

VIII EuroGOOS Tide Gauge Task Team Meeting

Report

Videoconference, July 1-2 2020

Chair: Begoña Pérez Gómez, Puertos del Estado, Spain. **Co-chair:** Vincent Donato, SHOM, France.

Attendees:

Inga Lips and Vicente Fernández (EuroGOOS), Elizabeth Bradshaw and Andy Matthews (NOC/PSMSL, UK), Laurent Testut, Guy Woppelmann and Médéric Gravelle (LIENSs/U.La Rochelle/SONEL, France), Francisco Hernández (VLIZ, IOC/SLSMF, Belgium), Phil Thompson (UHSLSC, US), Thomas Hammarklint (SMA, Sweden), Fabio Raicich (CNR-ISMAR, Italy), Anna Gyldenfeldt (BSH, Germany), Oda Roaldsdotter Ravndal (NHS, Norway), Marco Picone and Arianna Orosi (ISPRA, Italy), Guy Westbrook and Tara Keena (Marine Institute, Ireland), Per Knudsen (DTU, Denmark), Sylvie Pouliquen (CMEMS IBI In Situ TAC, EuroGOOS DATAMEQ WG), Stephan Tarot (CMEMS In Situ TAC), Marta de Alfonso and Fernando Manzano (Puertos del Estado, CMEMS IBI In Situ TAC), Marta Marcos (UIB, Spain), Ivan Haigh (NOC, Southampton, UK), Ivica Vilibić (IZOR, Split, Croatia), Antonio Novellino (EMODnet Physics), Patrick Goringe (SMHI, Sweden), Vibeke Huess (DMI, Denmark), Manuel Bensi (INOGS, Italy), Sara Almeida (IGN, Portugal).

Apologies from the TGTT Core Group: Vincent Donato (SHOM, France), Angela Hibbert (NOC, UK) and Alessandro Annunziato (JRC).

Welcome and introduction

The chair welcomes the attendees to the meeting, that being remote has allowed the participation of more experts beyond the task team core group: e.g. Phil Thomson, from Hawaii (University of Hawaii Sea Level Center), Sylvie Pouliquen (CMEMS In Situ TAC), Ivan Haigh (GESLA, NOC, UK) and Antonio Novellino (EMODnet Physics). This has been crucial for the discussion focused this year on links between data portals and metadata standards.

The agenda was adopted with one minor change of order of presentations for day 2, by all the participants.

The chair presented EuroGOOS and the role of the tide gauge task team, as well as the framework for the discussion and main objectives of the meeting, based on some weaknesses of the network in Europe: redundancies and duplicates in existing data portals, difficult access to all required metadata and quality control of huge amount of high-frequency data. Related to these needs she presented the objectives of the task team in H2020 EuroSea project, that has allowed allocation of some funding for advancing in these big issues. She emphasized the

role of the task team to promote and support collaboration between international GLOSS Data Portals and European Data Portals, as established in the terms of reference of the task team.

Data Portals

The first day was entirely dedicated to presentations from representatives of the different data portals, and to promote the discussion and exchange of ideas (starting from a technical point of view) about possible ways of cooperation. The objective is to end with some actions and recommendations from this group, that will be shared afterwards with the relevant stakeholders and managers of the different programs. More specific issues on metadata provided by each data portal are listed on Metadata section (second day of the meeting).

The meeting started with the presentations of the different GLOSS data portals, followed by the non-GLOSS general portals CMEMS In Situ TAC and EMODnet Physics.

GLOSS: University of Hawai'i Sea Level Center (UHSLC) (P. Thompson):

Phil Thompson, Director of the UHSLC, presented this GLOSS data portal, that started with the TOGA project in early 1980's and was formally funded by NOAA in 1993. It represents the US/NOAA contribution to international in situ sea level observing efforts.

