

■ Provide ...

- **High reliable and homogeneous GPS time series for cGPS@TG stations with 1 mm/yr accuracy**

■ Contribute ...

- **to solving questions about sea level change and climate change discussion**

A change in sea level is one prominent indicator of climate related change. Today, the sea level is either measured by radar altimetry or by tide gauges. For the later, a significant source of uncertainty is the vertical movement of the tide gauges. Vertical motion is measured using GPS since the early 1990th for an increasing number of tide gauges. The variety and the number of GPS stations at tide gauges prevented massive processing within the routine IGS processing streams.

In 2001 the IGS started the Tide Gauge Benchmark Monitoring Pilot Project (TIGA) to respond to the increasing demand of a dedicated product of precise geocentric coordinates and vertical rates for tide gauges. In 2011, the Pilot Project became an IGS Working Group. Currently, TIGA is reprocessing a very large data set of GNSS at tide gauges.



Example of a CGPS@TG station at Weikelo/Indonesia

TIGA Goals and Objectives

Maintain a global virtual CGPS @ TG network

- Select a set of tide gauges equipped with GPS, with a long and reliable history, useful for both sea level change studies and satellite altimeter calibrations. IGS network operation standards should be applied.
- Promote the establishment of more continuous operating GPS stations, in particular in the southern hemisphere.
- Provide meta information, e.g. on leveling between benchmarks or data access
- Provide training to tide gauge operators through workshops, encourage station operators to provide necessary metadata. Through GLOSS, advice station operators about the operation of CGPS @ TG stations.

Compute precise coordinates and velocities of GPS stations at or near tide gauges. Provide a combined solution as the TIGA official product.

Study the impacts of corrections and new models on the GNSS processing of the vertical. Encourage other groups to establish, e.g. nearby absolute gravity sites.

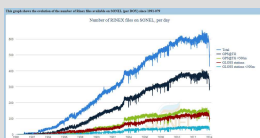
Provide advice to new applications.

TIGA Network



Roughly 800 tide gauge stations have GNSS nearby. Unfortunately only a small number (< 150) provide the necessary local ties (leveling) between the GNSS and tide gauge zero.

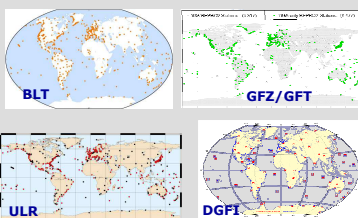
OSTST members are encourage to help to establish ties in their country.



(above) Number of active TIGA stations. TIGA stations are providing GNSS, tide gauge data and the leveling ties without restrictions. The TIGA-WG is working to increase the number of these high-quality stations.

(left) Development of the number of RINEX files for GNSS@TG available through the SONEl data center (www.sonel.org).

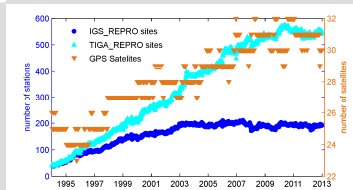
TIGA Analysis Centers



Several Analysis Centers re-process GNSS data for TIGA

BLT = University of Nottingham & University of Luxembourg
 DGFI = Deutsches Geodätisches Forschungszentrum
 GFZ = Helmholtz-Zentrum Potsdam GFZ
 ULR = University La Rochelle
 GEOSCIENCE Australia

- Roughly 800 stations are re-processed
- Results expected for stations since 1995 (almost two decades)
- The individual center solutions will be combined to one official IGS-TIGA solution
- TIGA Centers also contribute to the actual IGS-repro, and thus to the next ITRF solution.
- All results are freely available



Survey on cGNSS@TG

Survey on Continuous GPS and Tide Gauge co-localisations

In order to get a better idea about the status and opportunities on continuous GPS positioning of tide gauges, a survey is carried out periodically within various geoscience communities. The survey aims at identifying the existing permanent GPS stations which are close to tide gauges (up to approximately 10-15 km).

The following table displays an on-line updated view of the CGPS@TG information that has been supplied to us so far (Click on the Table icon below). The table can be sorted by clicking on the column items, and a version of the view can be downloaded in a format (csv) compatible with applications like excel.

Station Name	Latitude	Longitude	Distance to TG	Status
...

Survey results table

A 'kmz' file provides a Google Earth view of the CGPS@TG geographical distribution. The [sgpsatv.kmz](#) file is consistent with the above mentioned table (updated weekly). Clicking on a station symbol provides ancillary information on the station, and further clicking on the station name, provides an access to the so-called GPS sitelet (if the GPS data are available). The CGPS@TG 'kmz' view might be useful in conjunction with the 'kmz' files of satellite radar altimetry ground tracks provided by CUS, or with the 'kmz' file of tide gauge records provided by the PSNGL.

In addition to the periodic surveys, information on CGPS@TG collocations can also be supplied to us any time by filling up this form. Thank you in advance for your collaboration.

PLEASE VISIT: www.sonel.org/CGPS-TG-Survey.html
 your input is needed and appreciated

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