



**Presented at the FIG Working Week 2023,  
28 May - 1 June 2023 in Orlando, Florida, USA**

# FIG WORKING WEEK 2023

28 May - 1 June 2023 Orlando Florida USA

Protecting  
Our World,  
Conquering  
New Frontiers

# NOAA CORS Network

## History & Current Status

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Silver Spring, MD 20910  
USA



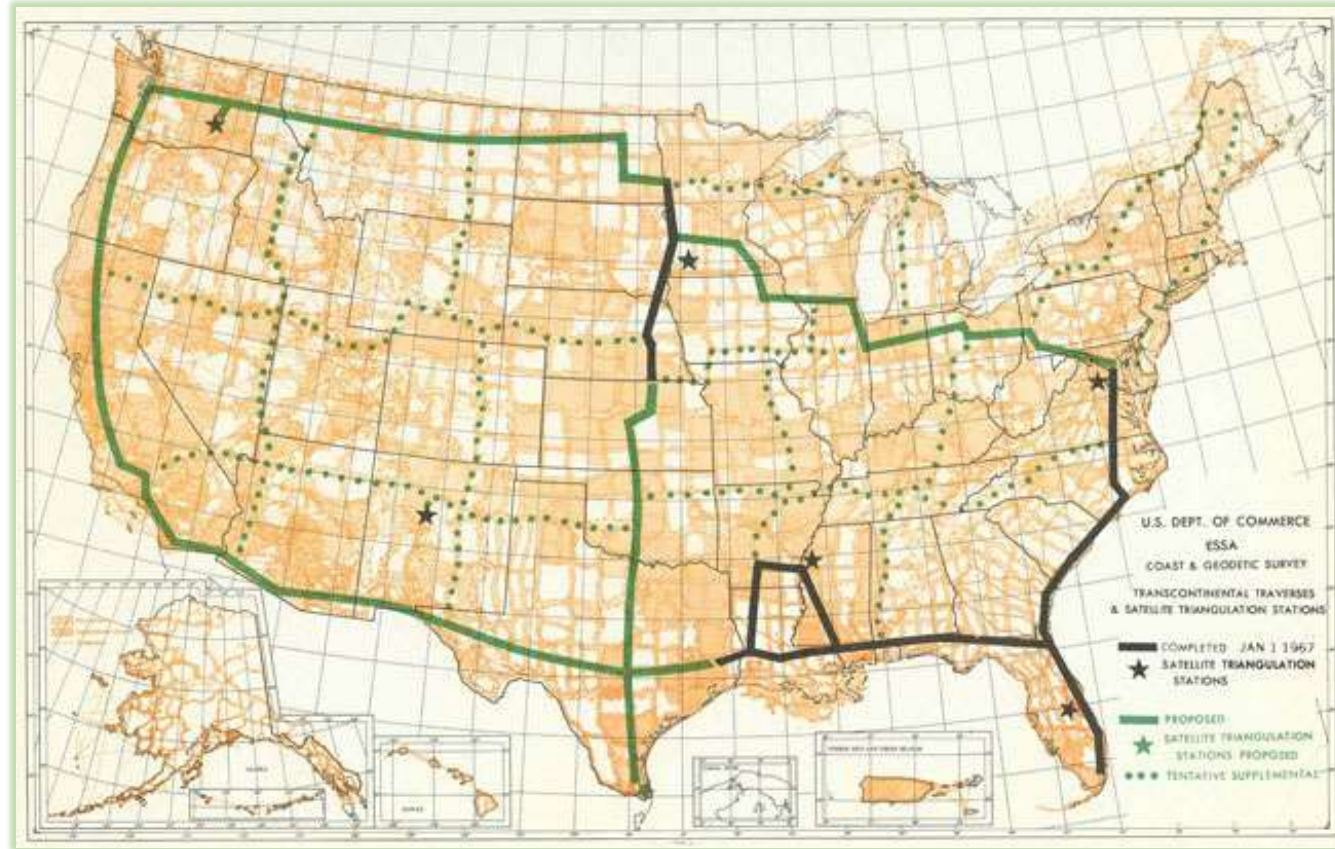
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## NSRS: Passive Geodetic Controls

