



Federal Agency for
Cartography and Geodesy



Status report on the UELN: update on available data and schedule for the publication of a new EVRF

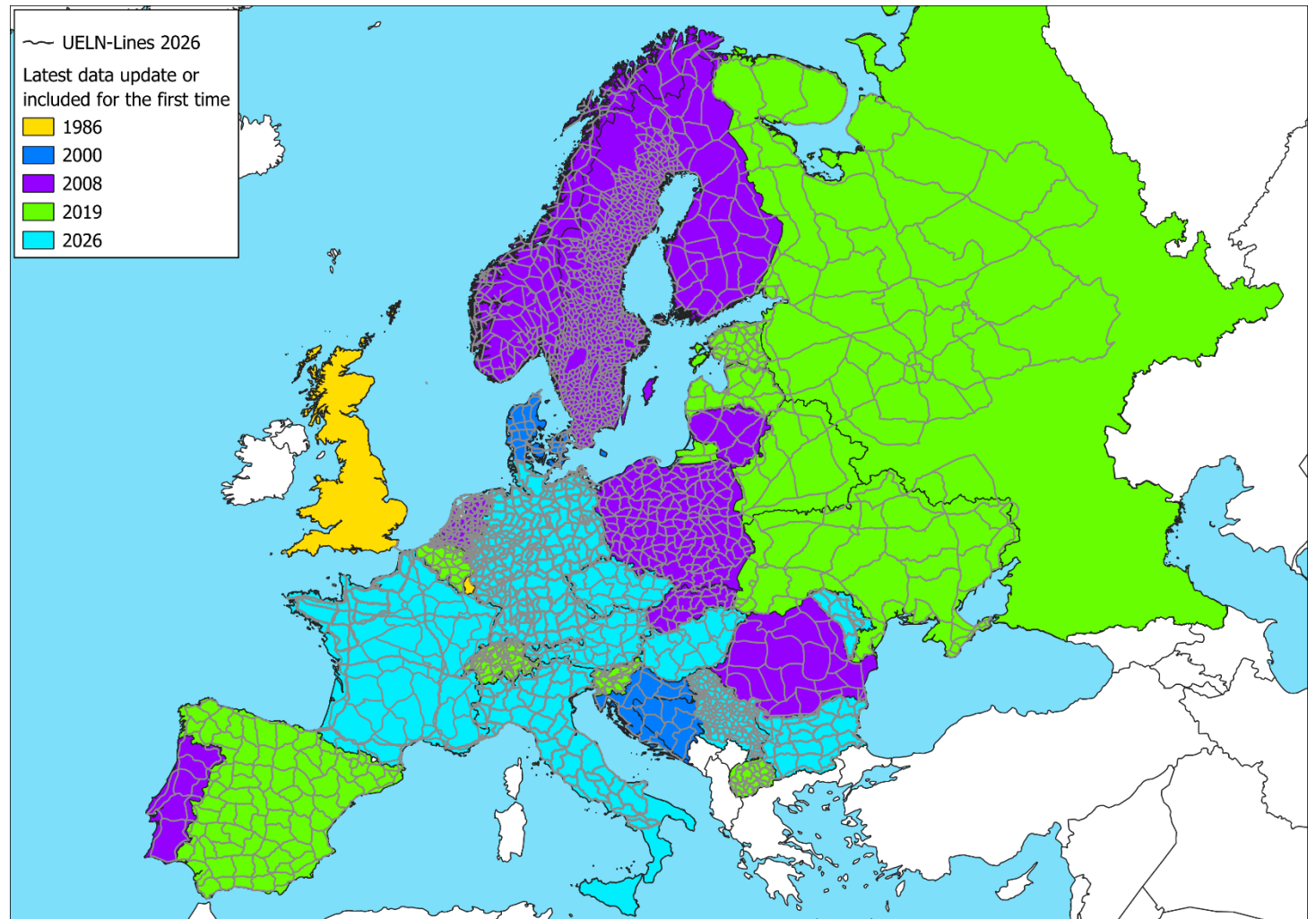
Tobias Bauer¹, Martina Sacher¹, Joachim Schwabe¹, Gunter Liebsch¹

