Federal Agency for
Cartography and Geodesy

Toward a new EVRS realization

Martina Sacher

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- New data in preliminary solution 04/2018
  - Ukraine
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Development of the network since 2008

- Latvia (2011) update
- Russia(2012) extension
- Spain (2012) update
- Latvia (2012) update
- Germany (2015) update
- Switzerland (2015) update
- France (2015) addition of NIREF
- Netherlands (2016) corrections
- Estonia (2016) update
- Belarus (2017) extension

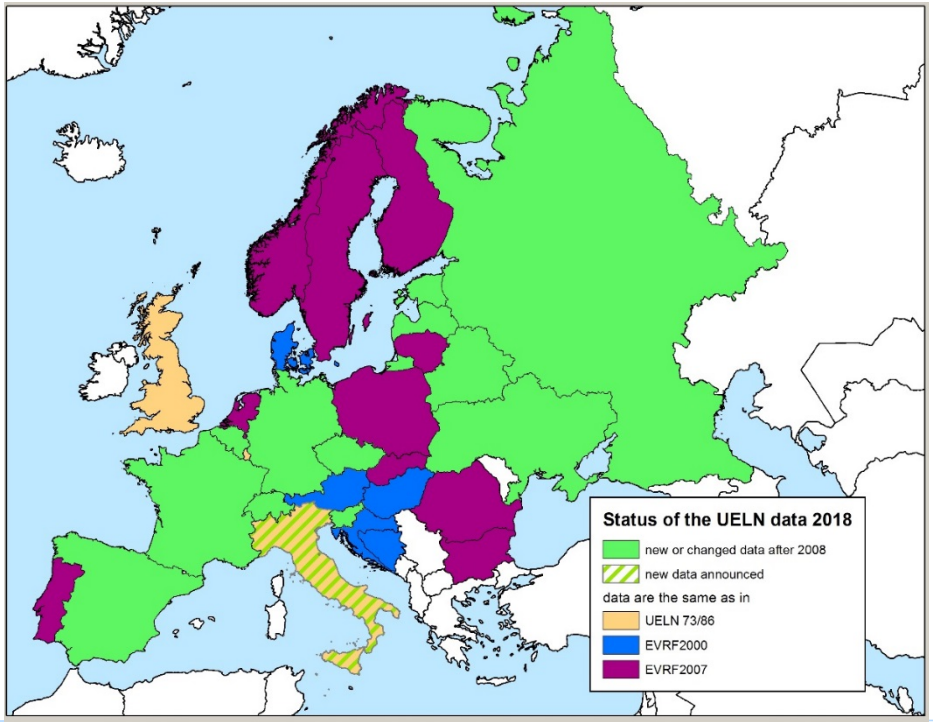
2018

- Belgium update
- Ukraine extension
- Czech Rep. update
- Slovenia update

Expected:

- Italy update
- Slovakia minor update

Age of the data in UELN



New data in 2018

Part of preliminary solution:

- Belgium (02/2018) update
- Ukraine (03/2018) enlargement
- Czech Rep. (04/2018) update

Not yet included in preliminary solution:

- Slovenia (04/2018) update

Announced:

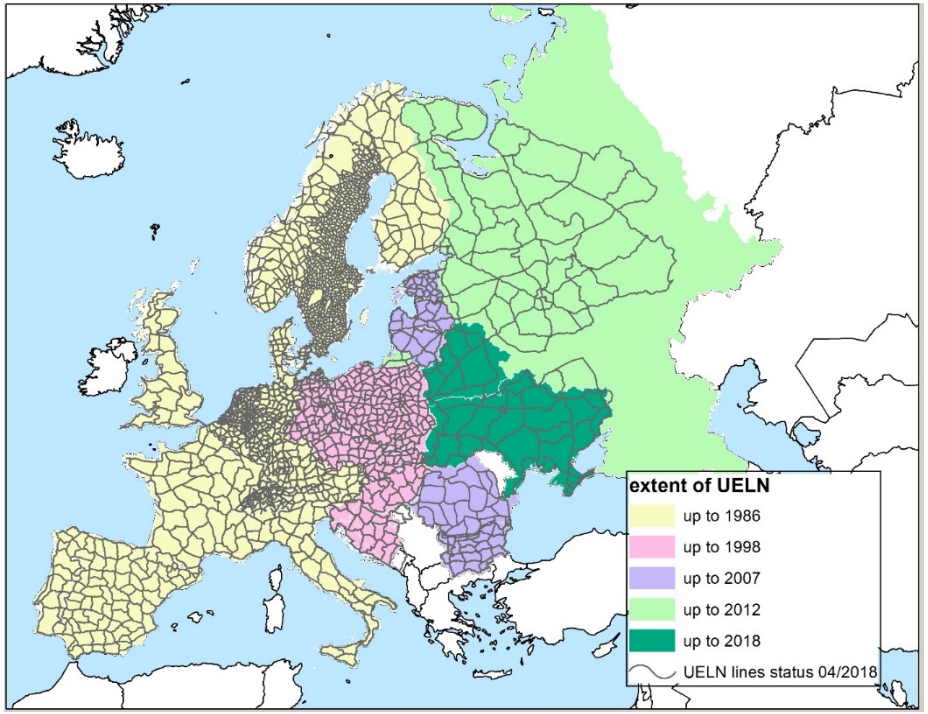
- Italy (0?/2018) update
- Slovakia minor update

Enlargement of UELN to Ukraine (1)

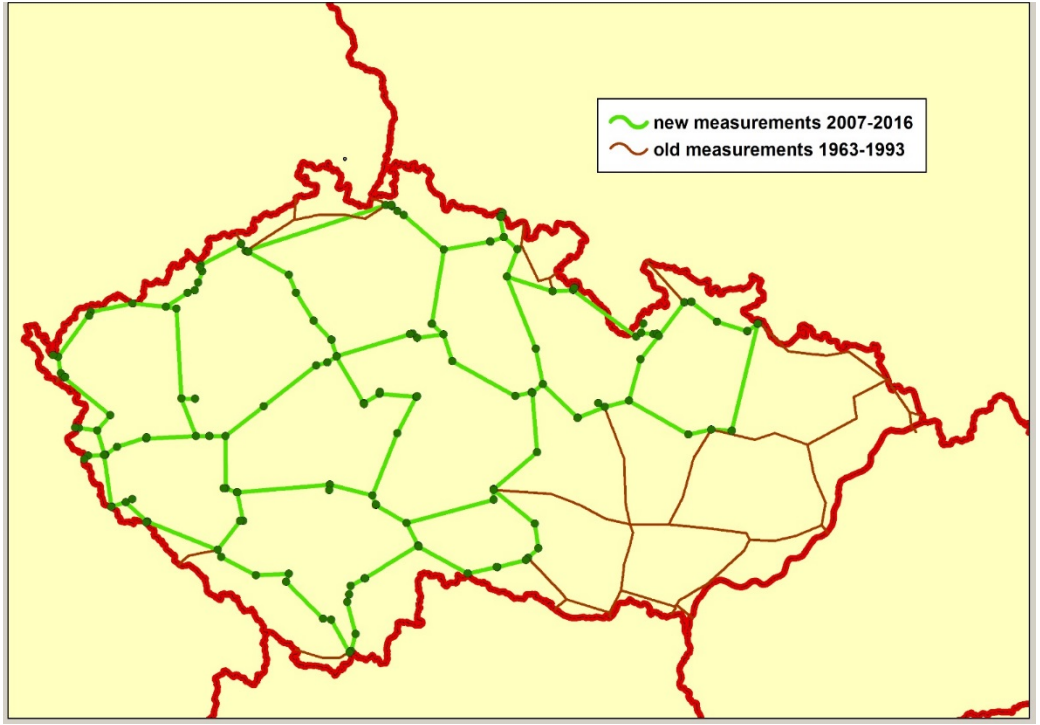
Enlargement of UELN to Ukraine (2)

- 187 lines
- 146 nodal points
- Measurements between 1972 and 2007
- Standard deviation: 1.64 mm/km
- Border connections:
  - 2 to Belarus
  - 1 to Hungary
  - 1 to Poland
  - 3 to Romania (2 via Moldova)
  - 4 to Slovakia

