Mega-Network GPS Solutions: Producing a Consistent, Global-Scale, and High-Resolution View of Plate Tectonic Stability, Rotation, and Deformation

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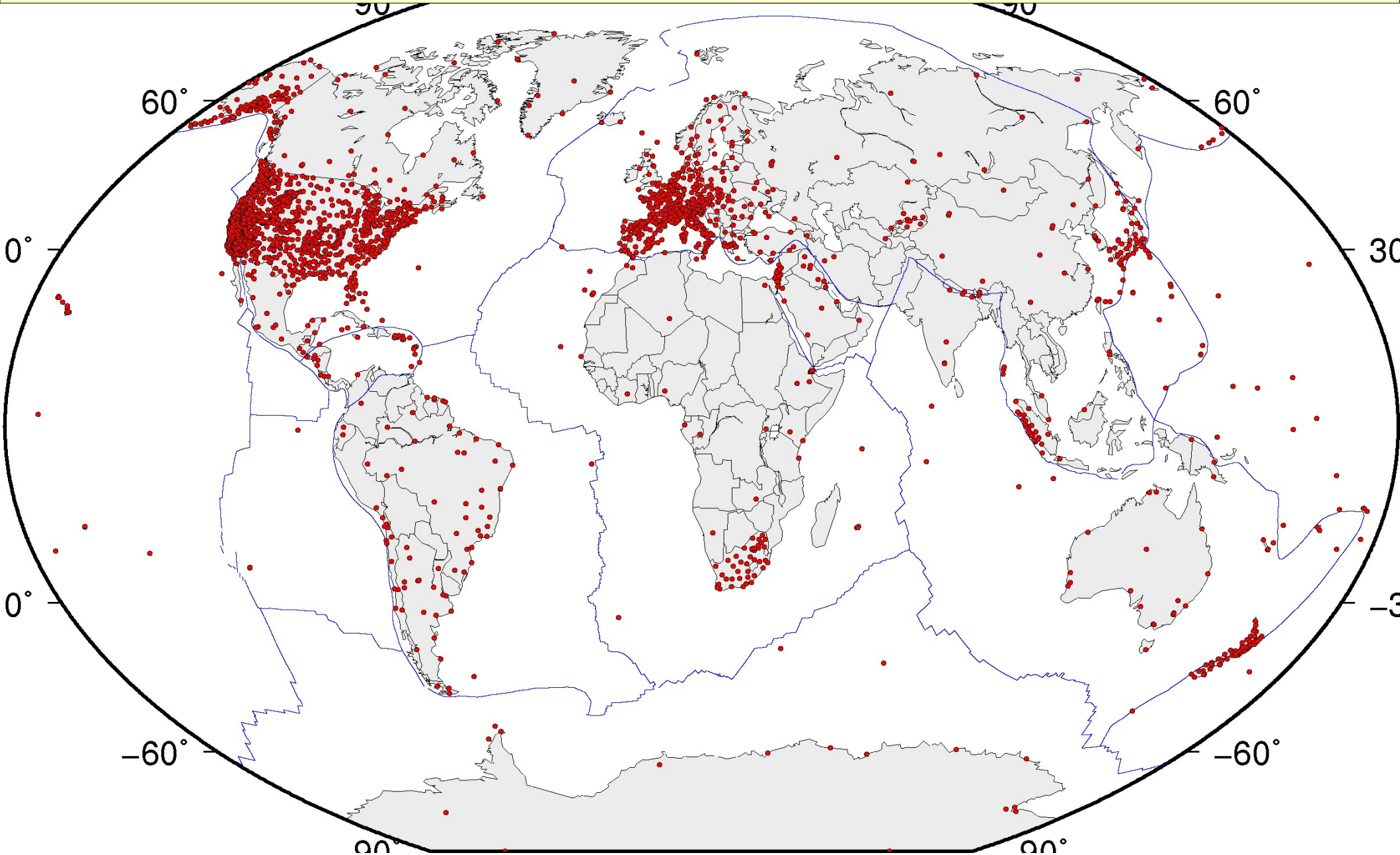
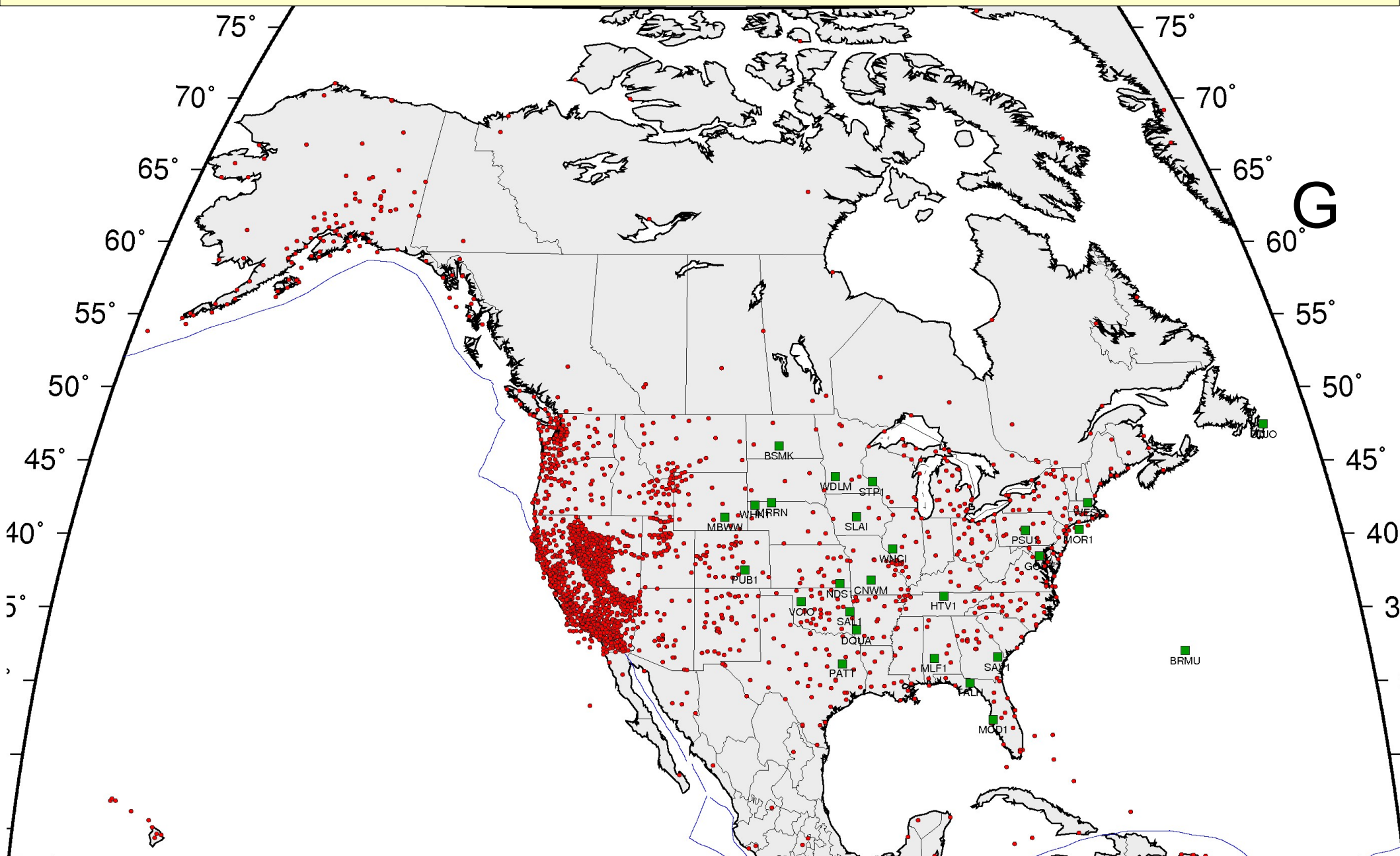
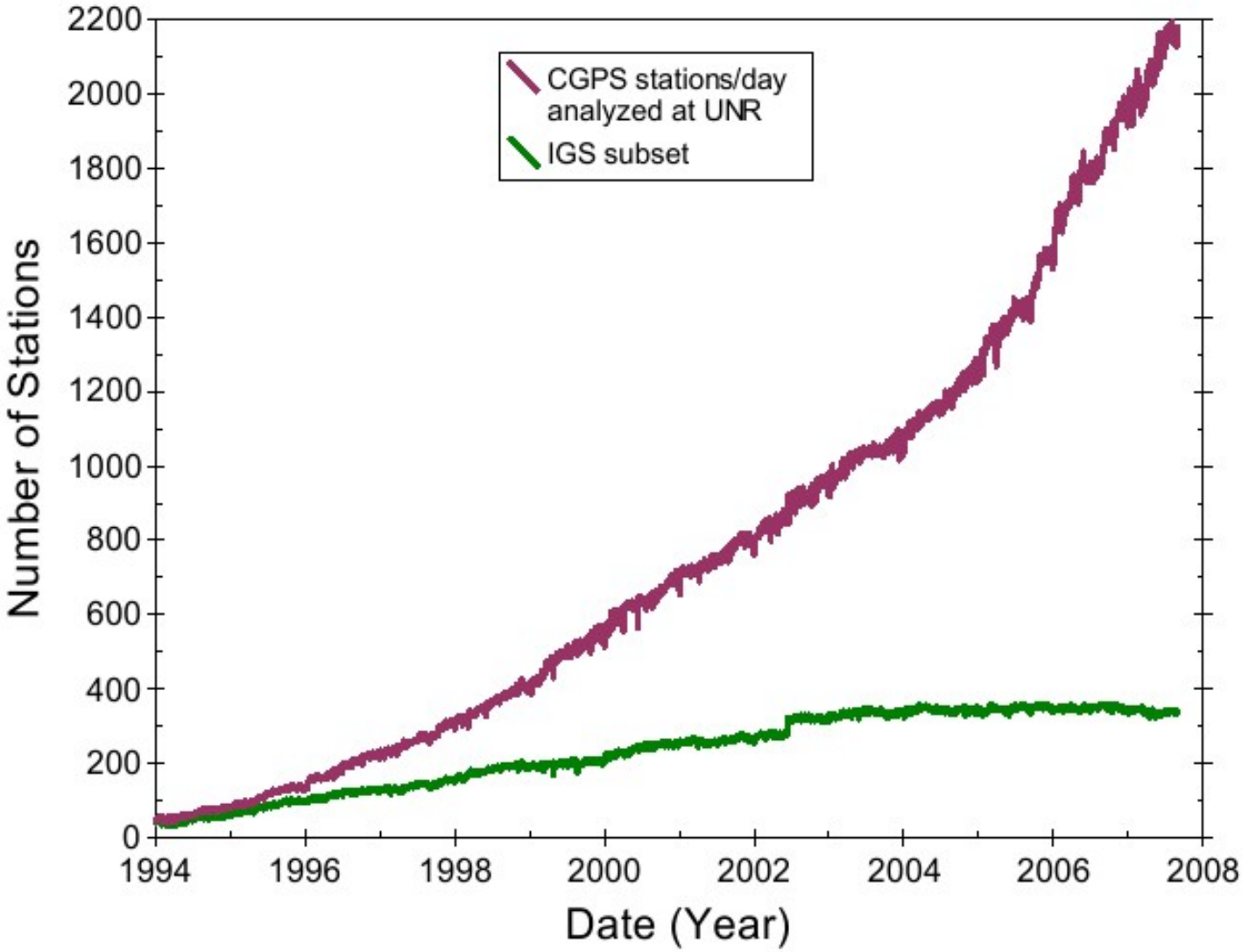
3096 GPS SITES PROCESSED (1994-2007)

