



Standardization of national shift grids for the transformation between national projected reference frames and ETRS89

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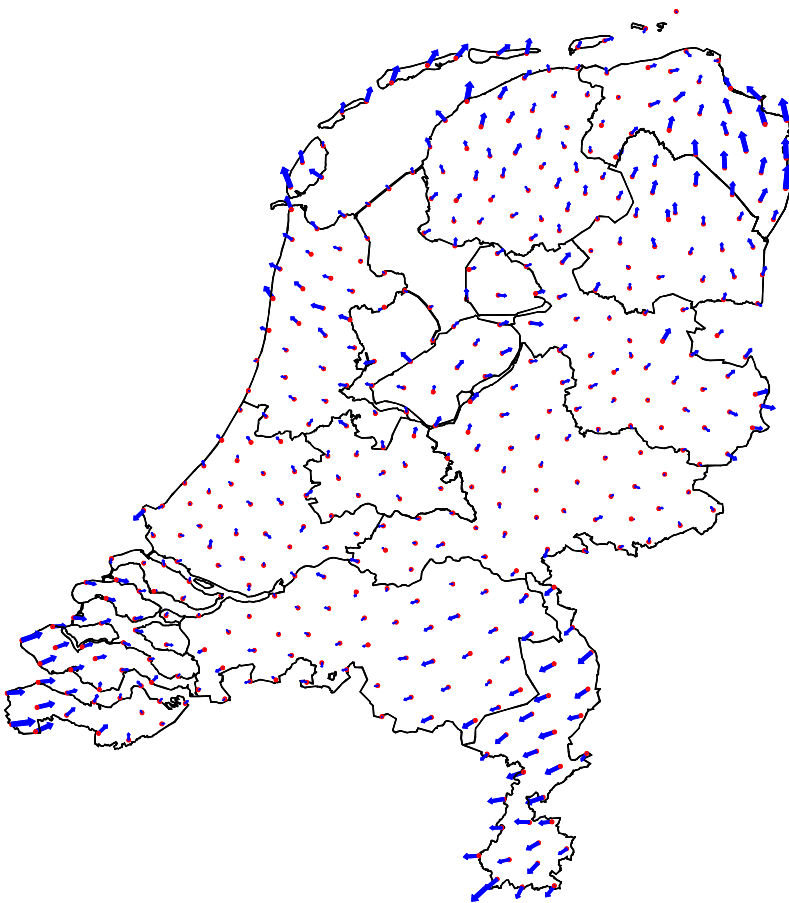
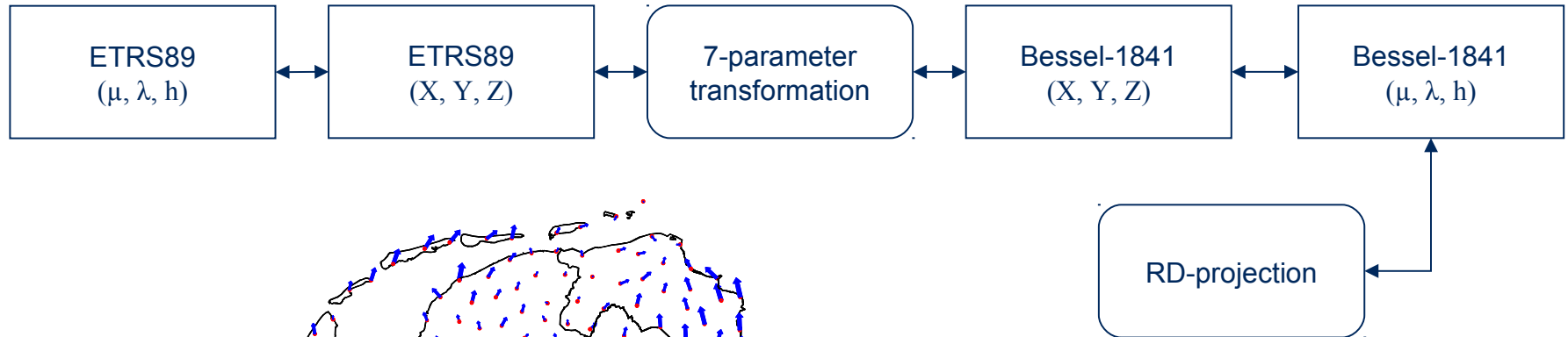
Outline

- Motivation
- Existing transformation procedure
- User friendly transformation procedure
- Issues
- Proposal