Extent of the network



New data of Czech Republic (1)



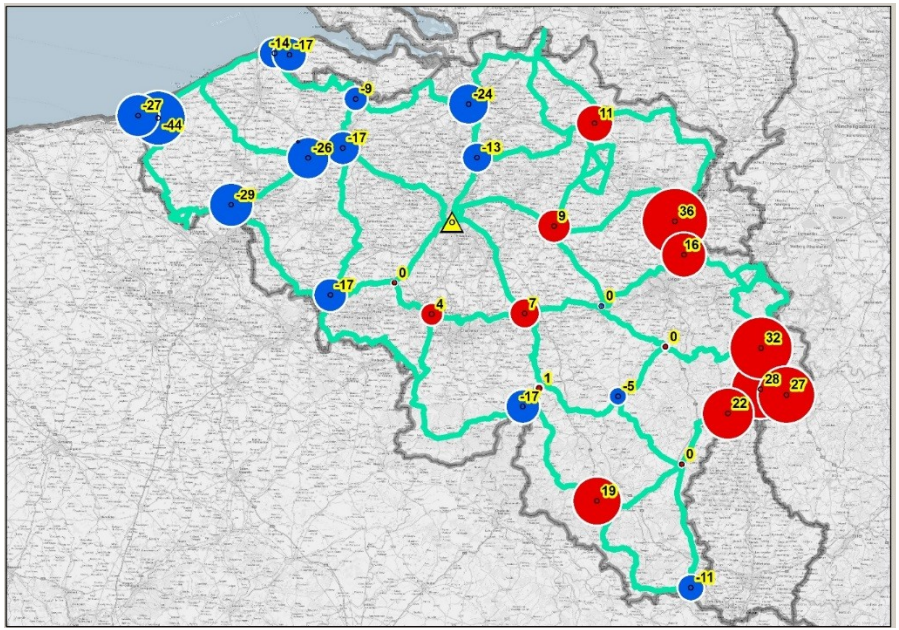
New data of Czech Republic (2)

- New data only for a part of the network
- 2 groups of measurements:
  - New observations (2007-2016): 174 lines
  - Remaining observations (1963-1993): 95 lines
- Common adjustment of the 2 network parts with variance component estimation
- S_{new}: 0.73mm/km
- S_{old}: 1.29 mm/km
- Most of the 25 border connections use parts of the old network for closing

New data of Belgium (1)

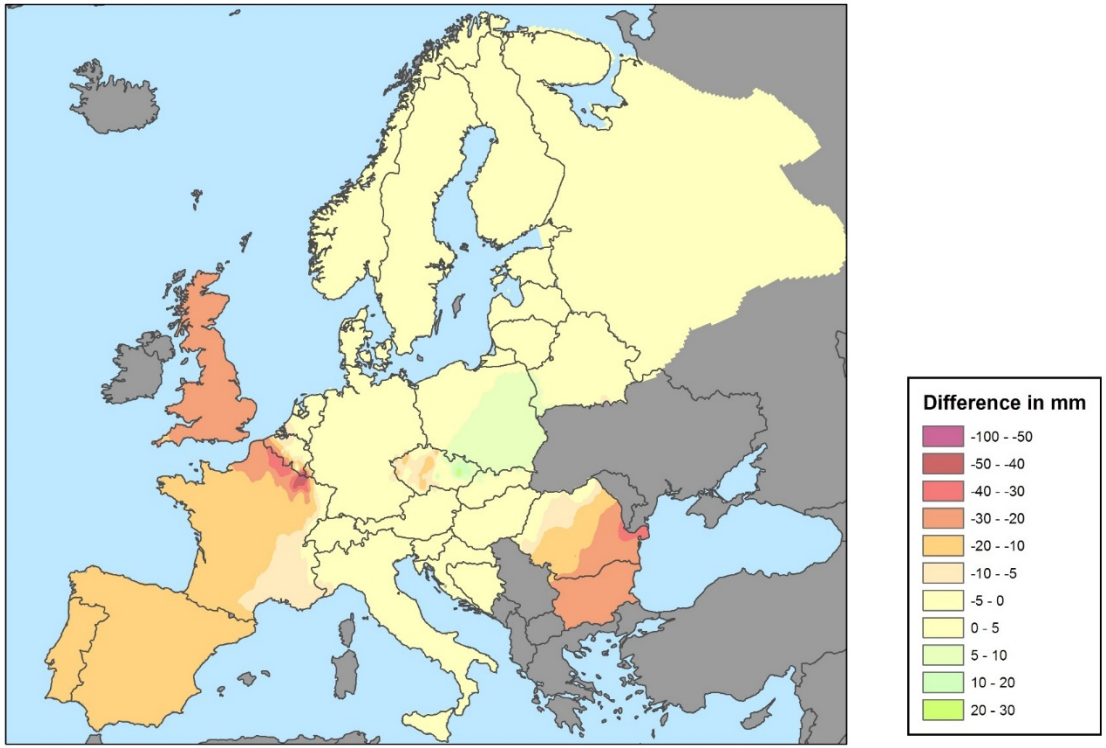
- 118 lines
- 84 nodal points
- Lines run along old 1. order measurements
- Observations are not independent:
- Height differences have been computed in a common adjustment of all Belgian leveling data (35 891 measurements 1.-3. order)
- Acceptance of the data as compromise to get the most current measurements

