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Modernised transformation for century old national system - ETRS89

EUREF 2025

Replace old reference systems?

UN-GGCE Geodesy Capacity Development Workshop invitation:

- Modernising national geospatial reference system

Example Netherlands:

- Keep century old national reference system,
and modernise the transformation instead!

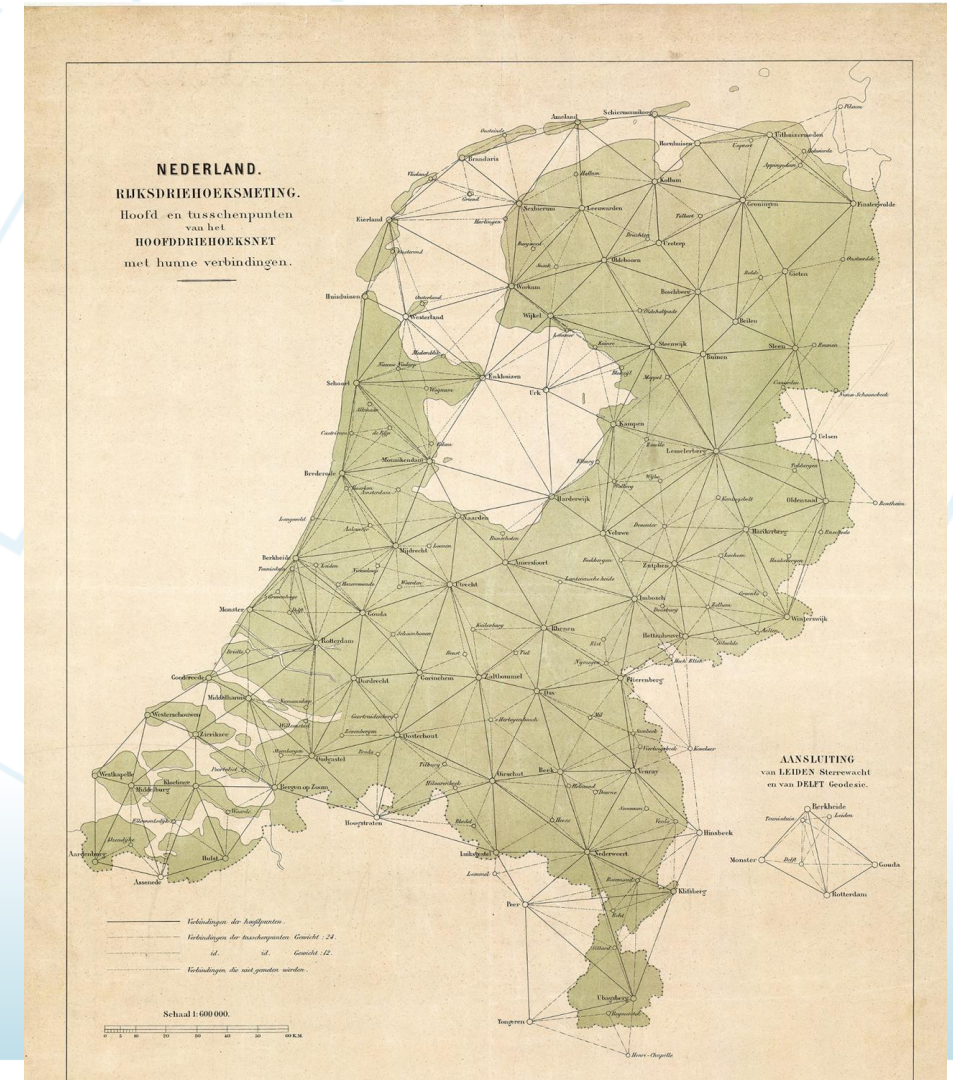
Netherlands' national projected coordinates: RD

