EPN DENSIFICATION
STATUS REPORT

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TARGET
Combination of national long term weekly SINEX solutions to realize *homogeneous, dense* European level position and velocity database

TARGET GROUPS AND PARTNERS

- IAG WG on Dense Velocity Fields
  - a subset is provided for the global velocity solution
- EPN WG on Velocity modeling
  - provides input velocity field data to support the improved realization of ETRS89
- EPOS
  - close cooperation with EPOS WG4
- Earth sciences
- NMCAs
BENEFITS

USER / PROVIDER SIDE
- independent tests of the national SINEX solutions,
- cleaned and “internationalized” (site naming) SINEX back to the user for own purposes,
- the combined solution is freed from occasional reference frame definition weaknesses,
- decreased network effect,
- high quality ETRS89 positions to test the national realization (EB),
- push forward the scientific analysis and use of the national GNSS production networks,

COMMUNITY SIDE
- creation of an “absolutely” homogeneous, dense ETRS89 velocity field
  → TECTONIC INTERPRETATION
- steps forward to the better realization of ETRS89,
  → POSSIBLE EXTENSION OF ETRS89 OVER THE NON-STABLE PART OF EUROPE (EPN WG)
THE APPROACH

• COLLECTION AND PREPARATION OF NATIONAL LONG TERM WEEKLY / DAILY SINEX SOLUTIONS
  • SINEX testing (constraints, quality, site naming)
  • SINEX CLEANING: outlier and offset detection, elimination
  • soln harmonization with EPN

• COMBINATION WITH EPN WEEKLY SINEX
  • EPN as reference
  • CATREF / MC approach
  • Handling of different software products (BERNESE, GAMIT)
  • same reference network as for the EPN cumulative

• RESULTS / PRODUCTS
  • cleaned national SINEX solutions,
  • position and velocity estimates in ITRFyy/IGSy/ETRFyy,
  • time series plots
  • EPN densification will be a GLOBAL product
<table>
<thead>
<tr>
<th>Country</th>
<th>Region</th>
<th>Data Availability</th>
<th>Notes</th>
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<tbody>
<tr>
<td>ASG</td>
<td>Poland</td>
<td>1482 - 1770</td>
<td>(2007 - 2014)</td>
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<tr>
<td>EST</td>
<td>Estonia</td>
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<td>EUPOS Combination Centre</td>
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<td>(1422-)</td>
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<td>Spain/Portugal</td>
<td>1400 - 1770</td>
<td>restricted publication</td>
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<td>The Netherlands</td>
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<td>1200 - 1770</td>
<td>GLOBAL</td>
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<td>UK (glo)</td>
<td>1200 - 1770</td>
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<td>Switzerland</td>
<td>0953 - 1770</td>
<td>IGS01 - cumulative</td>
</tr>
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</table>
STATUS OF THE NETWORK

>2400 SITES
LENGTH OF SINEX AVAILABILITY
some STATISTICS, as of today

- 2630 sites and 3770 solutions* in the EDV solution SINEX
- only 70 4charID overlap
- 5084 weekly SINEX files (plus daily - w/o AGRS and HEPOS )
- ~20 GB of SINEX data (a full HD movie, like The Wolf of Wall Street)
- data availability usually since 2007 (after w1400)
- ~2000 single outliers/short outlier periods had to delete
- runtime: a bit much ... [day]
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combined weekly SINEX size:
- 43 MB ECN (850 MB cumulative SINEX)
- 120 MB ECS (1450 MB cSNX)
- 75 MB ESB (1120 MB cSNX)
ANALYSIS ISSUE: MIXED IGS05/08 ATX

ALL ANALYSIS GROUPS - EXCEPT BIFG/UK - USED IGS05 UNTIL GPSweek 1632, THEN CHANGED TO IGb08 AT WEEK 1709

→ POSITION OFFSETS MAY APPEAR AT GPSweek1632 IN THE POSITION TIME SERIES

OFFSET ESTIMATES FROM THE

1) IGS TOOL (REBISCHUNG ET AL, IGSMAIL 6354) - PURE CORRECTION VALUE
2) RESIDUAL POSITION TIME SERIES FROM THE EDV COMBINATION (LINEAR FIT USING SECTIONS BEFORE AND AFTER WEEK 1632)

HAVE BEEN COMPARED AND ANALYZED TO DEMONSTRATE THE EFFECT IN EPN DENSIFICATION
IGS05/08 ATX OFFSETS: N-COMPONENT

CORRECTION ESTIMATES FROM THE IGS TOOL

OFFSET ESTIMATES USING THE REAL RESIDUAL TIMES SERIES
IGS05/08 ATX OFFSETS: E-COMPONENT

CORRECTION ESTIMATES FROM THE IGS TOOL

OFFSET ESTIMATES USING THE REAL RESIDUAL TIMES SERIES
IGS05/08 ATX OFFSETS: U-COMPONENT

CORRECTION ESTIMATES FROM THE IGS TOOL

OFFSET ESTIMATES USING THE REAL RESIDUAL TIMES SERIES
CONTRIBUTION SPECIALITIES

• RELEVANT CONTRIBUTIONS WITH STILL SHORT SERIES
  – Italy (400 sites!)
  – Greece, HEPOS

• PENDING CONTRIBUTIONS
  – Spain / Portugal: available and ready, but wait for the PhD of MV
  – Serbia, Croatia: invitation letter sent …

• EXPECTED CONTRIBUTIONS
  – The Netherlands (✓), Belgium
  – NKG
  – Germany

• NEED FOR METADATA (STA FILE and/or LOG files)
HELMERT-TRANSFORMATIONS

BGF_Helmert_parameters

SGN_Helmert_parameters

ECW_Helmert_parameters

BGF cumulative solution: epndv

SGN cumulative solution: epndv

ECW cumulative solution: epndv
ETRF2000 VELOCITIES
ETRF2000 VELOCITIES
ETRF2000 VELOCITIES  L< 3years
ISSUES, TASKS, PLANS

- **IGS01 / IGS05 / IGS08 ATX**
  - IGS08 only: BIGF
  - mixed (change at GPSweek 1632)

  What to do?
  - Keep them as they are!
  - Correction did not help – only re-processing!

- **HANDLING OF LARGE DATASETS**
  - Further tests with clustering
  - Latest CATREF version to be implemented (parallel processing)

- **FILLING IN THE WHITE SPOTS (BALKAN peninsula)**

- **EPN DENSIFICATION WILL BE GLOBAL → ← EPN not (yet)**

- **WEBSITE UNDER PREPARATION (EPNCB)**

- **FIRST PUBLICATION: partially after REFAG2014**