¹ Federal Agency for Cartography and Geodesy

UELN network up to date

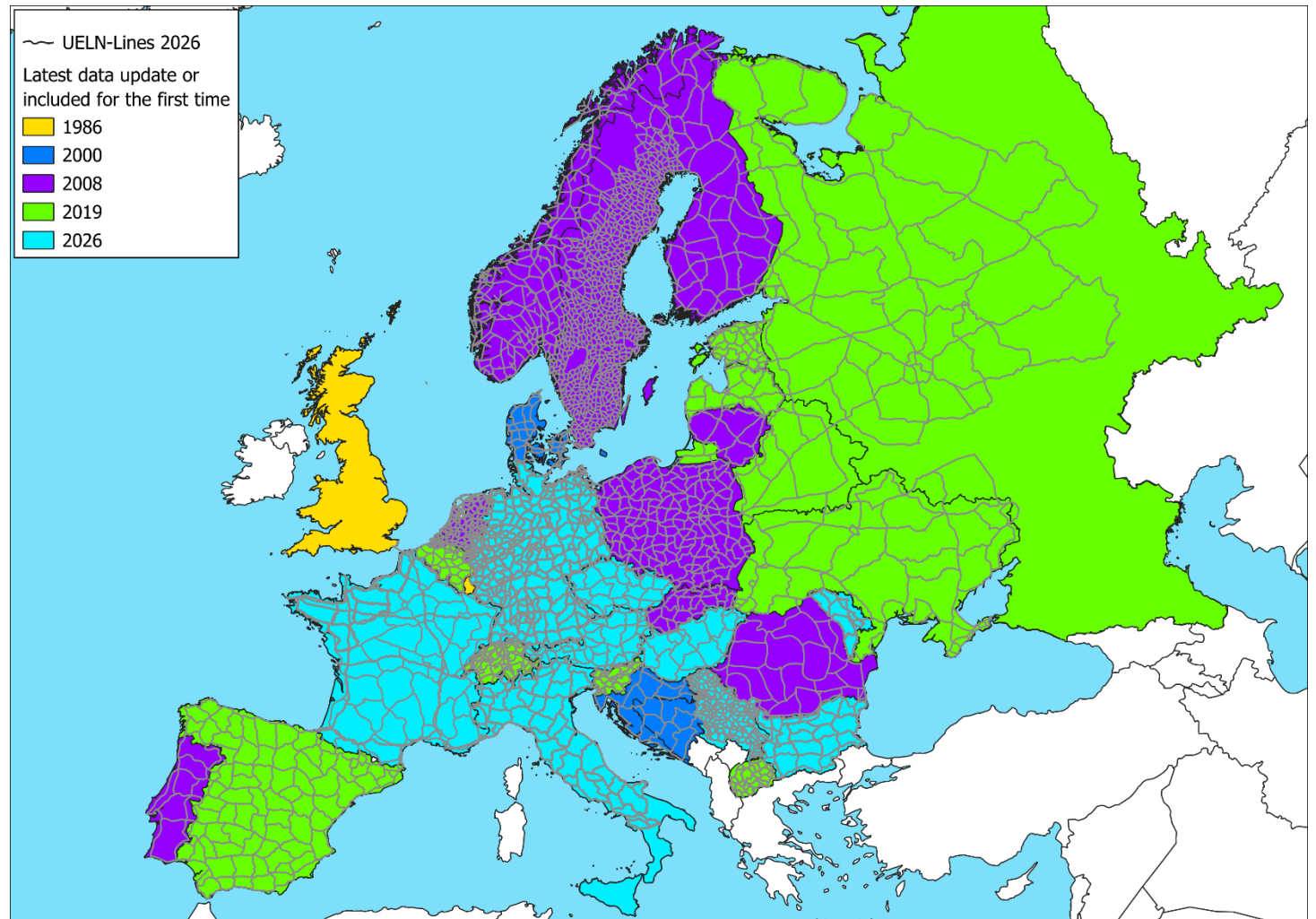
Current status of levelling data in UELN network:

- *Various countries updated data*
- *New measurements*
- *Cross border levelling data revised*
- *Data from two countries received for the first time*

