

Tide Gauge Benchmark Monitoring

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Members of the TIGA-WG



- Maintain a global **virtual** GNSS @ TG network
 - Promote the establishment of local ties (leveling) between GNSS and TGBMs.
 - Promote the establishment of more continuous operating GNSS stations, in particular in the southern hemisphere.
 - Provide meta information, e.g. on leveling between benchmarks or data access
- Compute precise coordinates and velocities of GNSS stations at or near tide gauges with a significant delay to allow as many as possible stations to participate (reproX). *Provide a combined solution as the TIGA official product.*
- Provide training to tide gauge operators through workshops, collect metadata. Through GLOSS advice station operators about the operation of GNSS @ TG stations.

We aiming on providing the best possible GNSS solution for sea level research

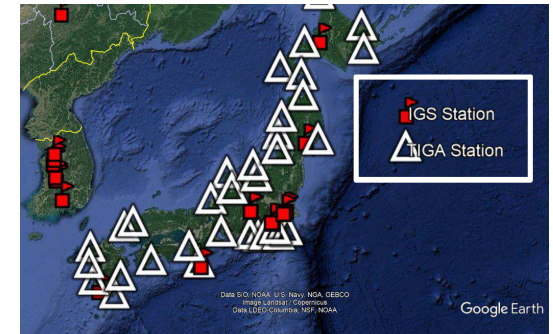
connecting the GNSS, tide gauge and sea level community

Progress since last AM Meeting (Dec 2019)

- Contributions by ULR and GFZ with dedicated repro3 solutions, UoL in 2022
- www.SONEL.org:
 - Integration of new levelling data (TGZ to ARP)
 - Integration of **RINEX3** files. Now collecting RINEX3 data for 566 stations.
 - « Last data events » tool : a table is automatically updated when :
 - A new station is added to SONEL database
 - A new sitelog has been recovered
 - A large amount of data has been downloaded out of the daily process
- (no meetings with GLOSS the past years -> important outreach activities are missing)

Applications of GNSS@TG

- Altimetry calibration and stability monitoring
- World Height System Unification
 - GNSS@TideGauges are the contact between the **physical** (geoid/MSL) and **geometrical** reference (ITRF) frames
- ITRF densification
- Reference for InSAR coastal/subsidence mapping
 - Coastal hazard assessment
- Near-coastal wet troposphere product for altimetry



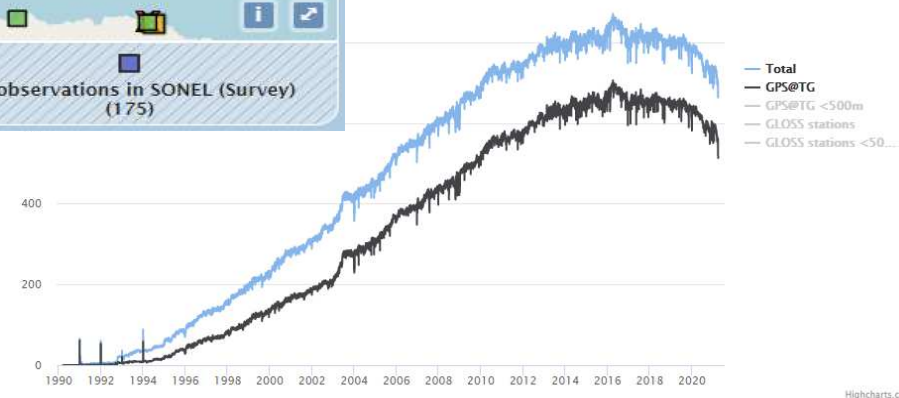


of RINEX files on SONEL, per day

1229 GNSS@TG stations (**600** are active (49%), **267** are dormant (22%, no data within the last 30 days), and still 175 (14%) have been identified as collocated with a tide gauge but no data freely available).