- ✓ It currently operates 73 TG's distributed worldwide, many in remote locations, significant component of the tsunami warning system in the Indian, Pacific and Caribbean.
- ✓ Two distinct datasets/data flux (hourly and daily resolutions) from 85 distinct data sources: Fast Delivery (FD): 1 month-lag and basic QC: 294 TG's (214 from the GLOSS Core Network-GCN) and Research Quality (RQ): 1-year lag, QC focused on identifying datum issues, 584 TG (254 GCN). Update status available.
- ✓ Data reception (open to providers decision): e-mail, ftp, https, etc
- ✓ Data access: ftp, http table, OPenNDAP (ascii and NetCDF formats). Focus now: new ERDDAP data server, identified by JCOMM Observations Coordination Group (OGC) as platform of choice, and with potential for cross datacenter cooperation.
- ✓ Products: above mentioned datasets, visualization tool/station explorer for UHSLC and NOAA NOS stations only and research products: seasonal forecasts and long-term impact projections.

GLOSS: British Oceanographic Data Center (BODC) (L. Bradshaw):

Liz Bradshaw is the head of the GLOSS Delayed Mode Data Centre, operated by BODC (UK) in collaboration with the Permanent Service for Mean Sea Level (PSMSL).

- ✓ Responsible for assembling quality controlling and distributing the final version of the GLOSS sea-level data sets, as well as all supporting metadata information (including benchmark details).
- ✓ Hourly and sub-hourly values together with ancillary variables when available from the GCN, GLOSS-Long Term Trend (GLOSS-LTT) and GLOSS-Ocean Circulation (GLOSS-OC) databases.

- ✓ Relies on Member Nations to provide the final version (QC'ed)
- ✓ If requested from the Member Nations, provides the monthly averages to the PSMSL
- ✓ Data and metadata ingested in an Oracle data base and reformatted to NetCDF
- ✓ Data provided in ASCII or WOCE netCDF format
- ✓ In-house QC, no data changed without permission of the data collector

GLOSS: Permanent Service for Mean Sea Level (PSMSL) (A. Mathews):

The GLOSS PSMSL (head: Liz Bradshaw, technical head: Andrew Mathews) hosted by NOC (Liverpool, UK) since 1933, is the Global Databank for Monthly and Annual Mean Sea Level data measured by tide gauges, a permanent service of IAPSO, part of GGOS (Global Geodetic Observing System) and one of GLOSS data centres.

- ✓ Data reception: up to 957 stations around the globe, via web services, e-mail, and no specific format. Datum/benchmark information requested
- ✓ QC expected to be done at high frequency level, only checks of spikes/datum shifts and consultation with data providers. Problems with changes of practices along the history. Further quality control provided by use of data in scientific studies. Working on a new QC method based on the use of model hindcasts
- ✓ Products: mean sea level trends (<https://psmsl.org/products/trends>). GNSS-IR Data Portal under development (within EuroSea project)

GLOSS: SONEL (M. Gravelle):

SONEL collects tide gauge data (from the French networks), levelling information and GNSS@TG data worldwide. It is the GLOSS data center for GNSS@TG data and collaborates strongly with the PSMSL.

- ✓ Reception of 1187 GNSS@TG stations, from 200 contributors. At this moment **only 177 tide gauges are connected with a nearby permanent GNSS station**
- ✓ Most of the stations identified are "opportunistic" (distance > 1km, not part of the tide gauge station)
- ✓ RINEX data from GNSS received daily by ftp, http, push...These data can be downloaded from <ftp://sonel.org>
- ✓ Output data: mean sea levels, QC GNSS data, levelling information
- ✓ Tools: Sonel Explorer, levelling json file GUI (to be developed)
- ✓ Products: Vertical Land Movement (VLM) from GNSS (solutions from different analysis centres), VLM from altimetry vs tide gauge data, relative and absolute sea level trends, waves (from models reanalysis): downloading ascii tables from the website: <https://www.sonel.org/-Vertical-land-movement-estimate-.html?lang=en>
- ✓ Collaborations: PSMSL, UHSLC and EMODnet (for display in EMODnet portal)

GLOSS: IOC Sea Level Station Monitoring Facility (IOC/SLSMF) (F. Hernández):

F. Hernández (VLIZ, IOC) presented this GLOSS data center hosted by VLIZ in Oostende (Belgium) through the website: <http://www.ioc-sealevelmonitoring.org/>. Focused on real time data transmission, with the lowest sampling time and latency, to show which tide gauge

stations are active worldwide, very important for tsunami warning systems. Research data is not the aim of this data center (no QC).