1888-1904 1st-order triangulation

1898-1928 Densification triangulation

1930-2014 Maintenance of triangulation points

1960-1978 Revision of coordinates low-order points



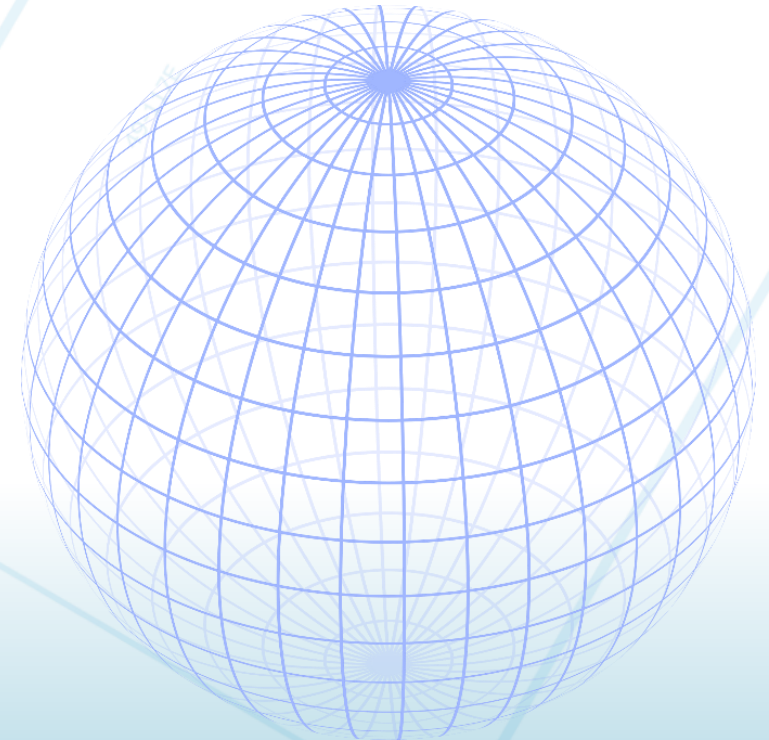
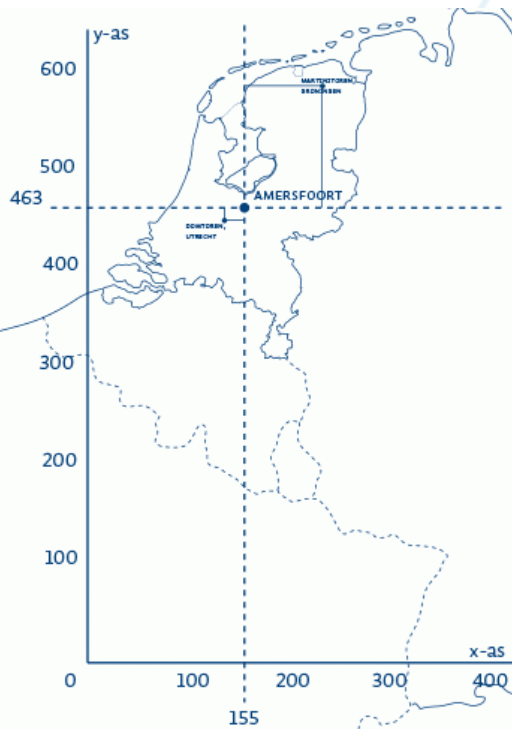
1888-1904	1 st -order triangulation
1898-1928	Densification triangulation
1930-2014	Maintenance of triangulation points
1960-1978	Revision of coordinates low-order points
2000-now	Defined by GNSS + transformation



2014-2018 Project: Switch to ETRS89?

