Minutes from E-GVAP combined expert teams and members meeting 20141022 to 23 (1 1/2 day) at UK Met Office, Exeter

The minutes are a supplement to the presentations by experts and members. The presentations are available via the homepage, egvap.dmi.dk, under "E-GVAP meetings". Uid is egvap, pw is gps2user.

Attendance Jonathan Jones, Dave Offiler and Chris Burrows, UK Met Office/METO; Frederic Marin and Patrick Moll, Meteo France; Rosa Pacione, e-geos/ASI; Henrik Vedel, DMI; Jana Sanchez, AEMET; Galina Dick, GFZ; Michael Bender, DWD; Sabine Hafner, obs-pmt/DWD; Eunhee Lee, Met. Inst. of South Korea; Balint Varga, OMSZ; Tivadar Horvath, SGOB; Jose Sobrino IGE; Lila Jean-Louis, SGN; Eric Pottiaux, ROB; Jan Dousa, GOP; Siebren de Haan, KNMI.

Many thanks to the Gemma, Jon, and Dave, and the UK Met Office, for arranging and hosting the meeting. Weather caused havoc to air traffic in Amsterdam on the way to the meeting, resulting in both missed participation, and severe delays for some of the participants making it to the meeting.

On specific subjects

Data formats for tropospheric delay data

Currently E-GVAP delay data are uploaded in COST ascii format. The "operational" data are distributed both via GTS in BUFR format, and available in COST ascii format via ftp. The "test" data are only available via ftp. The BUFR format is relatively old, the COST format has recently been slightly updated, both regarding header content and filenaming.

Both formats have shortcomings when it comes to distribution of slant delay data. The BUFR version cannot handle the large delays at low elevations, while the COST format will contain exessive header information when realistics amounts of sites and elevations are included in a file.

In parallel to this one i on the geodetic side discussion an update of the SINEX tropo format, which is used for distribution of tropospheric data in geodesy. Rosa and Jan are central in this work, see Rosas presentation from the expert meeting.

We discussed the needs on the meteorological side, in order that Rosa Pacione and Jan Dousa can bring them to the SINEX tropo format forum. The SINEX format is widely used in geodesy, whereas the COST format is only used for ground-based GNSS meteorological data exchange in Europe. It was decided to wait for and potentially change to use of the SINEX tropo format, instead of doing further updates to the COST format. If done, software enabling conversion from COST format to the future SINEX tropo format should be made available by E-GVAP.

Regarding the BUFR format it was concluded that the current version works OK for zenith delay distribution, but an alternative will be needed for distribution of slant delays. It could be a separate BUFR format specifically aimed for slant delays. Potentially it could be another, more modern format, such as netcdf, if or when EUMETNET members accept those in their data assimilation systems.

To avoid misunderstandings: There is at present no change in the E-GVAP data formats. The latest version of the COST format is version 2.2a.

Notice that software enabling conversion between COST and BUFR, as well as between different versions of the COST format is available at the ftp-server under support/code.

GNSS site naming

In the RINEX 3.02 format (ftp://igs.org/pub/data/format/rines302.pdf) a "more unique" naming will be

introduced, by combining four character site traditional site name with a reciever and antenna number and with a country identifier. For this to be "truly unique", the name must be constructed/approved centrally, e.g. by the IGS.

Meanwhile the "naming service" run by Dave Offiler for E-GVAP, most easily available at:
http://offiler.demon.co.uk/~dave/gwv/gwv_list.cgi
is still the best place to consult to avoid name clashes. All ACs are encouraged to consult this site before uploading data for at new GNSS site, and change the name if necessary to avoid name clashes.

It might be necessary to continue running this facility and do internal E-GVAP name clashes control and correction, as not all data providers, for example some private companies, may not adhere to the new naming scheme and control mechanism being proposed for RINEX 3.

Currently the facility is running courtesy of Dave Offiler. It should be made more visible, via the E-GVAP homepage and EUREF, and it should be put in a more operational setting.

To avoid misunderstandings: There is at present no change in the E-GVAP rules for site naming.

Requirements for moving AC solutions from "test" to "operational"
Formal requirements to be made regarding moving solutions from "test" to "operational". An inquriy regarding conditions will be made. Different users have different requirements.

Access to the EUMETNET Quality Monitoring Portal, QMP
From spring 2015 access to E-GVAP material at the EUMETNET QMP will become possible for the E-GVAP AC's. Currently only members of EUMETNET can access the QMP. The QMP presents timeliness statistics based on arrival times of E-GVAP data to DWD, and daily validation data based on a compilation done by the E-GVAP team.