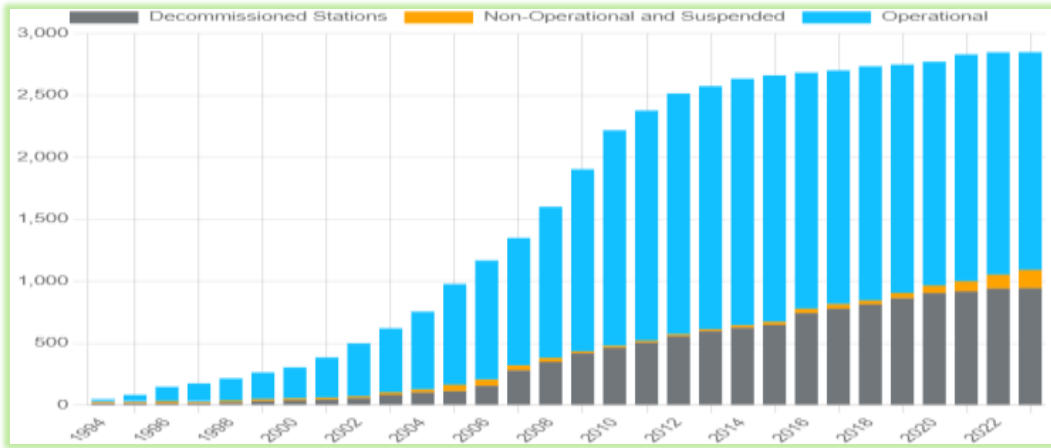


Hard to access  
Passive Monument



Destroyed Geodetic Control  
No Coordinates/Elevation!

## NSRS: NOAA CORS Network



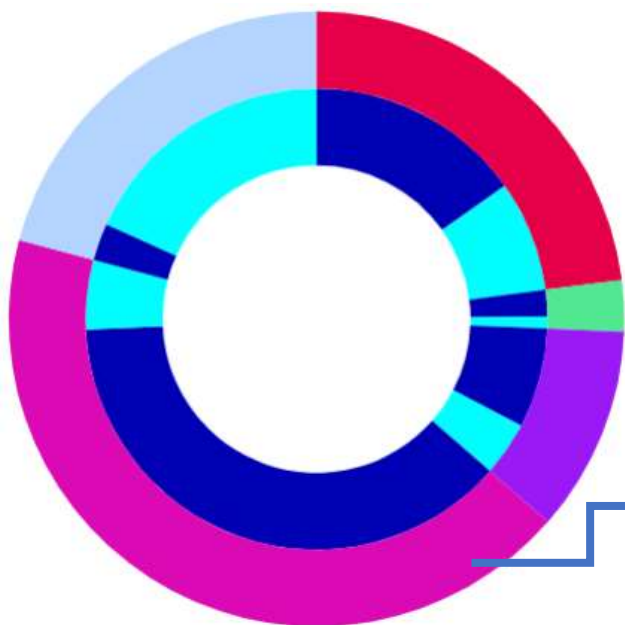
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012  
2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023

NCN in 1994 : 5 stations, in which:

- Operational stations: 5
- Non-Operational and Suspended stations: 0
- Decommissioned stations: 0

## Participating Agencies

223 Partners, 2833 stations, as of 2023-05-10



**Education:** 38 partners, 651 stations (22.98%), including:

- GNSS: 430 stations (66.05%)
- GPS-only: 221 stations (33.95%)

**Foreign Governments:** 16 partners, 76 stations (2.68%), including:

- GNSS: 52 stations (68.42%)
- GPS-only: 24 stations (31.58%)

**Private Industry:** 52 partners, 306 stations (10.80%), including:

- GNSS: 198 stations (64.71%)
- GPS-only: 108 stations (35.29%)

**State and Local Governments:** 96 partners, 1209 stations (42.68%), including:

- GNSS: 1071 stations (88.59%)
- GPS-only: 138 stations (11.41%)

