

Geodetic Infrastructures in the Lesser Antilles

Eastern CARibbean (ECAR) Observatories

SRC/UWI Trinidad

OVSG/IPGP Guadeloupe

OVSM/IPGP Martinique

MVO/SRC-IPGP Montserrat

ECAR Observatories

- Collect geophysical/geochemical data
- Operate seismic, geodetic and tide gauge networks
 - To Provide scientific advise and information to civile authorities and public on
 - Seismicity
 - Volcanic activity
 - To provide data to tsunami early warning centers
- Hazard and risk mitigation : volcano, eq, tsunamies
- Develop research
 - Volcanic processes
 - Crustal deformation processes along the lesser Antilles plate boundary
 - Earthquake cycles (loading vs release) on fault systems
 - Eq event modelling
 - Volcanoes/fault interactions
- ECAR Observatories are developping a common scientific and technical policy at the scale of the Lesser Antilles plate boundary

GPS monitoring in the ECAR

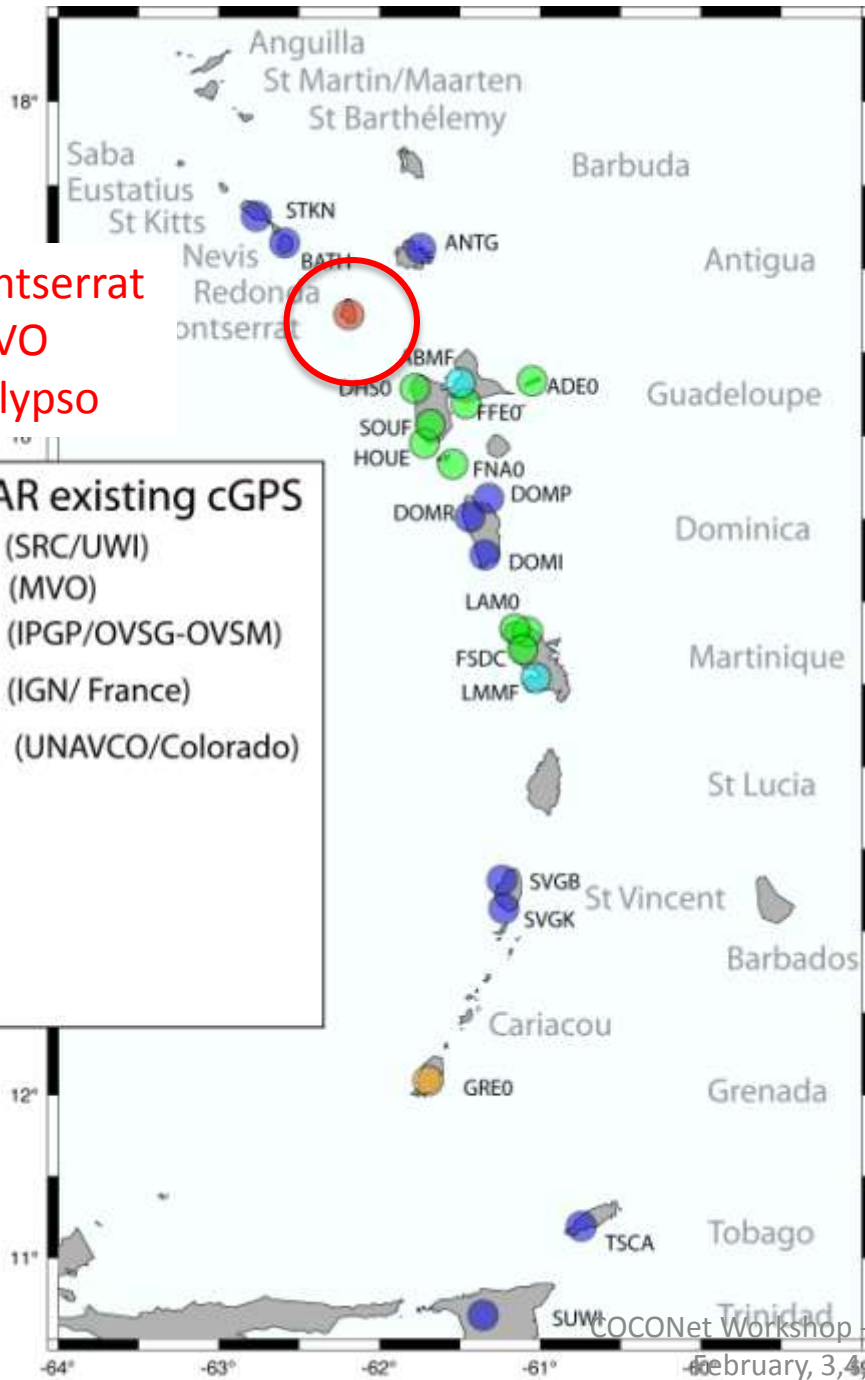
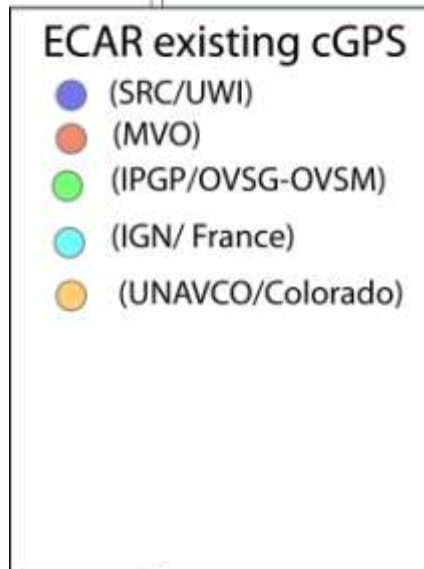
- Periodic GPS campaigns or continuous GPS stations to monitor volcano deformation
- Continuous GPS stations at the scale of the subduction to understand the regional tectonics
- Gamit/GLOBK (MIT) processing to produce precise GPS solution