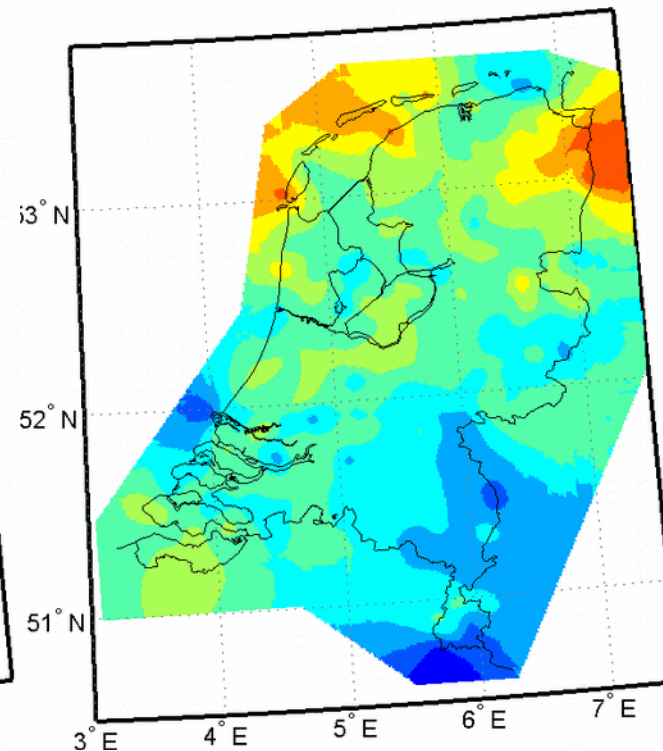
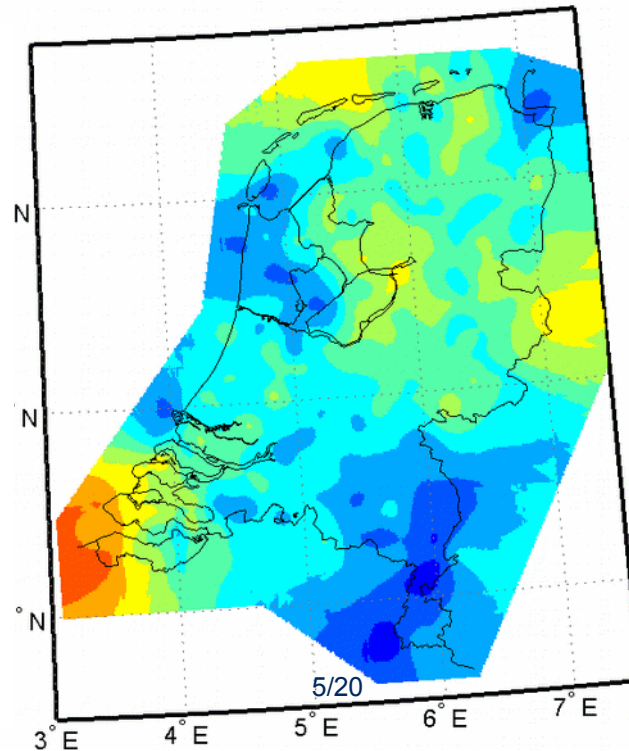
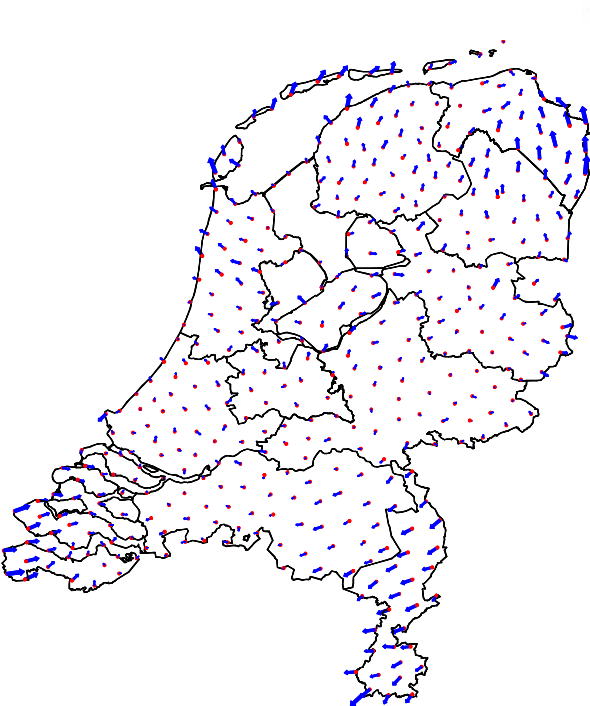
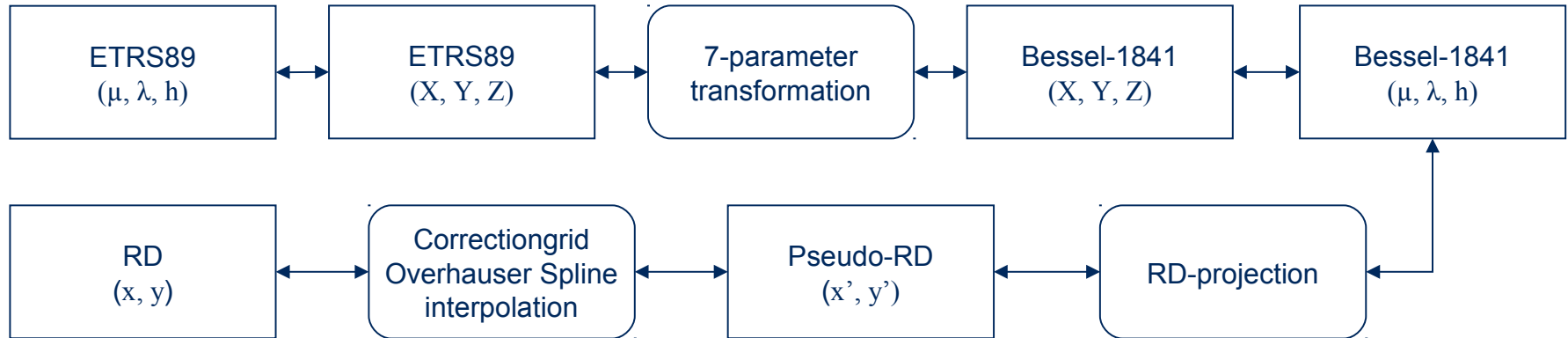
Motivation