- ✓ Reception of tide gauge data from 163 data providers
- ✓ Tools to show latest data received and status of transmission, including plots of recent data
- ✓ It hosts the most complete sea level station catalog (SSC) of all GLOSS data portals, in terms of number of stations
- ✓ Collaborations: PSMSL, UHSLC and EMODnet (for display in EMODnet portal)

GLOSS: GESLA (Global Extreme Sea Level Analysis) (I. Haigh):

GESLA is a new GLOSS dataset, led by Ivan Haigh (University of Southampton), that compiles worldwide higher-frequency tide gauge data for extreme sea level studies. It is not an operational service but is updated every few years by downloading/asking for data to original data providers or other data centers. GESLA-3 in preparation (updated until 2019). www.gesla.org.

- ✓ 1353 stations (including duplicates) distributed worldwide, 30 data providers listed (mostly national data providers and GLOSS data centers)
- ✓ Download and processing data
- ✓ Value added products: tide and skew surge
- ✓ 686 sites from UHSLC
- ✓ Matlab code (to be translated to Python by P. Thompson)

CMEMS (Copernicus Marine Service) In Situ TAC (M. de Alfonso):

The CMEMS In Situ TAC, led by Sylvie Pouliquen (IFREMER, France), integrates oceanographic data from different types of observing platforms, including tide gauges. The system is managed and operated in 7 european regions. Marta de Alfonso, head of the IBI region (European Atlantic coast), presented the data flow and processing applied to tide gauge data in CMEMS.

- ✓ Tide gauge data only available in near-real time: only automatic QC applied (SELENE software, from Puertos del Estado, for the IBI and the MED regions). No REP (reprocessed historical data) available yet (planned for next CMEMS phase, starting April 2021)
- ✓ Originally considered “mooring” stations, tide gauges are now specific platforms in CMEMS folders and websites, as suggested by the EuroGOOS Tide Gauge Task Team, to facilitate the access to the users
- ✓ Data distributed in standard NetCDF format for all variables, including sea level from tide gauges
- ✓ 480 tide gauges providing near-real time sea level data, with the minimum sampling as provided by the data provider for the last 30 days of data
- ✓ Monthly and historical files stored with original sampling in all the regions except IBI (only hourly values) and Global (all samplings, one NetCDF file per sampling data)
- ✓ Data available via dashboard: <http://www.marineinsitu.eu/dashboard>

EMODnet physics (A. Novellino):

Antonio Novellino (co-coordinator of EMODnet physics data portal) presented this European data portal that integrates all type of geophysical data, including sea level data from tide gauges from all the above-mentioned programs, among others.

- ✓ Quality control of input data
- ✓ Products: metadata, time series, maps, catalogues
- ✓ Integrated now: 1390 TG's from PSMSL, 150 from UH, 965 from IOC and 480 from INSTAC: total 2985 stations with duplicates. Linked to 186 stations with historical data from SeaDataNet (NOC) and 779 from SONEL
- ✓ Includes display of products provided by PSMSL and SONEL: relative and absolute sea level trends

Presentation on status of gaps and duplicities in data portals (L. Testut):

Laurent Testut presented the status of one of the key actions of the EuroGOOS Tide Gauge Task Team, now a task in the framework of EuroSea project: an analysis of the gaps and duplicities in all data portals presented during the meeting. For this, he has developed a python tool that can help to identify these issues. First objective: list of portals and review of number of stations, gaps and duplicities. Next step: comparing the content for each station in the different data portals. In a first study he has analyzed the content of 3 catalogues (without attached data) and of 10 data portals, and provided a raw number of stations for each one, with the following main findings:

- ✓ 19 GLOSS stations in SSC (IOC SLSMF) are not in the GLOSS Handbook (last update in 2012)
- ✓ Criteria followed to avoid duplicates: one site per 1x1 deg box leads to a list of 1780 unique label/sites
- ✓ Several useful visualization tools to find problems: barcode representation showing the presence of each unique site in the different data portals: e.g. 226 stations only in SSC, 2 stations only in CMEMS, including maps with position of these stations.
- ✓ Stations found present in all data portals/catalogs with different names

He provided some recommendations:

- SSC to be used as the reference catalog for the study, by removing GNSS-only stations and including those in EMODnet, CMEMS and EUTGI (metadata inventory – see below)
- Use of ISO3166 standard for country name in all data portals
- Information about the history of the GLOSS Core Network definition available on-line
- A simple html TG list desirable from EMODnet, GESLA, CMEMS, BODC
- A common agreed definition of what a TG site/station is, linked to a common and persistent ID

Discussion on Metadata standards and ways of improving cooperation:

EuroGOOS TGTT New Inventory of Metadata (T. Keena and G. Westbrook):

Tara Keena, from the Irish Marine Institute, presented the status of another key action of the EuroGOOS Tide Gauge Task Team, also a task in EuroSea project: the implementation of a new inventory and tool for metadata analysis of all available tide gauges in Europe. The objective of this task is to compile all relevant metadata from European tide gauges in a unique site, where national data providers can easily contribute and update their information, and that international programs could use for completion of their records. For the latter, these metadata will also be easily transferred to files easily ingested by automatic procedures (formats: XML, JSON, etc).

The tool is not yet finished (EuroSea project has just started in November 2019), but a proof of concept version already exists:

<http://eutgn.marine.ie/geonetwork/srv/eng/catalog.search#/home>

Developed with open-source applications, at this moment it makes use of a shared spreadsheet that feeds a database in the Marine Institute and a Geo Network application. The final place of the tool will be decided by the EuroGOOS Tide Gauge Task Team after consultation with GLOSS, CMEMS and EMODnet data portals, when finished. Before this, agreement on mandatory metadata, unique ID for tide gauges and common vocabularies definition should be ideally accomplished for a final useful tool at the end of the project. The tool must rely, as well, on existing metadata catalogues managed by existing programs, especially the one maintained by IOC/SLSMF.

Standards on metadata and formats for GLOSS Data Portals

See below some key technical points for each of the databases and catalogues considered

UHSLC:

- ✓ Use of master .geoJson file to populate NetCDF headers
- ✓ ISO 3166 country names/codes
- ✓ Various IDs for identifying links to different agencies
- ✓ Missing data originator and other info
- ✓ Good information in Pat Caldwell's ascii/text meta files, need to upgrade to modern system
- ✓ Benchmark metadata: internal repository, working to get that information into an accessible database
- ✓ Focus on advantages of ERRDAP API: plans to build web tools on top, if other centers also establish ERRDAP servers with common metadata, search can be cross-agency, allowing tracking downloads from original servers.

BODC:

- ✓ Metadata on site information, data sampling and processing, and instrument information

- ✓ Metadata stored in a “html” history document
- ✓ Moving to making data FAIR (Findable, Accessible, Interoperable and Reusable) and TRUST (Transparency, Responsibility, User Focus, Sustainability and Technology) Principles for digital repositories
- ✓ Working on assignment of persistent identifiers such as DOI (ISO26324)
- ✓ Participation on the Persistent Identification of Instruments Working Group to help improve the description of a time series where the sensor and platform may change and move many times.
- ✓ Focus also in ERRDAP (JCOMM selection): constructed for the GLOSS web page and to have access to all GLOSS data sets simultaneously
- ✓ Specific NetCDF format

PSMSL:

- ✓ Data format: legacy text format linked to the website (CSV and netCDF formats used as well, not on the website)
- ✓ Metadata page for each site on the website, taken from the database (updated generally weekly)
- ✓ Introducing now international agreed standards and vocabularies: e.g. ISO 3166-1 Country Codes)
- ✓ List of tide gauges tied to GNSS receivers (with Reference to Ellipsoid) and associated metadata: https://www.psmsl.org/data/obtaining/ellipsoidal_links.php (a consistency check with the one prepared by EuroGOOS TGTT, in Europe, will be done)
- ✓ Intensive metadata exchange with SONEL (XML format) on GNSS near tide gauges: list of sites with GNSS and Tide Gauges, ellipsoidal height, vertical movement rate and geodetic ties
- ✓ Additional metadata not necessarily advertised such as interactive maps.
- ✓ Migrating from XML format to GeoJSON format
- ✓ Provides a list of json files with metadata, as example: RLR definition, sites linked to Ellipsoid via GNSS, XML catalog, Station Locations, Trends, etc.. Some of them in XML and CSV

SONEL:

- ✓ Station summary on the website, including IGS log file, pictures, BM position map, bibliography and log book.
- ✓ IGS log file: created by the International GNSS Service, it is well structured and used internationally. Only disadvantage for its use in the TG community: not easily parsable, a json or xml format would be better.
- ✓ New json5 format file proposed for exchange of levelling data internationally

IOC/SLSMF:

- ✓ SSC catalog: <http://www.ioc-sealevelmonitoring.org/ssc.php>, the most extensive, synchronized with other metadata catalogs hosted by GLOSS data centers
- ✓ Three main core fields: name, latitude & longitude and data provider identifier
- ✓ It includes RSS feeds and web services to retrieve information from the SSC
- ✓ SSC has an SSC Id and includes Id's from other data portals, if available

- ✓ Editable clicking in a station, with e-mail and password (by data providers)
- ✓ Specific metadata on data transmission/sampling issues

GESLA:

- ✓ ASCII file, specific flag definition for QC (QC is applied)
- ✓ Agreement on data format and flags with other data portals would be desirable

Standards on metadata and formats for CMEMS and EMODnet:

CMEMS In Situ TAC:

- ✓ NetCDF format adopting specific recommendations from the EuroGOOS TGTT since 2018:
http://eurogoos.eu/download/NetCdf_Recommendations_forCMEMS_EuroGOOSTGT_T_October_2017.pdf
- ✓ Specific mandatory attributes defined for variable SLEV: *time_sampling*, *sea_level_datum* and *processing_method*
- ✓ Additional optional attributes recommended: *TGBM_name*, *TGBM_sea_level_datum*, *co_location_with_GNSS*, *TGBM_ellipsoidal_height_estimate*, *vertical_land_movement_estimate*, *GNSS_campaign*
- ✓ Additional information provided under attribute *comment* (url's, link to additional metadata, etc)
- ✓ Metadata managed by each CMEMS region independently, they would appreciate a common repository for tide gauge metadata available somewhere

EMODnet Physics:

- ✓ Compilation of metadata according to SeaDataNet standards: e.g.: parameters P01, P02, P22 (INSPIRE), L06 (Platform), C19 (Sea Region), EDMO, EDMERP (institution)
- ✓ Use of an ERDDAP data server for discovery and access services:
https://erddap.emodnet-physics.eu/erddap/tabledap/EP_ERD_INT_SLEV_AL_TS_NRT.subset

Quality control tools

New GLOSS Manual on Quality Control

The chair informed about the recent publication of the GLOSS manual on Quality Control of In Situ Sea Level Observations: <https://unesdoc.unesco.org/ark:/48223/pf0000373566>. This manual had been started and drafted many years ago, but never finished. In the meantime, different projects and programs have published quality control procedures for tide gauges (and for other type of platforms). This new manual makes a review of all existing publications, software packages and approaches followed by national institutions and programs worldwide as by May 2020. It describes the standard recommended procedures for delayed-mode and near-real time data quality control and processing, with special focus on automated algorithms advantages, limitations and quality assessment.