Existing cGPS networks

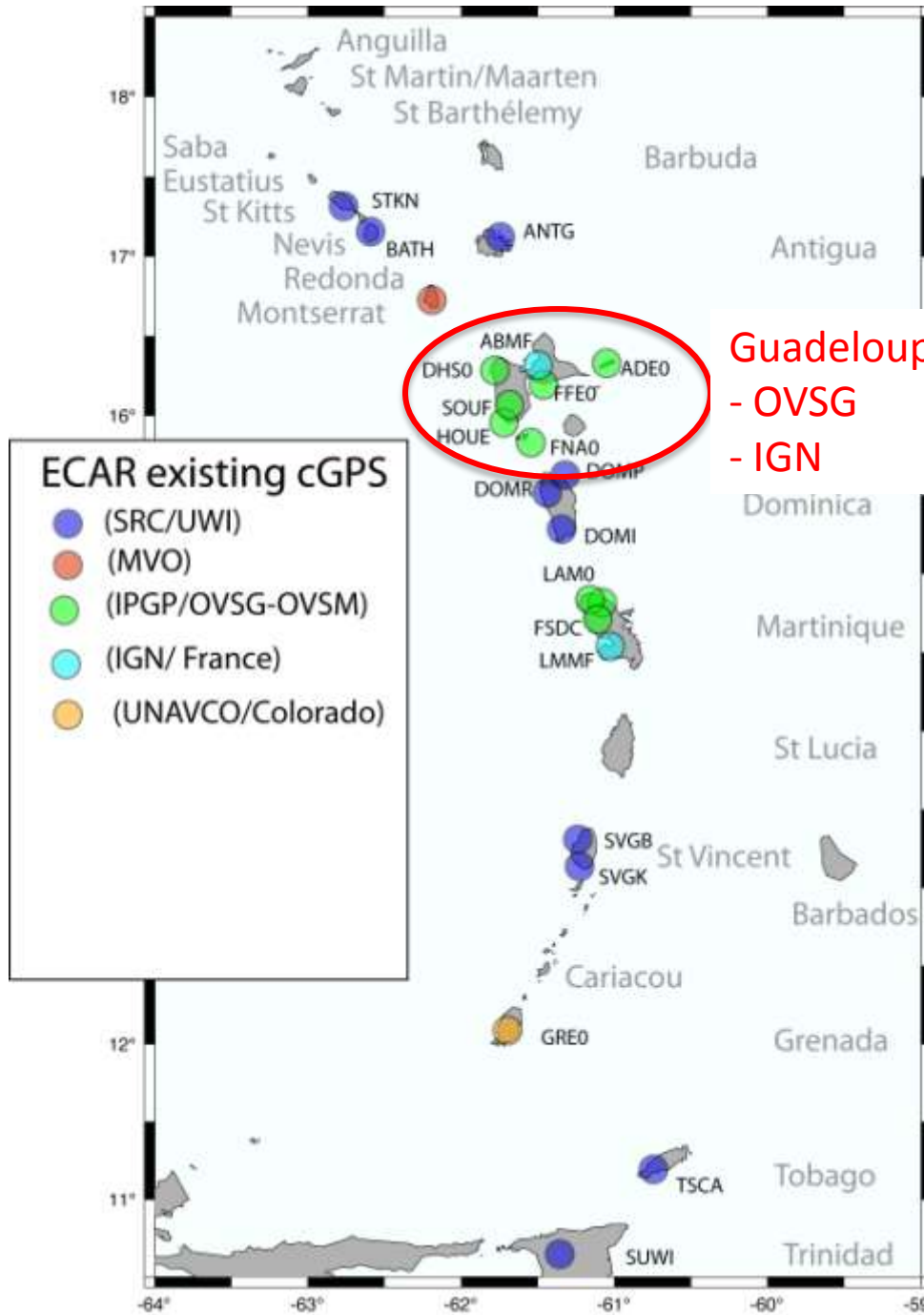
- MVO volcanic network

- 6 Trimble netRS + 4 Trimble NetRS (calypso)
- 1s/30s or 30s sampling
- Freewave transmission / internet (calypso)
- Reinforced concrete monument or roof of buildings