New data of Belgium (2)

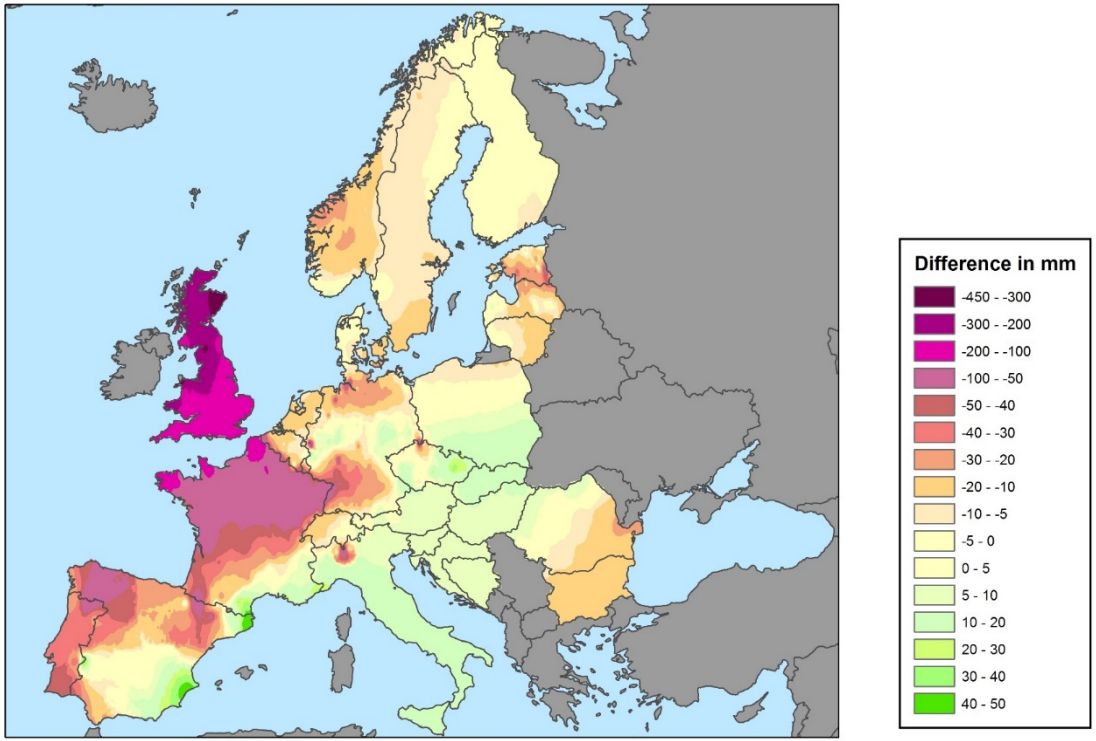


- Single adjustment of the Belgian data - fundamental point at ROB was fixed
- Tilt of the adjusted heights compared to the old data
- Differences between -44mm and +36mm
- New Belgian data in UELN cause height change of -2cm in the North of France and in GB

