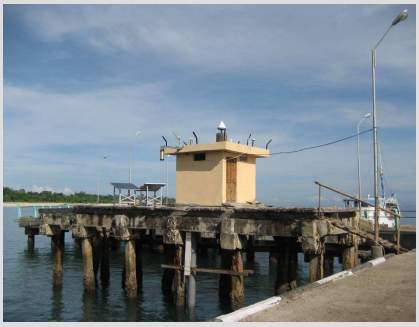
Tide Gauge Benchmark Monitoring
The IGS TIGA Project

T. Schöne and the IGS TIGA Working Group*

- **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.

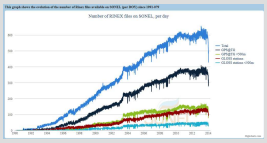
Study the impacts of corrections and new models on the GNSS processing of the vertical. Encourage other groups to establish, e.g. nearby absolute gravity sites.

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.

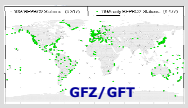
OSTST members are encourage to help to establish ties in their country.

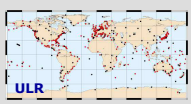


(above) Number of active TIGA stations. TIGA stations are providing GNSS, tide gauge data and the leveling ties without restrictions. The TIGA-WG is working to increase the number of these high-quality stations.

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

TIGA Analysis Centers

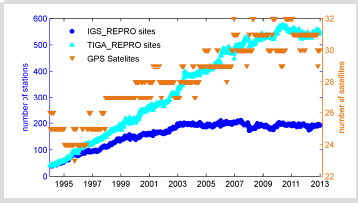




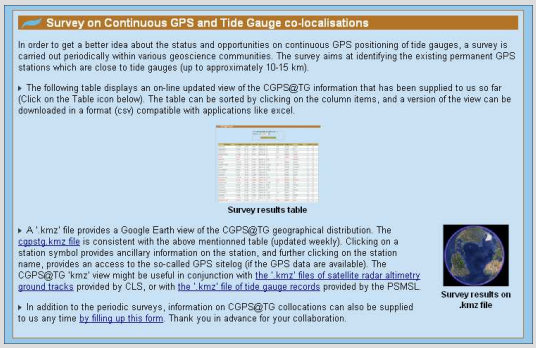
Several Analysis Centers re-process GNSS data for TIGA

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



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

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ftp://ftp.gfz-potsdam.de/pub/transfer/kg_igs/igstiga **http://adsc.gfz-potsdam.de/tiga**