- September 2013 – June 2014:
 - Reconnaissance to phase out *stelsel van de Rijksdriehoeksmeting* (RD)
 - Many scenarios defined
 - Main conclusions
 - a. First step: Exchange of geo-information in ETRS89
(Necessary for INSPIRE-datasets anyway)
 - b. Need for a (more) user friendly transformation procedure
between RD and ETRS89
 - a. relies on b.
- New version of PCTTRANS software (transformations and other geodetic computations) in development at Hydrographic Survey
 - Will use Open Source libraries (proj4)

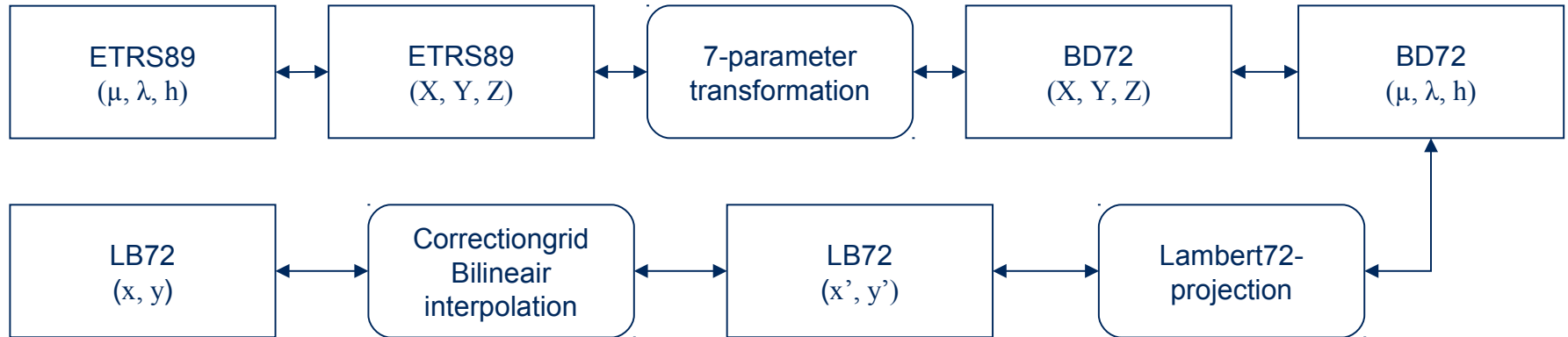
Existing transformation procedure: RDNAPTRANS™



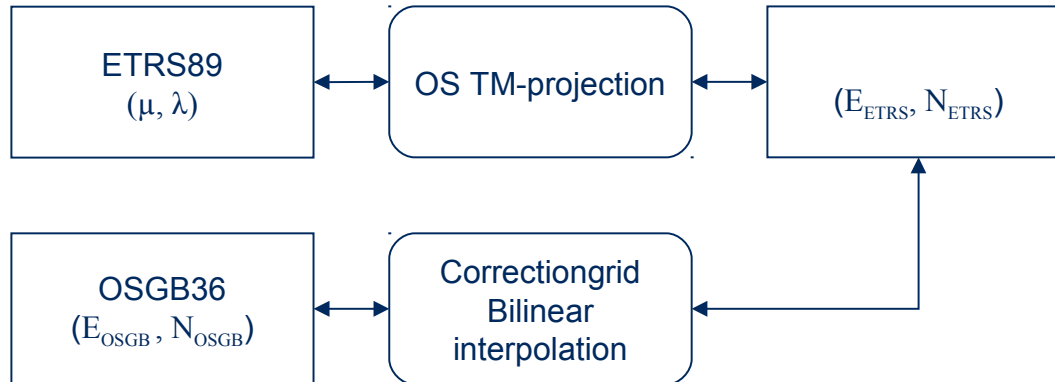
Existing transformation procedure: RDNAPTRANS™