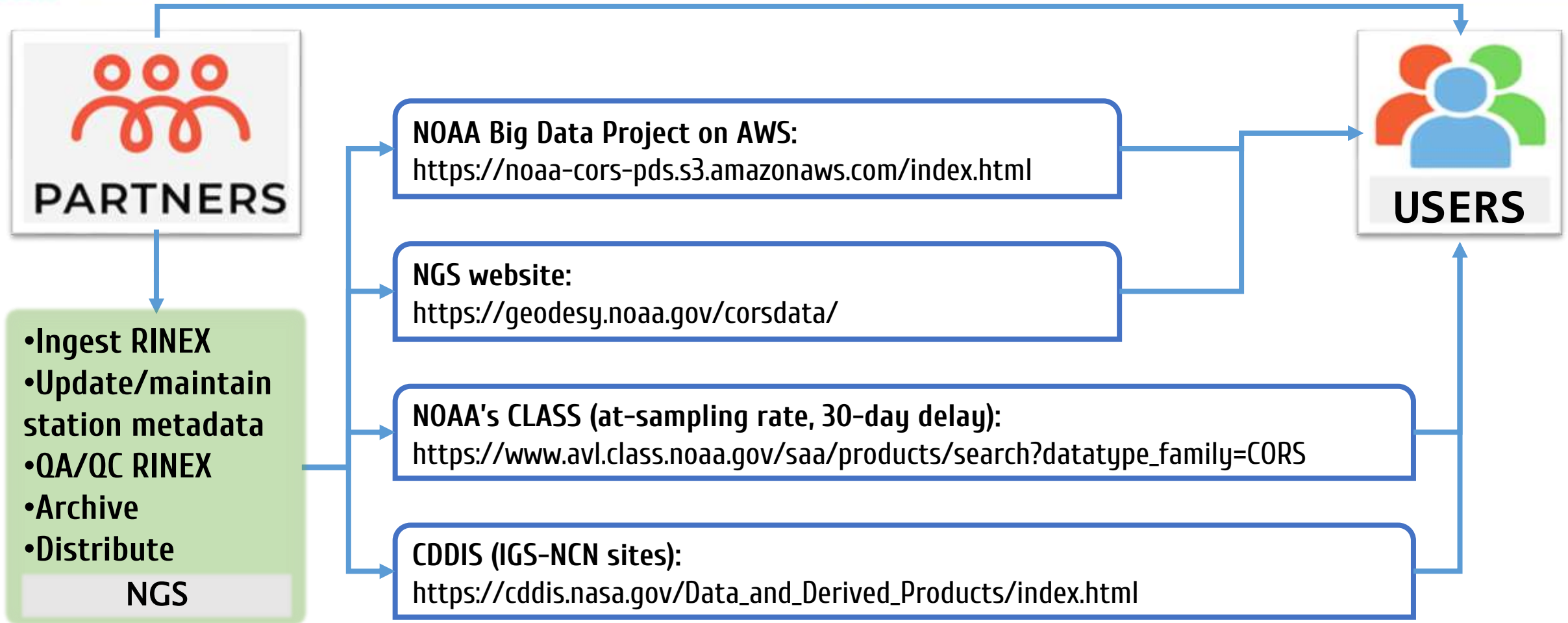
**U.S. Federal Agencies:** 20 partners, 591 stations (20.86%), including:

- GNSS: 74 stations (12.52%)
- GPS-only: 517 stations (87.48%)

Responsible Agency	Total	Op.	Non-Op.	Sus.	Dec.
UNAVCO	502	385	117	2	18
U.S. Coast Guard (USCG)	394				394
Texas DOT	181	147			34
Michigan DOT	108	98	3		7
SmartNet North America	103	76	4		23
North Carolina Geodetic Survey	96	74	1		21
Missouri DOT	92	71			21
Ohio DOT	66	48			18
Minnesota DOT	61	48	5	1	7
U.S. National Geodetic Survey	56	24	12	2	18

Co.	St.	SiteID	Ages (years)	Collect Freq.	Constellation	Responsible Agency
ES	ES	SSIA	22	Daily	GPS+GAL+GLO	Centro Nacional de Registros, El Salvador
US	ND	BSMK	21	Hourly	GPS+GLO	City of Bismarck
US	MD	BACO	15	Hourly	GPS+GAL+GLO	Baltimore County MD, Land Survey Division
US	IN	AUBN	14	Hourly	GPS+GLO	City of Auburn Information Systems Indiana
US	CA	SACR	14	Hourly	GPS+GAL+GLO	California Surveying and Drafting Supply Inc.
US	NY	ASCS	13	Hourly	GPS+GLO	Alfred State College
US	OH	BGOH	13	Hourly	GPS+GAL+GLO	City of Bowling Green, Ohio
US	NE	NEHO	12	Hourly	GPS+GLO	Central Nebraska Public Power Irrigation District
BD	BD	BMPD	10	Hourly	GPS+GLO	Bermuda, Dept. of Land Surveys and Registration

Each contribution is important & valuable for enhancing the quality & accuracy of the NSRS