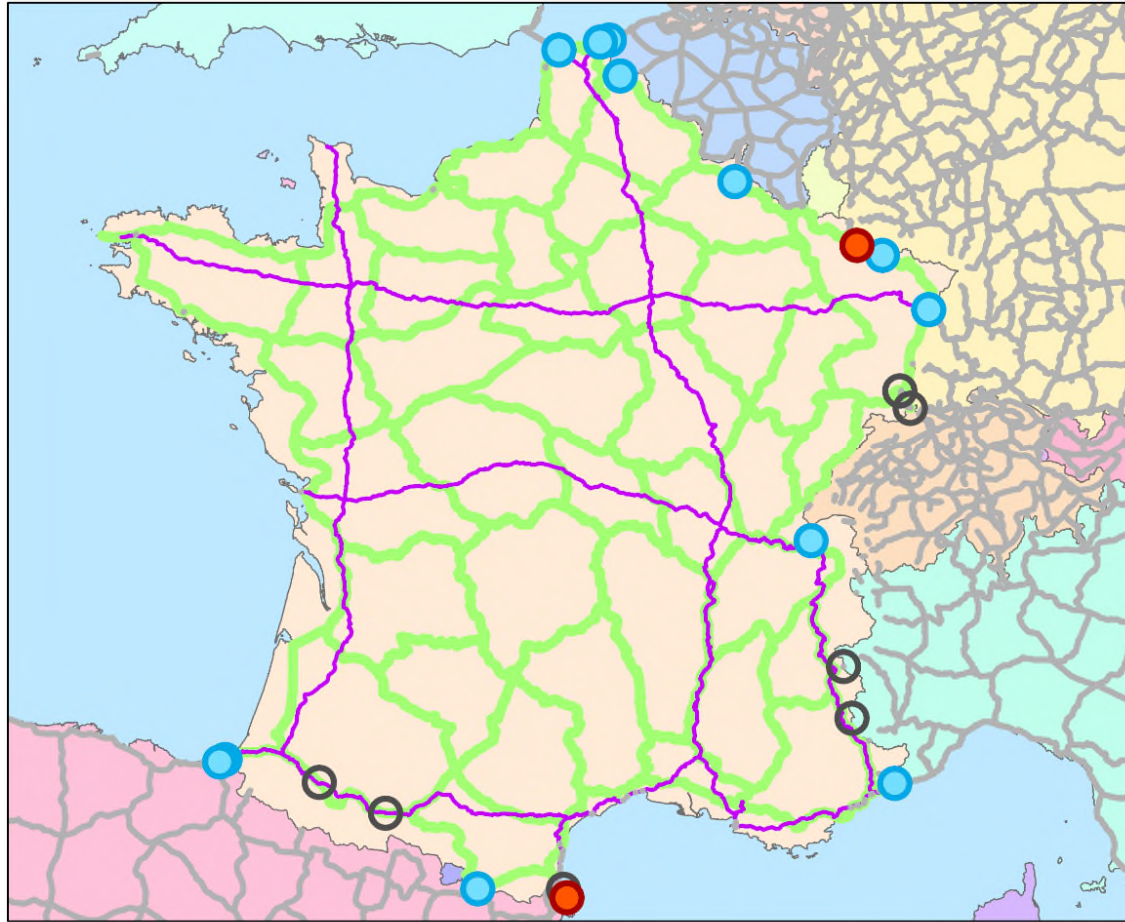


Outline

- 1) Examples of updated or new data
- 2) Consideration of hydrodynamic connections for next EVRF
- 3) Timeline for release of EVRF2027