Montserrat
- MVO
- Calypso

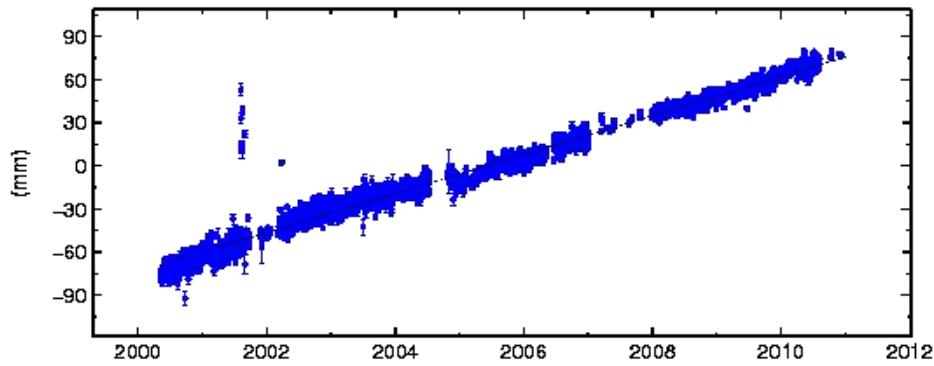


Guadeloupe

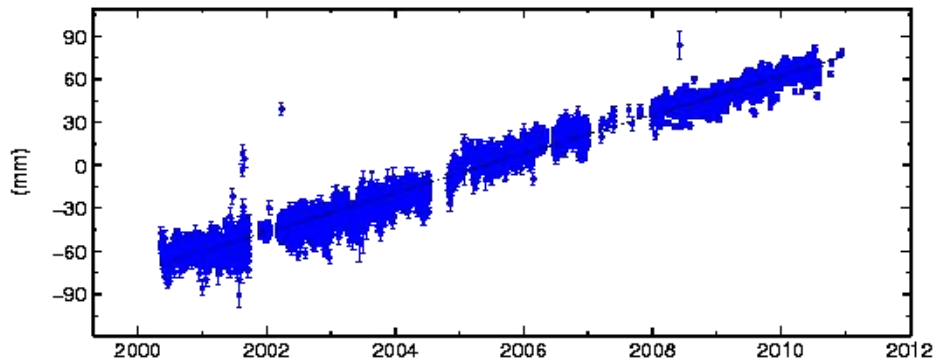


- Reinforced concrete pillar on slab/rocks/roof
- Ashtech Z12, Zxtreme, microZ
- 30 sec / 24h
- Internet, freewave, modem