Other packages/experiences for automatic QC:

QC of 1-min data from IOC/SLSMF (I. Vilibic)

Ivica Vilibic is a researcher expert on meteo-tsunamis from the Institute of Oceanography and Fisheries in Split (Croatia). He and his group need very high-frequency data (1 min or less) for their studies. These data are available through IOC/SLSMF but without any QC applied. He presented the work carried out by a PhD student (Petra Zemunik) to process the data from the whole global network. The main objective is to map worldwide sea level oscillations between 2 min – 2h. After applying some predefined criteria they ended working with 482 stations in total. They focused only on the QC of the high-frequency part (datum issues or long-term drifts not relevant here). The process included removal of tides, automatic despiking, data filtering, removal of tsunami events, visual inspection and analysis of percentiles to remove outliers. Final product: high-frequency time series quality controlled. Ideas for collaboration and distribution welcome.

Discussion

Detailed discussion attached on the shared google doc https://docs.google.com/document/d/1z7Hg1cChxpu_FciZ0sv4Pp5qL6GZQDRw3Rs-qBq4jKI/edit. Main issues raised during the discussion were:

- ERDDAP data servers: used by UHSLC, BODC and EMODnet. GLOSS data centers aim to implement a unified instance for the users at the GLOSS website. Platform of choice by JCOMM for data centers cross references. Strongly supported by EMODnet as well (Antonio)
- All data portals could benefit from data from the others: e.g.: CMEMS needs data from the global network for operational oceanography, BODC interested in more stations from Europe, and PSMSL in more stations in the Mediterranean Sea. All need more stations from Africa.
- Need of common vocabulary for metadata (not available now). GLOSS task for years, this is challenging. Many types of metadata (discovery, data, depending on the application). Sylvie suggests focusing first on active stations. Data archeology for the future. The chair proposed to establish a minimum set of mandatory metadata to start with and progress. However, international agreements/coordination will be required on mandatory metadata.
- Sylvie Pouliquen questioned on GLOSS data access for CMEMS applications: for operational oceanography (a few hours latency) data should be downloaded from IOC/SLSMF, for high-quality data it depends on the data sampling (hourly-daily from UHSLC, higher frequency from BODC).
- There is a strong need of a unique ID (now a different one for each data portal): this is linked to the need of an agreed definition of what a “site” is. Sylvie suggested

involving JCOMMOPS for their experiences in other global networks (GLOSS involved): suggested to use WIGOS ID or explore what other networks do.

- General agreement on the need/convenience of common QC flags
- Antonio Novellino: convenience of adding information on sensors and history of changes, attached to the timeseries
- Antonio Novellino commented on European Commission requests: asset mapping, showing the different sources of data, products on trends and recent trends (since 2000), products on anomalies and hazards, products that combine/compare satellite altimetry and in-situ data, be compliant to INSPIRE Directive
- Discussion on what a site is, difficulties of this definition, depending on the application, the length of the timeseries, etc. Sylvie Pouliquen suggested to establish links to OceanSites program that have experienced the same problems (J. Kartensen from Geomar is the responsible for OceanSites, he is in EuroSEA)
- Data policy: free and open at the European level, also for UNESCO/IOC. Some problems (small percentage of stations, however) at national level. Also, some institutions distributing data to one data portal refuse to do it through another one (e.g. CMEMS).
- Link with JCOMMOPS and a meeting with the GLOSS chair is required. Sylvie Pouliquen suggested decoupling “easier access to data” from “GLOSS labelled” stations, but all visible and associated in a map
- Antonio Novellino suggests creating a global attribute: “sensorML” also for TG’s (as proposed for other networks)
- The establishment of small technical groups for progressing in different tasks was proposed by the chair and it was very well received by all. Work in metadata will be linked to EuroSea WP3 data management task.

Other issues:

The chair announced the commitment to the Task Team core group of a new member from LIENSs/U. La Rochelle/SONEL (France): Dr. Guy Wöppelmann, and a change of representative from DMI (Denmark): Vibeke Huess that will replace Kristine S. Madsen.