Levelling data of France

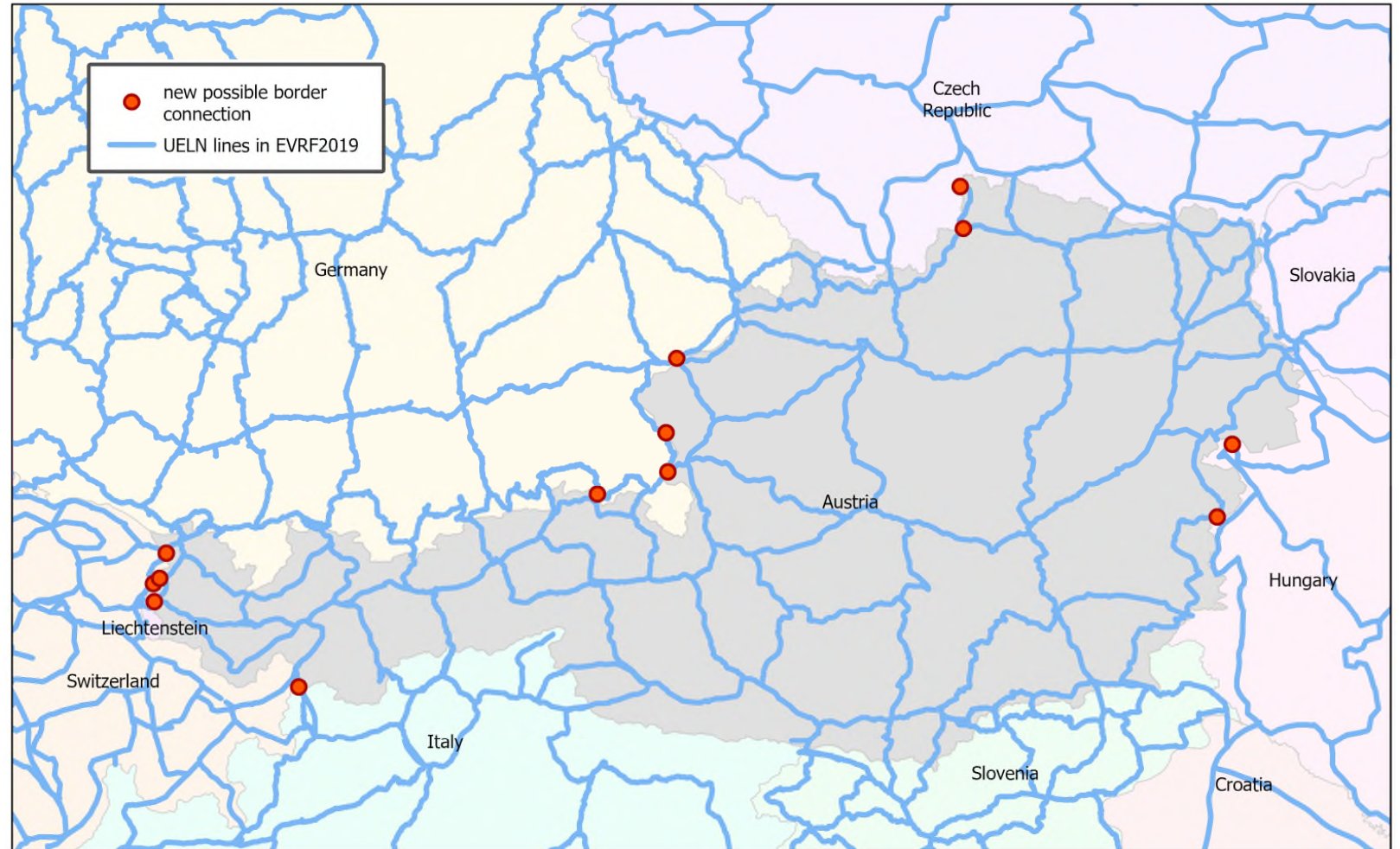


- Within WG “European Unified Height Reference”, updated levelling data were provided
- Reprocessing of IGN69 and NIREF data allowed to find more connections between both networks and neighboring countries
- Some connections are not part of the IGN data anymore
- New border connections to neighboring countries are considered by France for the future

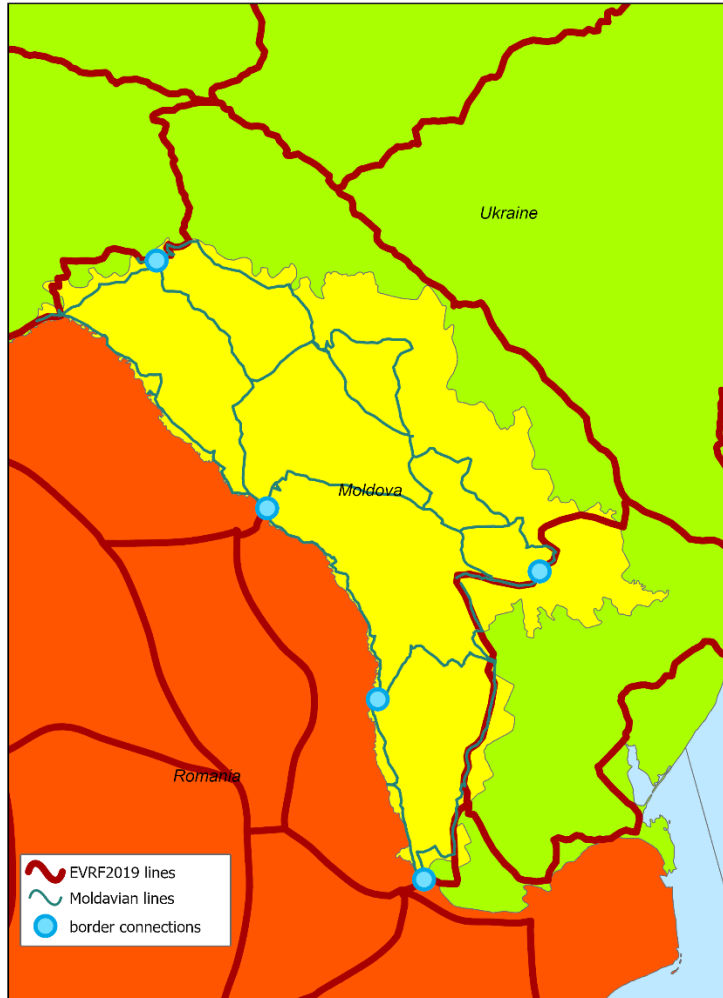


Additional border connections to Austria

- Austria provided entire levelling data set to UELN data center
- Connections to all neighboring countries of Austria were revised and updated in UELN network
- Old measurements from the 1950s are not usable any more
- New possible connections to Hungary (2), Czech Republic – 2. order network (2), Germany (4), Switzerland (4)