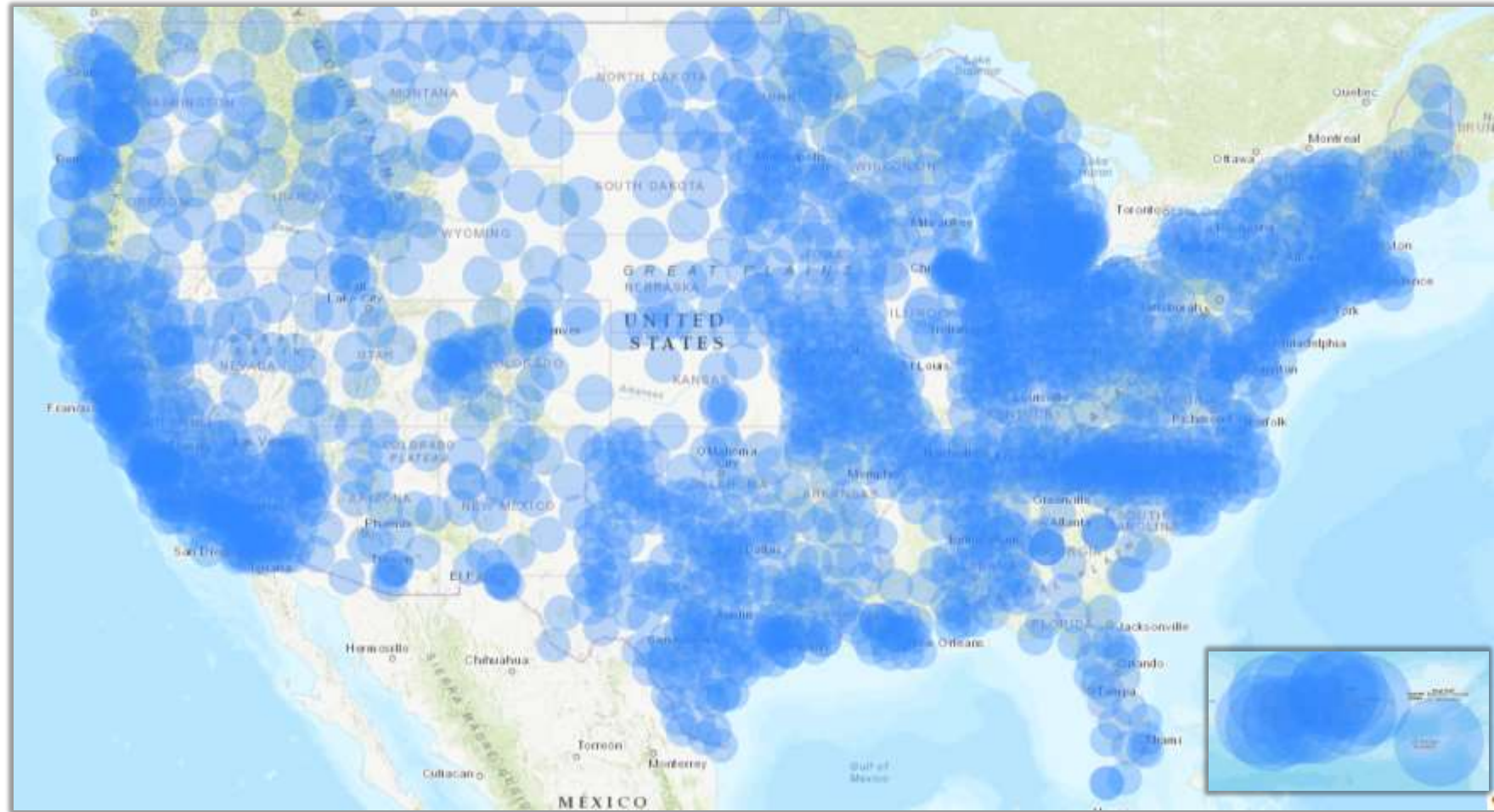
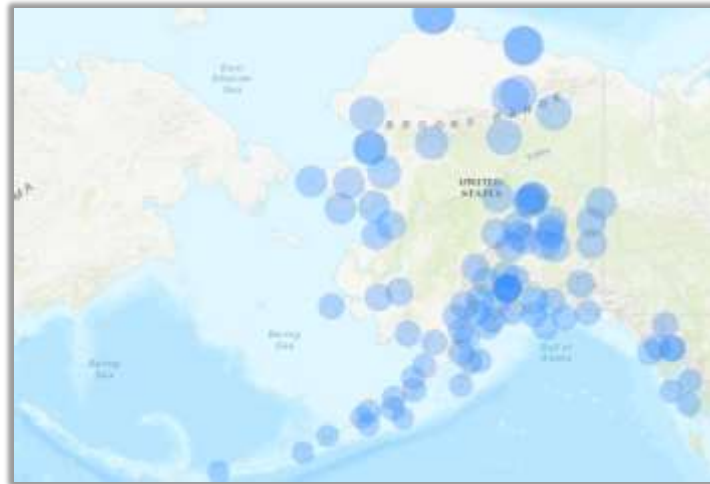