Next workshops

The EuroGOOS Tide Gauge Task Team will organize two workshops involving the global sea level community in the framework of the EuroSea project:

- First workshop in January 2021: focused on the European network – GLOSS collaboration: new metadata inventory and standards, data flow between data portals, analysis of gaps and duplicates, optimization of data stream, exchange format and product generation, new PSMSL tool for land uplift/subsidence land data. Focused more on internal communication within the sea level community in Europe and alignment with GLOSS objectives and needs. Ideally to be held side with the GLOSS GE meeting, by now side by EuroSea GA meeting. Final date confirmation dependent on the pandemic situation.
- Second workshop in November 2022: focused on new automatic quality control algorithms and product generation from tide gauge data, new instrumentation

developments, a training course on quality control. Involving end-users for showing outputs of the project.

Review of actions from previous meeting

Action 1: Ask if the Office can include the names of the core participants in the website (chair). **Done**

Action 2: Ask silent participants by e-mail about their availability for the task team and update the list of members accordingly (chair). **Done**

Action 3: Distribute the document on TG-GNSS stations in CMEMS to the INSTAC's of CMEMS, for potential use of these information on the metadata for each station (chair). **Pending**

Action 4: Repeat survey to national contacts to contribute to the document on action 3 (SONEL). **To be confirmed by SONEL September-October 2020.**

Action 5: Include information from stations in Sweden (Thomas). **Done**

Action 6: add to the table of TG-GNSS stations information on Tide Gauge Bench Mark – tide gauge datum distance (all). **Pending**

Action 7: to provide a detailed description on CMEMS In Situ TAC access to tide gauge data (Marta de Alfonso). **Done**

Action 8: circulate and send to the EuroGOOS office the existing document describing the existing data portals possibly updated/improved with basic output from the new python script (statistics), to probably upload later to EuroGOOS website (Chair, Laurent). **Pending.**

Action 9: to review the coordinates and names of stations in the different data portals and clarify which are duplicates or different stations at the same harbor, with Laurent tool (Laurent). **Ongoing**

Action 10: to contact GLOSS and explore the possibility of formal collaboration with CMEMS InSitu TAC. **Pending**

Action 11: EuroGOOS office to explore possibility of repeating Tide Gauge Task Team survey with support from the Task Team, with resources from EuroSea project (Office). **Pending, to be discussed within EuroGOOS.**

Action 12: to update the list of contact points for each organization in Europe in charge of a tide gauge network (Vicente, Begoña). **Done**

Concluding remarks and future actions:

The two days meeting showed the well-known need of strengthening the communication between international GLOSS data portals and European (CMEMS, EMODnet) programs. All

attendants agreed on the advantages of working together and establishing the following priorities to progress on:

1. Review the **definition of “site/station”** in the tide gauge network, starting from GLOSS criteria;
2. Establishment of a new **unique code for tide gauges**, based on “site/station” definition;
3. Establishment of **common metadata standards** (vocabulary and definitions) for a better cross-agencies links and data exchange

GLOSS has worked on these issues in the past, which confirms they are really challenging and that it will be difficult to solve easily now that all the programs are established and running operationally. Therefore, a more realistic approach should be followed, which could consist of:

- Starting with only active stations and operational/near-real time applications;
- Agree on a “minimum” set of mandatory metadata to work with: compiling the information and agreeing on common vocabulary and definitions for all data portals;
- Creating small technical working groups to deal and progress in each of the above-mentioned priorities.
- Prepare recommendations on harmonization of all these activities to relevant decision makers

Other relevant aspects being discussed during the meeting:

- Agreement on **common data formats** and QC flags would be useful and highly desirable;
- **FAIR principles** and traceability: all programs are working taking into account these principles. Definition of new unique ID’s would certainly help, assignment of persistent identifiers as DOI’s needed. The data provider must be credited as much as the data program/aggregator: this will ensure and help on the sustainability of the network.
- **Quality control and products**: although it was not extensively discussed during this meeting, it became evident that different strategies/approaches are being currently followed by different programs. Some questions arose: convenience of updating existing recommendations? What is the role of national data providers that are already doing this work? Do they get credit somewhere for that? GLOSS QC manual provides recommendations about the algorithms and tools
- **Data exchange** between programs: CMEMS INSTAC interested in tide gauges from GLOSS for operational purposes, GLOSS interested in having access to more stations in Europe, EMODnet Physics interested in displaying existing products. How can all this be articulated?
- Do the existing agreements with national data providers (sometimes being Member States) allow data exchange between different programs?