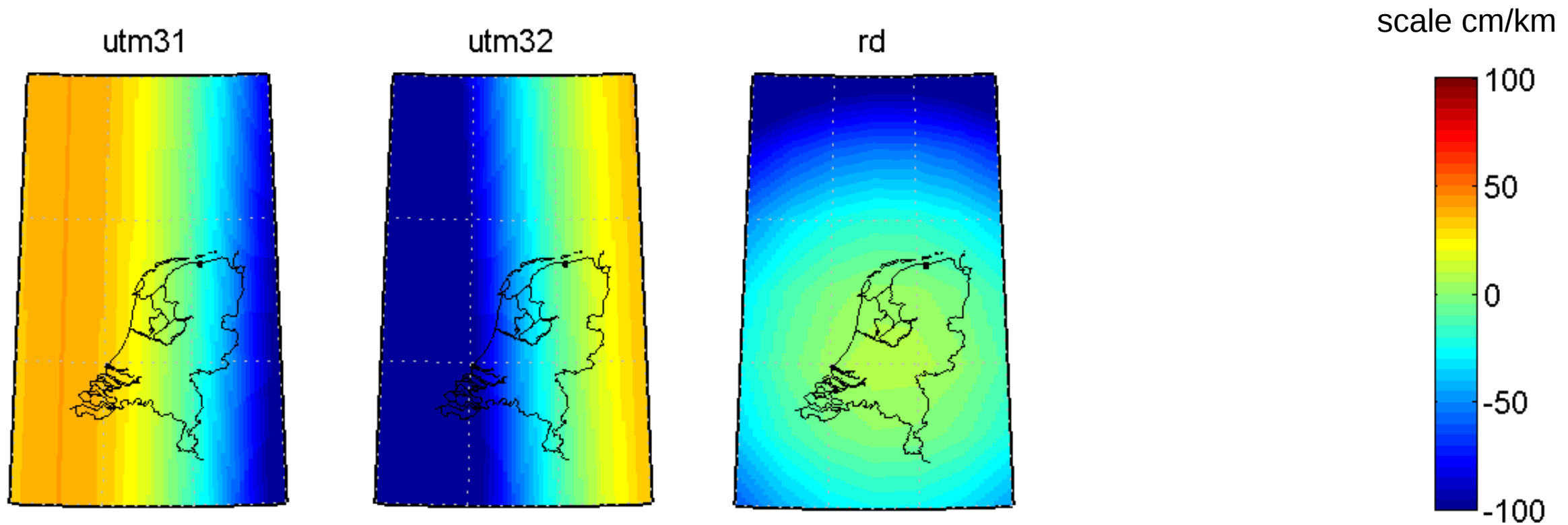
Motivation:

Official transformation in survey equipment and software
but 25 cm error in GIS software: transformation too “complex”



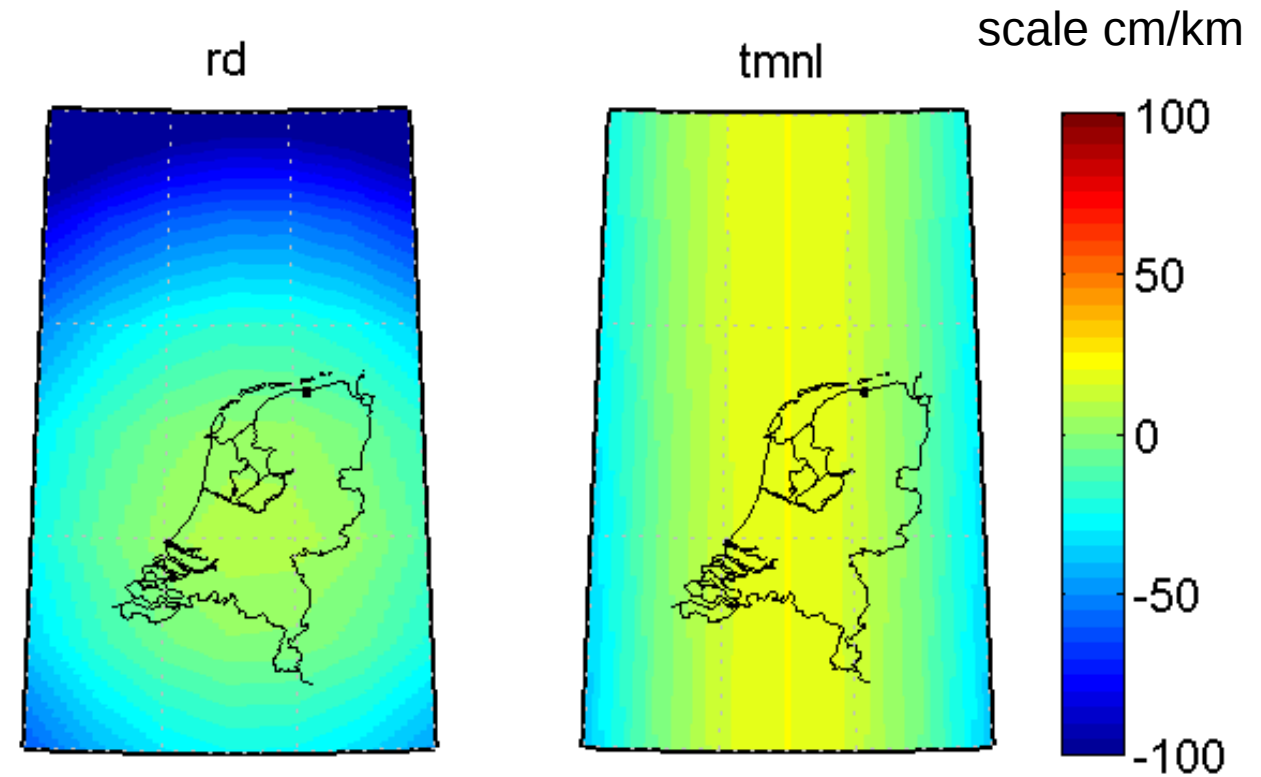
What projection of ETRS89?