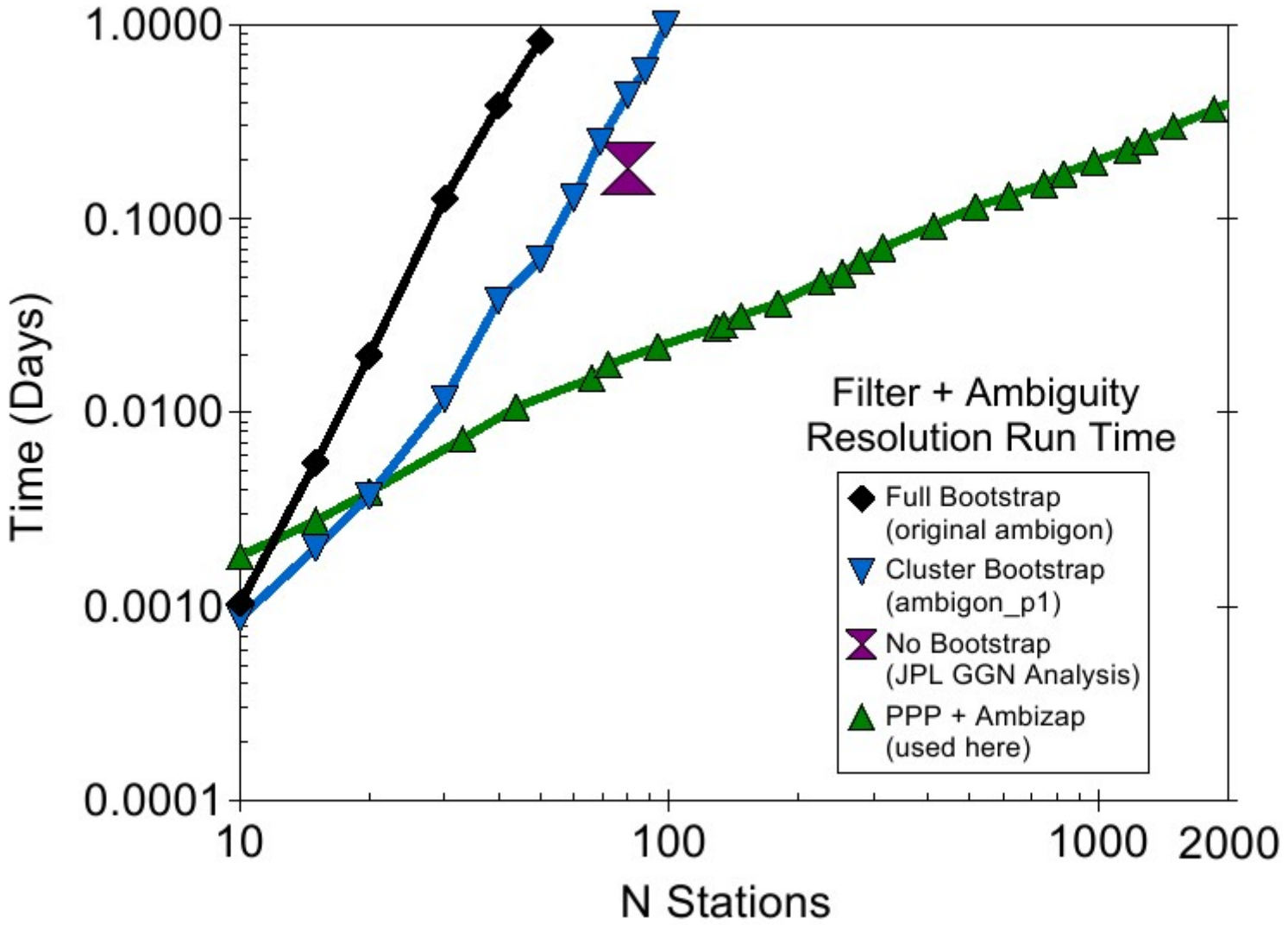


~2000 NORTH AMERICAN GPS SITES PROCESSED

(Green sites *define* a no-net rotation frame for stable North America)

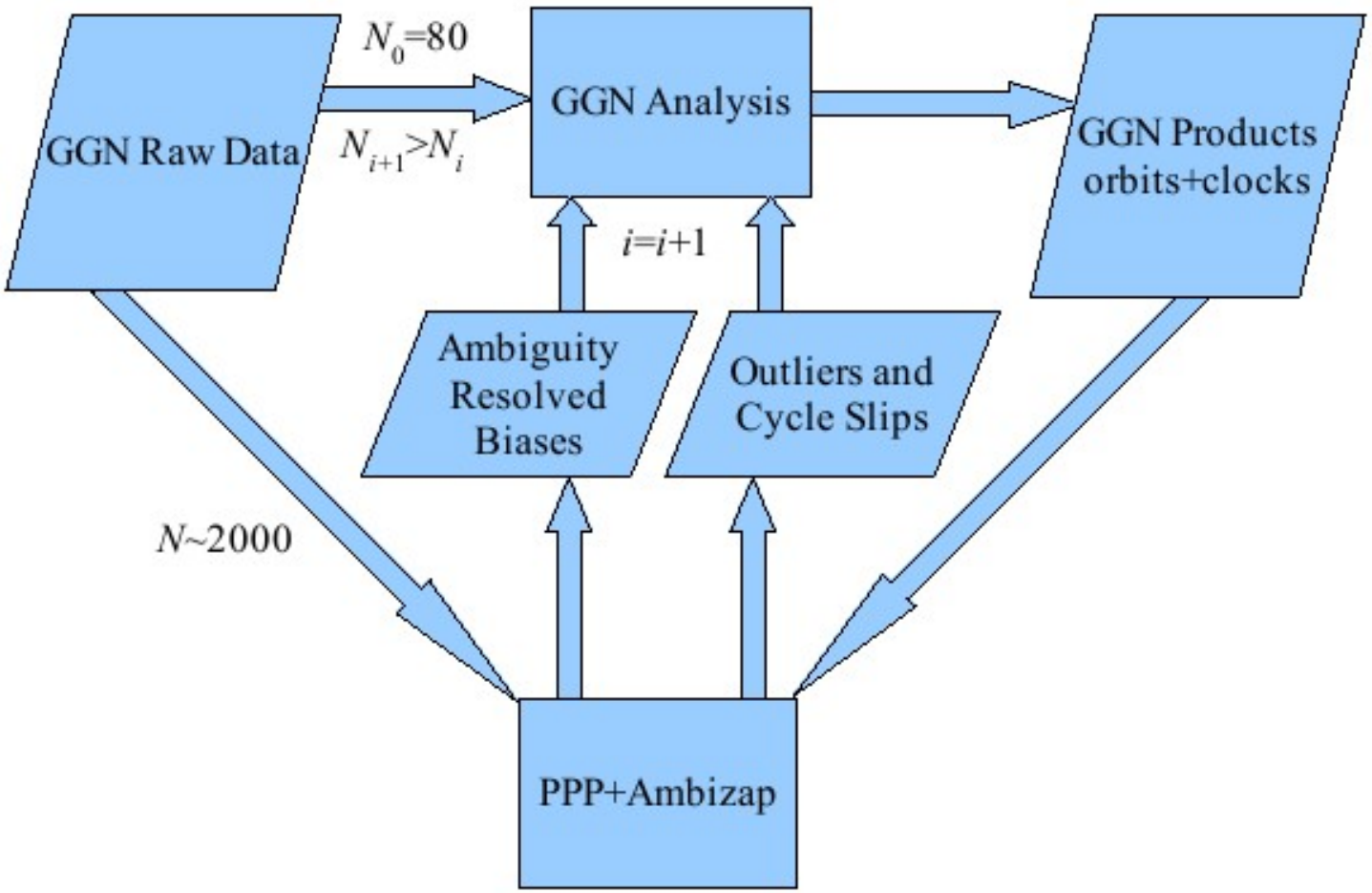



CGPS stations/day analyzed at UNR
IGS subset
Number of Stations
Date (Year)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
1994
1996
1998
2000
2002
2004
2006
2008