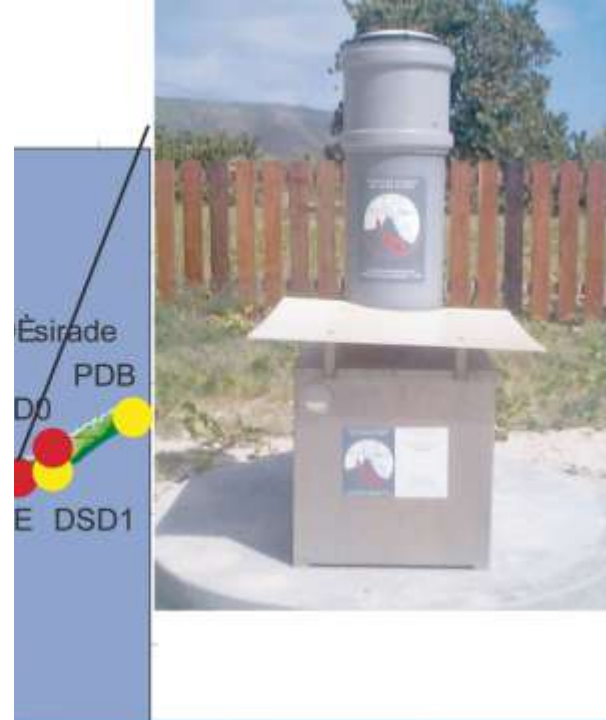
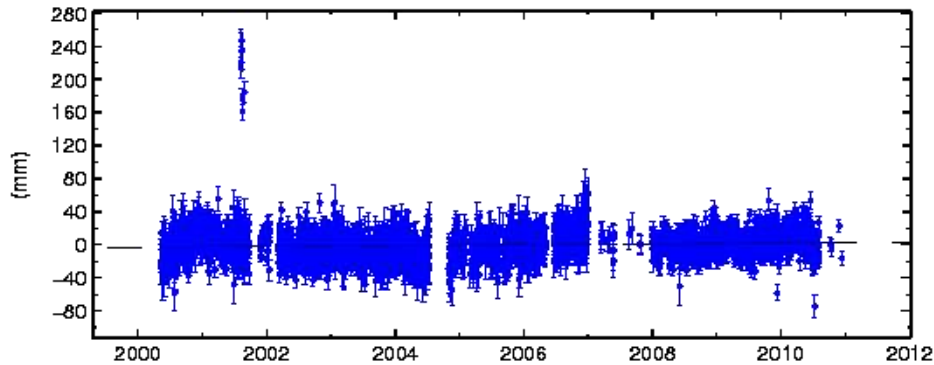
HOUE North Offset 1778842.016 m
 rate(mm/yr)= 13.61 ± 0.01 nrms= 2.69 wrms= 4.5 mm # 2741



HOUE East Offset 31923168.368 m
 rate(mm/yr)= 13.61 ± 0.02 nrms= 2.21 wrms= 6.1 mm # 2737



HOUE Up Offset 376.971 m
 rate(mm/yr)= 0.54 ± 0.06 nrms= 1.67 wrms= 15.9 mm # 2613



uerto Rico -
 011

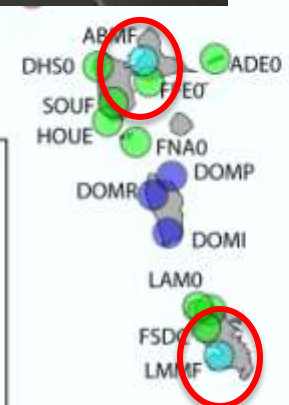
IGN cGPS

- Metallic pillar on the roof
- Trimble netR5
- 1s/30s sampling
- Internet



ECAR existing cGPS

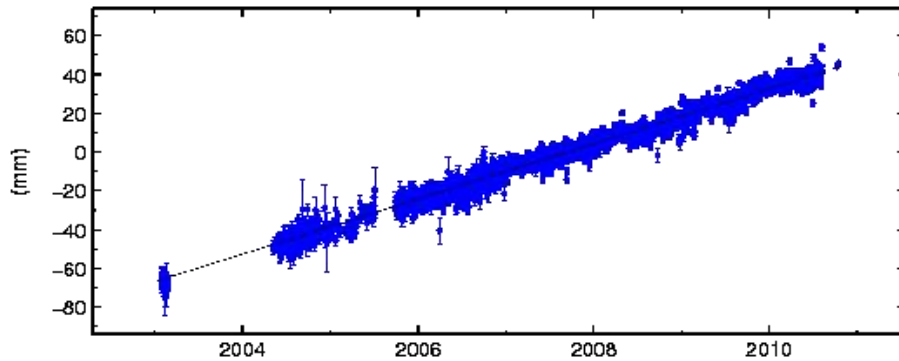
- (SRC/UWI)
- (MVO)
- (IPGP/OVSG-OVSM)
- (IGN/ France)