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(USA) NCN 70-km coverage of Operation stations  
(May 10, 2023)

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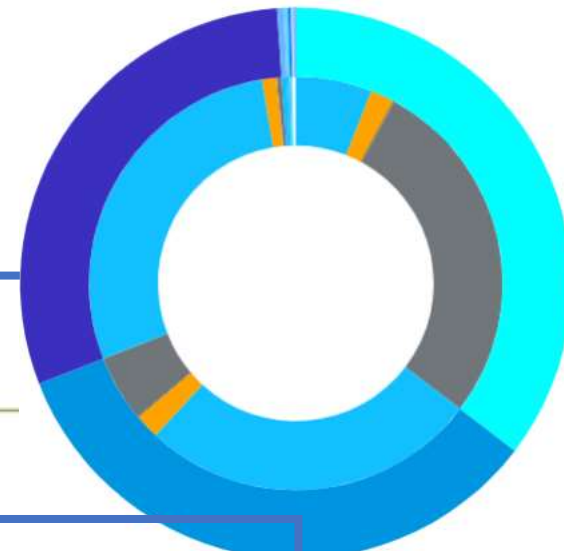
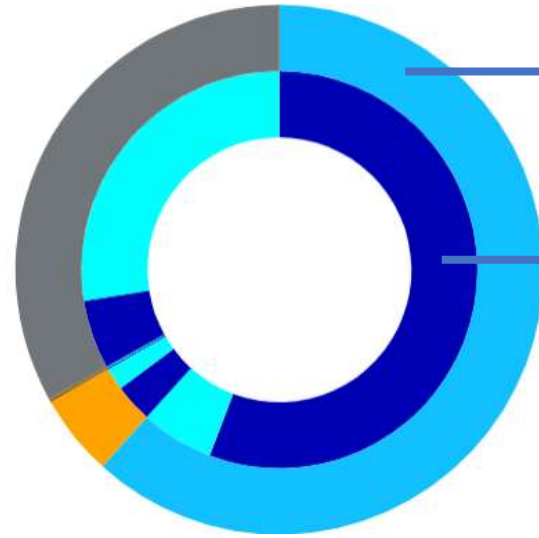
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- GPS:** 1008 stations (35.39%), including:
  - Operational: 170 (16.87%)
  - Non-Operational: 52 (5.16%)
  - Suspended: 3 (0.30%)
  - Decommissioned: 783 (77.68%)

- GPS+GLO:** 959 stations (33.67%), including:
  - Operational: 754 (78.62%)
  - Non-Operational: 54 (5.63%)
  - Suspended: 2 (0.21%)
  - Decommissioned: 149 (15.54%)

- GPS+GAL+GLO:** 850 stations (29.85%), including:
  - Operational: 806 (94.82%)
  - Non-Operational: 32 (3.76%)
  - Suspended: 2 (0.24%)
  - Decommissioned: 10 (1.18%)

- GPS+BDS+GAL+GLO: 11 stations (0.39%)
- GPS+BDS+GAL+GLO+QZSS: 7 stations (0.25%)
- GPS+GAL+GLO+SBAS: 5 stations (0.18%)
- GPS+BDS+GAL+GLO+QZSS+SBAS: 3 stations (0.11%)
- GPS+BDS+GAL+GLO+SBAS: 2 stations (0.07%)
- GPS+GAL+GLO+QZSS: 1 stations (0.04%)
- GPS+GAL: 1 stations (0.04%), none is Operational
- GPS+BDS+GLO: 1 stations (0.04%)



