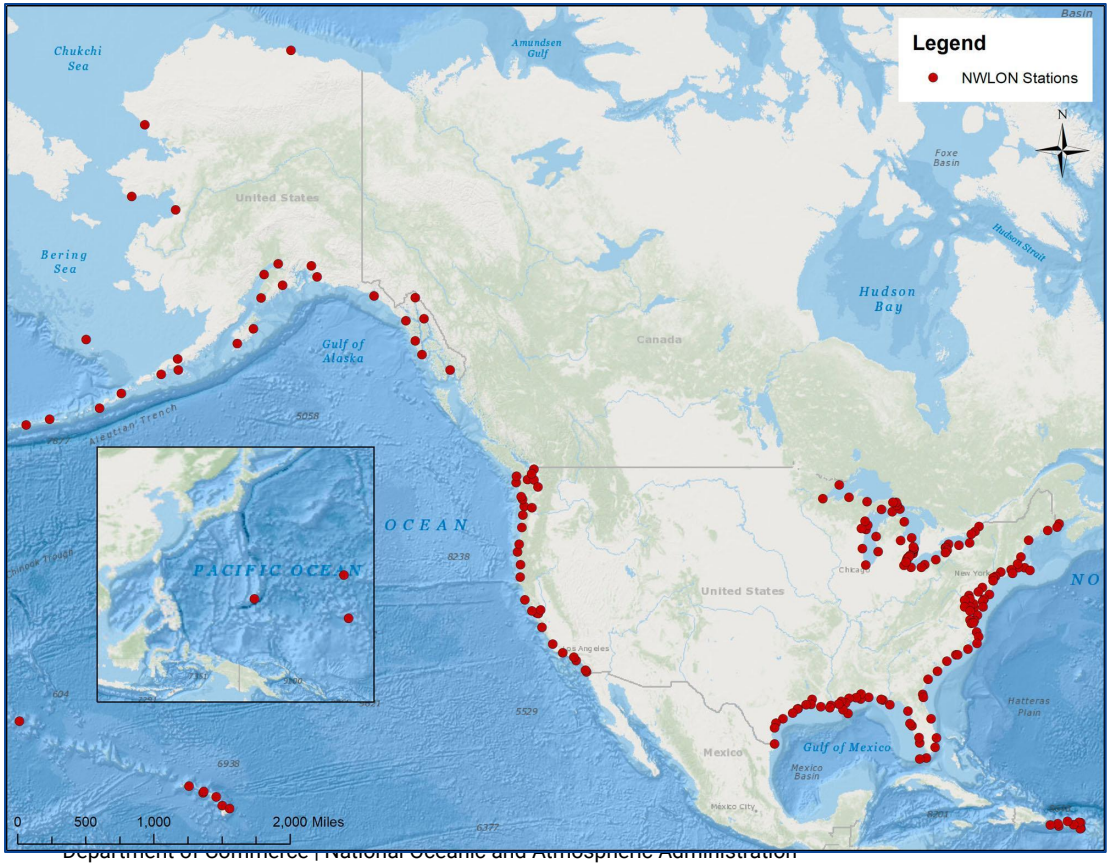
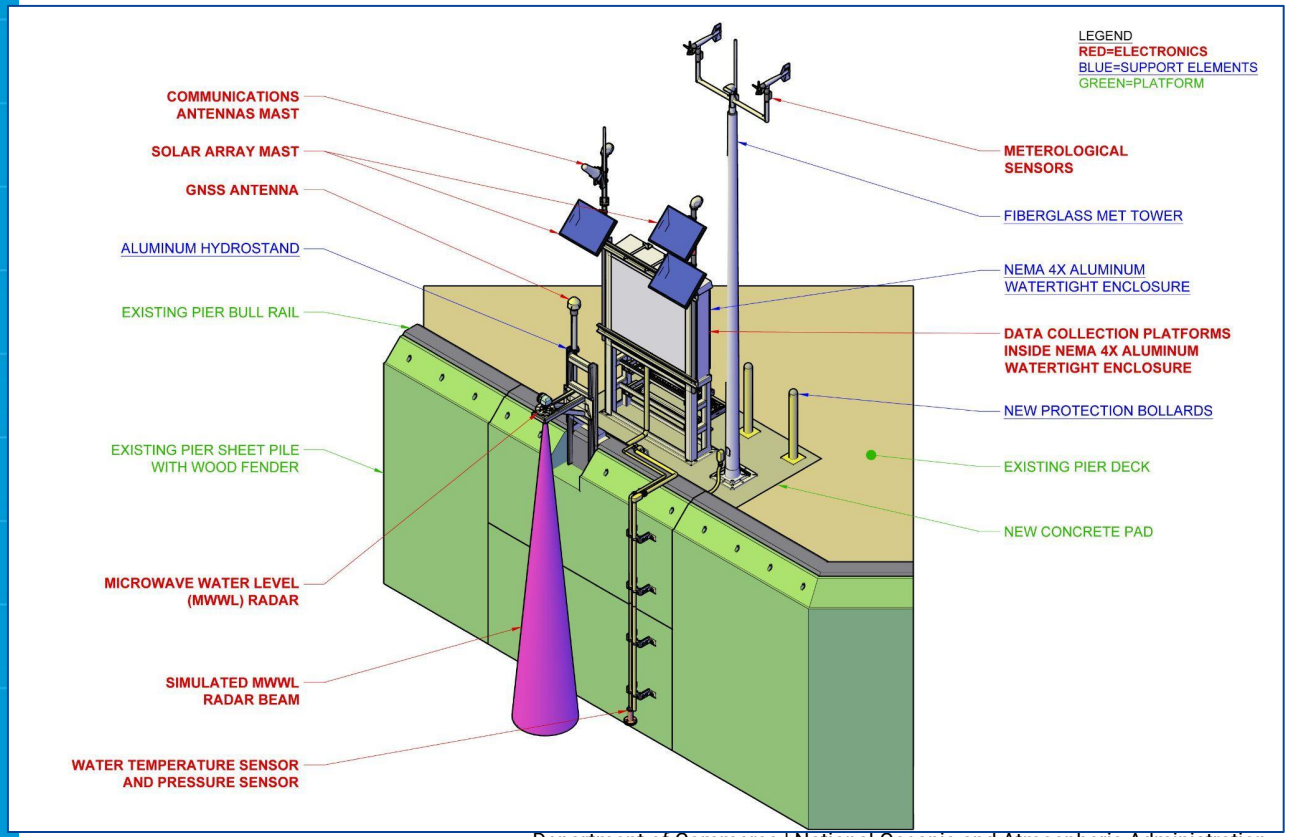
Incorporating GNSS into the National Water Level Observation Network (NWLON)

