

International GNSS Service (IGS)

Call for Participation

TIGA - Tide Gauge Benchmark Monitoring

Background

In the 1990s the idea of a dedicated GNSS service to support the tide gauge community was jointly developed by the geodetic and sea level communities. The goal was to derive geocentric coordinates and time series of vertical motion for a large set of globally distributed tide gauges co-located with GNSS stations in support of climate studies. In 2001 the IGS Governing Board accepted the proposal to establish the “GPS Tide Gauge Benchmark Monitoring - Pilot Project (TIGA-PP)”. This pilot project has now been in operation for more than nine years. Over this period many achievements have been made, and single products are now widely used in many different projects. Moreover, results and the work of TIGA have attracted considerable researchers and users.

In response to this successful initial period, at its 37th meeting the IGS Governing Board accepted the proposal for a transition of the TIGA Pilot Project to an IGS Working Group. The generation of the primary product – geocentric coordinates and time series of the TIGA station network - will become more regular. In addition, the TIGA Working Group will analyze the results of TIGA to identify station discontinuities and to further improve the manner in which the height component is modeled and computed in GNSS processing.

Goals and Objectives

The IGS has the experience and infrastructure as well as a stated interest to continue its activities of monitoring of tide gauge benchmarks using GNSS. With its global distribution, the IGS network of stations provides a work framework for the TIGA activities. For the specific goals of TIGA this network is further densified by inclusion of non-IGS stations collocated with tide gauges, which nevertheless follow the IGS station guidelines.

The aims of the TIGA Working Group are identified as follows:

1. Compute precise station coordinates and velocities for the GNSS @ TG stations on a regular, though not necessarily continuous basis. Newly available stations or published station data of already existing stations will be included into the repeated reprocessing in order to analyze the largest possible number of stations. The combined solution will have a maximum latency of one year after the reprocessing.
2. Global network of GNSS stations at tide gauges
 - Maintain and expand the global GNSS @ TG network.
 - Accept varying latency in GNSS data delivery.
 - Promote the establishment of more continuously operating GNSS stations, in particular in the southern hemisphere.
 - Promote the establishment of links to other sites which may contribute to vertical motion determination, e.g., DORIS, SLR, VLBI, and/or absolute gravity stations.

3. Contribute to the procedures in which IGS realizes a global reference frame in order to improve its utility for global vertical geodesy. This may involve reprocessing a significant subset of the (past and present) IGS global tracking data set.

GNSS and other space geodetic techniques are only one type of tool for the determination of vertical rates. Establishing ties to absolute gravity sites near tide gauges is strongly recommended, and results will be evaluated as part of the Working Group activities.

The TIGA Working Group will actively participate in projects of the Global Geodetic Observing System (GGOS), in particular GGOS themes “Sea Level” and “World Height System”, and IAG activities related to the goals of TIGA.

Organizational Aspects

The Working Group’s product will be based on the existing infrastructure of the IGS plus the expertise of the former TIGA Pilot Project. This Call for Participation has been released in order to enlist the participation of current TIGA Analysis Centers, and Data Centers, as well as to solicit the participation of new institutions. The IGS Central Bureau is asked to accept the increased responsibility resulting from the inclusion of TIGA products into the IGS product suite.

TIGA Working Group

The TIGA Working Group is responsible for establishing and managing the TIGA product generation during a period of four years. The (initial) members are:

- Ruth Neilan, IGS Central Bureau, Director (ex officio)
- Urs Hugentobler, Chairman IGS GB (ex officio)
- Tilo Schöne (Deutsches GeoForschungsZentrum GFZ, Germany) (chair)
- Philip Woodworth (PSMSL, UK)
- Gary Mitchum (University of South Florida, USA)
- Mark Merrifield (UHSLC, GLOSS, USA)
- Paul Tregoning (Australian National University, Australia)
- Heinz Habrich (Bundesamt für Kartographie und Geodäsie, Germany (Analysis Coordinator of EUREF Permanent Network))
- Laura Sánchez (Deutsches Geodätisches Forschungsinstitut, Germany)
- Guy Wöppelmann (University La Rochelle, France)
- Minghai Jia (Geoscience Australia, Australia)
- Sergei Rudenko (Deutsches GeoForschungsZentrum (GFZ), Germany)
- Matt King (Newcastle University, UK)
- Daniela Thaller (University of Bern, Switzerland)
- Norman Teferle (University of Luxembourg, Luxembourg).

The Working Group may ask other bodies or individuals to provide their expertise and to review proposals throughout the whole project.

The TIGA Working Group will evaluate and review proposals solicited in terms of science applications for Analysis Centers, Data Centers and Combination Centers taking appropriate actions as necessary. The descriptions and responsibilities of these fundamental IGS

components are defined in the Terms of References (<http://www.igs.org/organization/bylaws.html>).

The TIGA Working Group will identify open issues in the field of GNSS @ TIGA and promote and/or carry out studies to address such problems.

Links to working groups of the International Association of Geodesy (IAG), the International Association for the Physical Sciences of the Ocean (IAPSO), the Global Sea Level Observing System (GLOSS), the Permanent Service for Mean Sea Level (PSMSL), NOAA/NOS and other international and national agencies will be established or maintained, as appropriate.