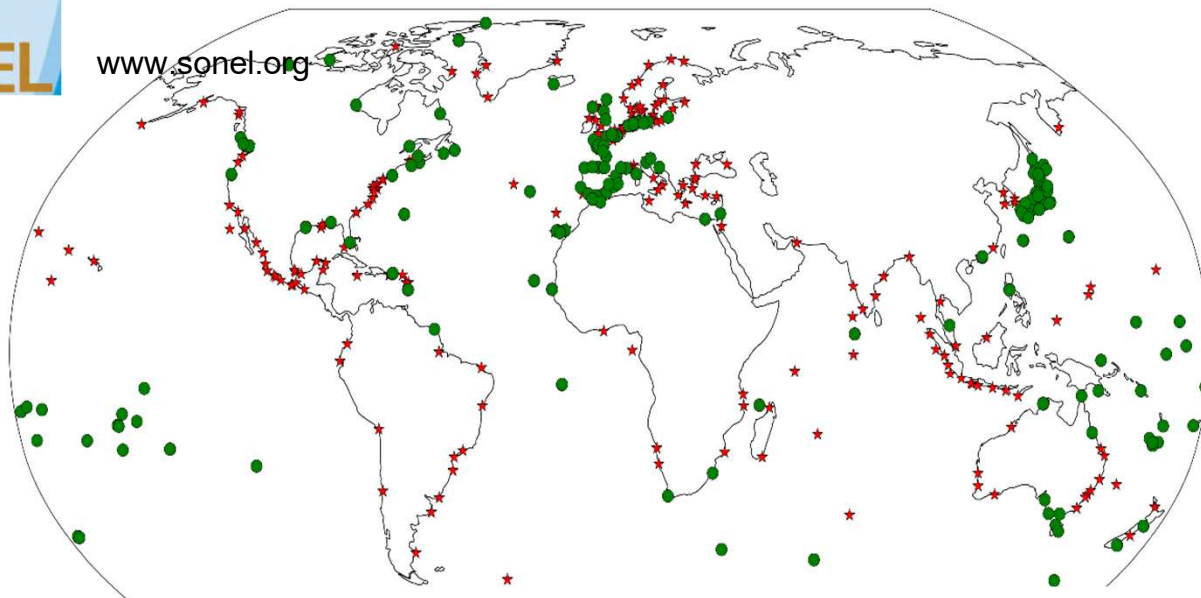
www.sonel.org



Highcharts.com



www.sonel.org



Year	Instrument	From	To	From	To	From	To	From	To	From	To	From	To	From	To	Height diff. 43001M002-pressure inlet WLR7	WLR7
2013	TCA	-1,6711	-0,6712	-0,0880	-0,2260	-0,9506	-7,3672	-0,0850	-25,0891	20130906	20140915	1514					
2014	TCA	-1,6711	-0,6714	-0,0875	-0,2274	-0,9524	-7,3660	-0,0850	-25,0706	20140915	20150912	1514					
2015	TCA	-1,6711	-0,6714	-0,0875	-0,2287	-0,9536	-7,3666	-0,0850	-25,0703	20150913	20160902	1397					
2016	IMU	-1,6710	-0,6712	-0,0880	-0,2281	-0,9544	-7,3679	-0,0850	-25,0746	20160701	20170902	1397					
2017	TCA	-1,6710	-0,6703	-0,0881	-0,2268	-0,9557	-7,3679	-0,0850	-25,0746	20170902	20180902	1397					
2018	TCA	-1,6711	-0,6716	-0,0879	-0,2267	-0,9560	-7,3610	-0,0850	-25,0693	20180902	20190906	1514					
2019	TS16	-1,6715	-0,6722	-0,0881	-0,2264	-0,9575	-7,3566	-0,0850	-25,0675	20190906	20200904	1514					
2020	GNSS					-17,6239	-7,3560	-0,0850	-25,0649	20200904							

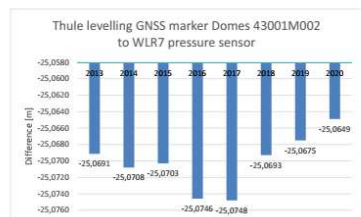
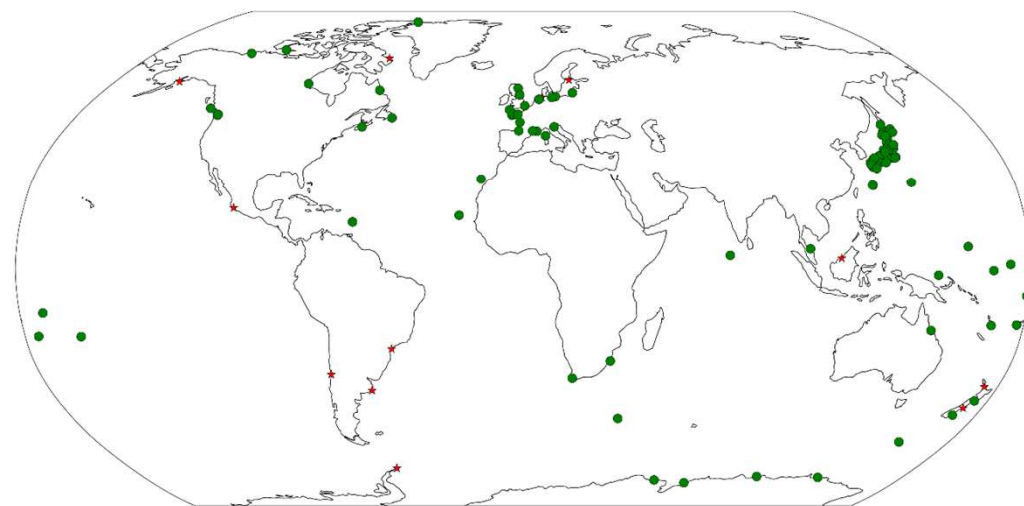