Differences between preliminary solutions 2017 and 2018



Differences between EVRF2007 and preliminary solution 2018



Next realization of EVRS (1)

- New data of 15 countries
- Computation of the heights for Great Britain
  - UELN(GB)= H(ODN)+offset
  - Offset computed from adjustment+ tunnel measurement
  - Offset from adjustment 04/2018: -0,166m
- New uplift model for the Nordic countries NKG2016LU_lev
  - Application to the data of BY, DK, EE, FI, LT, LV, NO, RU, SE
- Reduce of the Swiss measurements to a common epoch by velocities of Swiss uplift model

Next realization of EVRS (2)

- Providing heights at a reference epoch (2000) + current epoch (2020) + point velocities
  - Epoch 2000 is nearby the mean epoch of the observations
  - User will be able to compute heights at any reference epoch
- Tidal system
  - EVRF2007 in zero tide system according to **IAG resolution No. 16** adopted in **Hamburg 1983** and according to the EVRS definition
  - **IAG resolution No. 1** adopted in **Prague 2015** resolves mean tide for an International Height System
  - Users expect conformance of heights with mean see level mean tide
  - Next EVRF in zero tide
  - Providing mean tide additionally

Next realization of EVRS (3)

- Questionnaire to the participating countries about providing of the results:
  - As for EVRF2007: participating countries receive adjusted heights of the whole network approval of each country necessary
  - Data of countries that don’t agree will be excluded from the distribution (EVRF2007: only Bosnia-Herzegovina)
  - *Alternative if countries agree: Publication of the adjusted heights in the internet??*
- Publishing of transformation parameters between national height systems and EVRF agreement of the countries will be necessary too

Next realization of EVRS (4)

Deadlines

- Report on adjustment results to all participating countries autumn 2018 (together with questionnaire)
- Release of the Realization EVRF2019 at the next symposium
- Next step after symposium 2019: computation of transformations between national height systems and EVRF2019

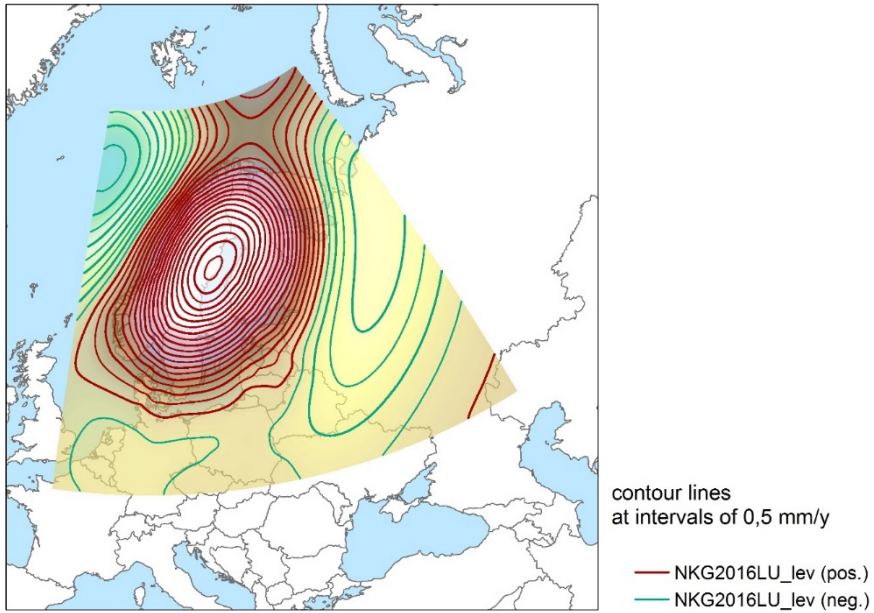
Thank you for your kind attention!