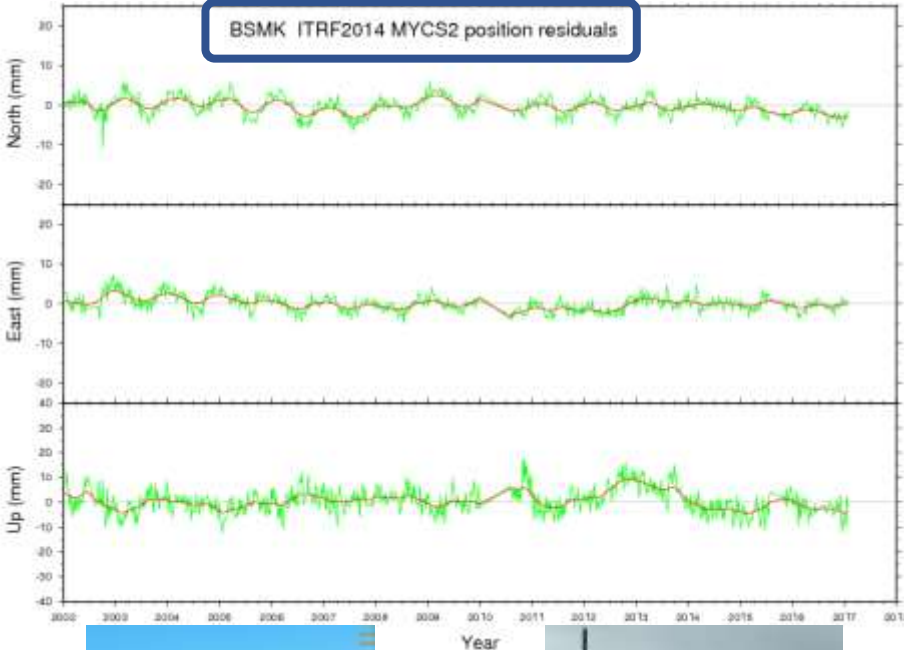
- Operational:** 1757 stations (61.69%), including:
  - GNSS [Operational]: 1587 stations (90.32%)
  - GPS-only [Operational]: 170 stations (9.68%)
- Non-Operational:** 141 stations (4.95%), including:
  - GNSS [Non-Operational]: 89 stations (63.12%)
  - GPS-only [Non-Operational]: 52 stations (36.88%)
- Suspended:** 7 stations (0.25%), including:
  - GNSS [Suspended]: 4 stations (57.14%)
  - GPS-only [Suspended]: 3 stations (42.86%)
- Decommissioned:** 943 stations (33.11%), including:
  - GNSS [Decommissioned]: 160 stations (16.97%)
  - GPS-only [Decommissioned]: 783 stations (83.03%)

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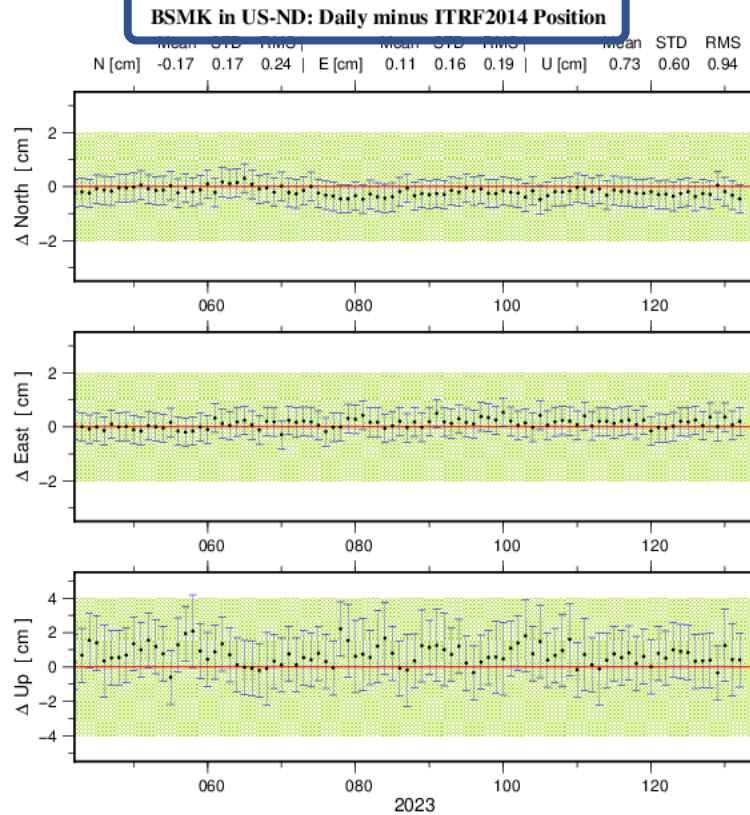


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## BSMK - City of Bismarck, North Dakota, USA



\*\*\*ITRF2014\*\*\*  
BSMK BISMARCK (BSMK), NORTH DAKOTA

Retrieved from NGS DataBase on 06/16/20 at 11:57:26.

Antenna Reference Point(ARP): BSMK BISMARCK CORS ARP

PID = A37216

### ITRF2014 POSITION (EPOCH 2010.0)

Computed in Jun 2019 using data through gpswk 1933.

X = -820592.305 m latitude = 46 49 16.05321 N  
Y = -4294897.466 m longitude = 100 49 00.08926 W  
Z = 4628582.349 m ellipsoid height = 551.223 m

### ITRF2014 VELOCITY

Computed in Jun 2019 using data through gpswk 1933.