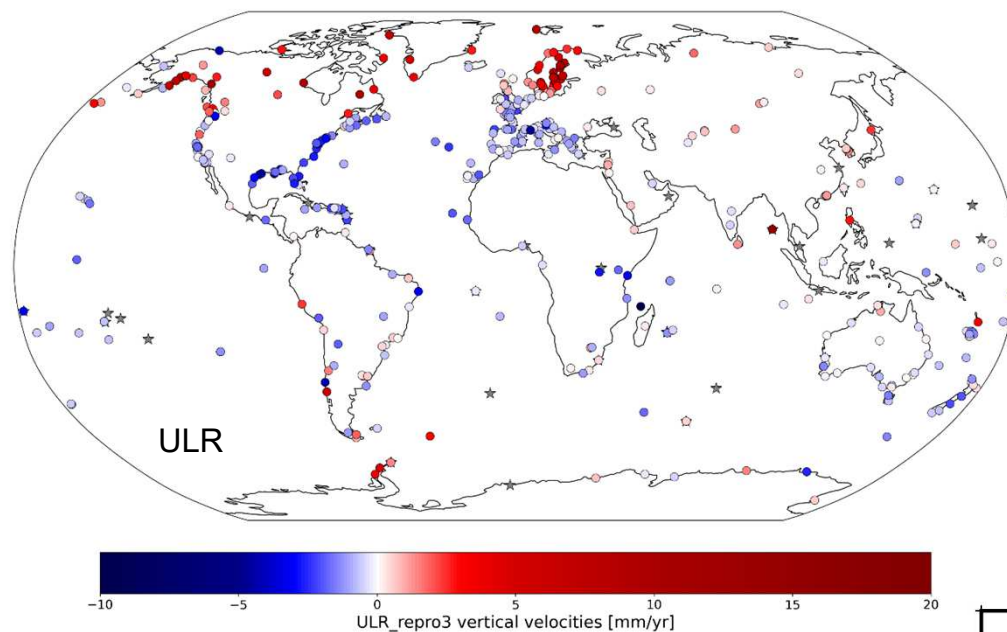
Figure 7 Height differences Thule

The changes in pressure sensor position is likely a combination of debris-buildup in the well and subsidence of the pier/concrete block where the Datum point is placed.

