TOWARDS D2050 AND THE “ROUTINE” COMBINATION IN EPN DENSIFICATION

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J ZURUTUZA

and the representatives of 26 ACs
• MILESTONES
• METADATA HARMONIZATION
• IGb08 → IGS14 CRD CONVERSION
• AC STATUS, CONTINUATION
• VELOCITY UNCERTAINTIES
• EXPLOITATION
MILESTONES

• D1933 PUBLISHED LAST YEAR
• PAPER IN GPS SOLUTIONS
  https://rdcu.be/bS6Fl
• ENHANCED VELOCITY FILTERING
• METADATA CROSSCHECK
• PREPARATIONS FOR D2050
Regional integration of long-term national dense GNSS network solutions

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Abstract
The EUREF Permanent Network Densification is a collaborative effort of 26 European GNSS analysis centers providing series of daily or weekly station position estimates of dense national and regional GNSS networks, in order to combine them into one homogenized set of station positions and velocities. During the combination, the station meta-data, including station names, DOMES numbers, and position offset definitions were carefully homogenized, position outliers were efficiently eliminated, and the results were cross-checked for any remaining inconsistencies. The results cover the period from March 1999 to January 2017 (GPS week 1000-1933) and include 31 networks with positions and velocities for 3192 stations, well covering Europe. The positions and velocities are expressed in ITRF2014 and ETRF2014 reference frames based on the Minimum Constraint approach using a selected set of ITRF2014 reference stations. The position alignment with the ITRF2014 is at the level of 1.5, 1.2, and 3.2 mm RMS for the East, North, Up components, respectively, while the velocity RMS values are 0.17, 0.14, and 0.38 mm/year for the East, North, and Up components, respectively. The high quality of the combined solution is also reflected by the 1.1, 1.1, and 3.5 mm weighted RMS values for the East, North, and Up components, respectively.

Keywords Reference frame · GNSS · SINEX · Combination · Densification · Velocity field
OUTLINE

• MILESTONES

• METADATA HARMONIZATION
  - LEVEL_0: 4-CHAR IDs
    (9?) - waiting for software updates
METADATA HARMONIZATION
IERS – EPN D – E_GVAP
METADATA HARMONIZATION

IERS – EPN D – E_GVAP

1836 agree
324 name conflict
193 crd conflict
1424 – no match

Publicly available, agreed conversion table is needed

In progress ...
METADATA HARMONIZATION

- **LEVEL_0:** 4-CHAR IDs
- **LEVEL_1:** EQUIPMENT & ATX (X)CHECK

metadata in logsheets vs SINEX(n)
type-mean vs individual

LOG SHEETS ARE ESSENTIAL !!!

M3G
OUTLINE

• MILESTONES
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• IGb08 → IGS14 CRD CONVERSION
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• EXPLOITATION
IGb08 → IGS14 CONVERSION

• ALL IGb08 COMPLIANT SOLUTIONS BEFORE W1933
• IGS TOOL AND LATITUDE DEPENDENT MODEL TO CONVERT CERTAIN TYPE MEAN PCVs TO IGS14
• INDIVIDUAL CALIBRATIONS ARE NOT AFFECTED
• LIMITED NUMBER OF STATIONS INVOLVED
• UNAVOIDABLE FOR VELOCITY ESTIMATION
IGb08 → IGS14 CONVERSION

The diagram shows the comparison between IGb08 and IGS14 conversion. The x-axis represents different countries, and the y-axis represents values ranging from 0 to 700. The chart includes categories labeled PCV, PCV and Ind., Ind., and None, indicating different conversion data points for each country.
IGb08 → IGS14 CONVERSION

East component

North component

Up component

LEIAR10_NONE
OUTLINE

• MILESTONES
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• AC STATUS, CONTINUATION
• VELOCITY UNCERTAINTIES
• EXPLOITATION
# AC STATUS after D1933

<table>
<thead>
<tr>
<th>Category</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not active any more</td>
<td>CEG – GRE – MON (G Stangl) AGRS?</td>
</tr>
<tr>
<td>Routine in progress</td>
<td>CZE – DEN – ISS – NOR</td>
</tr>
<tr>
<td>Up to now in batches</td>
<td>GGI – LTU – NGI – IBE</td>
</tr>
<tr>
<td>(Capacity) issues</td>
<td>AMO – BIGF – CAT – MAO – SRB</td>
</tr>
<tr>
<td>New: EPOS &amp;</td>
<td>INGV – UGA-CNRS – <strong>ROM(SGO)</strong></td>
</tr>
</tbody>
</table>
AC VISIBILITY

- PAPERS LIKE THE D1933 PUBLICATION IN GPS SOLUTIONS

- DOI TO ALL AC PRODUCTS RINEX to SINEX
  EUREF level action is planned

- **DATA PUBLICITY:** CLARIFICATION IS NEEDED FROM ALL ACs, ON WHAT SHOULD BE MADE AVAILABLE
D1933 → D2050

- IGb08.atx → IG14.atx
- Two more years of data
- Improved meta data check

(X)CROSS-CHECK

- Realistic uncertainty estimate: hector by M Bos
- Draft version: December 2019 AGU presentation
- New web pages for displaying the results
EXPLOITATION

• POSITION AND VELOCITY VALIDATION OF NATIONAL DENSIFICATIONS – ESTONIAN EXAMPLE !!

• WG OF GEOKINEMATICAL MODELLING
  realistic uncertainties are needed

• EPOS ERIC
  EPN Densification + EPOS pan-European processing

• EUROPEAN GROUND MOTION SERVICE
  project starts in 2020 and EPN Densification may used to connect InSAR patches and validation of the results. Velocities + timeseries are required.
FUTURE STEPS

• THE ENHANCED D2050 SOLUTION BEING PUBLISHED IN DECEMBER 2019

• DEDICATED WEB PAGES PREPARED IN PARALLEL
  - P & V SOLUTIONS SHALL BE AVAILABLE
  - INTERACTIVE PAGES FOR BROWSING TIME SERIES
  - SUPPORT FOR TECTONIC INTERPRETATION
  - VELOCITY FILTERING AND MODELING

• D2075 PUBLISHED IN SPRING 2020, THEN REGULAR UPDATES 3 TIMES PER YEAR (ROUTINE ANALYSIS IN THE BACKGROUND)

• PLAN TO DECLARE IT AS A EUREF PRODUCT
ACKNOWLEDGMENT


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