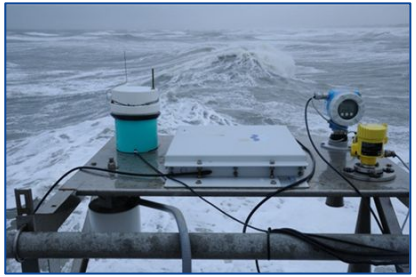
Peter Stone
Bob Heitsenrather, Greg Dusek, Rob Loesch, Adam Grodsky, Eric Breuer
NOAA/NOS/Center for Operational Oceanographic Products and Services (CO-OPS)

National Water Level Observation Network

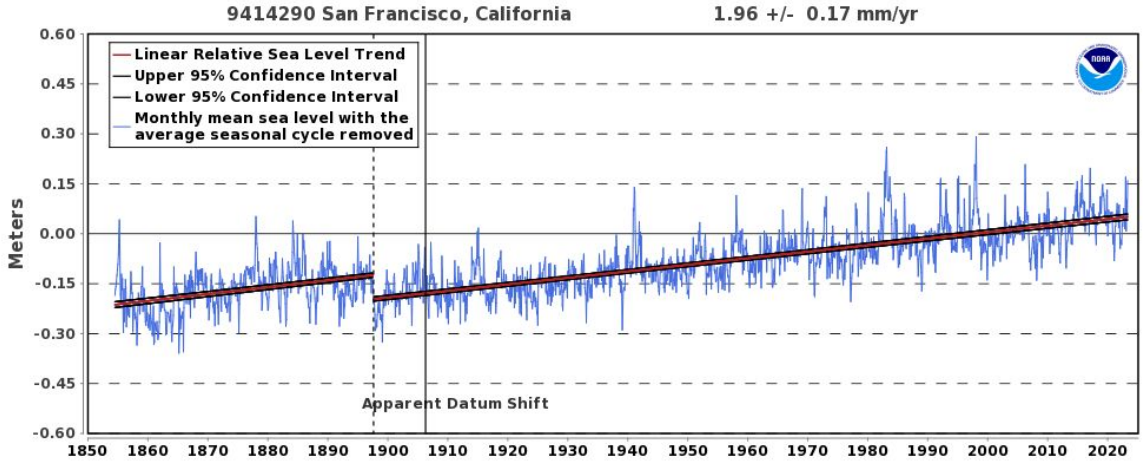


Typical NWLON Station Design





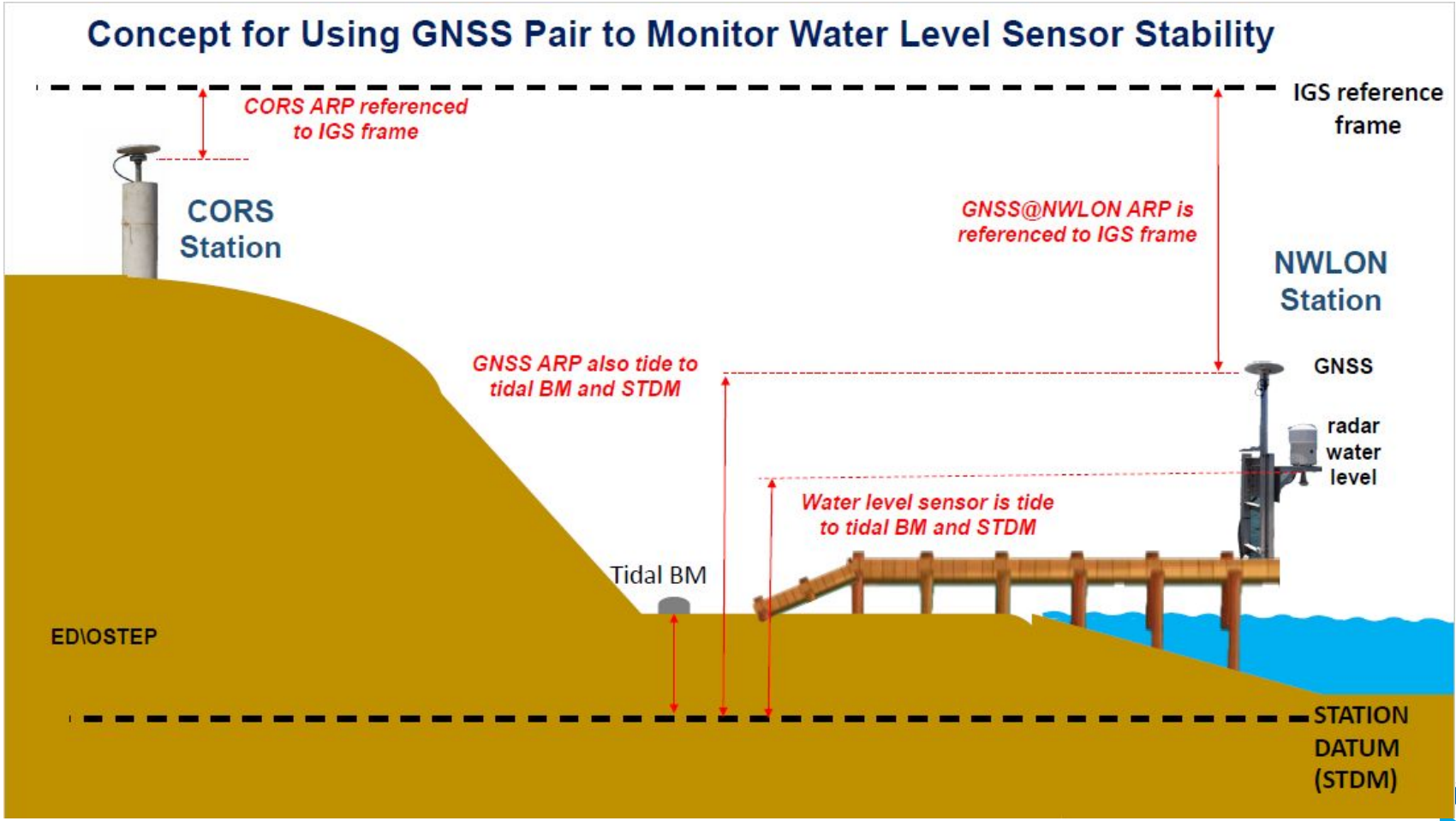
Sea Level Trends from WL Observations



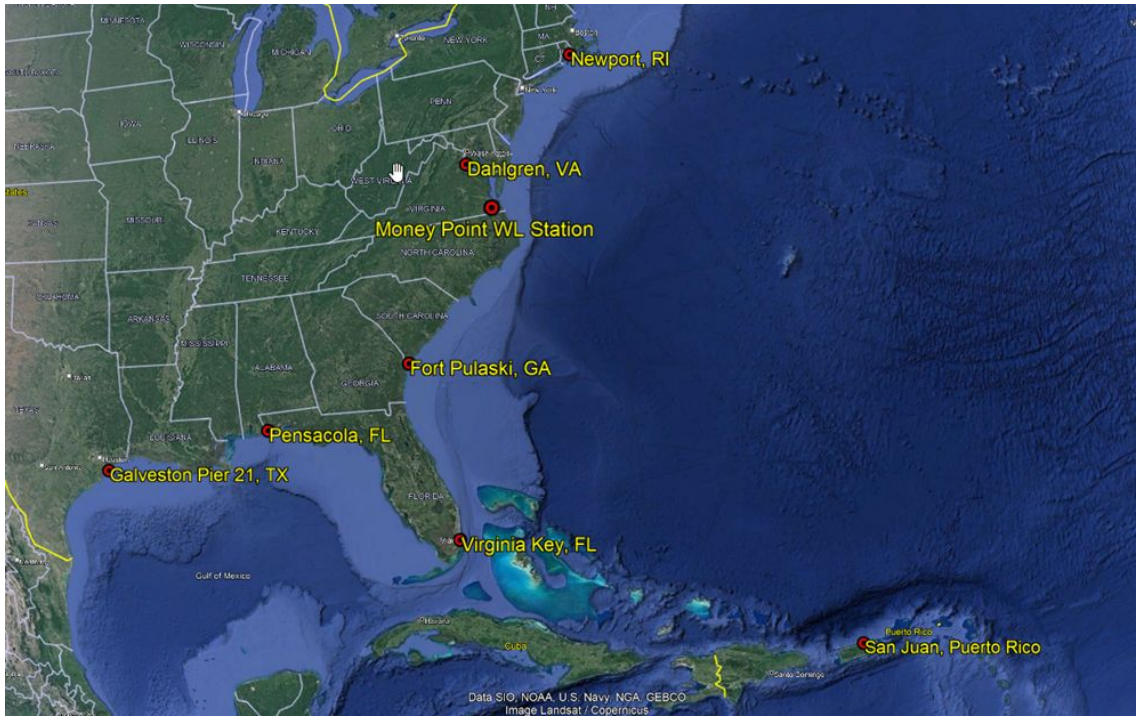
Relative sea level trend = absolute sea level change + vertical land motion

Note: local motion effects need to removed (e.g. sensor and pier motion)

Concept for Using GNSS Pair to Monitor Water Level Sensor Stability



GNSS Installation at NWLON Stations



NWLON GLOSS Stations

Newport, RI – N100

Fort Pulaski, GA – N003

Virginia Key, FL – N300

San Juan, PR – N240

Pensacola, FL – N302

Galveston, TX – N301

Partners, Stakeholders, Beneficiaries

- GOMO
- NOS/National Geodetic Survey
- SONEL
- University of Nevada Geodetic Lab
- NASA/JPL
- GLOSS
- 3rd party GNSS operators