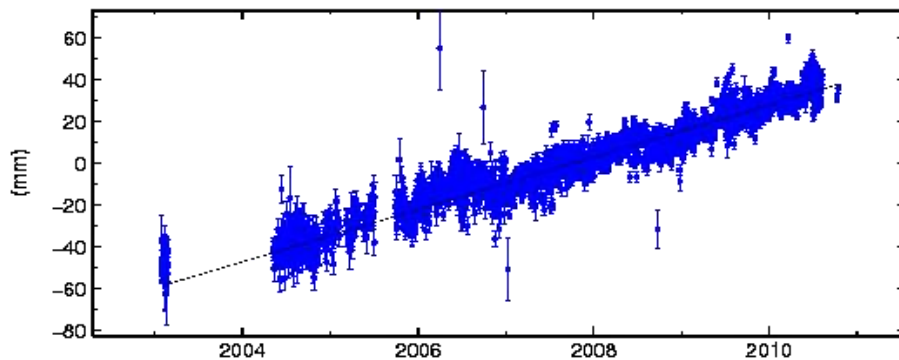
OVS Martinique

- FSDC :
 - roof of building (Obs)
 - Ashtech Zxtreme 30s
 - Internet
- LAM :
 - reinforced concrete building
 - Ashtech Zxtreme 30s
 - Free wave
- AJB :
 - Huge rock
 - Topcon GB100 30s
 - Radio-modem

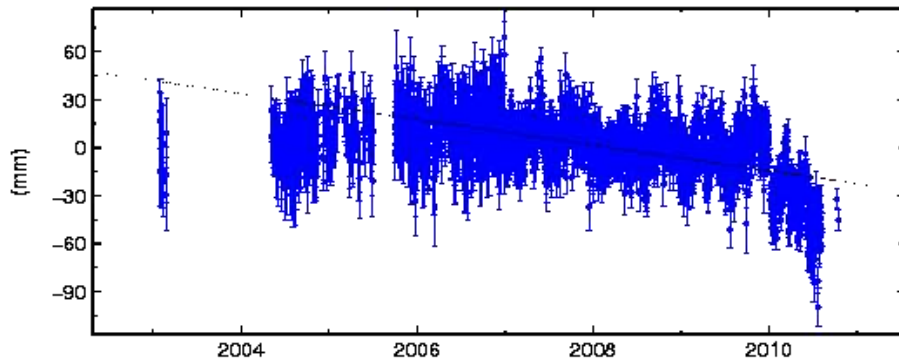
FSDC North Offset 1640274.224 m
rate(mm/yr)= 14.21 ± 0.03 nrms= 2.06 wrms= 3.2 mm # 1949