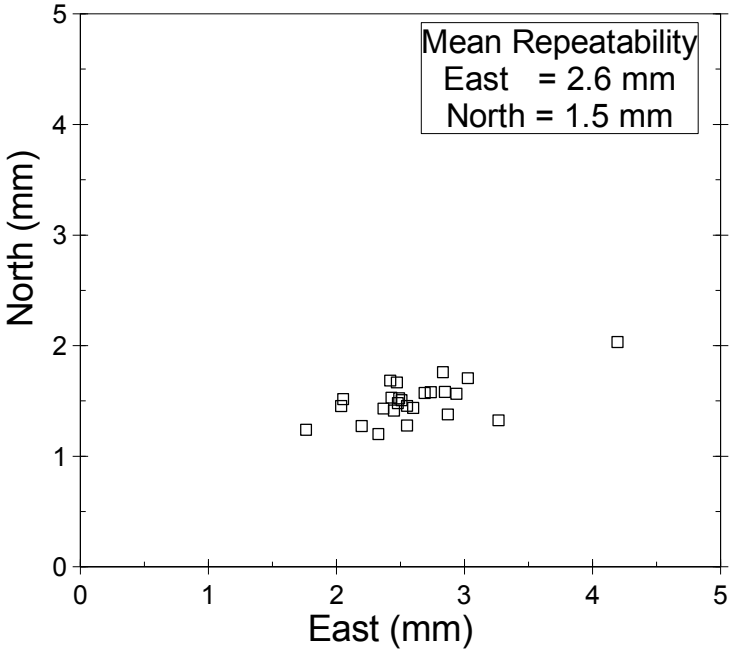

1.0000
0.1000
0.0100
0.0010
0.0001
Time (Days)
10
100
1000
2000
N Stations
Filter + Ambiguity
Resolution Run Time
Full Bootstrap
(original ambigon)
Cluster Bootstrap
(ambigon_p1)
No Bootstrap
(JPL GGN Analysis)
PPP + Ambizap
(used here)

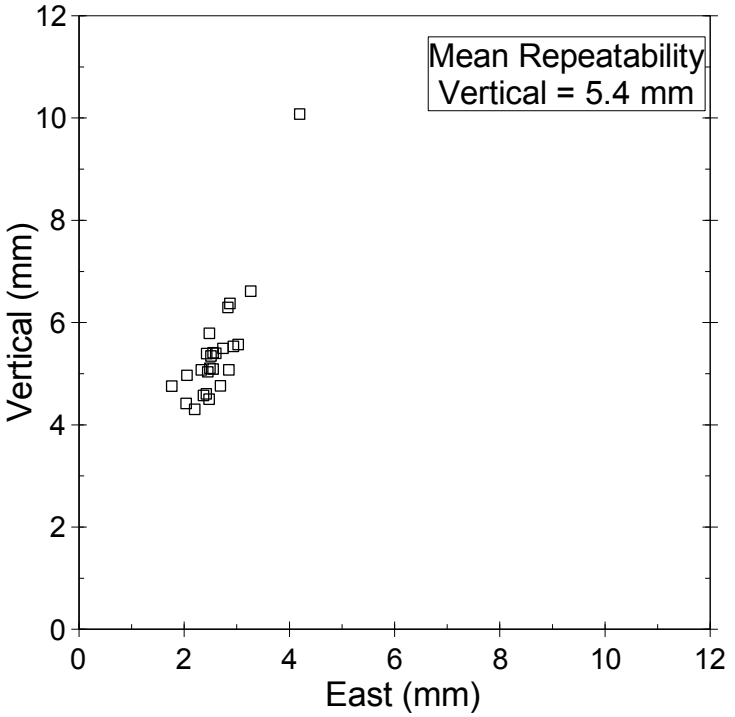
Future Development (with Willy Bertiger, JPL):

Application of Ambizap to Global GPS Network (GGN) analysis at JPL to improve IGS orbits and reference frame by simultaneous analysis of ~400 global stations

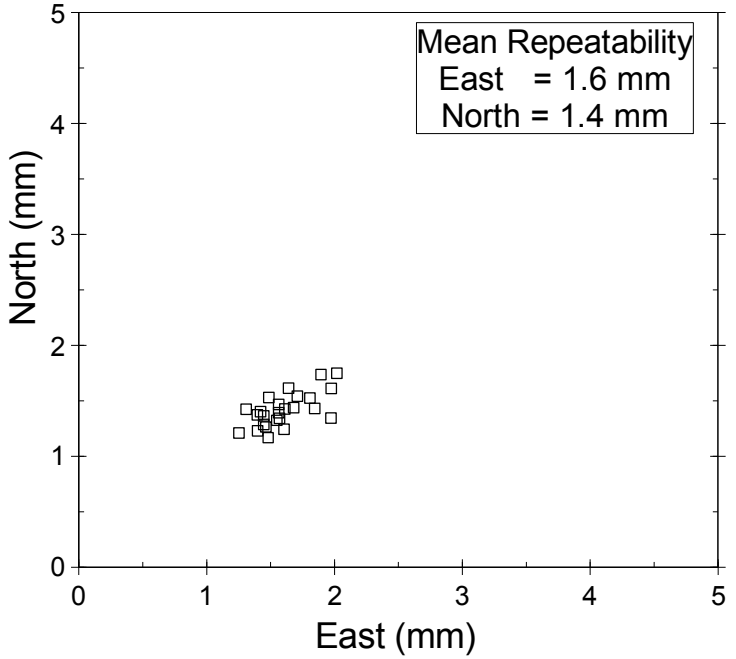


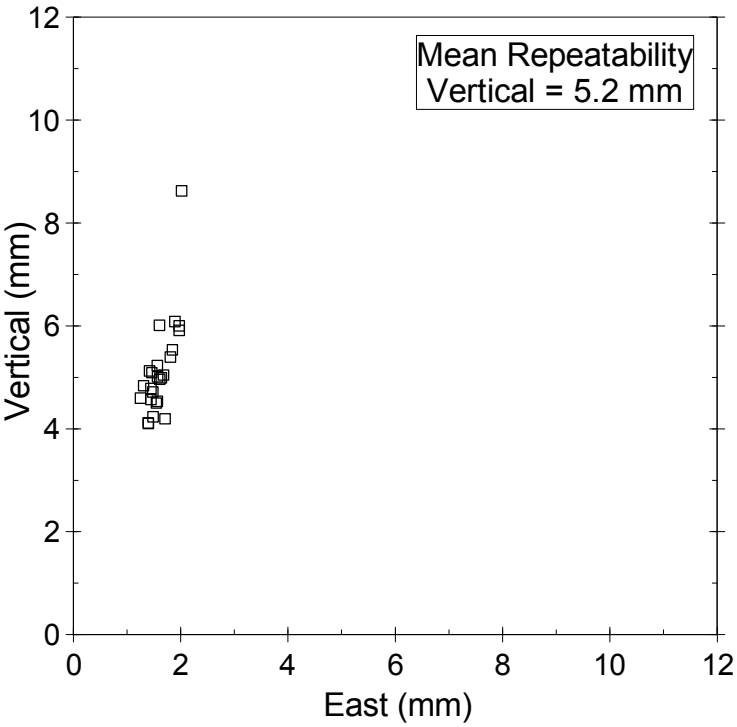
Repeatability for 25 Stations BEFORE Ambiguity Resolution