- Users want a single projection (metres)
- INSPIRE recommended projections have larger scale error than RD



New projection of ETRS89 for the Netherlands?

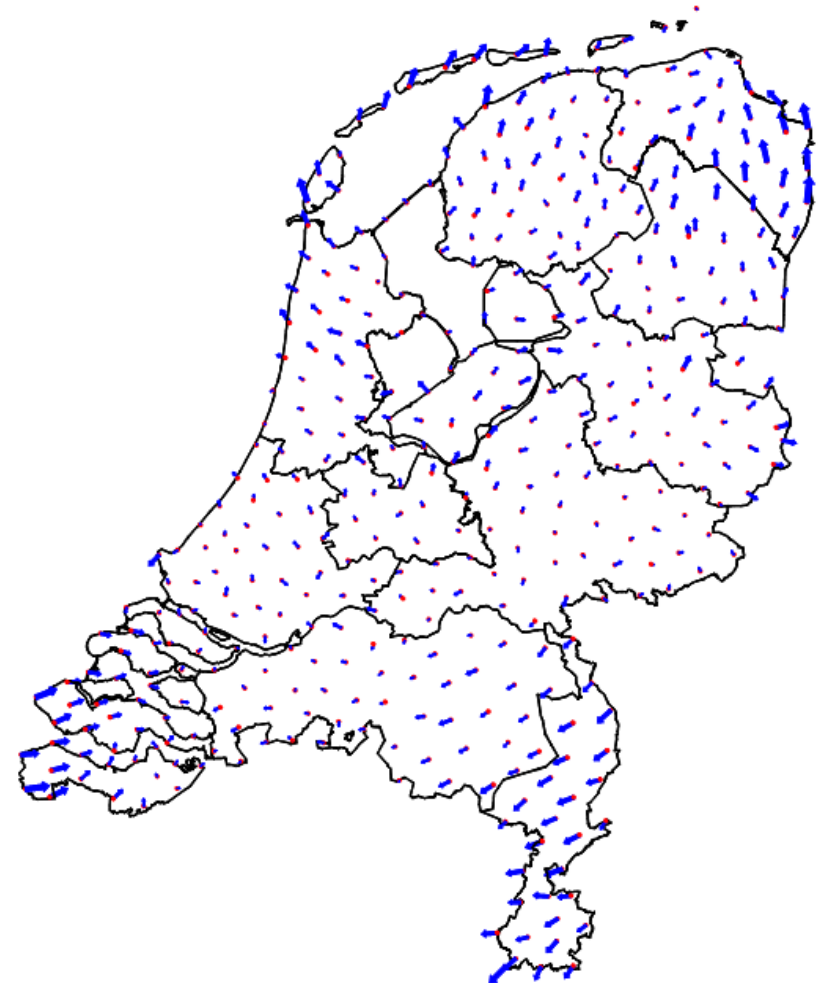
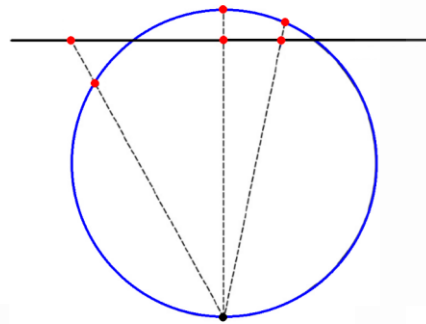
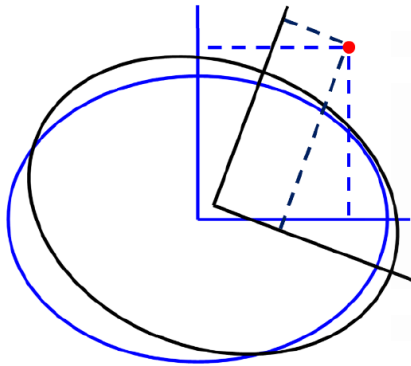
- Custom TM for the Netherlands similar scale error as RD
- New coordinates are confusing and even impossible for some users
- Transformation from RD to ETRS89 needed in GIS to migrate old datasets to new projection
- New projection needed if RD is in GIS?