VX = -0.0160 m/yr northward = -0.0047 m/yr  
VY = 0.0015 m/yr eastward = -0.0160 m/yr  
VZ = -0.0053 m/yr upward = -0.0028 m/yr

### NAD\_83 (2011) POSITION (EPOCH 2010.0)

Transformed from ITRF2014 (epoch 2010.0) position in Jun 2019.

X = -820591.518 m latitude = 46 49 16.02776 N  
Y = -4294898.732 m longitude = 100 49 00.04159 W  
Z = 4628582.368 m ellipsoid height = 551.987 m

### NAD\_83 (2011) VELOCITY

Transformed from ITRF2014 velocity in Jun 2019.

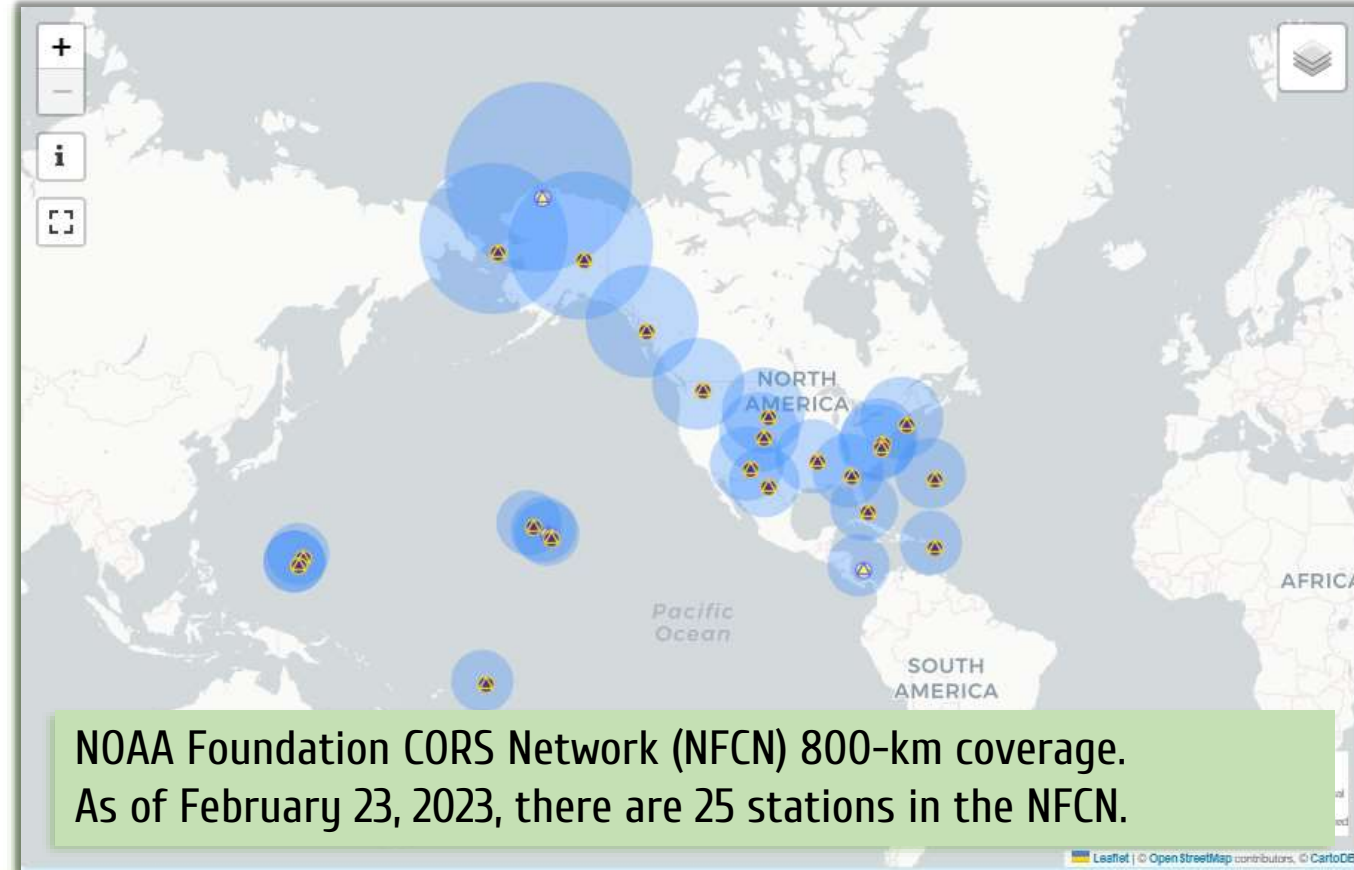
VX = 0.0029 m/yr northward = 0.0003 m/yr  
VY = 0.0025 m/yr eastward = 0.0024 m/yr  
VZ = -0.0027 m/yr upward = -0.0040 m/yr





## NOAA Foundation CORS Network (NFCN)

- A federally controlled network
- Provide support for the ITRF and plate rotation models
- Target Operational Time:
  - Network availability >90% at all times;
  - Individual station down time < 14 days;
- In 2022, NGS received enough funding from BIL to complete installations of NGS's owned stations.

