

Report of Working Group D: Reference Frames, Timing and Applications

9 and 10 November 2016, Sochi, Russian Federation

Co-Chairs: Zuheir Altamimi, Gerard Petit

Secretary: Mikael Lilje

1. INTRODUCTIONS

The Co-Chairs welcomed all to the meeting. Unfortunately neither Ruth Neilan nor Neil Weston could attend ICG-11. Zuheir Altamimi acted as chair for the part of the meeting regarding Geodetic References and Gerard Petit for the part regarding Timing References. Mikael Lilje acted as secretary. The names of the participants can be found in appendix A. The meeting was split into two days where presentation and discussions devoted to Geodetic References and Timing References were held on Wednesday, Nov 9 and summary and recommendations were discussed on Thursday Nov 10.

2. REVIEW OF MINUTES FROM ICG-10 MEETING

The minutes from the working group meeting at ICG-10 in Boulder, US were reviewed. Especially agenda item 7 and 8 were discussed (Working group D Activities and Achievements and Next steps). Round-table discussion of the representatives of Providers on the minutes concerning the recommendations, templates and comments can be found further down in the meeting minutes.

Last year the meeting discussed the need of a compilation of all WG-D recommendations. Due to Ruth's unfortunate absence, this meeting postponed the action to the next ICG-meeting.

3. TASK FORCE ON GEODETIC REFERENCES

3.1. Discussion on progress with WG-D Recommendations

Recommendation #11 (Finalization and Publication of Templates on Geodetic and Timing References)

The meeting noted the need to assure that the uploaded version is still valid. We also need to include on the template the date when the template was delivered. The provider reported the following status;

- Galileo: No change needed for the GGRF.
- GPS: Current version still valid
- Glonass: Working on an update
- Beidou: Coordinate update next year.
- QZSS: No update at this stage.
- India: No representative at the meeting

Recommendation #12 (Achieving Interoperability of Geodetic References among the Different GNSS Systems)

GPS reported that they have delivered. Zuheir encourage the other providers also to contribute with necessary information based on the various systems Ground Control stations. It is believed that the IGMA Trial Project will contribute to progress of the recommendation.

Recommendation #23 (Improving the accuracy of multi-GNSS orbits determination by the IGS)

Beidou is positive to contribute but cannot say when the information will be present. All providers welcomed the presentation prepared by Marek Ziebert (Presented by Zuheir) at the first Plenary Session. The providers ask for a white paper (1-2 pages) describing and clarifying the purpose and benefit. The Working Group D will ask Marek to prepare this.

3.2. Presentations made at the Working Group D meeting on Geodetic References

All presentations are available at the Working Group D webpage

- Brief presentation and description of ITRF2014, by Zuheir Altamimi
- The WGS 84 Terrestrial Reference Frame in 2016, by Stephen Malys, Robert Wong, Scott A. True
- Status of the Galileo Terrestrial Reference Frame (GTRF), by Werner Enderle, on behalf of the GGSP Consortium.
- Results of the PZ90.11 reference frame implementation to Glonass, Igor Silvestrov, Vladimir Pasyukov, Igor Gusev,
- Explanation on the release of BDS ICD (version 2.1) – Yang Yuanxi
- ISO/TC211 – update – Larry Hothem
- How GNSS CORS in Japan works for geodetic control and disaster mitigations. Hiromichi Tsuji

4. TASK FORCE ON TIMING REFERENCES

4.1. Discussion on progress with WG-D Recommendations

Recommendation #11 (Finalization and publication of templates on geodetic and timing references)

The recommendation is still ongoing. Most templates have been published between 2012 and 2016 but some templates still need updating due to last leap second insertion

Recommendation #16-A (Information on the works related to the proposed redefinition of UTC)

The recommendation need to be updated following last years WRC-15.

Recommendation #19 (Official provision of a rapid UTC (UTC_r) by the BIPM)

Gerard presented on the progress regarding the official weekly publication. Details can be found in the presentation available on the webpage.

Recommendation #20 (BIPM publication of [UTC-GNSS times] and [UTC-UTC(k)_{GNSS}])

The evolution of Circular T implies small change to the resolution.

Recommendation #21 (Monitoring offsets between GNSS System Times)

The recommendation need to be complemented by a fourth Recommend to foster comparison of offsets computed by the different GNSS

4.2. Presentations made at the Working Group D meeting on Timing References

All presentations are available at the Working Group D webpage

- Report on actions since ICG-10 (G. Petit) EGNOS timing performances as evaluated by SPMS, J. Delporte
- Description of BeiDou Time Template, H. Yuan (NTSC, China), Z. Cai (BSNC, China)
- GNSS Time Difference Monitoring Technology and Forecast Accuracy Analysis, H. Yuan, J. Zhang, W. Guang
- The GLONASS time: Current status and monitoring results, D.S. Aganov, P.P. Bogdanov, A.V. Druzhin, T.V. Primakina
- National Time Scale UTC(SU): current status and perspectives, A. Goncharov, I. Silvestrov, O. Denisenko

5. OTHER BUSINESS

- Japan presented on the coming IAG-IASPEI, July 30- August 4, Kobe, Japan, FIG/IAG/ICG Technical Seminar on Reference Frame in Practice.
- “The Multi-GNSS Experiment (MGEX) of the International GNSS Service (IGNSS) – Achievements, Prospects and Challenges”, new paper by Montenbruck
- Discussion about the name of the task force and to change to “Geodetic and Timing Reference” to reflect better the focus of the working group.

6. RECOMMENDATIONS FROM WORKING GROUP D

Zuheir presented the WG-D report to the second plenary session. Working D suggests to update the following three recommendation;

- Recommendation #16-A (Information on the works related to the proposed redefinition of UTC)
- Recommendation #20 (BIPM publication of [*UTC-GNSS times*] and [*UTC-UTC(k)_{GNSS}*])
- Recommendation #21 (Monitoring offsets between GNSS System Times)

7. CLOSING OF THE MEETING

Zuheir thanked all delegates for their active participation

APPENDIX 1: ATTENDANCE LIST

Mr Zhiwu Cai	China
Ms Shunli Song	China
Mr Yuanxi Yang	China
Mr Haibo Yuan	China
Mr Xinhui Zhu	China
Mr Jerome Delporte	European Union
Mr Ryuichi Ichikawa	Japan
Mr Hiromichi Tsuji	Japan
Mr Petr Bogdanov	Russia
Mr Sergey Bryzhov	Russia
Mr Oleg Denisenko	Russia
Mr Andrey Druzhin	Russia
Mr Alexander Goncharov	Russia
Mr Igor Gusev	Russia
Mr Vladimir Pasyunikov	Russia
Ms Tatiana Primakina	Russia
Mr Igor Silvestrov	Russia
Ms Anastasia Zueva	Russia
Mr Jim Burton	US
Mr Frank Clark	US
Mr Larry Hothem	US
Mr John Labrecque	US
Mr Stephan Malys	US
Mr Werner Enderle	ESA
Mr Gérard Petit	BIPM
Mr Rick Hamilton	CGSIC
Mr Jaroslav Simek	EUPOS
Mr Markku Poutanen	EUREF
Mr Mikael Lilje	FIG
Mr Krzysztof Czaplewski	IAIN
Mr Zuheir Altamimi	IERS
Ms Heinho Choi	Korea