The “complex” transformation

3 steps:

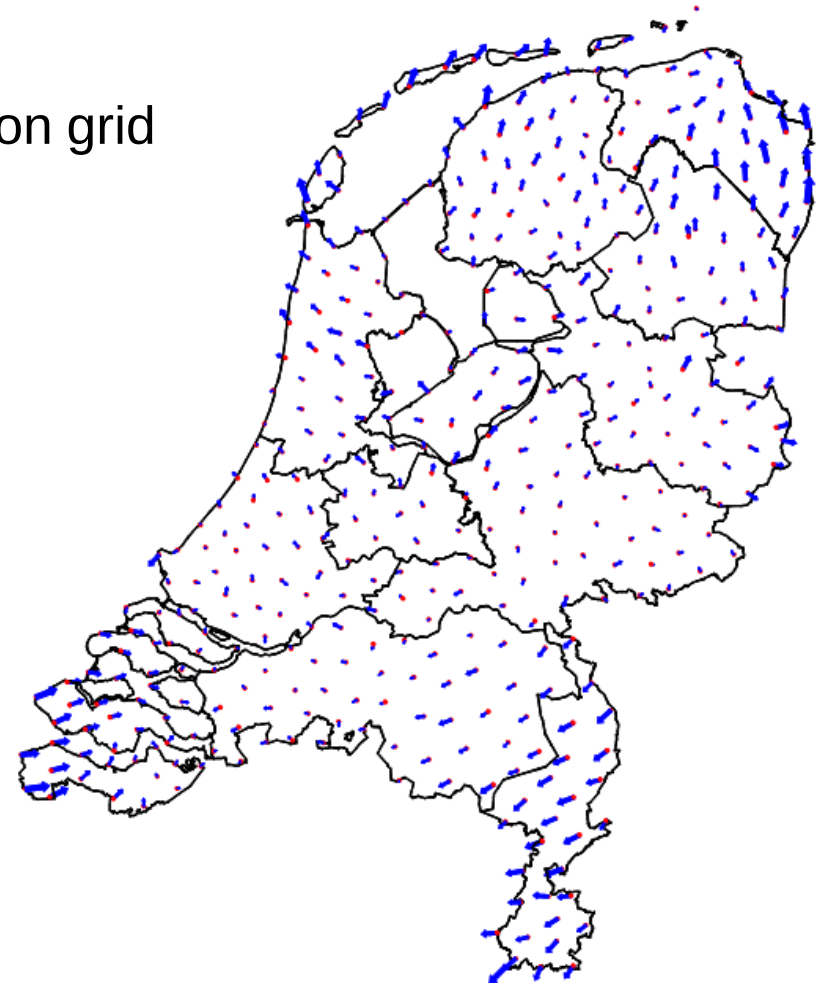
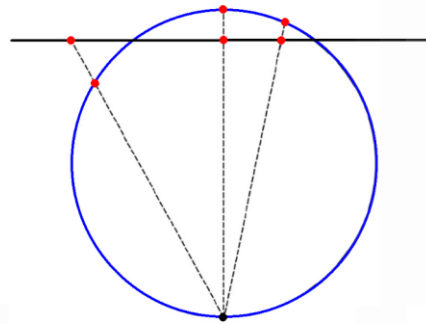
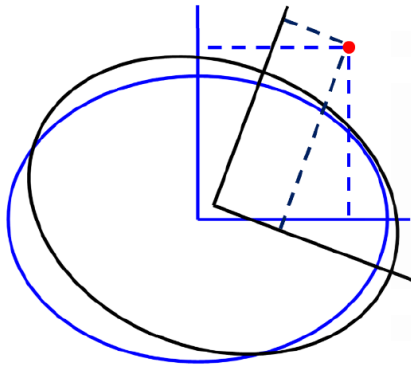
- 7-parameter datum transformation
- Stereographic map projection
- Correction/distortion grid (25 cm)