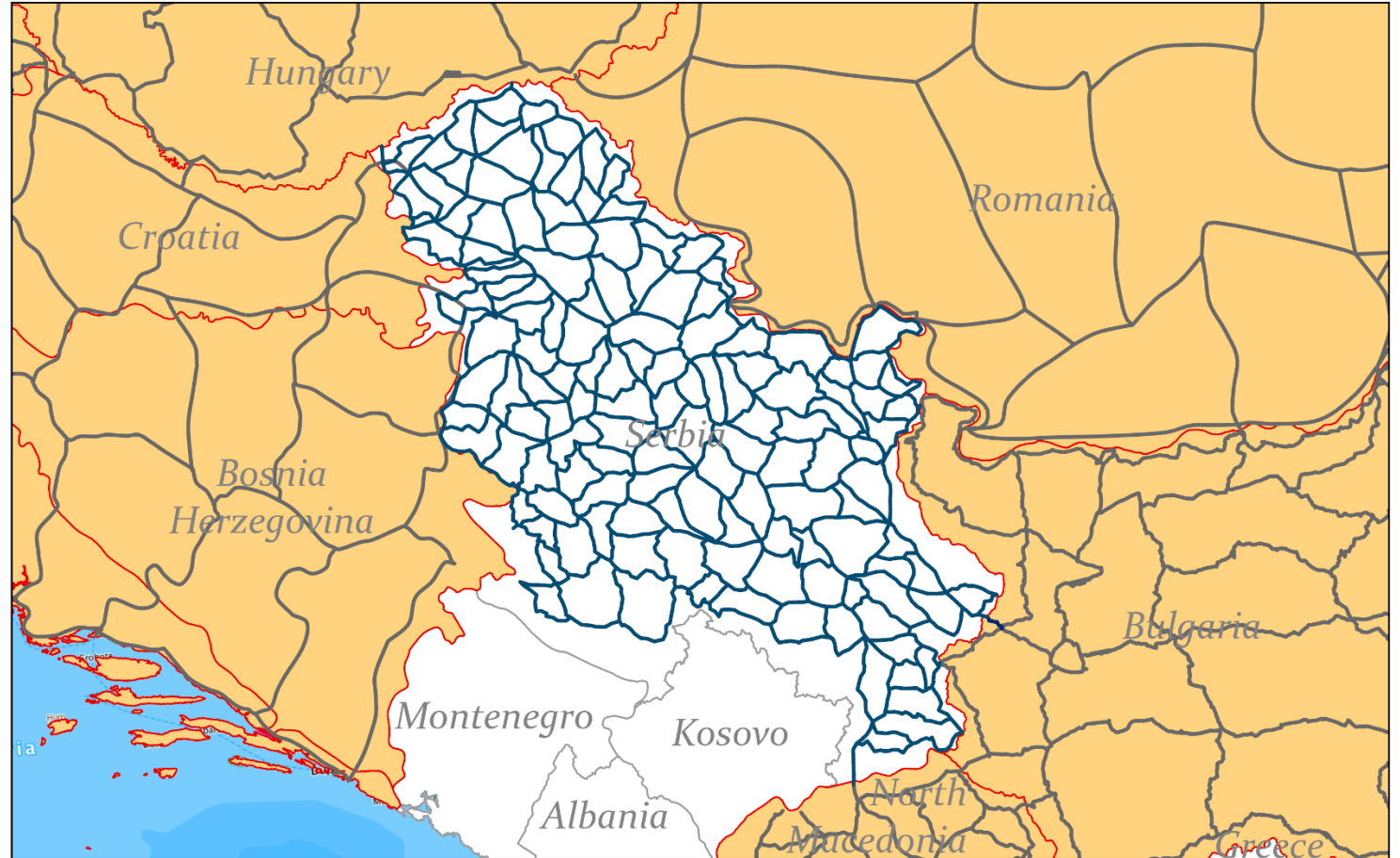
Levelling data of Moldova



- Late 2022, M. Sacher visited Moldova as part of TAIEX expert mission: “Integration of Levelling Network of the Republic of Moldova in UELN” (***TAIEX** is the Technical Assistance and Information Exchange instrument of the European Commission*)
- Levelling network of Moldova was measured 2008-2021
- Integration into UELN possible by 5 border connections (3 RO, 2 UA)
- Because of Transnistria conflict, no measurements and connections to Ukraine at the Eastern border possible
- Test adjustment of the measured height differences resulted in standard deviation of 1.3 mm/km
- Up to now, no gravity values are available
→ computation of geopotential differences using normal height differences (measured height differences including normal height correction) and normal gravity by