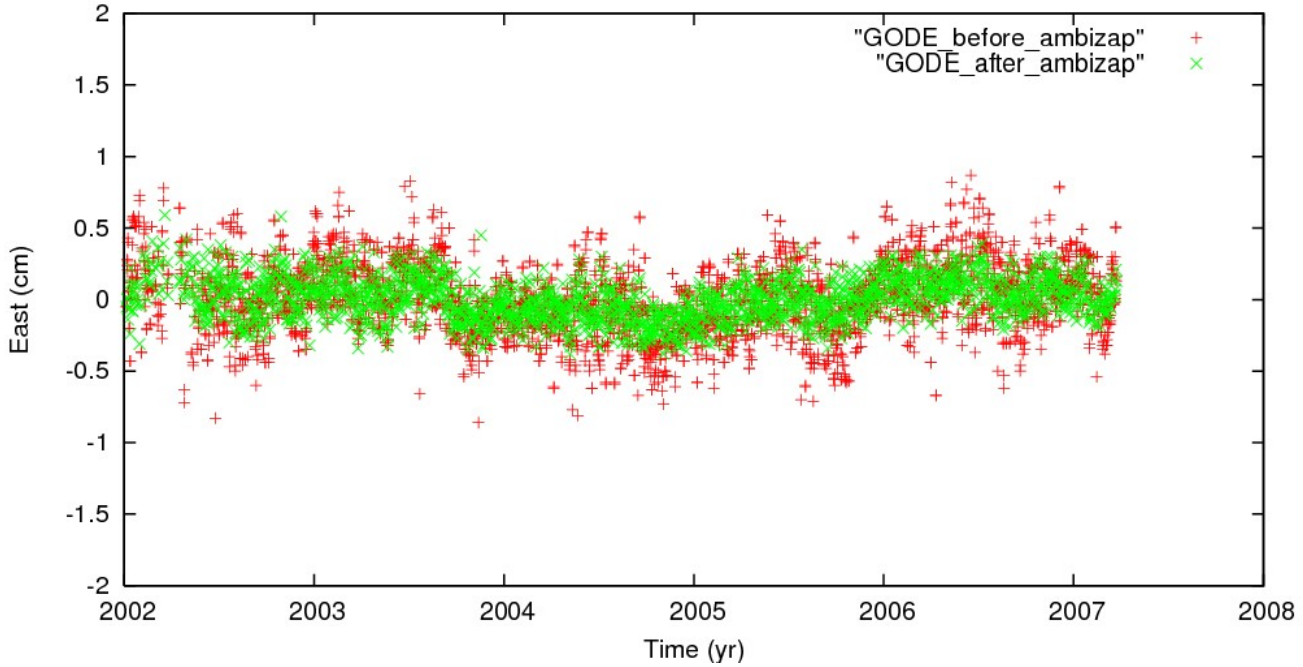


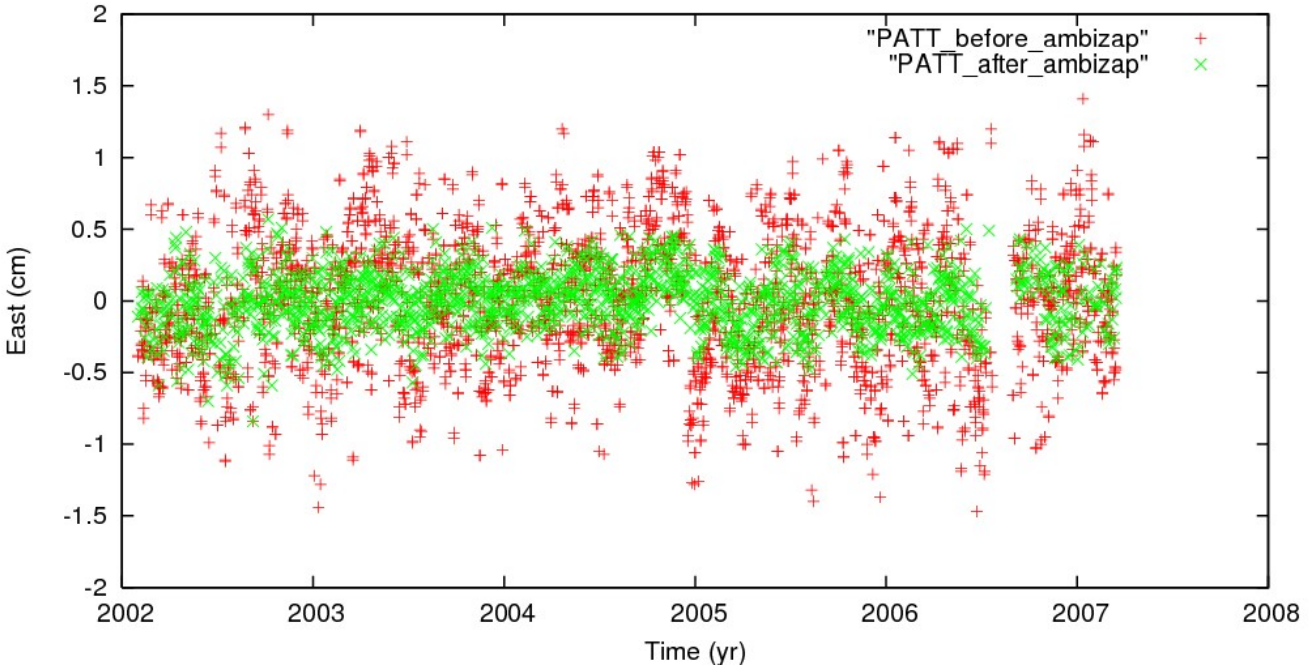


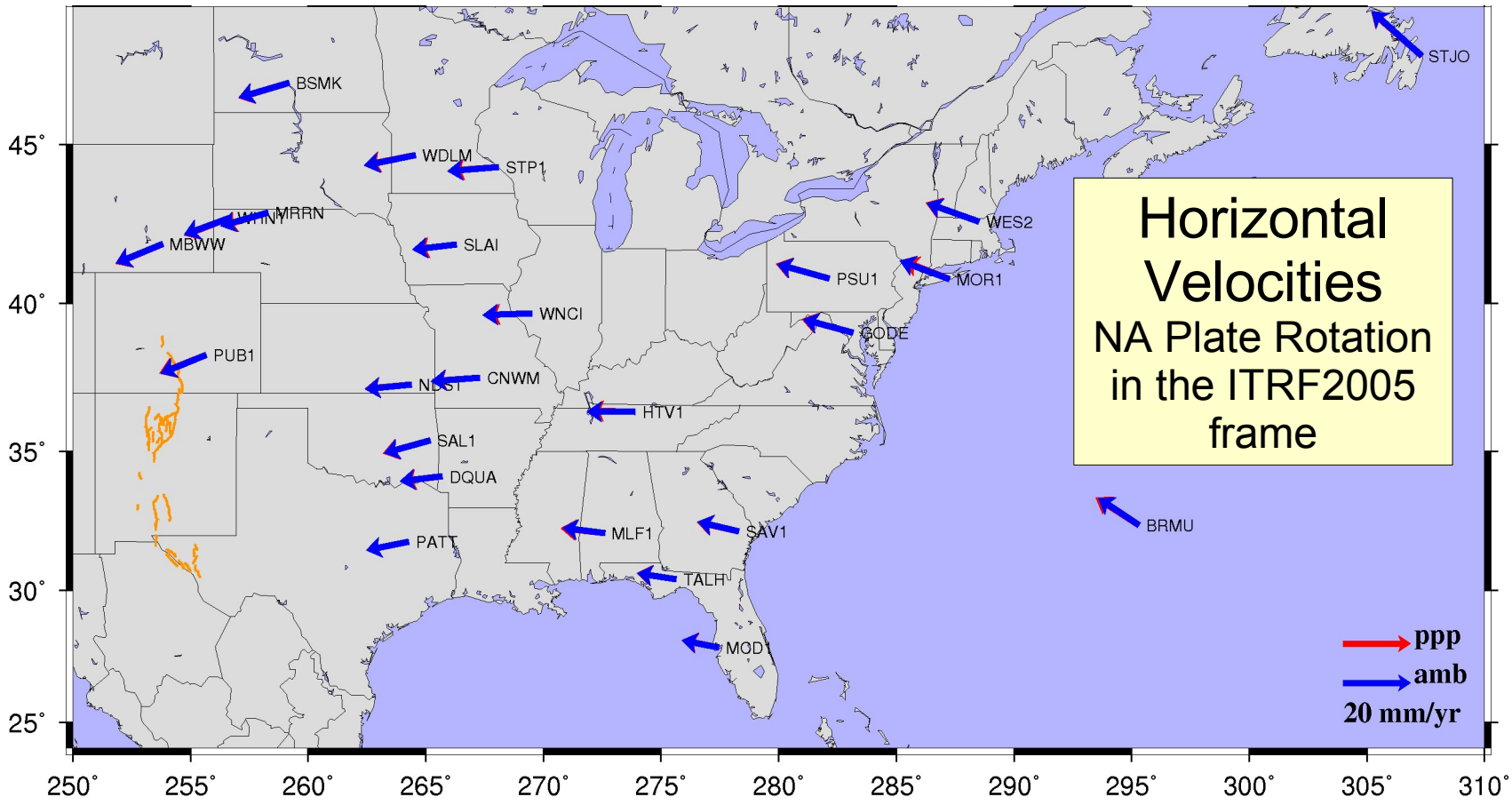
Repeatability for 25 Stations AFTER Ambiguity Resolution