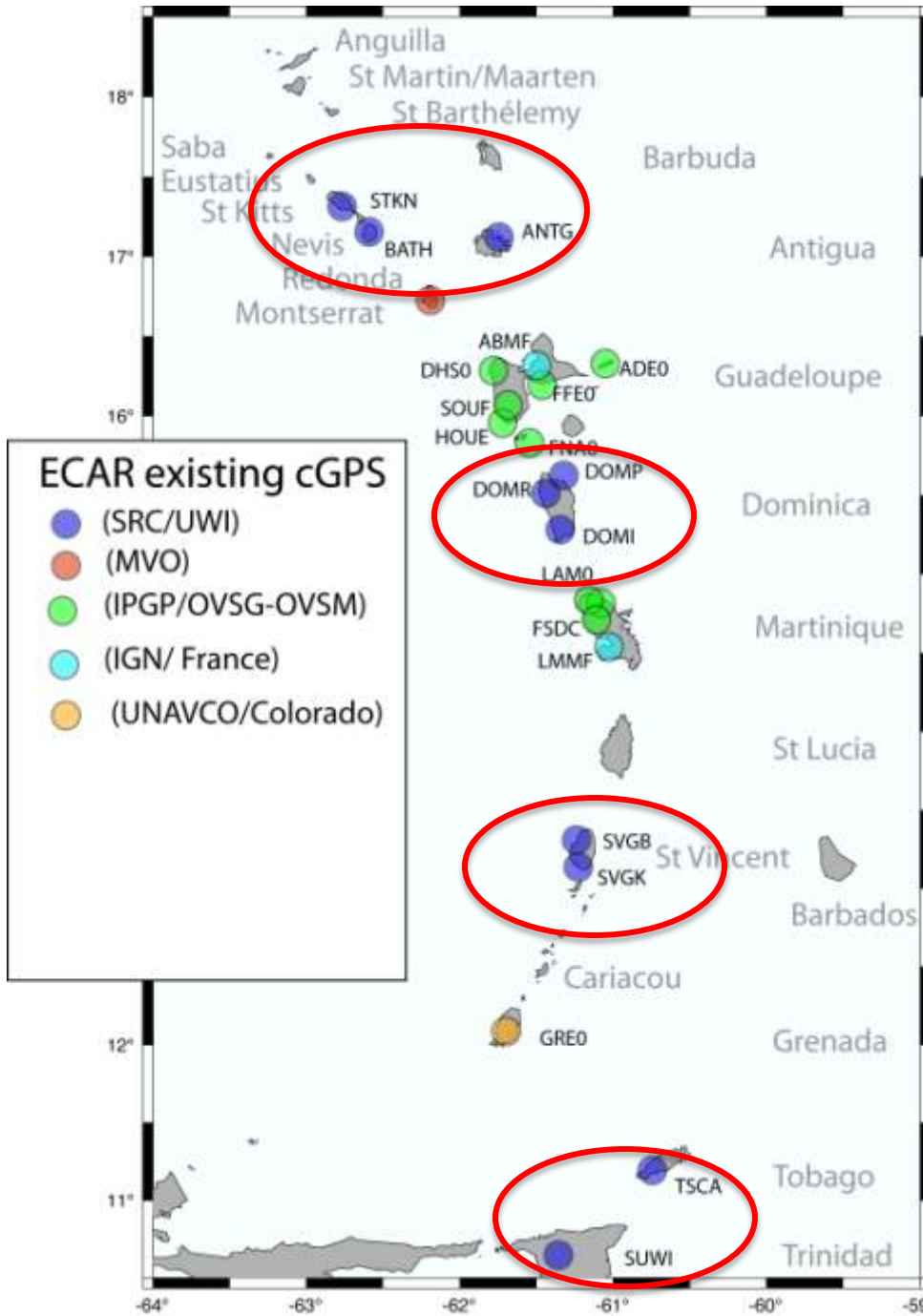
FSDC East Offset 32173922.564 m
rate(mm/yr)= 12.53 ± 0.04 nrms= 2.11 wrms= 5.2 mm # 1942



FSDC Up Offset 500.752 m
rate(mm/yr)= -8.05 ± 0.16 nrms= 1.79 wrms= 16.6 mm # 1846