Call for Participation

The TIGA Working Group is seeking participation in the following activities:

- TIGA Data Center (TDC)
- TIGA Analysis Center (TAC)
- TIGA Combination Center (TCC)
- TIGA Network Coordinator (TNC).

TIGA Data Center

Data Centers are the operational backbone of the Working Group's product service. They are solicited to fulfill three functions:

1. Store GNSS data sent by different media with high and changing latency.
2. Store metadata (e.g. leveling data, sketch maps of the TG) of any kind (e.g. computerized, handwritten, microfiches, etc.)
3. Provide GNSS data and metadata in an easy and convenient way

TIGA Data Centers should complement the existing IGS data centers by providing additional information about tide gauge metadata and GNSS metadata. In the case of more than one accepted proposal, synchronization between the different centers is necessary.

TIGA Analysis Center (TAC)

TIGA Analysis Centers will process tracking data of the GNSS @ TG network in order to calculate and make available network solutions in SINEX with special emphasis on the height component and vertical rates. All TIGA Analysis Centers have to include a common subset of global IGS reference frame stations for establishing a consistent reference frame. To achieve a homogeneous spatial network, TIGA Analysis Centers may also agree on the inclusion of non-GNSS@TG stations. TIGA Analysis Centers will follow recommendations in the IERS Standards as far as possible.

TIGA Analysis Centers will be asked to undertake data reprocessing with up-to-date models on a preferably biennial basis, according to the TIGA Working Group schedule and charter. The TIGA Working Group will decide on the necessary reprocessing campaigns. The individual networks should cover a global network, and preferably provide reprocessed orbits, clocks, and EOPs. The product should be unconstrained daily solutions and weekly combinations.

TIGA Analysis Centers are encouraged to analyze the accuracy of the vertical component, including the effects of station discontinuities, and how to handle them, and to provide advice on improvements in analysis methods. Studies of the effects of correction models on the derived heights may also be undertaken.

Refer to (http://www.igs.org/organization/AC_AAC_policy2005final.pdf) for a general charter for establishing an AC.

TIGA Combination Center (TCC)

The TIGA Working Group is seeking one or more groups to perform independent analyses, evaluations and combination of the individual TAC contributions. The results of the TIGA Combination Center(s) work should be station coordinates, time series of station coordinates, and vertical rates of TIGA stations. Close cooperation with the IGS-ACC is a vital. The results of the TIGA combination will have to be cross-validated with the IGS reprocessing campaign results.

TIGA Network Coordinator (TNC)

TIGA combines data and their meta information from tide gauges and GPS stations. The TNC should fulfill a coordination function, ensure the consistency and completeness of site logs, leveling information, monitor the data flow, provide guidance to tide gauge operators in IGS guidelines, assists the TDC's to keep contact with the station operators, and supports the network enhancement and topology.

GENERAL PROPOSAL INFORMATION

The Call for Participation is non-exclusive. TIGA is an open project with the only restriction that all participants adhere to the principles and guidelines of the IGS (see www.igs.org).

Proposals submitted in response to the Call for Participation must include specific details on the technical support that will be offered by the organization and a management plan. These two main proposal sections will be used for proposal evaluation and to facilitate comparative analysis. Proposals must be signed by an official authorized to certify institutional support, sponsorship and management of the proposed activities.

Proposals are due on or before March 15th, 2011, at the addresses provided below. Due to the importance of the project, groups may join at any time subsequently during the lifetime of the Working Group.

PROPOSAL EVALUATION AND SELECTION

The principal criteria considered in evaluating the proposal are their relevance to the IGS and TIGA Working Group objectives, their intrinsic merit, and overall contribution to the service when compared to contributions available through other proposals. In addition to these criteria, management factors will be considered in the selection.

The TIGA Working Group will review the proposals and provide a recommendation to the IGS Governing Board. The IGS Governing Board will decide which proposals are accepted, provisionally accepted, or declined. If the TIGA Working Group recommends and the IGS

Governing Board decides to accept only a portion of the proposal, the submitting organization will be given the opportunity to accept or decline such partial acceptance.

Organizations responding to this Call for Participation will be notified by the Chairman of the Working Group of the outcome of the proposal selection process in April 2011.

SCHEDULE OF IGS TIGA WG ACTIVITY

February 2 nd , 2011	Call for Participation released
March 16 th , 2011	Proposals due
April 3 rd , 2011	IGS Governing Board Meeting
April 10 th , 2011	Responses and Letters of Acceptance sent
May 1 st , 2011	Official start of the TIGA Working Group

PROPOSAL PREPARATION DETAILS

The Proposal should be structured as follows:

- Cover Page (details below)
- Proposal Summary
- Description of Proposed Activities
- Management Proposal
- Financial Arrangements.

The Cover Page should contain the following information:

- IGS TIGA component referred to
- Parent/funding organization
- Name and title of authorizing official
- Name and title of primary point of contact
- Mailing address
- Phone/fax/email
- Cooperating organizations/institutes
- Signatures (the cover page should be signed both by the Authorizing Official committing the organization/institution to the IGS activity and the primary point of contact involved).

Please send your proposal as PDF to the IGS Central Bureau (igs cb@igs cb.jpl.nasa.gov) and tschoene@gfz-potsdam.de.

Proposals should not exceed 15 pages.