# **EPN Analysis Progress**

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## **Bernese GPS Software Version 5.0**

EPN Sub-Network Analysis:



- It has been discussed to switch from Bernese GPS Software version 4.2 to 5.0 within year 2005.
- □ Required steps to ensure continuity and consistency will be worked out.
- Test-solutions from UPA, ROB and BKG are already available. COD runs version 5.0 since some time. WUT announced version 5.0 solutions to me.
- Sub-Network Combination



- Since the beginning of 2005 ADDNEQ2 of Version 5.0 has been used for the subnetwork combination
- "Minimum constraint conditions" are applied to reference stations. The datum in general remains unchanged.
- □ A-priori constraint matrix will be regularized before writing SINEX format.
- No significant changes of the station coordinates, beside the reference stations.
- Station coordinates are introduced as observations and not the original number of satellite observations any more.



## **EPN Sub-Network Solutions with Bernese 5.0**

EPN LAC Mail 0438



- □ Summary of a questionnaire about change to version 5.0
- 2 Steps proposed
  - □ Change from 4.2 to 5.0
    - ,,silent change" (in responsibility of LACs)?
  - Change of processing parameters
    - to be discussed
- A realization as one common step shows up as alternatively
  - Minor changes resulting from both steps















## **Response to ADDNEQ2 Combination**

- Zinovy Malkin, Institute of Applied Astronomy RAS, St. Petersburg
  - □ Variance factor increased from 0.002 to about 60.
  - New EPN SINEX files could not be used for further combinations.
  - A-priori sigma has to be changed from 1 mm (suitable for original observation) to about 8 mm (suitable for station coordinates).
  - $\square$   $\blacksquare$  After correction the variance factor results in nearly 1.
- Carine Bruyninx
  - New SINEX files could not be used for combination with CATREF software
  - Tests are on-going
- Alessandro Caporali, UPA
  - Wrong solution epoch, if new SINEX files have been introduced for further combinations.
  - □ → Will not affect the new solution (Stefan Schaer)
- Stefan Schaer, AIUB
  - New SINEX files could not be used for combination with Bernese GPS Software version 5.0 (reason unknown)

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Sub-Network Combination



#### **Response to ADDNEQ2 Combination cont.**

- Marek Lehmann and Leszek Jaworski, Astrogeodynamical Observatory Borowiec
  - □ A change in the coordinates of BOR1 was noticed.
  - □ This is an expected result, because BOR1 is a reference station.

Sub-Network-Combination



#### Comparison Version 4.2 versus 5.0 (week 1302)

Helmert transformation of station coordinates in ITRF2000:

NUMBER OF PARAMETERS : 7	
NUMBER OF COORDINATES : 441	
RMS OF TRANSFORMATION : 0.6 MM	
PARAMETERS:	
TRANSLATION IN X : $0.9 + -0.$	.3 MM
TRANSLATION IN Y : $-2.1 + -0.$	.3 MM
TRANSLATION IN Z : $7.7 + -0.$	.2 MM
ROTATION AROUND X-AXIS: 0 0 0.00000 +- 0.	.00001 "
ROTATION AROUND Y-AXIS: - 0 0 0.00009 +- 0.	.00001 "
ROTATION AROUND Z-AXIS: - 0 0 0.00001 +- 0.	.00001 "
SCALE FACTOR : -0.0001 +- 0.	.0000 MM/KM

- Comparison of station coordinates in ITRF2000:
- RMS OF UNIT WEIGHT FOR COORDINATE COMPARISON : 0.0026

Systematic difference for station height, stations from version 5.0 are "higher".

- This is no scale, but a shift in Z-axis direction according to Helmert parameters above.
- Comparison to CATREF software:
  - "Minimum constraint condition" of Bernese software and CATREF result in station height differences of about 5 mm.

Sub-Network Combination



#### Helmert Transformation, Week 1302





Residual [mm]

#### **Residuals to Mean Coordinates, Week 1302**

Sub-Network Combination **Coordinate Comparison** 5 4 3 2 **v**4.2 F **□** v5.0 -1 -2 -3 -4 -5 NEU GRAS TRO1 ONSA KIRU REYK HOFN MAR6 KIR0 VIS0 VIL0



Sub-Network Combination Coordinate Comparison (North, East, Up) 8 POTS 6 4 2 Residual [mm] ■ v5.0 0 **v**4.2 -2 -4 -6 -8 GRAS JENE VINS PEAN GLSV PANO NEWL ISTA VALE VROC Total number of stations ~ 160 Station





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## **Daily NEQ-files combination**

- Daily files from WUT since more than 1 year
- Daily from BKG since some weeks
- First tests carried out, but too early for presentation



- EPN LAC Workshop 2005
  - □ The next LAC Workshop is planned for 2005. Date and venue is not fixed.
  - The change-over from Bernese Software 4.2 to 5.0 will be an important subject of the workshop.
- EPN contribution to ITRF2004
  - □ Has to be discussed with Zuheir Altamimi.