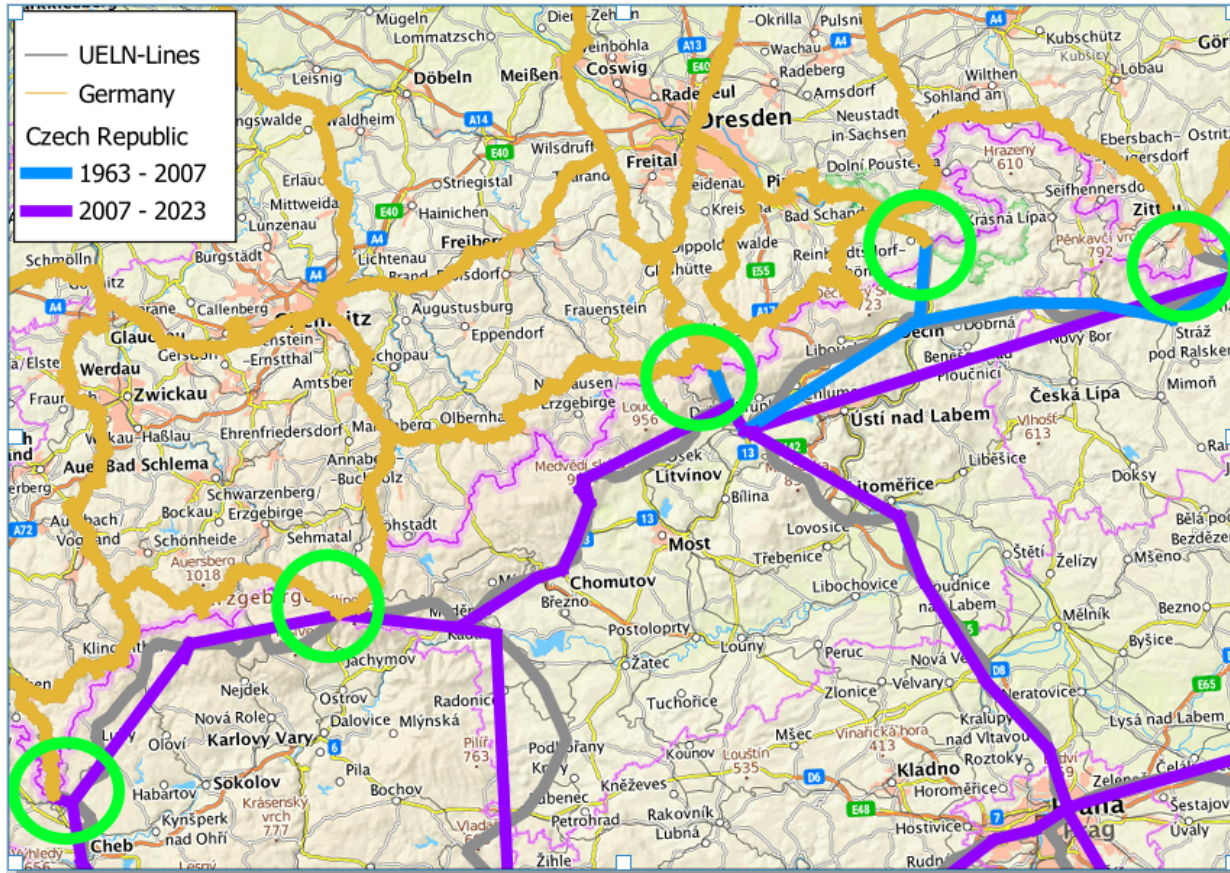
Levelling data of Serbia

- Serbia provided data of national levelling network in March 2025
- Measurements between 2013 and 2023
- Single adjustment:
 - 260 nodal points
 - 399 observations
 - $S_0 = 1.77 \text{ mm / km}$
- Border connections to Bulgaria (3), North Macedonia (1), Hungary (2) are to be integrated in the UELN network



The border of Kosovo is used without prejudice to positions on status and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo declaration of independence.

Levelling connections between Czech Republic and Germany (Saxony)



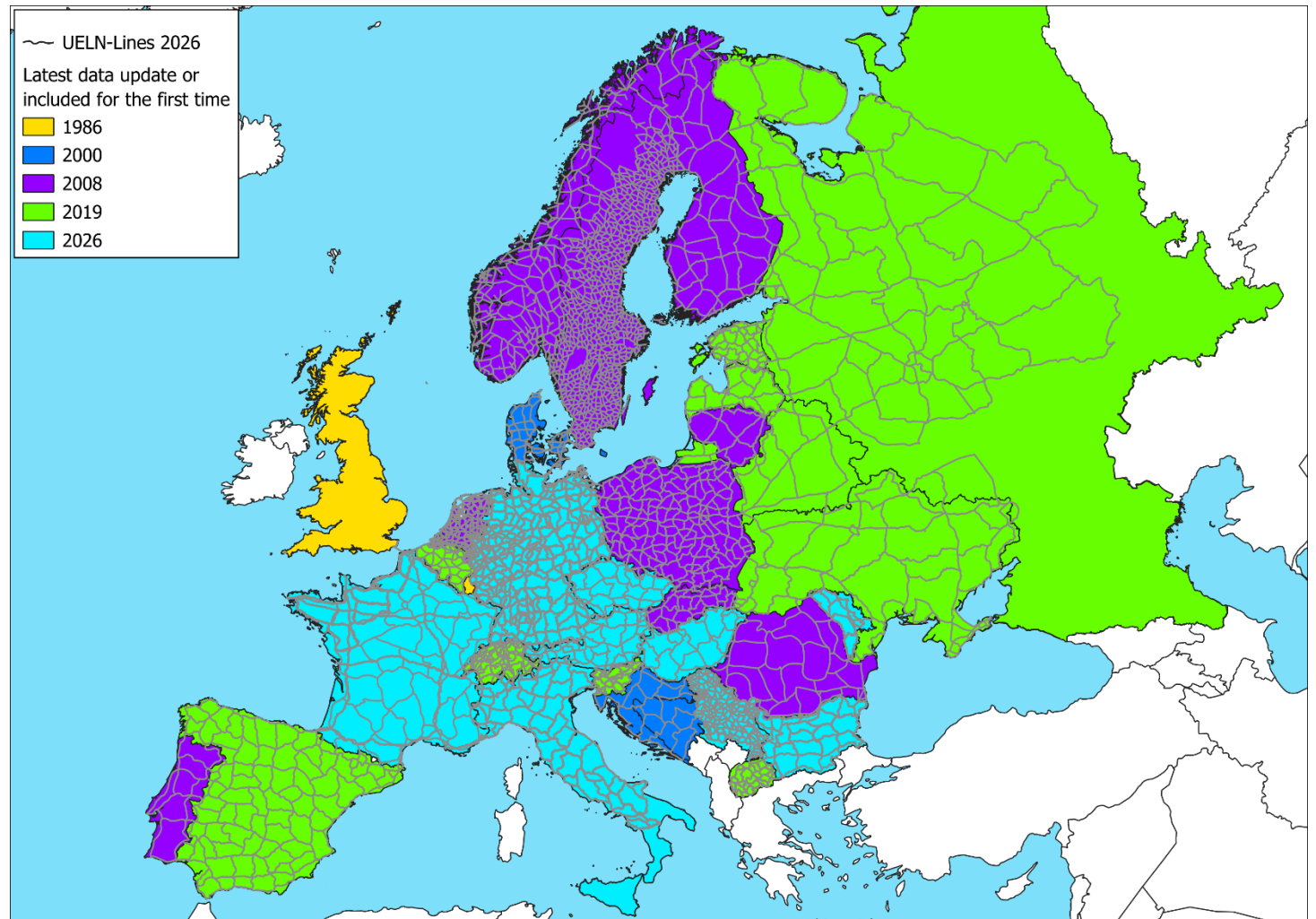
- Green: new measurements at borders – recently finished