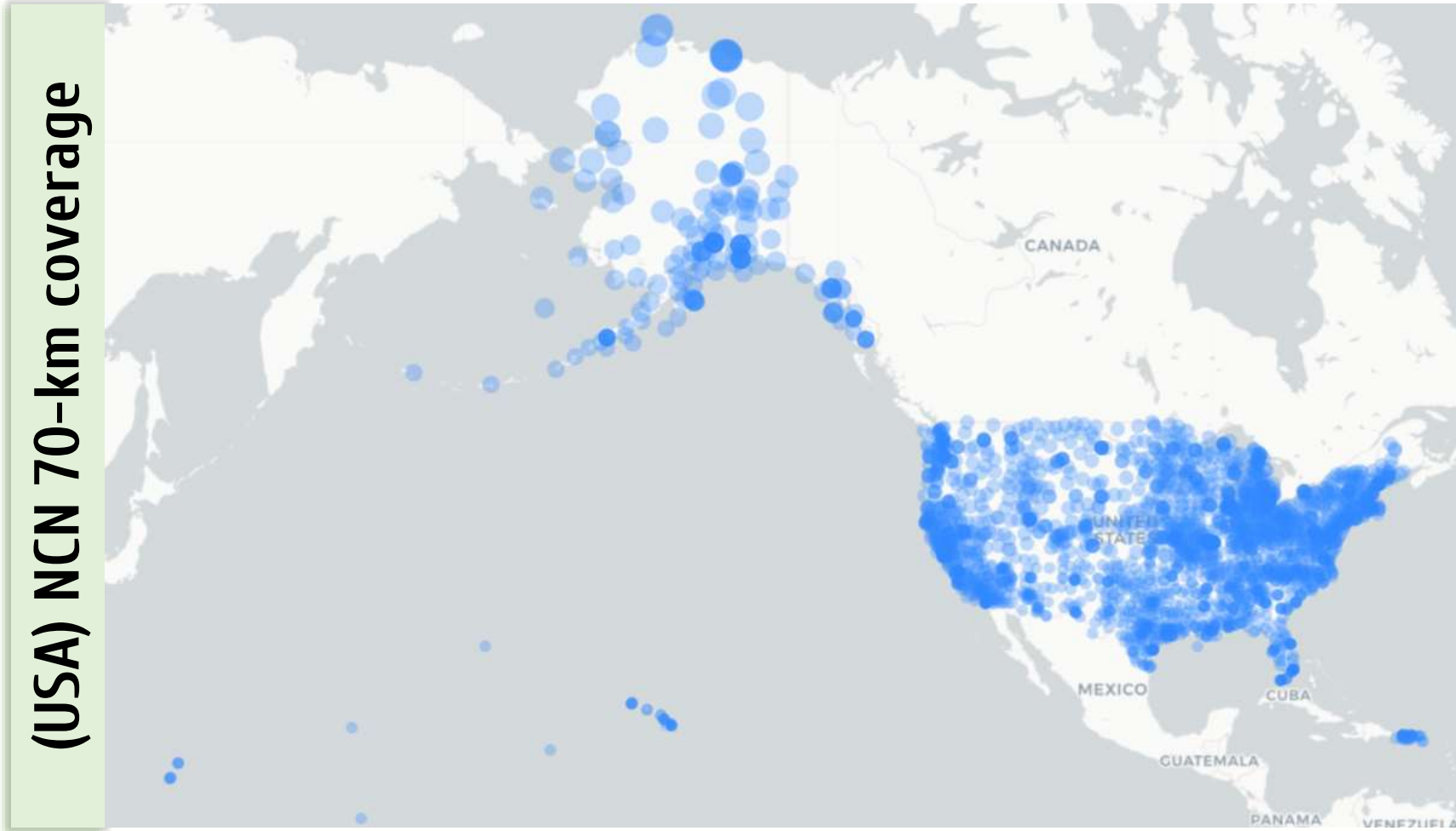




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