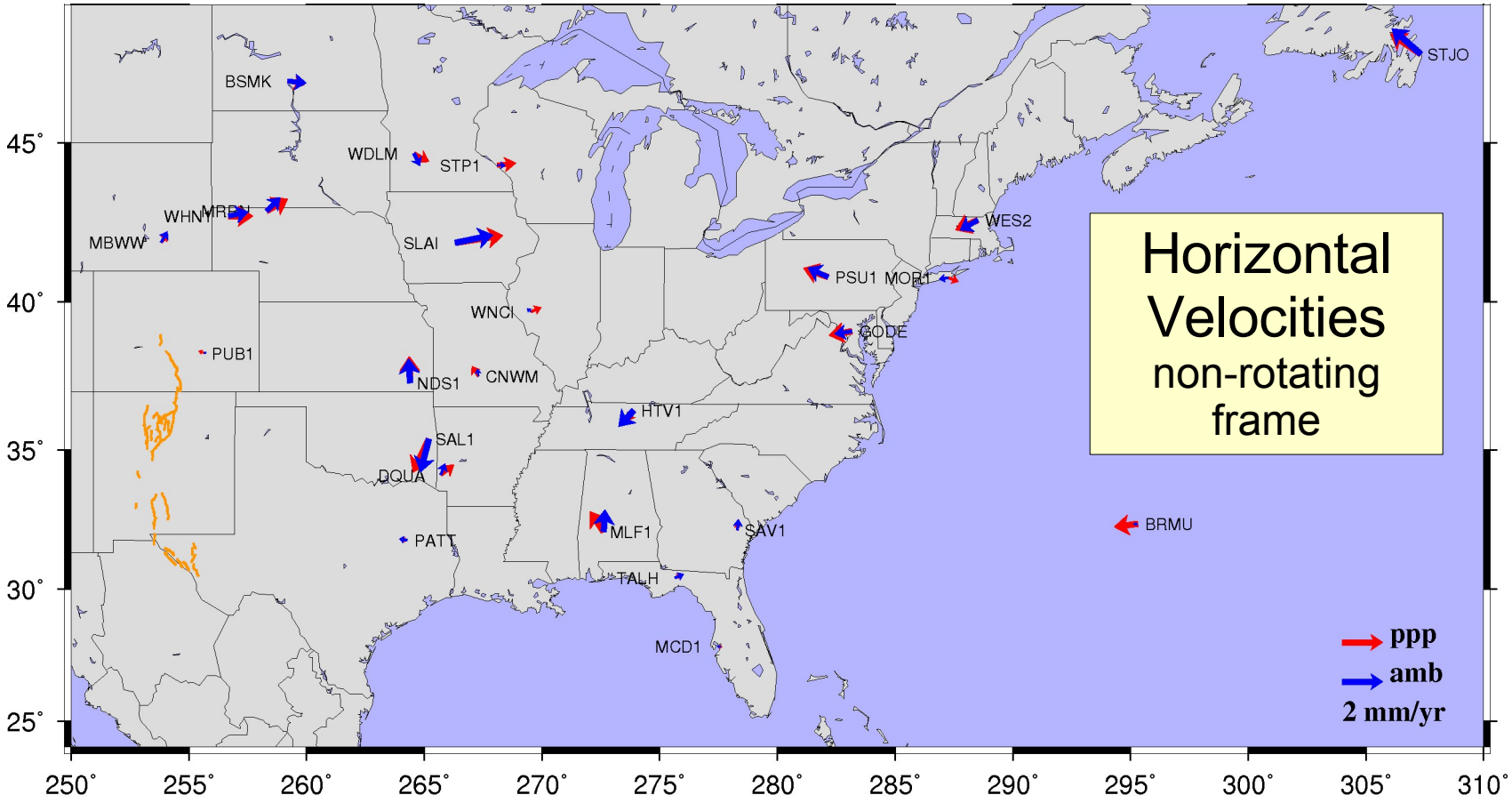


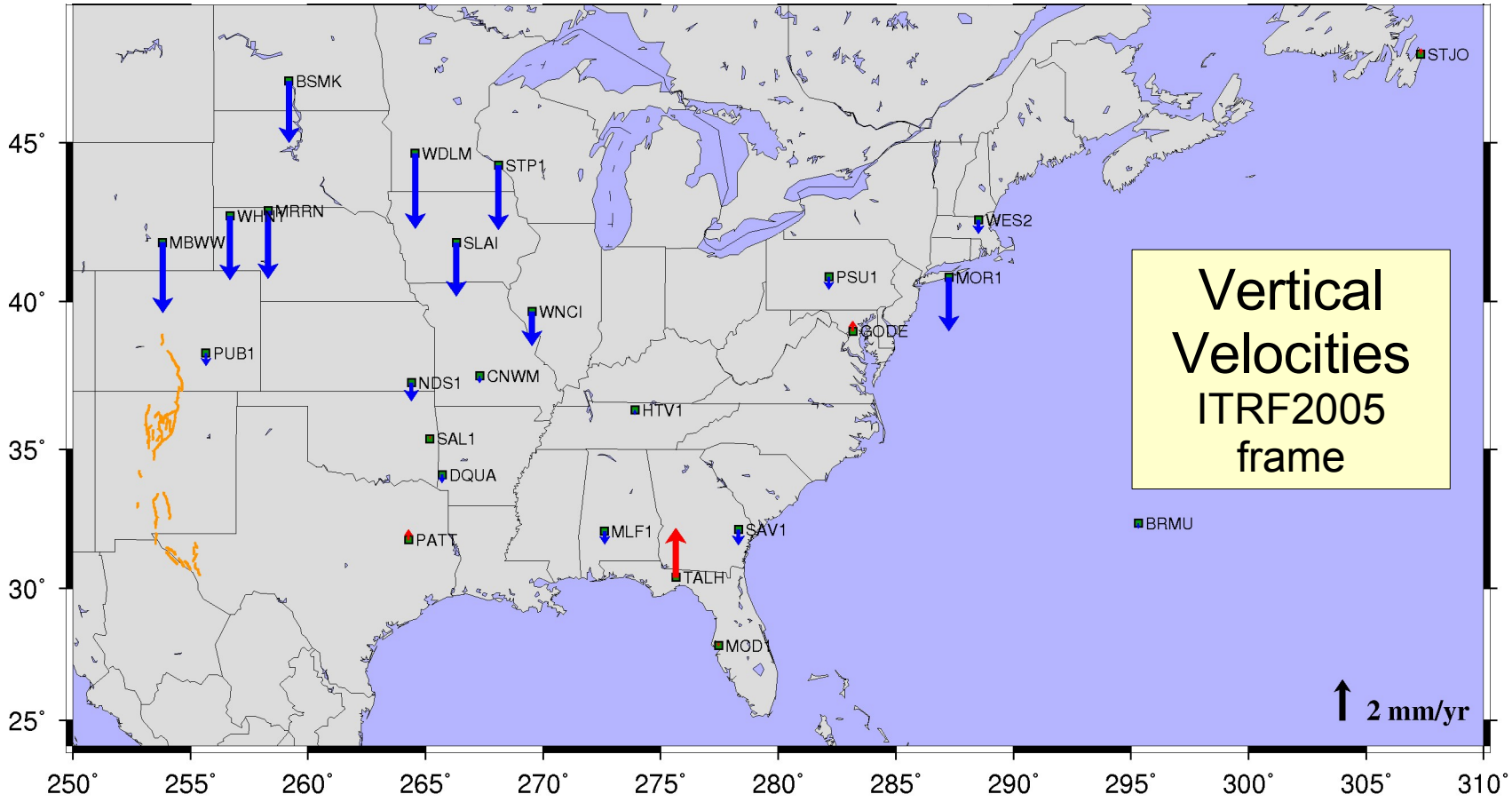



"GODE_before_ambizap"
"GODE_after_ambizap"
East (cm)
Time (yr)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
2002
2003
2004
2005
2006
2007
2008

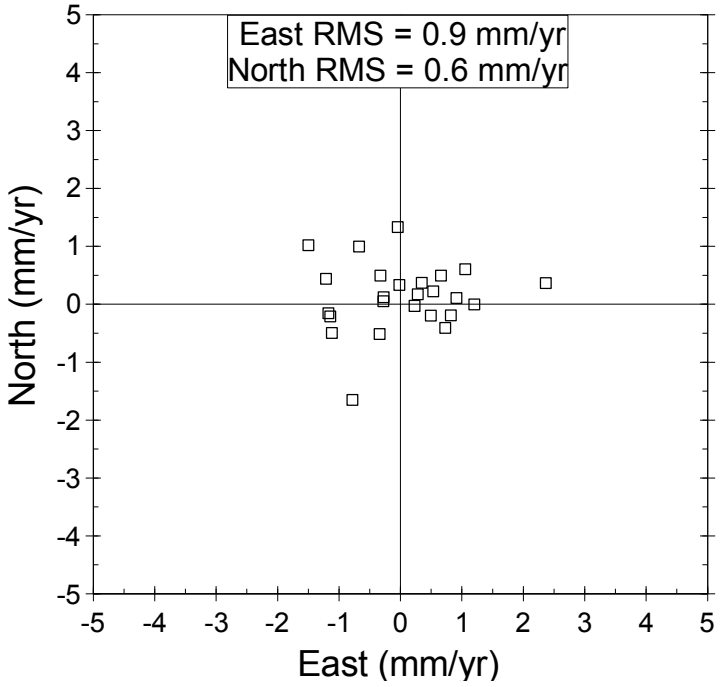

"PATT_before_ambizap"
"PATT_after_ambizap"
East (cm)
Time (yr)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
2002
2003
2004
2005
2006
2007
2008


Horizontal Velocities
NA Plate Rotation in the ITRF2005 frame
BSMK
WDLM
STP1
MRRN
MBWW
SLAI
WNCI
PUB1
CNWM
HTV1
SAL1
DQUA
PATT
MLF1
SAV1
TALH
MOD1
BRMU
PSU1
MOR1
WES2
GODE
STJO
ppp
amb
20 mm/yr
45˚
40˚
35˚
30˚
25˚
250˚
255˚
260˚
265˚
270˚
275˚
280˚
285˚
290˚
295˚
300˚
305˚
310˚

