08:30 - 10:00 Real-time & near-real-time user requirements *

chairs: G. Dick, J. Wang, G. Blewitt, P. Fang

This session will focus on identifying current and future users and their requirements for the RT/NRT and other IGS products, assessing the status of current products to meet the requirements, and proposing future improvements. Main topics could include, but are not limit to, the emerging needs of users for tsunami warning, earthquake monitoring, operational numeric weather prediction (NWP) and weather research in general, E-GVAP perspectives, climate applications, space weather, time transfer, and LEO satellite tracking.

Oral presentations (*8:30 – 10:00, 15 min each and 15 min for wrap-up*):

1. (Tsunami warning) **G. Blewitt or Tony Song (Tony.Song@jpl.nasa.gov): Requirements for real-time GPS detection of tsunamis**

2. (Weather prediction) **Jan Dousa (jan.dousa@pecny.cz): Case study for the IGS ultra-rapid orbit requirements**

3. (E-GVAP) **G. Dick**

4. (Climate applications) **J. Wang: Climate applications of a global, 2-hourly atmospheric precipitable water dataset derived from IGS tropospheric products**

An analysis technique was developed to derive atmospheric precipitable water (PW) using zenith tropospheric delay (ZTD) data from the International GNSS (Global Navigation Satellite Systems) Service (IGS) tropospheric products (~80-370 stations, from 1997-2006) and from ~200 SuomiNet stations in the U.S. (2003-2006). This PW dataset will be updated regularly for community use. The climate applications of the GPS PW dataset are highlighted in this study. Firstly, the GPS PW dataset is used as a reference to validate radiosonde and atmospheric reanalysis data. Secondly, the PW diurnal variations are documented using the 2-hourly GPS PW dataset. Some recommendations are also made to improve future IGS products for climate applications.

5. (???) **F. Pang or others**

6. discussion of recommendations

Presentations requested by participants:

1. ***Oscar L. Colombo (olcolombo@verizon.net):*** I could give a talk, on the Wednesday, on the real-time use for precise long-baseline differential GPS navigation, where I could present:

   (1) Results of tests I am making with data from receivers of the Castilla-Leon and other NTRIP networks in Spain, and also the experimental NGS network in our area, plus downloads of the hourly navigation rinex files and the ultra-rapid orbits (predicted part) compiled and distributed by the CDDIS. My early results already look pretty decent.

(2) In early May, I'll be in Argentina, to stay with relatives there, and to visit Claudio Brunini and his group in La Plata (my alma mater), to see first hand what they are doing. They have organized the setting up of the Argentinian national GNSS network, and now run its main data analysis center. They would like to move into some real-time support for trasportation, etcetera. The IGS real-time data and products could help them greatly during softtware develoment and preliminary tests and demonstrations. So maybe I'll get out of that visit something interesting to say about what some people do, or would like to do, outside the IGS, with IGS real-time data and products.
Finally, but I'm not sure of its relevance:
(3) I could suggest that the consolidated hourly nav files also could be streamed to the users, and that the predicted ultra-rapids could be distributed with more streams than the one, out of Finland, that is carring them already (as far as I know). Also, it would be nice if precise IONEX files --at least for areas with good IGS+local ground coverage-- were also streamed, to help with the first step in resolving ambiguities over long baselines, which is to resolve those between fixed reference sites circumscribing an area of operations, in order to interpolate their unambiguous ionspheric observables to users in that area (more or less as in VRS, but with the user software estimating its own residual tropo correction, because that cannot be interpolated very well over distances of much more than 100km).
I've written some papers on that, mostly with Manuel Hernandez-Pajares and his colleagues at the UPC.

2. F. Vespe, **R. Pacione (rosa.pacione@telespazio.com)**, B. Pace**: Accuracy of Regional Near-Real Time GPS ZTD and Site Coordinate Estimates versus IGS Ultra Rapid Products**

GPS data coming from regional ground-based GPS networks are routinely analyzed for Near Real Time applications all based on IGS Ultra Rapid Products. During the last years two NRT data streams have been set-up in Europe under E-GVAP and EUREF umbrella. E-GVAP (*The EUMETNET GPS water vapour programme*, http://egvap.dmi.dk) is set up to provide European GPS delay and water vapour measurements for operational meteorology working in close collaboration with the European geodetic community. In the EUREF Analysis Workshop held in Padua 2006, it was discussed about a NRT processing helpful for a quick monitoring of the EPN station coordinates. In this European scenario ASI is an E-GVAP and EUREF NRT Analysis Center delivering regional GPS products based on IGS Ultra Rapid orbits which are updated four times daily. The accuracy of NRT tropospheric estimates is set to be 9 mm (standard deviation) if they are compared to radiosonde observations and of the order of about 2 cm (3DRMS) if NRT coordinates are compared to EUREF rapid ones. But, could the accuracy of such regional NRT products be improved if IGS delivers Ultra Rapid orbits more frequently for example eight times daily? To get an answer, we investigate if NRT estimates accuracy is related to the time of the day and how it degrades at the late boundary of the time span of the considered IGU products (if a degradation is detected).

3. **Basara Miyahara (basara@gsi.go.jp): Results of GEONET real-time analysis**

4. **Jan Dousa (jan.dousa@pecny.cz): Case study for the IGS ultra-rapid orbit requirements**

We study the effect of the orbit errors in the precise ZTD estimation. The PPP and the network solutions are considered in deriving the marginal impacts from the radial and tangential

orbit errors in ZTD. A simulation study is provided for the network solution. We additionally present a detail evaluation of the IGS ultra-rapid orbit prediction for every hour of 24h prediction interval and independently for each satellite. The orbit prediction accuracy is studied with respect to the prediction interval for the radial, along-track and cross-track components and the prediction quality time-series are derived too. The accuracy code is evaluated by comparing the predicted and fitted orbits. We are interested in the requirements for the IGS ultra-rapid orbits in terms of (near) real-time application, especially ZTD estimation for the numerical weather prediction.

5. **Tony Song (Tony.Song@jpl.nasa.gov): Requirements for real-time GPS detection of tsunamis**