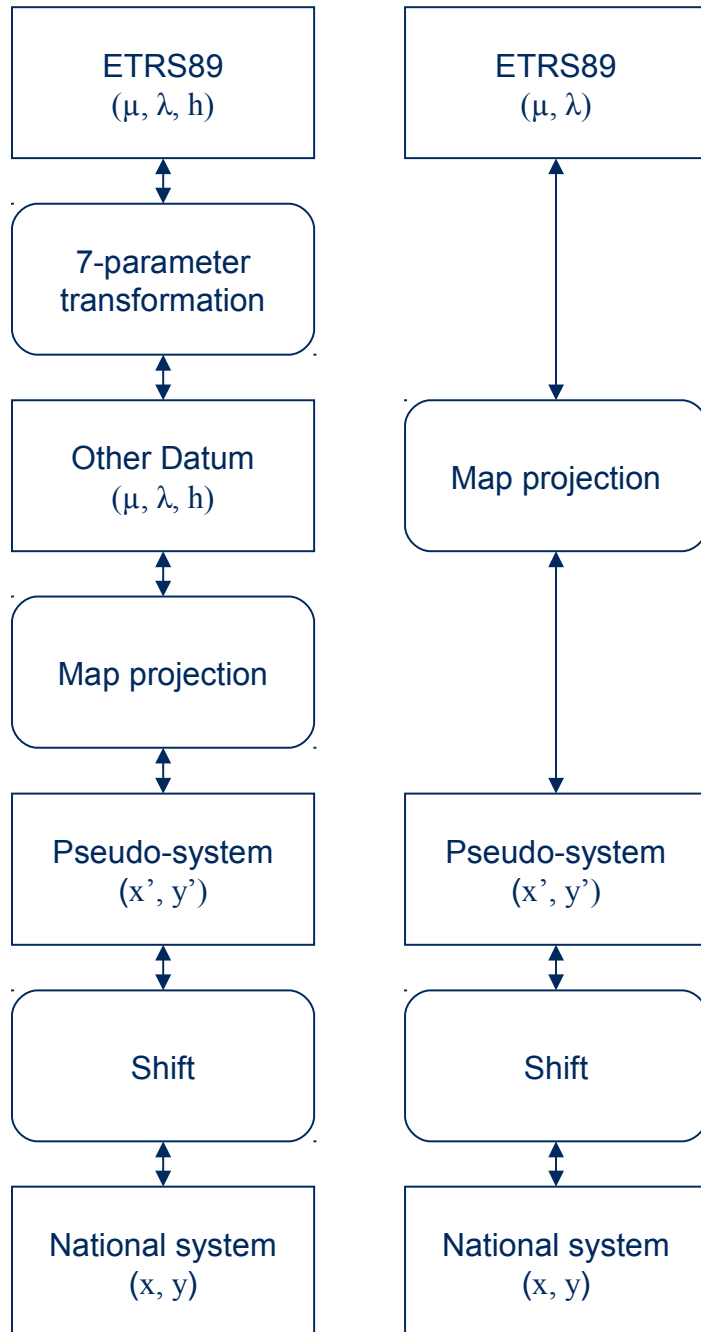
Existing transformation procedure: Belgium