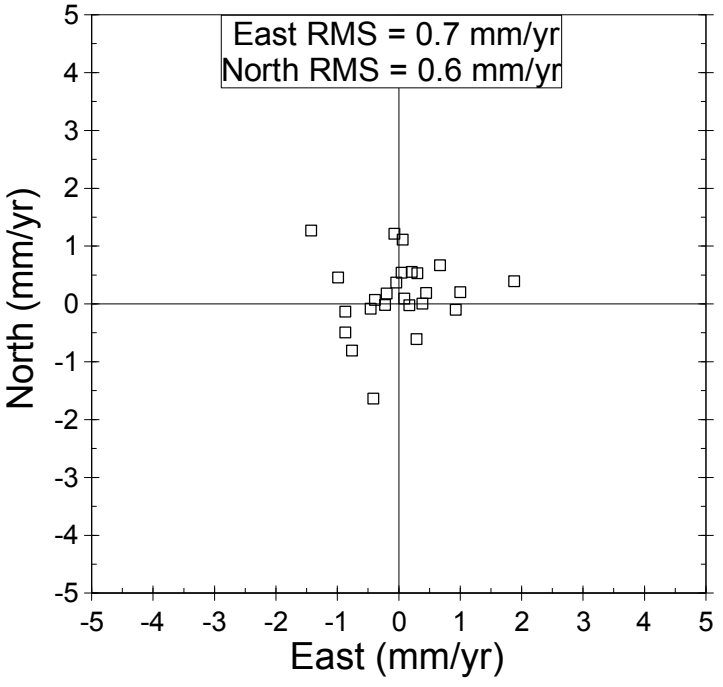

Horizontal Velocities
non-rotating frame
ppp
amb
2 mm/yr
BSMK
WDLM
STP1
WHN1
MBWW
SLAI
WNCI
PUB1
NDS1
CNWM
HTV1
SAL1
DQUA
PATT
MLF1
SAV1
TALH
MCD1
PSU1
MORI
WES2
GODE
BRMU
STJO
45˚
40˚
35˚
30˚
25˚
250˚
255˚
260˚
265˚
270˚
275˚
280˚
285˚
290˚
295˚
300˚
305˚
310˚

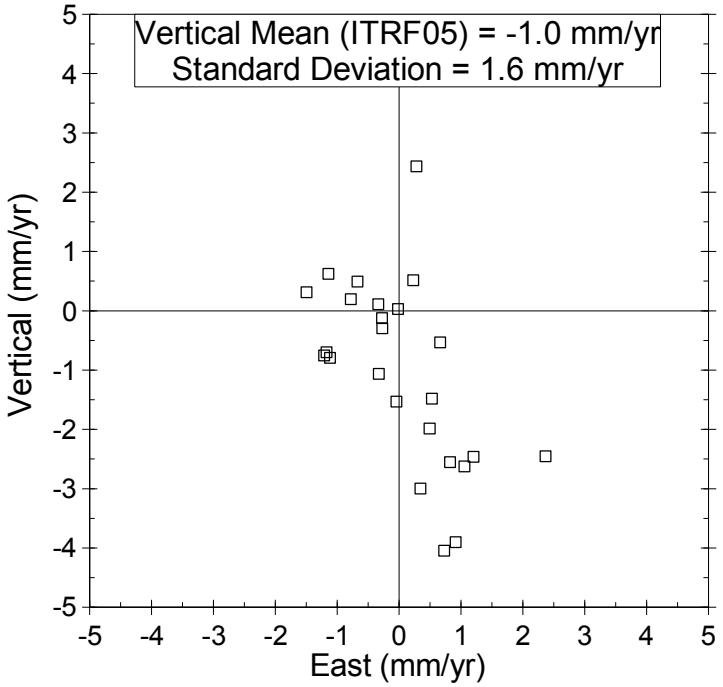

Vertical
Velocities
ITRF2005
frame
BSMK
WDLM
STP1
MRRN
WHIT
MBWW
SLAI
WES2
PSU1
MOR1
WNCI
GODE
PUB1
NDS1
CNWM
HTV1
SAL1
DQUA
PATT
MLF1
SAV1
TALH
MOD1
BRMU
STJO
2 mm/yr
45˚
40˚
35˚
30˚
25˚
250˚
255˚
260˚
265˚
270˚
275˚
280˚
285˚
290˚
295˚
300˚
305˚
310˚

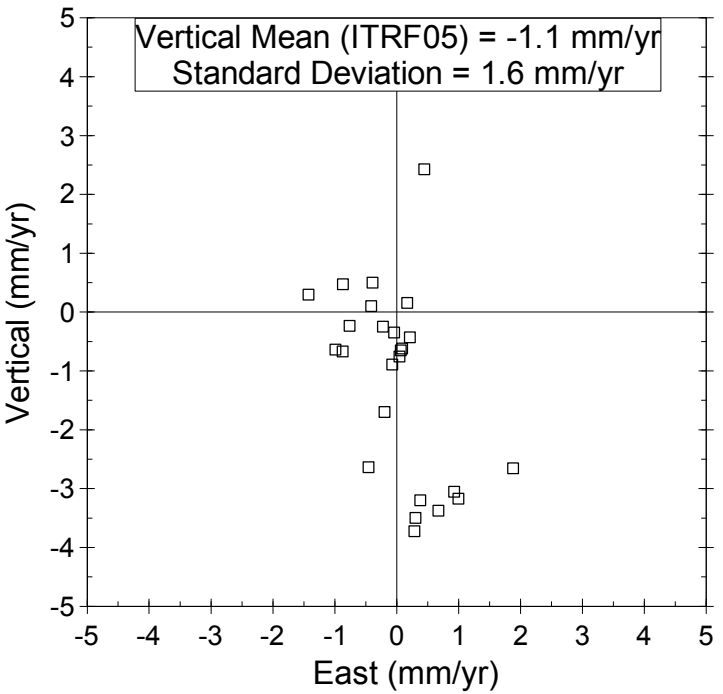
Velocities in NA Frame BEFORE Ambiguity Resolution



Velocities in NA Frame AFTER Ambiguity Resolution







COMPARISON OF PLATE ROTATION VECTORS

Solutions for the rotation of stable North America with respect to reference frame ITRF2005

STUDY	LATITUDE	LONGITUDE	RATE
Altamimi et al. (2007)	-4.291±0.861º	272.615±0.571º	0.192±0.002º/Ma
This study	-5.114º	271.560º	0.186º/Ma