- Border connections between Czech Republic and Saxony were old
- Only 2 (of 4) connections were usable in EVRF2019
- BKG contacted the regional authority for surveying in Saxony and Czech Colleagues
- Czech colleagues sent an update of their whole levelling network (status 2023) → data have been included to UELN, but some old measurements on connection lines are remaining
- Decided to re-measure all 4 connections between Saxony and Czech republic + 1 additional connection
- New received data to be included in UELN network, e.g. data around Zittau received last week

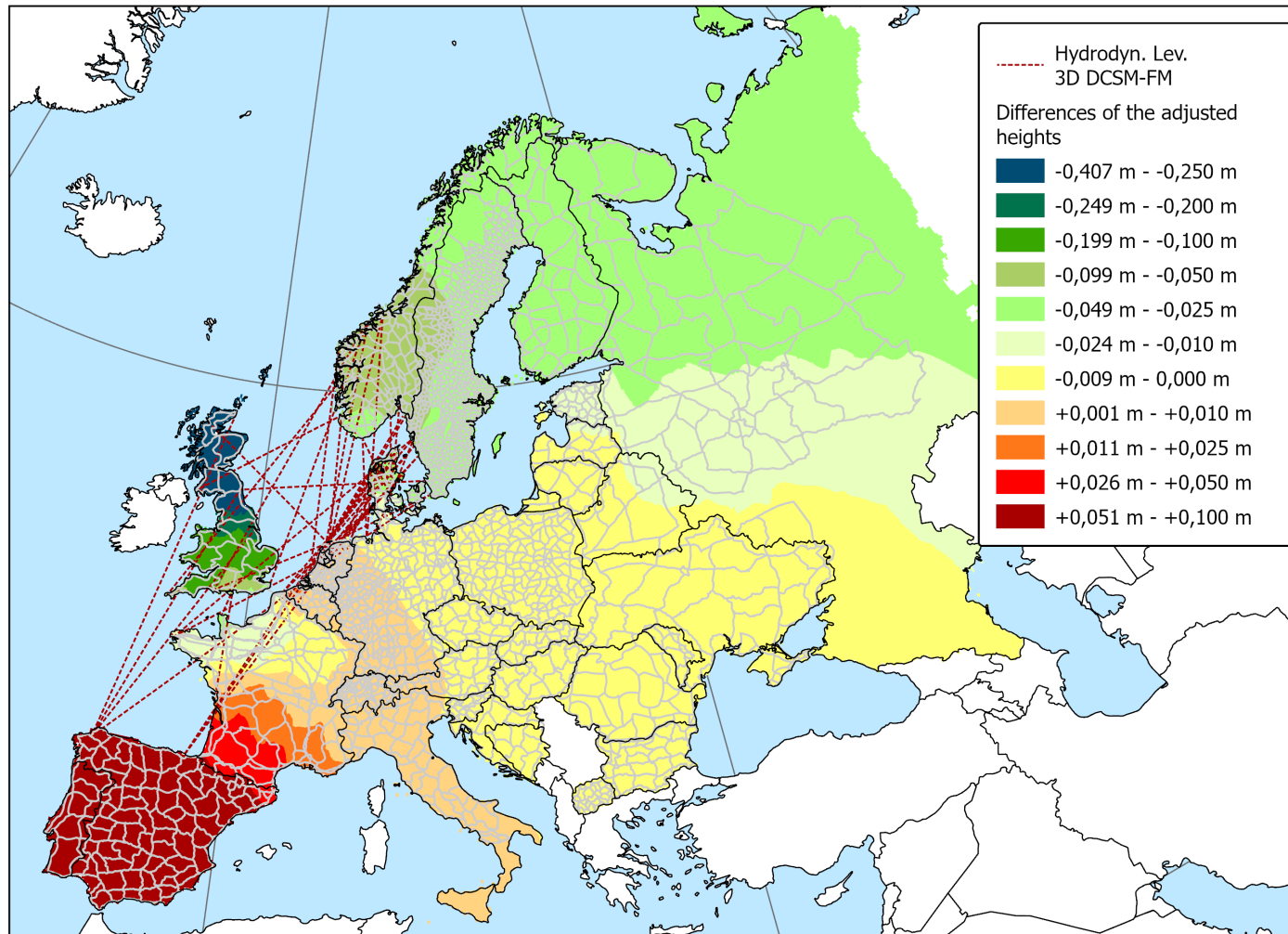
UELN up to date

Further Countries which provided also updated data

- Bulgaria: new measurements between nodal points after 2019
- Czech Republic: updated data provided
- Hungary: additional measurements for border connections to Serbia
- Italy: additional measurements in South Tyrol