Existing transformation procedure: Great Britain



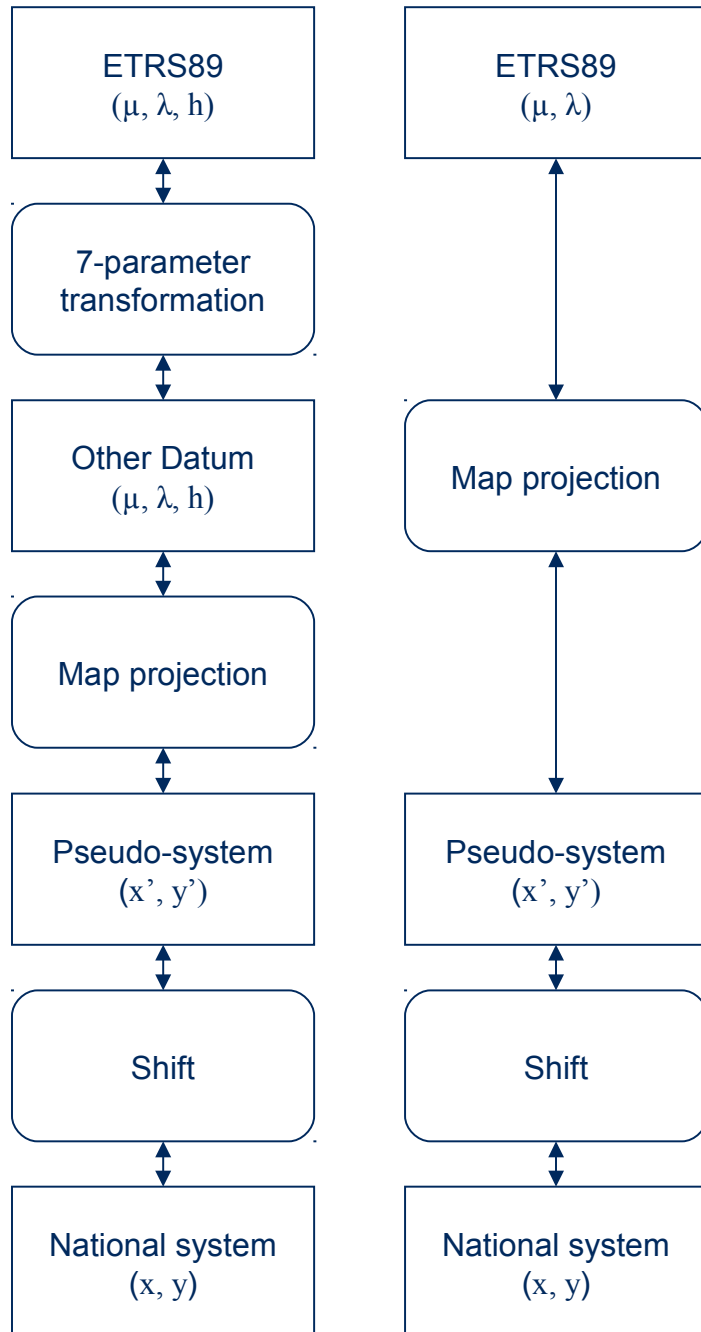
Procedures NL, B, GB, ... similar



Similarities

- Use of a correction/shift grid to projected coordinates
- Not implemented in GIS

Procedures NL, B, GB, ... similar

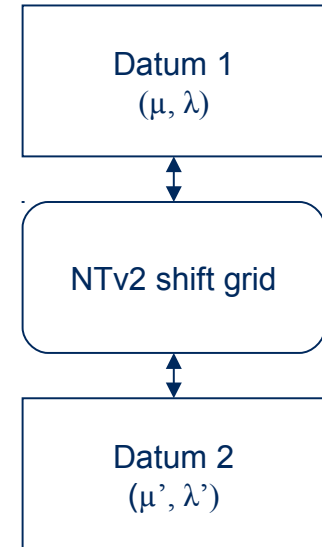


Similarities

- Use of a correction/shift grid to projected coordinates
- Not implemented in GIS
- Not user friendly

NTv2 (National Transformation version 2)

- Correction to ellipsoidal coordinates
- Implemented in GIS (user friendly)
- Included in EPSG database
 - Database with transformations and projections used in GIS
- Available for
 - Germany (EPSG:15948)
 - Great Britain (EPSG:5338)
 - Switzerland (EPSG:15486)
 - ...



NTv2

- Correction to ellipsoidal coordinates
- Implemented in GIS
- Included in EPSG database
- Available for
 - **Germany**
 - Great Britain
 - Switzerland
 - ...

...An accuracy of a few cm inside of each federal region is achieved by the transformation. Near the borders of the federal regions, the accuracy is some dm, such that overall a sub-meter accuracy is achieved...