Finn Bo Madsen/DTU
Levelling info for Greenland ☺



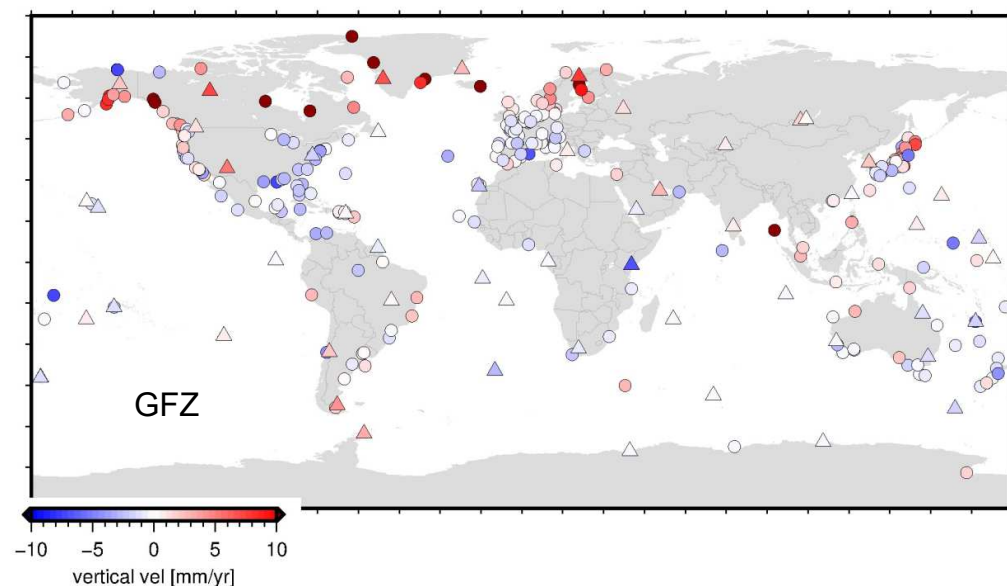
★ No tie - GNSS@TG < 1km ● Tie



Network of **601** stations over the period [2000-2020],
554 « robust » velocities (**468** GNSS@TG velocities)


TIGA repro3 contribution

Network of **341** stations (**101** TIGA and **153** GNSS@TG stations + 66 IGS14 core stations)



IGS NETWORK - 509 STATIONS DISPLAYED

Full Screen Views : [Default](#) [Map](#) [Table](#)



Filter...

[Site Info](#)

Site	Location	Latitude
Receiver - Firmware	JAVAD TRE_3 - 4.1.01-210527	
Receiver SN	4171601	
Antenna - Radome	JAVRINGANT_G5T - NONE	
Calibration	ROBOT	
Clock	INTERNAL	
Last Data Available	2021-12-01 (v3)	
DOMES Number	23501M003	
Constellation	GPS+GLO+GAL+BDS+QZSS+IRNSS+SBAS	
Data Center	CDDIS	
Nearby Tide Gauge	COLOMBO - 5313m	
Station Log	sgoc00lka_20211028.log	

Overview

Location: Narahenpita, Colombo, Sri Lanka

Latitude, Longitude: 6.892, 79.874

Elevation: -78.5 m

Email Advisories

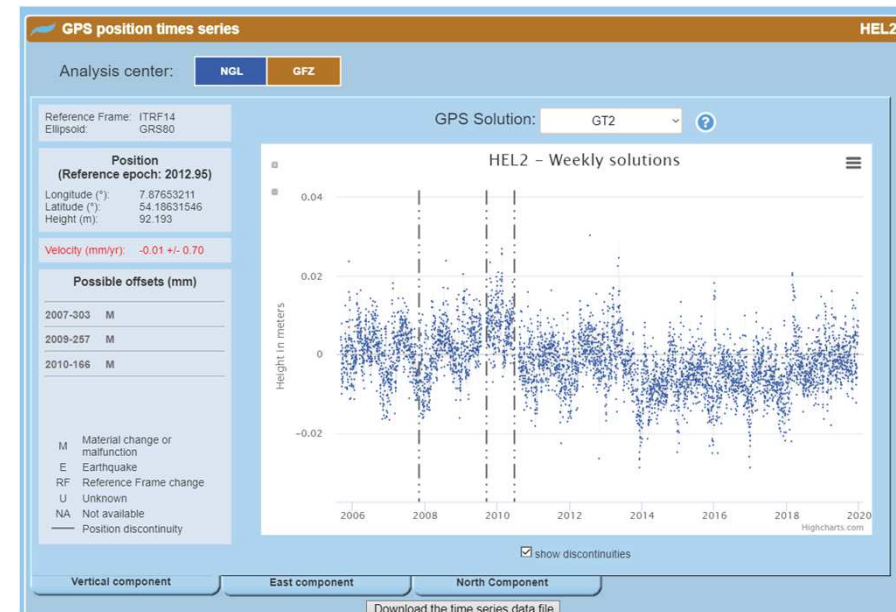
Photos

Ways have been establish for seamless integration of collocated tide gauges information between IGS (www.igs.org), SONE (www.sonel.org) and PSMSL

<https://www.sonel.org/spip.php?page=maregraphe&idStation=1994>

TIGA-WG plan@2022

- Integration of GFT & ULR solution in SONEL
- UoL repro3 solution based on CODE orbits & integration into SONEL
- Time Series Analysis at tide gauges
- Outreach to GLOSS-GE and sea level community
 - *e.g., GLOSS-GE, OSTST*
- Work towards more levelling ties
- How-to-tie: Manual for **Tides, Water Level and Currents Working Group of IHO**
- Most GNSS@TG are legacy receiver of the TG community delivering GPS signals only





IGS

INTERNATIONAL
GNSS SERVICE

Thank You!

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