Contact:

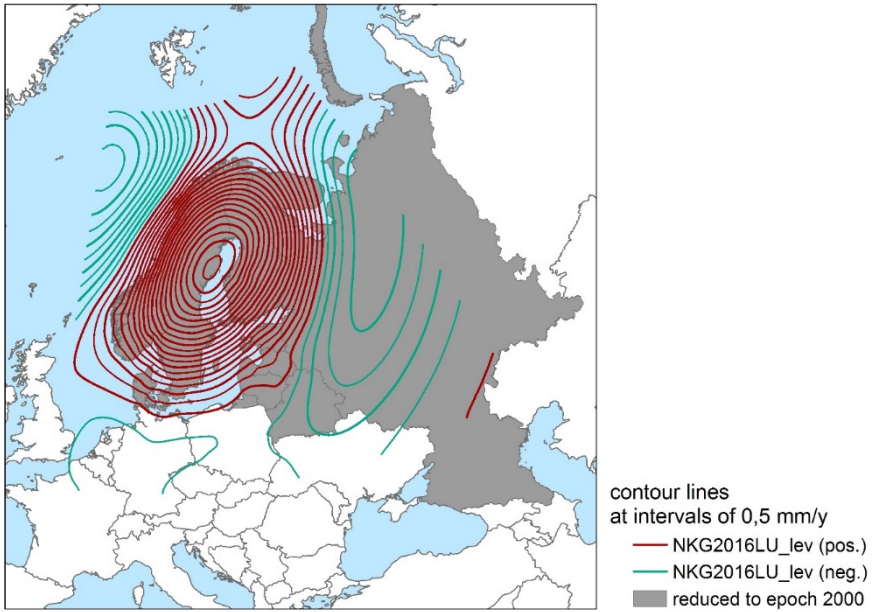
Federal Agency for Cartography and Geodesy
Section Integrated Spatial Reference
Karl-Rothe-Str. 10-14
04105 Leipzig, Germany

contact person
Martina Sacher
Martina.sacher@bkg.bund.de
www.bkg.bund.de
Tel. +49 (0) 341 5634 423

New uplift model for the Nordic countries: NKG2016LU_lev

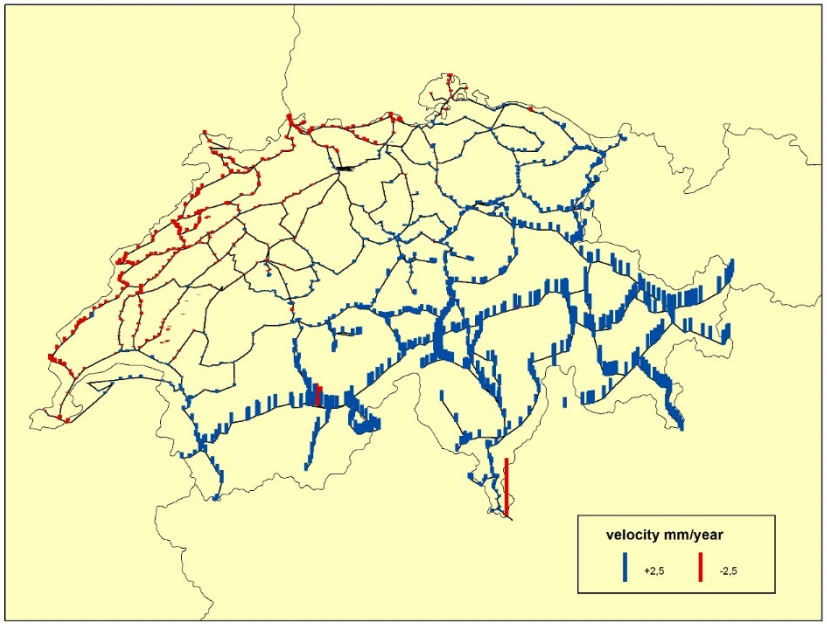


National networks that are reduced to a common epoch



Reduce of observations in other countries at the margin of the model (NL, DE, PL) results in an increase of the standard deviation after adjustment.

Consideration of the vertical velocities of the Swiss points



- Velocities from dataset UELN2015
- Graphic shows all points in UELN adjustment – including any instable points
- A posteriori - Standard deviation from adjustment CH in kgal·mm:
  - Static: 1,09
  - Kinematic : 0,86

Velocities from:
CHVRF15/UELN15
Bundesamt für Landestopografie swisstopo
Bereich Vermessung
Dr. Andreas Schlatter / Dr. Urs Marti