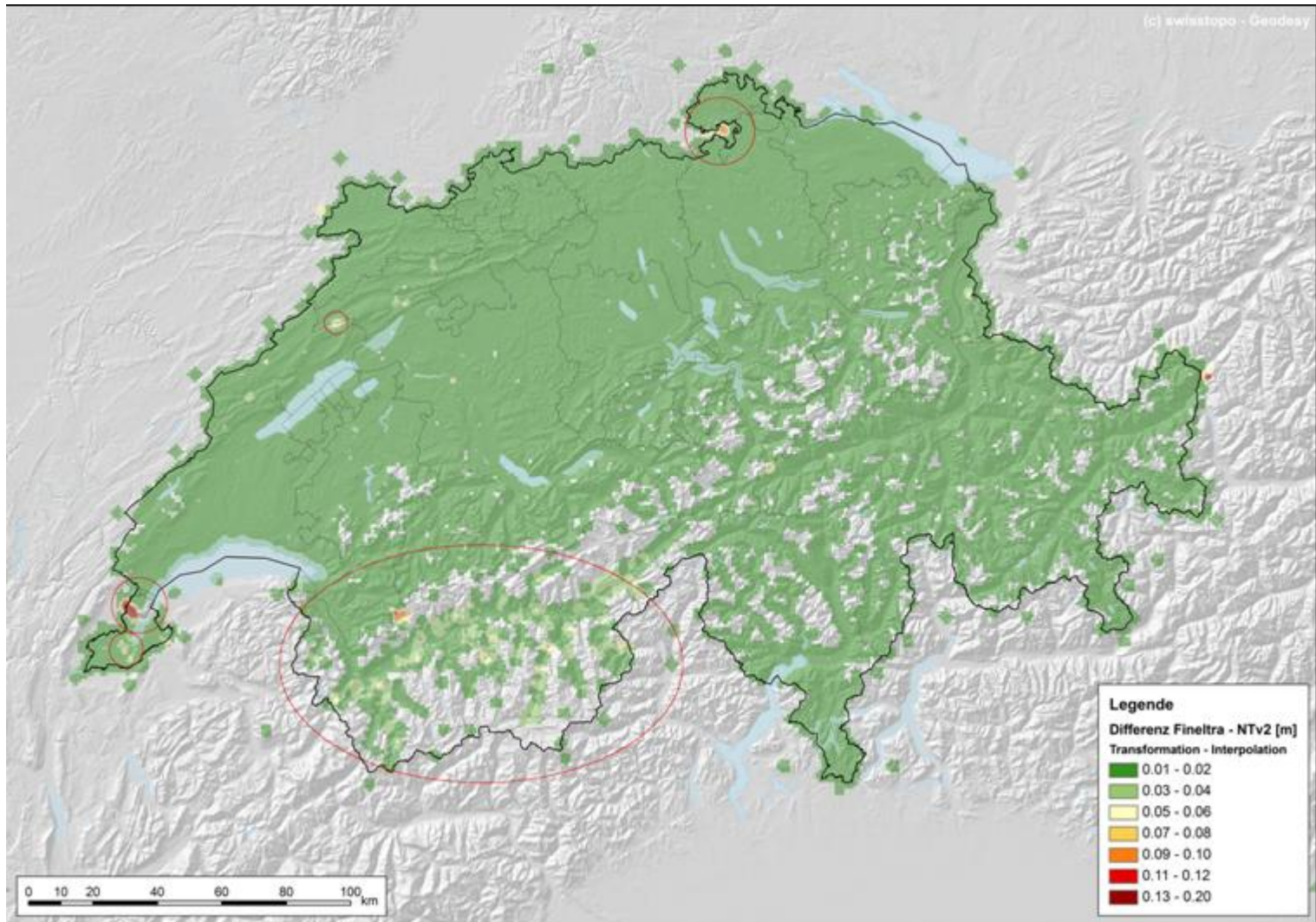
(translated from
<http://www.adv-online.de/Geodaetische-Grundlagen/Transformation/Transformation-BeTA2007/>)

NTv2

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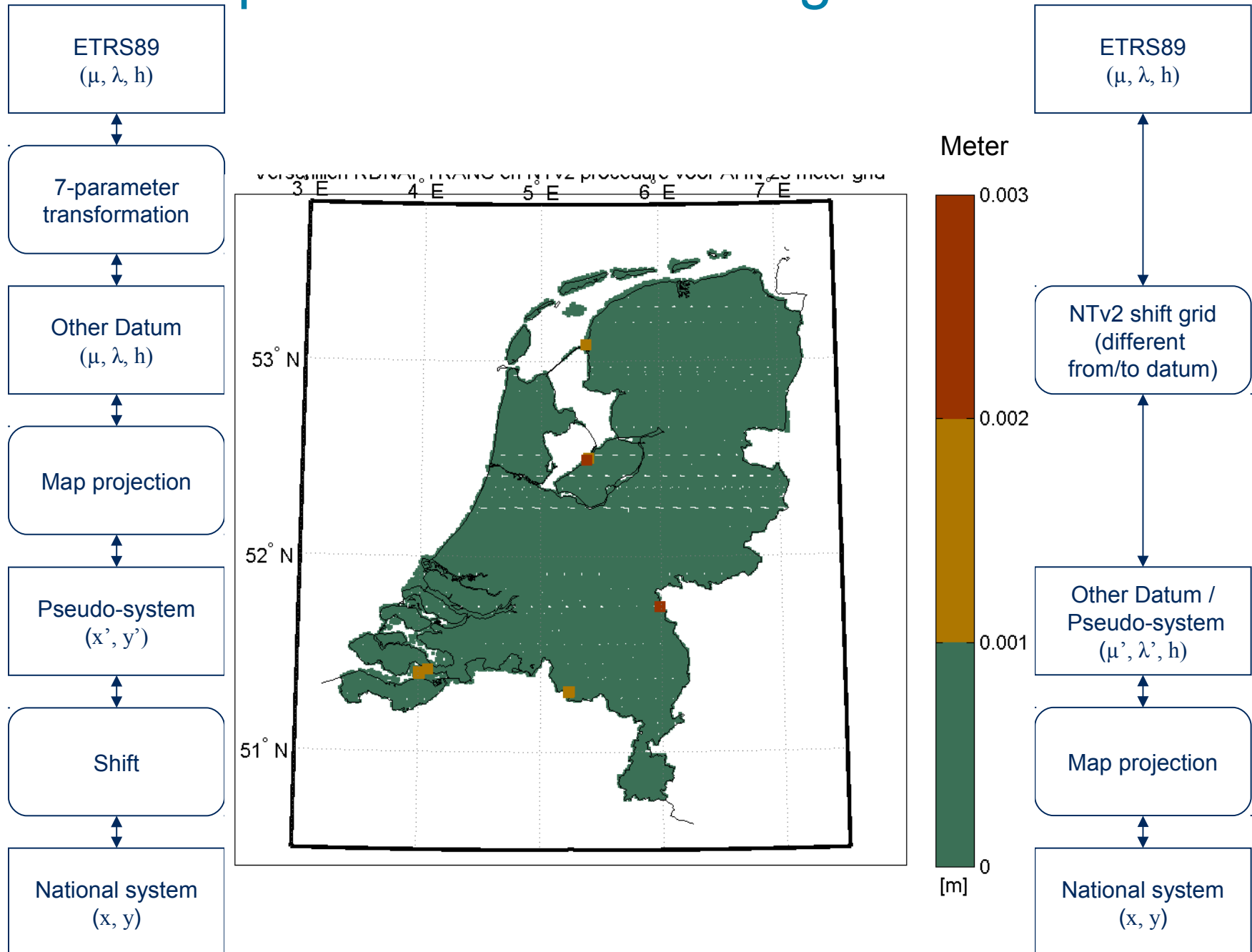
...The difference in transformed coordinates between the original OSTN02 format and the NTv2 format is insignificant (0.001m on average, 0.01m maximum). ...

