Service Quality Monitoring
Working group status
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7th EUPOS Council and Technical Meeting
November 9-10 2021, Bucharest, Romania, Online
How we can monitor Network RTK quality?

**Monitoring by physical monitoring stations**
- 🟢 real values of deviations
- 🔴 higher costs
- 🔴 the inability to monitor the entire network

**Monitoring by Virtual stations**
- 🟢 no physical monitoring stations
- 🟢 lower costs
- 🟢 monitoring of the entire network
- 🔴 virtual principle ≠ real deviation

EUPOS Service Quality Monitoring
EUPOS WG on Service Quality Monitoring

- Working group members
  - Karol Smolík (Slovakia) - chair
  - Branislav Droščák (Slovakia)

- WG cooperators
  - Szymon Wajda (Poland) – ASG-EUPOS
  - István Galambos (Hungary) – gnssnet.hu
  - Vlad Sorta, Miluta Flueras (Romania) – ROMPOS
  - Christian Trautvetter (Germany) – SAPOS
  - Rolands Pinta (Latvia) – EUPOS-RIGA
  - Pavel Ivancenco (Moldova) – MOLDPOS
  - Jan Řezníček (Czech Republic) – CZEPOS
**EUPOS** service quality monitoring

Status (November 2021)

<table>
<thead>
<tr>
<th>Stations</th>
<th>GNSS receiver manufacturers</th>
<th>Network softwares:</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Trimble</td>
<td>Trimble Pivot Platform</td>
</tr>
<tr>
<td>87</td>
<td>Leica</td>
<td>Geo++ GNSMART</td>
</tr>
<tr>
<td>7</td>
<td>Javad</td>
<td>Leica Spider</td>
</tr>
<tr>
<td>75</td>
<td>Topcon</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total:** 225 stations
**EUPOS** service quality monitoring

User interface

http://monitoringEUPOS.gku.sk
**EUPOS** networks deviations comparison

**Statistics**

<table>
<thead>
<tr>
<th>RTK network</th>
<th>Control Software</th>
<th>Time period</th>
<th>Number of monitored stations</th>
<th>Maximal</th>
<th>Average</th>
<th>No fix</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SKPOS®</td>
<td>Trimble Pivot Platform</td>
<td></td>
<td>Leica Spider</td>
<td>Geo++ GNSMART</td>
<td>Σ</td>
</tr>
<tr>
<td></td>
<td>ASG</td>
<td>8 years</td>
<td>35</td>
<td>49.9 cm</td>
<td>1.0 cm</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>Sapos®</td>
<td>7 years</td>
<td>87</td>
<td>46.4 cm</td>
<td>0.9 cm</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>Rompos®</td>
<td>6 years</td>
<td>4</td>
<td>50.9 cm</td>
<td>0.9 cm</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Moldpos®</td>
<td>7 years</td>
<td>75</td>
<td>49.8 cm</td>
<td>1.1 cm</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td>CzePOS</td>
<td>4 years</td>
<td>10</td>
<td>37.9 cm</td>
<td>1.0 cm</td>
<td>7%</td>
</tr>
<tr>
<td></td>
<td>Leica Spider</td>
<td>3 year</td>
<td>4</td>
<td>35.3 cm</td>
<td>0.7 cm</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Geop++ GNSMART</td>
<td>7 years</td>
<td>7</td>
<td>48.7 cm</td>
<td>1.0 cm</td>
<td>12%</td>
</tr>
<tr>
<td></td>
<td>Eupos®</td>
<td>6 years</td>
<td>3</td>
<td>49.7 cm</td>
<td>1.1 cm</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14%</td>
</tr>
</tbody>
</table>

Average values:

- Maximal deviation:
  - SKPOS®: 49.9 cm
  - ASG: 46.4 cm
  - Sapos®: 50.9 cm
  - Rompos®: 49.8 cm
  - Moldpos®: 37.9 cm
  - CzePOS: 35.3 cm
  - Leica Spider: 48.7 cm
  - Geop++ GNSMART: 49.7 cm
  - Eupos®: 49.7 cm

- Average deviation:
  - SKPOS®: 1.0 cm
  - ASG: 0.9 cm
  - Sapos®: 0.9 cm
  - Rompos®: 1.1 cm
  - Moldpos®: 1.0 cm
  - CzePOS: 0.7 cm
  - Leica Spider: 1.0 cm
  - Geop++ GNSMART: 1.1 cm
  - Eupos®: 2.0 cm

- No fix deviation:
  - SKPOS®: 13%
  - ASG: 7%
  - Sapos®: 8%
  - Rompos®: 15%
  - Moldpos®: 28%
  - CzePOS: 9%
  - Leica Spider: 12%
  - Geop++ GNSMART: 20%
  - Eupos®: 14%
**EUPOS networks deviations comparison**  
*Statistics – 5 years*

<table>
<thead>
<tr>
<th>Year</th>
<th>RTK network</th>
<th>SKPOS</th>
<th>ASG</th>
<th>SAPOS</th>
<th>ROMPOS</th>
<th>RIGA EUPOS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ne</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2021</td>
<td>Average</td>
<td>1.0 cm</td>
<td>0.9 cm</td>
<td>0.9 cm</td>
<td>1.1 cm</td>
<td>1.0 cm</td>
</tr>
<tr>
<td></td>
<td>u</td>
<td>2.4 cm</td>
<td>1.2 cm</td>
<td>1.9 cm</td>
<td>2.4 cm</td>
<td>1.2 cm</td>
</tr>
<tr>
<td></td>
<td>No fix</td>
<td>13%</td>
<td>7%</td>
<td>8%</td>
<td>15%</td>
<td>12%</td>
</tr>
<tr>
<td>2016</td>
<td>Average</td>
<td>1.1 cm</td>
<td>1.0 cm</td>
<td>0.9 cm</td>
<td>1.3 cm</td>
<td>1.3 cm</td>
</tr>
<tr>
<td></td>
<td>u</td>
<td>2.4 cm</td>
<td>1.2 cm</td>
<td>1.3 cm</td>
<td>2.6 cm</td>
<td>1.4 cm</td>
</tr>
<tr>
<td></td>
<td>No fix</td>
<td>16%</td>
<td>8%</td>
<td>10%</td>
<td>18%</td>
<td>17%</td>
</tr>
</tbody>
</table>
Summary

- EUPOS network RTK quality monitoring tool works right
- tool is available for public on [http://monitoringEUPOS.gku.sk](http://monitoringEUPOS.gku.sk)
- results from the monitoring confirm „cm“ quality of EUPOS countries network RTK
- we plan to continue our activity and do more analysis in future
Attention! Join us - join EUPOS SQM!

- What you will get?
  - feedback about quality of your service
  - comparison of your service with other countries

- E-mail contact:
  - karol.smolik@skgeodesy.sk

- What we need for joining:
  - login and password which allows us to get
    - access to the network RTK solution (VRS concept)
    - access to permanent stations via NTRIP Caster
  - corrections provided in RTCM 3.x format
  - CORS coordinates
Thank you for your attention

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