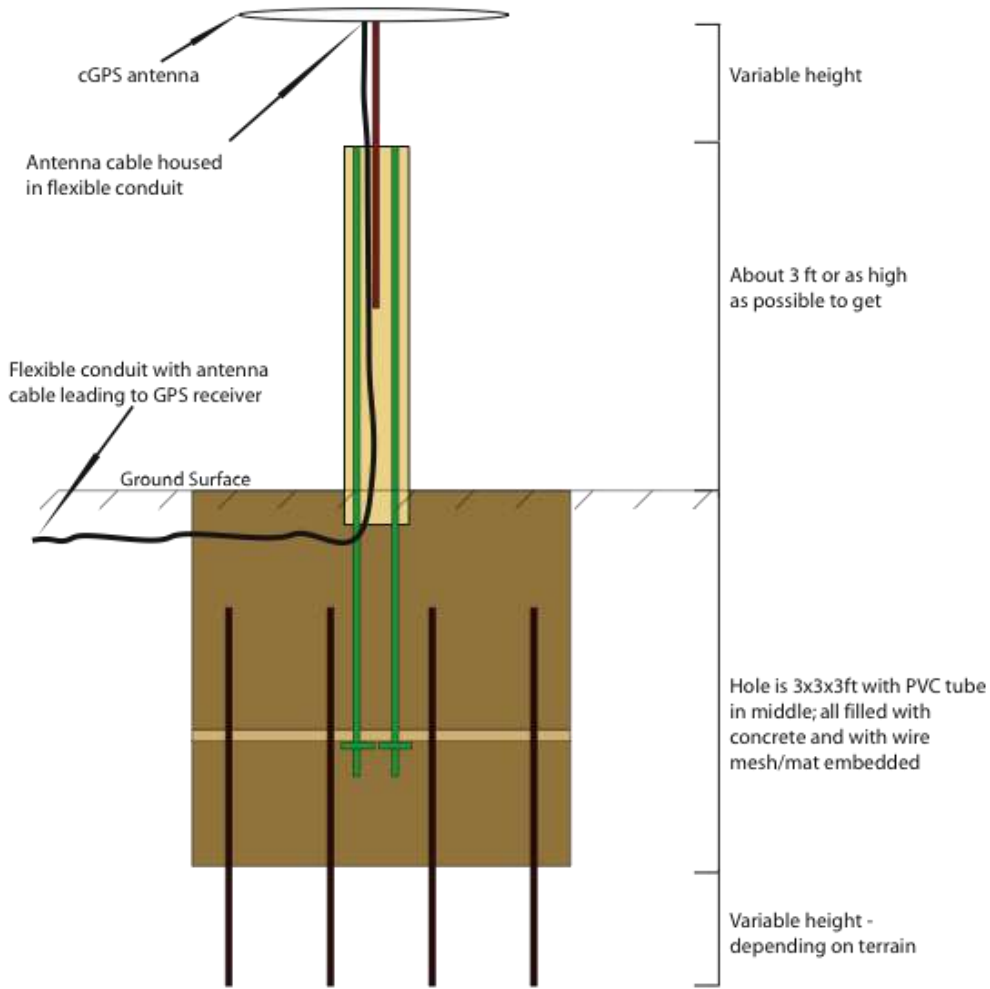


SRC/UWI



- 10 GPS stations
- Roof of reinforced concrete building
- Trimble NetRs
- 30s /24h (DOMR & DOMP : 1s/30s)
- Internet

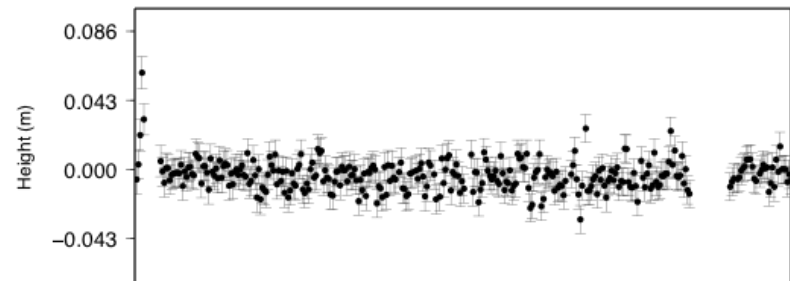
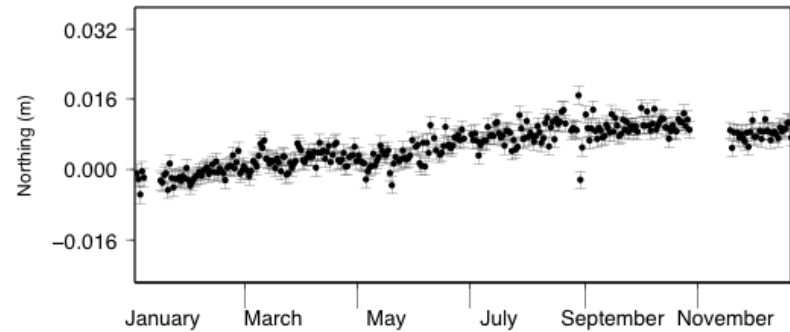
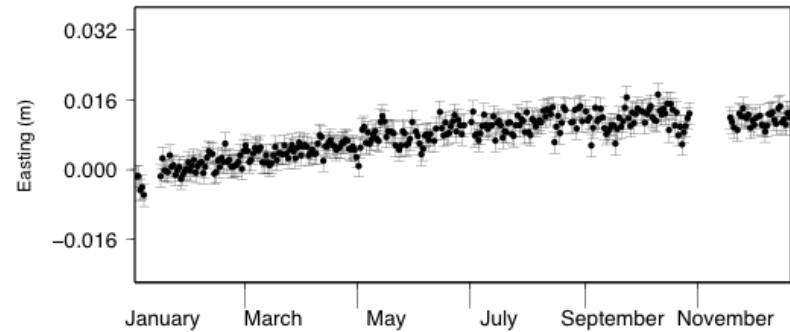
Schematic of SRC-MVO design for cGPS monument



- two pieces of 5/8" rebar tied to base of wire mat and running to top of PVC tube - antenna mount tied into these two pieces with lacing wire
- Steel mat made with 5/8" steel bars tied with lacing wire
- two layers (one at based and another above the wire mat) of mixed cement/concrete, each ~ 1 foot
- 3 inch PVC tube with two pieces of 5/8" rebars running up the middle and filled with mixed cement/concrete
- 5/8" steel rebars - pound the four at base as far a sossible into the ground and tie into wire mat with lacing wire
- cGPS antenna mount - tied into the two pieces of 5/8" rebar