(from:
<http://www.ordnancesurvey.co.uk/business-and-government/help-and-support/navigation-technology/os-net/ostn02-ntv2-format.html>)

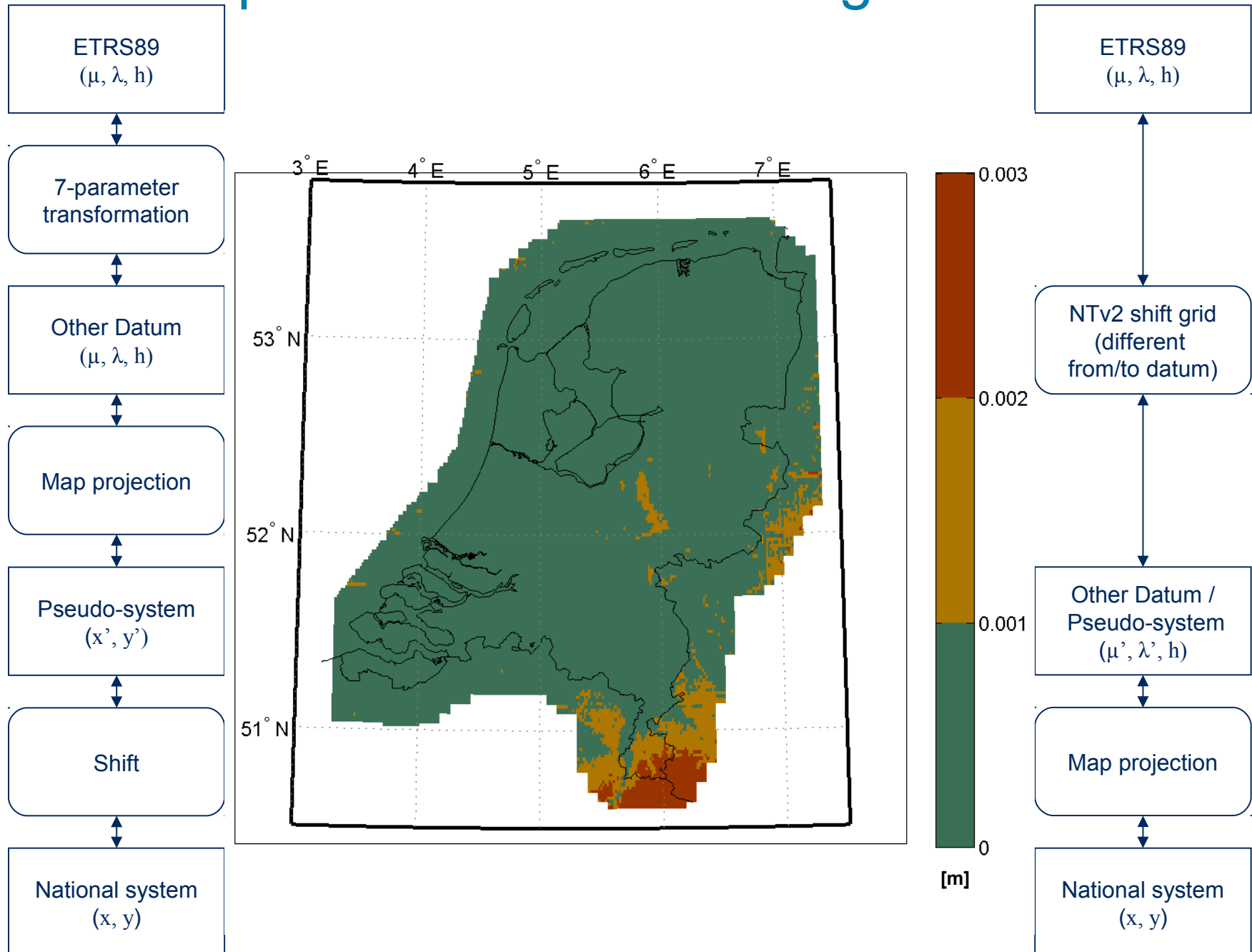


<http://www.swisstopo.admin.ch/internet/