Conform transformation to ISO model

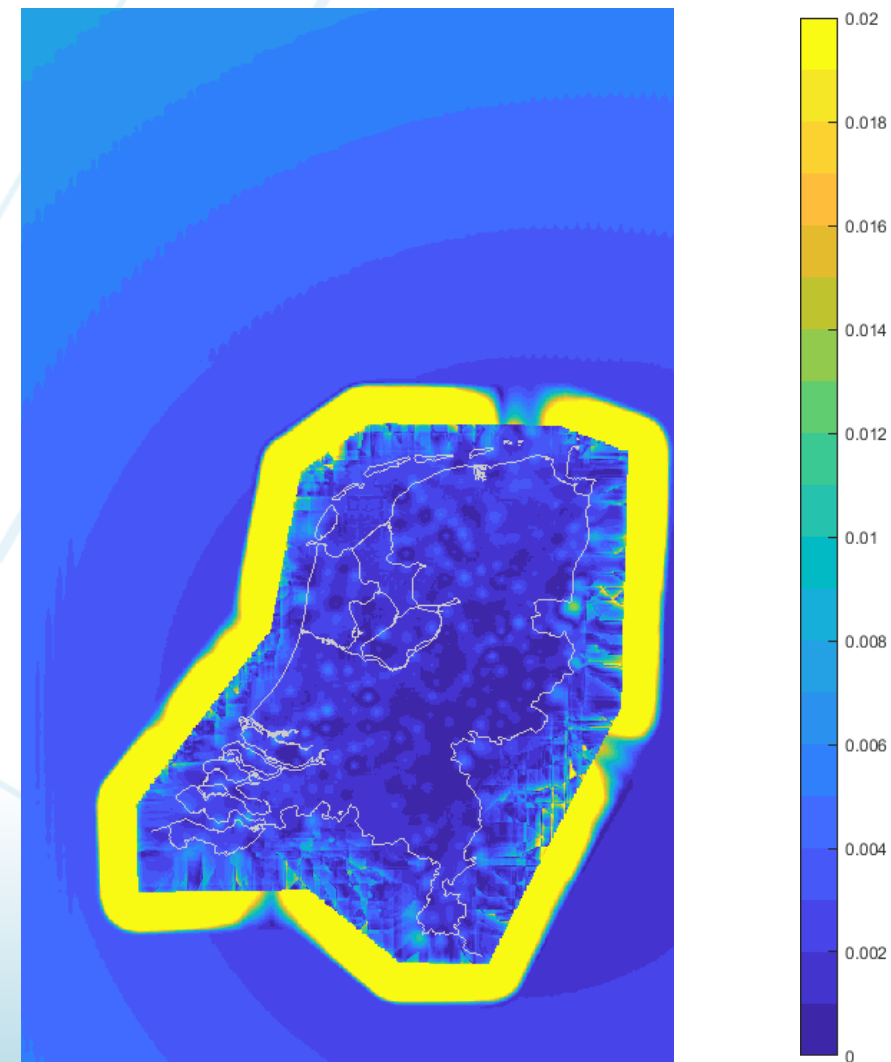
2 steps:

- 7-parameter datum transformation
 - Correction/distortion grid (25 cm)
 - Stereographic map projection
- } datum transformation grid



Difference with old transformation

< 1 cm within administrative borders at sea level

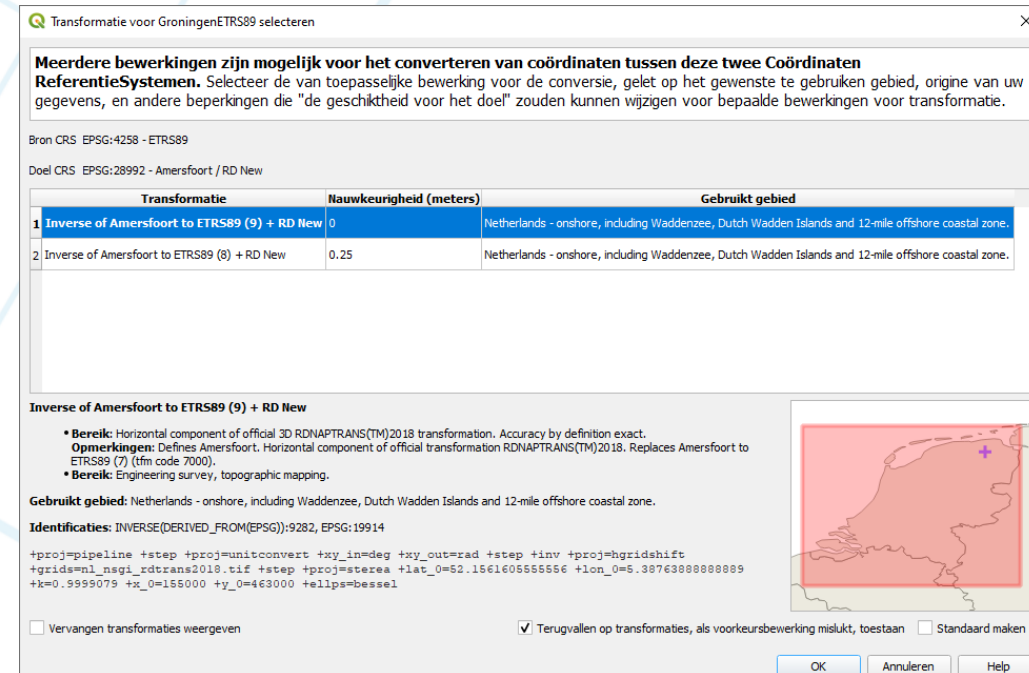


Result

With the new transformation via EPSG in GIS software we can continue to use RD as national projection next to ETRS89, as everyone can transform back and forth without losing accuracy!

Advantages

- No new national reference system needed now
- Datum transformation can accommodate new ETRFs
- Ready to switch to new system when needed



Conditions

Comply with ISO model of EPSG to modernise an old national reference system

- Enough datapoints to estimate correction grid
- Homogenous and smooth distortions
- Commonly supported projection
- Good datum transformation (precision and size of rotation parameters)

Conclusions

We should focus more on end user's needs (also workshops in Tromsø and Oslo)

- Users want projected coordinates (e.g. CAD software)
- Users trust transformations by (GIS) software blindly (black box)
- A new reference system can create more practical problems than it solves, as many end users would keep using the old reference system

Final take away

New realisation:

- Normally: Same system definition, significantly different coordinates
- Alternative: New system definition, no significantly different coordinates

(NB: We could do that for ETRF2000 too!)

Questions?

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