SRC/UWI

ANTG 2008 - final ephemeris



Planned/funded IPGP - SRC

Guadeloupe and St Barthélemy

OVSG-IPGP

Martinique

OVSM-IPGP

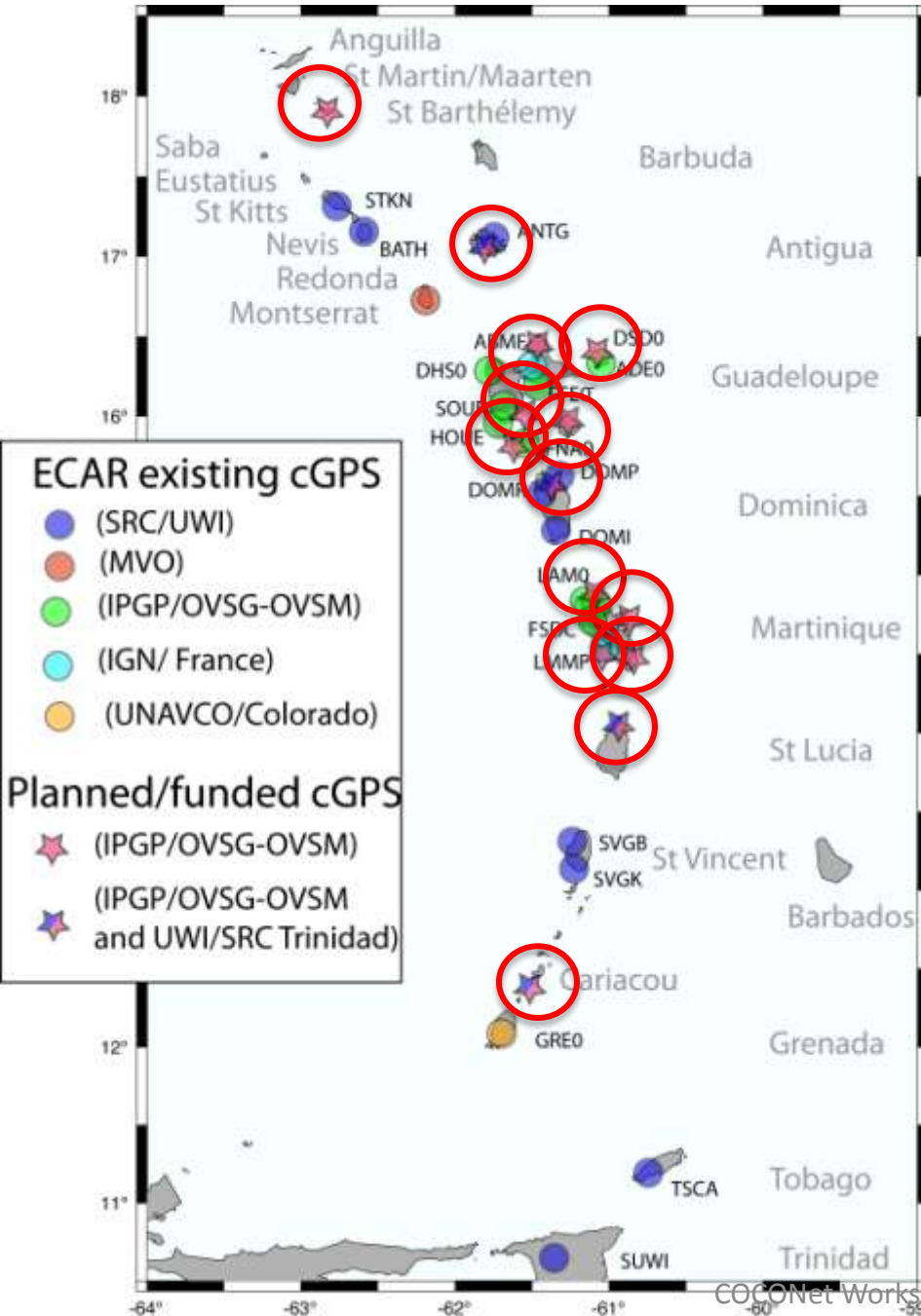
Antigua

Dominica

Santa Lucia

Carriacou

SRC – OVSM/OVSG-IPGP



Planned/funded IPGP - SRC

- Design of seismic-GPS station
 - Reinforced pilar on bedrock
 - Topcon GB1000 and Trimble NetR5
 - 30sec/1day
 - Planned to 1s

Deshaie Station

cGPS integrated in COCONet