Final List of Actions from July 2020:

Apart from the completion of pending actions listed above, new actions proposed after this meeting has been added to the list of actions (new from 9 to 12):

Action 1: Distribute the document on TG-GNSS stations in CMEMS to the INSTAC's of CMEMS, for potential use of these information on the metadata for each station (chair). **Pending**

Action 2: Repeat survey to national contacts to contribute to the document on action 3 (SONEL). **To be confirmed by SONEL September-October 2020.**

Action 3: add to the table of TG-GNSS stations information on Tide Gauge Bench Mark – tide gauge datum distance (all). **Pending**

Action 4: circulate and send to the EuroGOOS office the existing document describing the existing data portals possibly updated/improved with basic output from the new python script (statistics), to probably upload later to EuroGOOS website (Chair, Laurent). **Pending.**

Action 5: to review the coordinates and names of stations in the different data portals and clarify which are duplicates or different stations at the same harbor, with Laurent tool (Laurent). **Ongoing**

Action 6: to contact GLOSS and explore the possibility of formal collaboration with CMEMS InSitu TAC. **Pending**

Action 7: EuroGOOS office to explore the possibility of repeating the Tide Gauge Task Team survey on network status in Europe, with support from the Task Team, and resources from EuroSea project (Office). **Pending, to be discussed within EuroGOOS.**

Action 8: the EuroGOOS TGTT to establish a common repository/folder to share all these documents

Action 9: EuroGOOS Office and the EuroGOOS TGTT to contact JCOMMOPS (Mathieu Belbeoch) and Johannes Kartensen (OceanSites), to learn from the experience in other networks and strengthen collaboration within EuroSea project (both partners here)

Action 10: report to GLOSS chair (Gary Mitchum) and new GLOSS technical secretariat (Bernardo Aliaga) about the output of this meeting.

Action 11: creation of small working groups for each of the 3 priorities identified.

Action 12: ensure link with EuroSea WP3 on data management

Relevant links

Discussion google doc document:

https://docs.google.com/document/d/1z7Hg1cChxpu_FciZ0sv4Pp5qL6GZQDRw3Rs-qBq4jkl/edit?usp=sharing

Agenda: <http://eurogoos.eu/events/eurogoos-tide-gauge-task-team-meeting-2020/>

Presentations:

<https://www.dropbox.com/sh/pxkucmq881n64i2/AAB5cvKYPmX8d4utxcwrKcjHa?dl=0>

Other documents provided by the attendants:

Sylvie Pouliquen AtlantOS data management report: <https://www.atlantos-h2020.eu/download/7.4-Data-Management-Handbook.pdf> (to be pursued in EuroSea WP3)

IOC Manual on Quality Flags: https://www.nodc.noaa.gov/oas/support/MG54_3.pdf

Elizabeth Bradshaw:

https://www.gooseocean.org/index.php?option=com_oe&task=viewDocumentRecord&docID=24169

Andy Matthews, on persistent identifiers: <https://www.rd-alliance.org/group/persistent-identification-instruments-wg/outcomes/persistent-identification-instruments>

Technical working groups: (only leaders and confirmed volunteers included, still open)

1. Technical working group for **site/station definition**:

Lead: [Guy Woppelmann](#); Participants: Andrew Mathews, Fabio Raicich, Begoña Pérez Gómez

2. Technical working group for **unique ID definition**

Lead: [Liz Bradshaw](#); Participants: Marta de Alfonso, Fernando Manzano

3. Technical working group for **agreement on minimum metadata and common vocabularies and definition**:

Lead: [Marta Marcos](#); Participants: Laurent Testut, Antonio Novellino, Liz Bradshaw, Andrew Mathews, Begoña Pérez Gómez, Marta de Alfonso