Hydrodynamic connections in UELN network



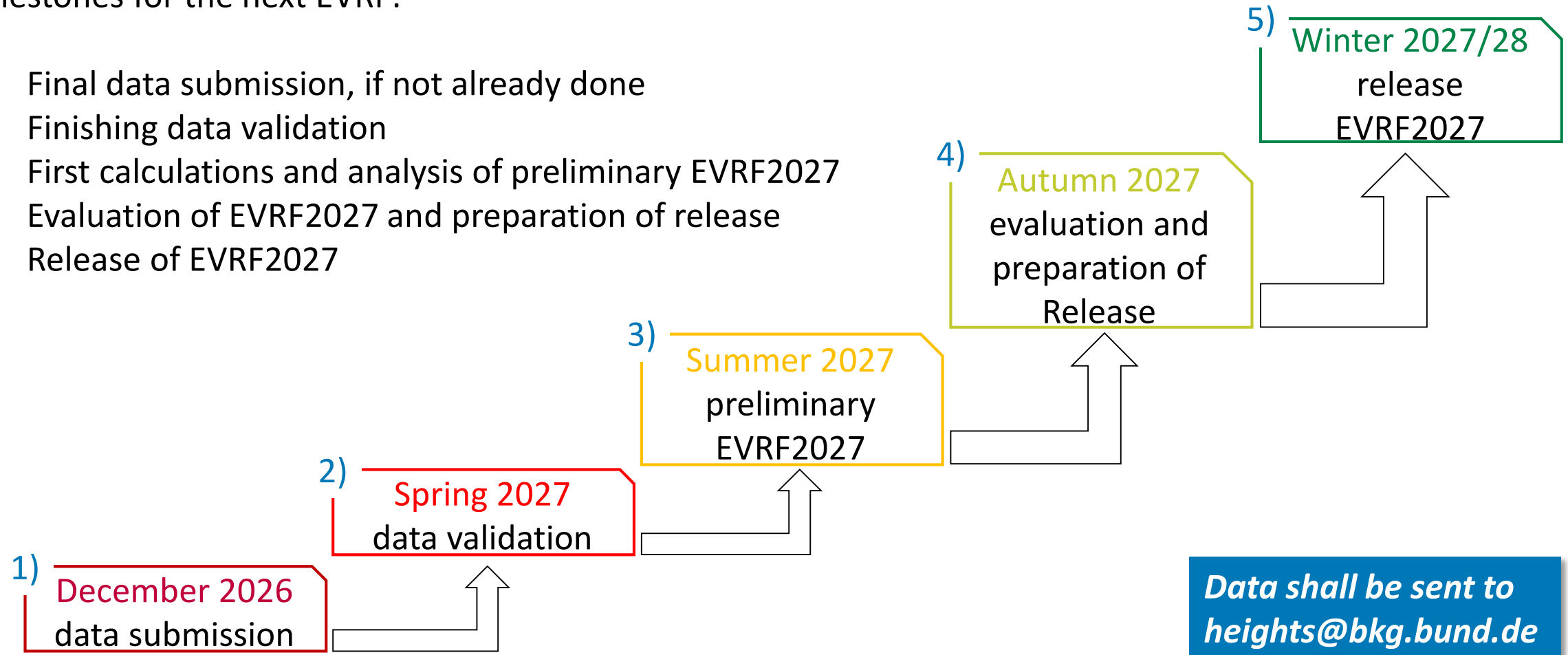
- Effect on height differences if additional hydrodynamic connections from 3D DSCM model are included
- Goal: Minimize systematic errors due to uncertainties in national levelling networks of Great Britain and France
- Connections chosen as suggested by Cornelis Slobbe in the scope of the WG “European Unified Height Reference”
- Selection of connections based on comparison with GNSS/levelling points (preliminary EHRS_CP)

Considered for EVRF2027

Timeline for release of EVRF2027

Milestones for the next EVRF:

- 1) Final data submission, if not already done
- 2) Finishing data validation
- 3) First calculations and analysis of preliminary EVRF2027
- 4) Evaluation of EVRF2027 and preparation of release
- 5) Release of EVRF2027





Federal Agency for
Cartography and Geodesy



Thank you for your kind attention!

Federal Agency for Cartography and Geodesy

G3 – Integrated Spatial Referencing

Karl-Rothe-Straße 10-14

04105 Leipzig

Tobias Bauer

tobias.bauer@bkg.bund.de / heights@bkg.bund.de

www.bkg.bund.de

Phone +49 341 5634– 428