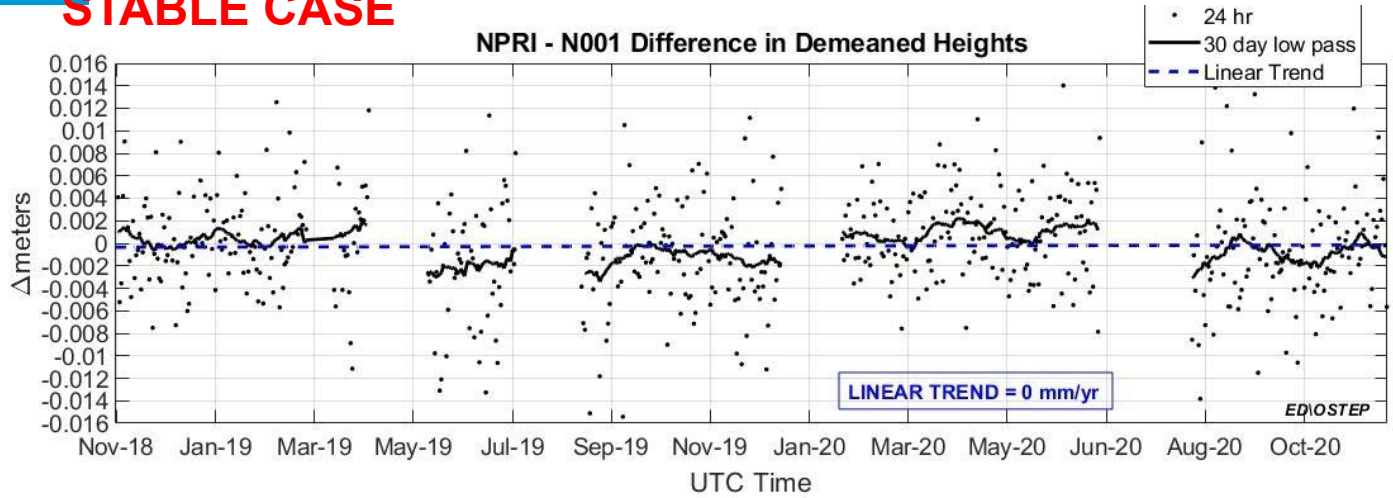
Data Dissemination and Archiving

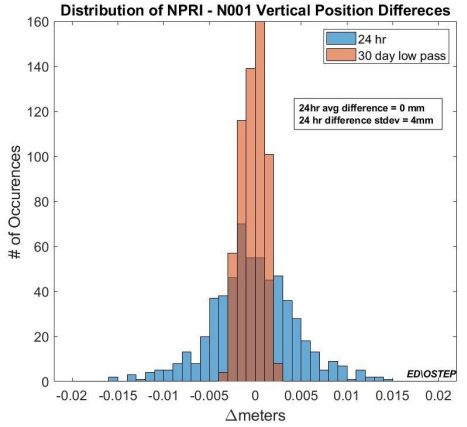
Example Installations

Virginia Key, FL

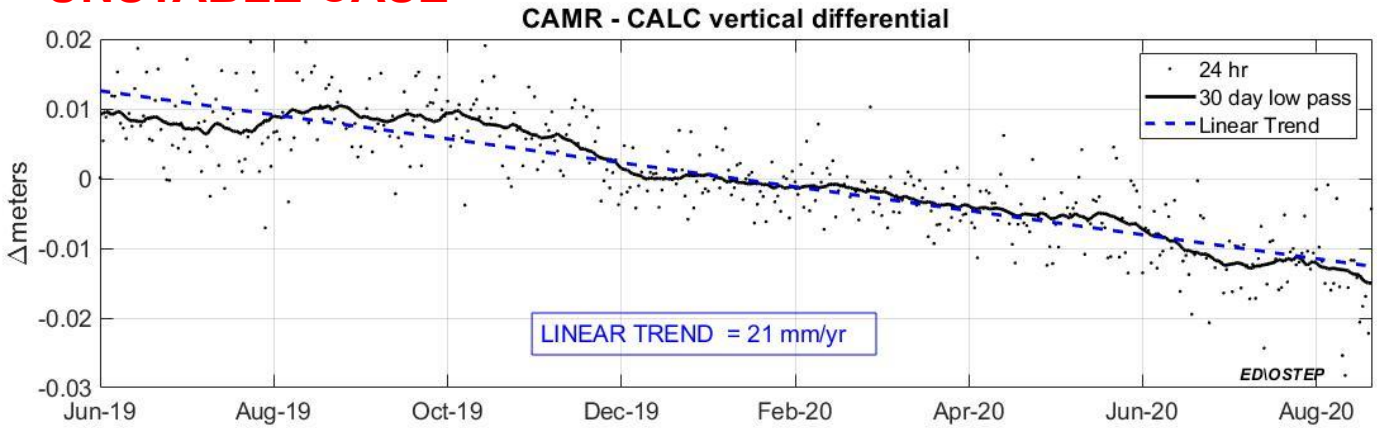
San Juan, PR

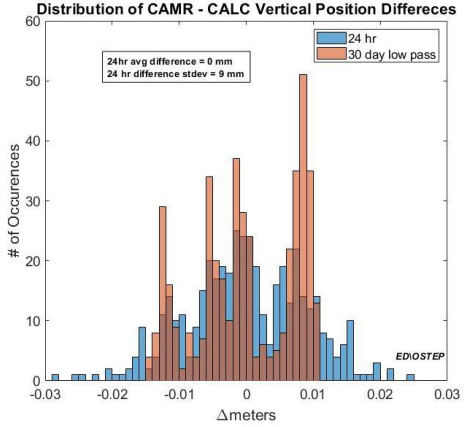
STABLE CASE

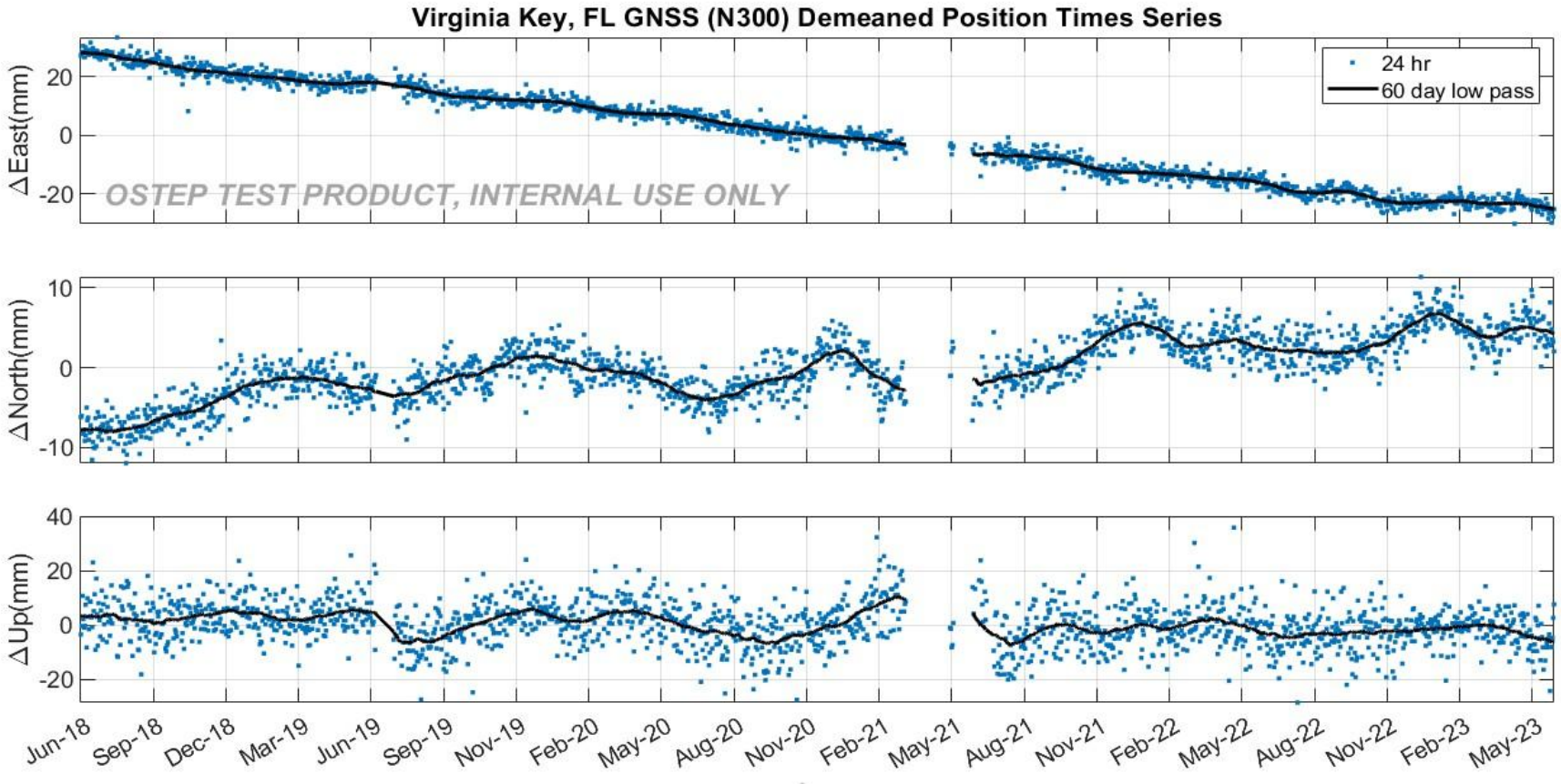




