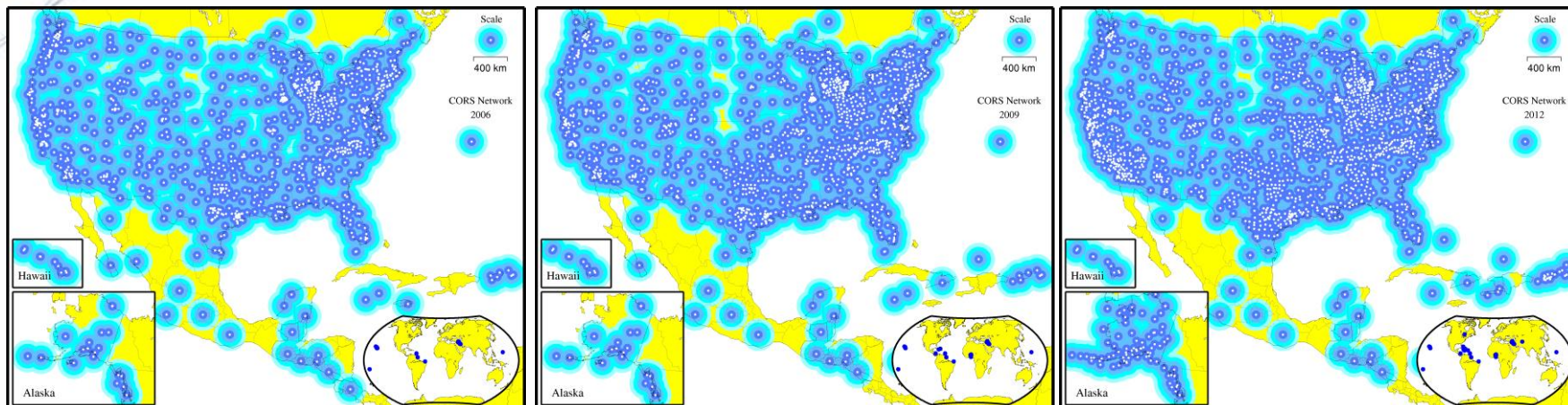
2003 (~600)



2006 (~900)

2009 (~300)

2012 (~1900)



With Growth Comes Change

- Growth is often thought of as good
- Too much “good” can be bad!
- Emphasis in recent years has been on station quality, have removed a number of poor quality stations.
- In the next year will be reviewing station quality against network average, per guidelines issued in 2006
- Update to guidelines forthcoming including spacing requirements

Summary

- All NGS Products and Services are in consistent frames in 2012:
 - IGS08 epoch 2005.00
 - NAD 83(2011,MA11,PA11) epoch 2010.00
- Users must use appropriate antenna calibrations with particular reference frames
- QC of CORS stations will increase updated guidelines forthcoming
- GNSS data distribution by end of the year
- Reprocessing of CORS should begin within the next year

Questions/Comments

- We recognize that NGS and the public want CORS to be the primary access to the NSRS, but **accuracy and constancy are not always possible.**
- We are keen to hear your comments/concerns
- Check: geodesy.noaa.gov/CORS/news.shtml
geodesy.noaa.gov/CORS

Choose **Data Products**

giovanni.sella@noaa.gov