Validation and timeliness statistics
A vast amount of monitoring of E-GVAP products is performed, both regarding quality (relative to ZTDs from other GNSS processing and to NWP) and of timeliness.

It was decided to introduce a compilation of the timeliness monitoring done at the EUMETNET QMP, to provide monthly means for each AC&solution, to give an easy overview. This particular monitoring focuses on the age of the last ZTD to arrive, ie. monitors if at least *one* ZTD estimate in an uploaded file for the sites uploaded is young enough to beat a certain timeliness criteria. Henrik to establish this compilation.

Similarly it was decided to introduce monthly validation statistics, based on O-B's (GNSS versus NWP) and save it for easy inspection, for use for example w.r.t. moving solutions from "test" to "operational".
The base for this statistics will initially be the O-B from the UK global model, which is also used for the EUMETNET QMP validation. We noted it would be prerable to have also statistics from a higher resolution "European" model, but did not identify yet which model or models to use. Henrik.

From EUMETNET Observations Programme there was a proposal to change the timeliness monitoring criteria from 90 min to 60 min. We suggested the QMP keep a 90 min criteria and add a second 60 min criteria.

Observations Programme proposal for a study of the effect of E-GVAP data
The STAC (scientific advisory board in EUMETNET) is interested in the effect of E-GVAP data oin NWP, and has proposed a study of this. This is quite common in EUMETNET regarding other types of observations. Potentially the Observations Programme can finance 30 k-euro for such a study.

The point was made that over the last 10 years many OSE (with/without the observation being studied included in the data assimilation) type studies of the impact of GNSS data in NWP has already been made, demonstrating in general a positive impact of ground-based GNSS data. Many of these results have been reported at E-GVAP expert team meetings. A compilation of these results should be done and presented to STAC, before spending ressources on an extra study.

It was proposed by Siebren to redirect the study money to a study on the impact of slant delays instead. Whether that is possible is not yet clear, likewise not whether the obs. programme money could in some other way be spend to help improve usage of E-GVAP data among E-GVAP members. Notice, that here I (Henrik) add a bit of information from later contacts between Siebren, Sabine and I.

Milestones 2014 (from the E-GVAP programme plan)

- *Continuation of existing E-GVAP-II data processing and distribution*. This is done.
- *Update of Product Requirements Document (depending on the user interest).* There we no calls for changes, hence on immediate update required. Howevr, it was decided to make an inquiry to members and other users, to find out if there are additional requirements to the current ones, which are based directly on WMO recommendations. In connection with this a list of cut-off times for the data assimilation at member institutes will be compiled, to provide guidance on future timeliness criteria. Henrik to contact people, Dave and Henrik to revise doc with additional requirements if requested.
- *Update of document of common, minimum requirements to GNSS data processing as regards access to data from individual sites, to satellite orbit and clock estimates, and timeliness and precision.* Jon and Siebren.
- *Reports from expert teams and E-GVAP team.* The presentation from the expert teams meeting, along with minutes and periodic E-GVAP reports will be made available at the home page (Henrik).

Key focus areas (goals set at meetings)

- *Enable upload and distribution of sub-hourly GNSS delay data.* The current COST format, 2.2a, enables sub-hourly uploads.
- *Active quality control, AQC.* On the fly comparison of different solutions for the same site to be set up, to determine if an AC has a widespread problem on data quality, and if so warn automatically against usage. Henrik to set up test version of the system (which has been developed). Should be discussed where to run it in operational mode, in order to ensure maximum speed of inter-comparisons.
- *Expanded coverage in data poor areas, both European and global.* This is happening, in part due to the start of the EU COST action GNSS4SWEC, which was proposed and launched with a large involvement from E-GVAP experts and the E-GVAP team.

Next meeting

It was discussed to have the next meeting in connection with a GNSS4SWEC meeting planned for autumn 2015 in Wroclaw, Poland. The flexibility regarding the timing of the GNSS4SWEC meeting was unclear, it was decided to investigate this, and the willingness of non GNSS4SWEC E-GVAP potential E-GVAP meetings participants to travel to Wroclaw.

South Korean ground-based GNSS

Eunhee Lee, from the national met office of South Korea, explained briefly about ground-based GNSS meteorology in South Korea, indicating strong interest for collaboration with E-GVAP. Her institute runs an NWP model similar to one of those used at UK Met Office.

Minutes compiled by
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