UNSTABLE CASE






Virginia Key, FL GNSS (N300) Demeaned Position Times Series
24 hr
60 day low pass
ΔEast(mm)
ΔNorth(mm)
ΔUp(mm)
OSTEP TEST PRODUCT, INTERNAL USE ONLY
Jun-18
Sep-18
Dec-18
Mar-19
Jun-19
Sep-19
Nov-19
Feb-20
May-20
Aug-20
Nov-20
Feb-21
May-21
Aug-21
Nov-21
Feb-22
May-22
Aug-22
Nov-22
Feb-23
May-23

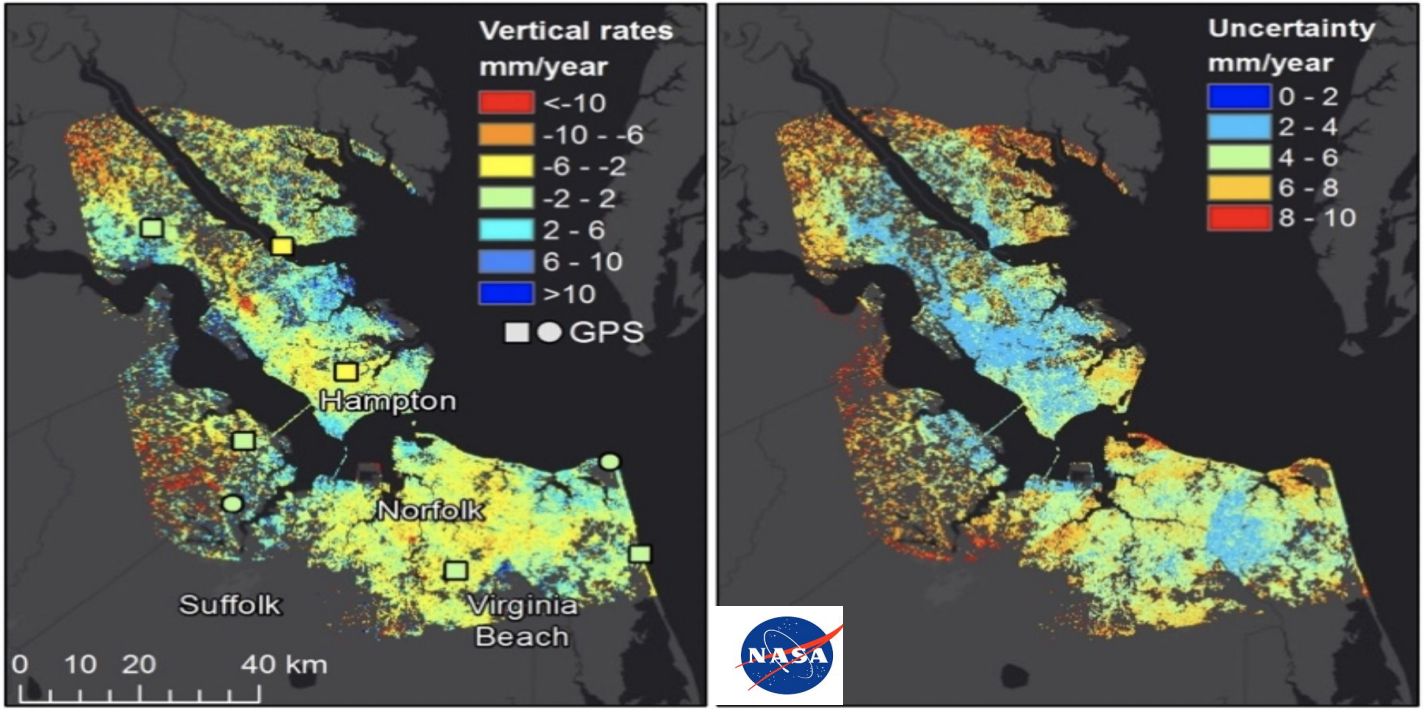
What is challenging?

San Francisco, CA

Atlantic City, NJ

Station Location

What is challenging?



Variability in Vertical Land Motion

NWLON stations are critical to observe, monitor and predict sea level rise and coastal flooding