swisstopo/en/home/products/software/products/chenyx06.parsysrelated1.72268.downloadList.60956.DownloadFile.tmp/entzerrungsgittergross.jpg>

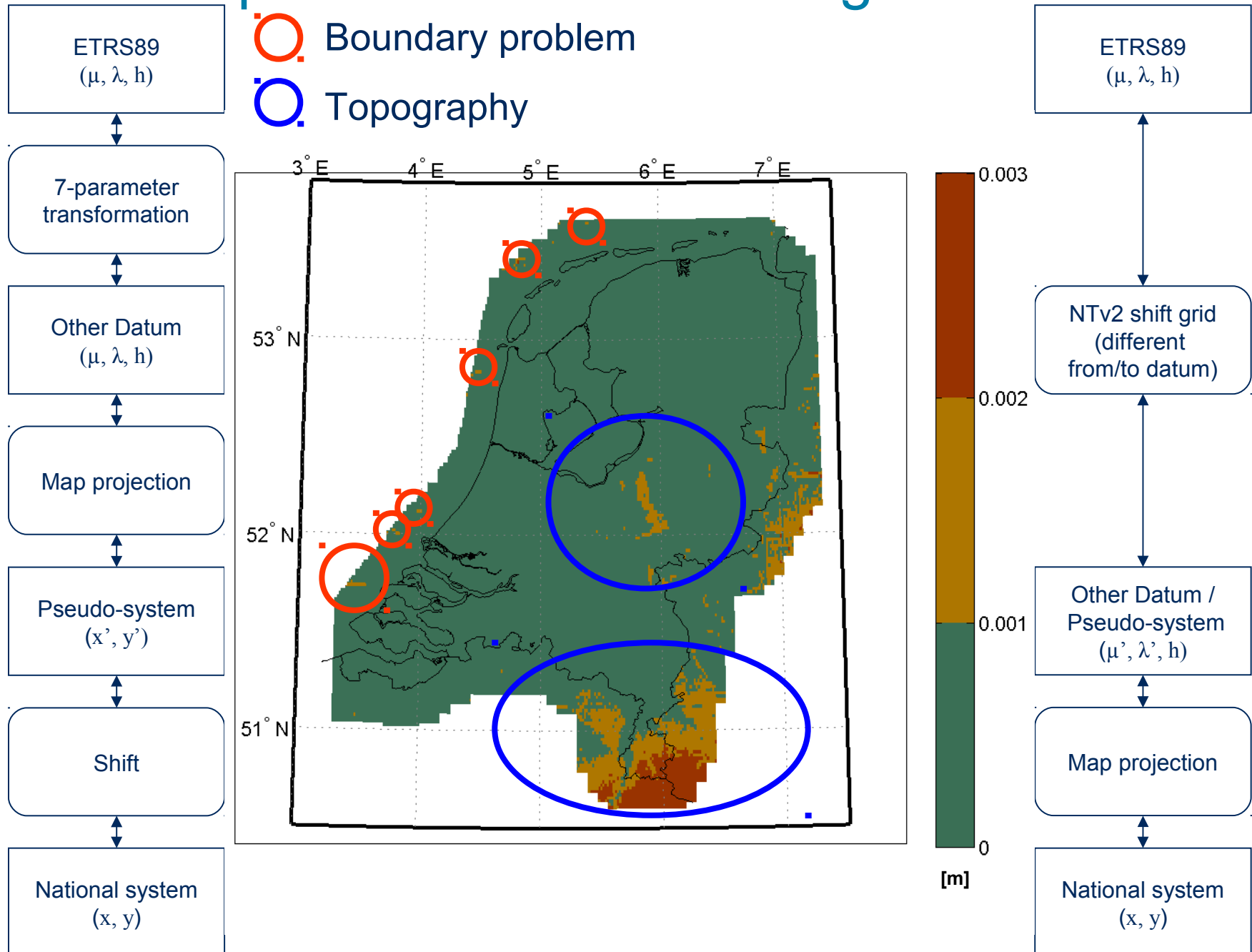
Comparison for 25 meter gridded DEM



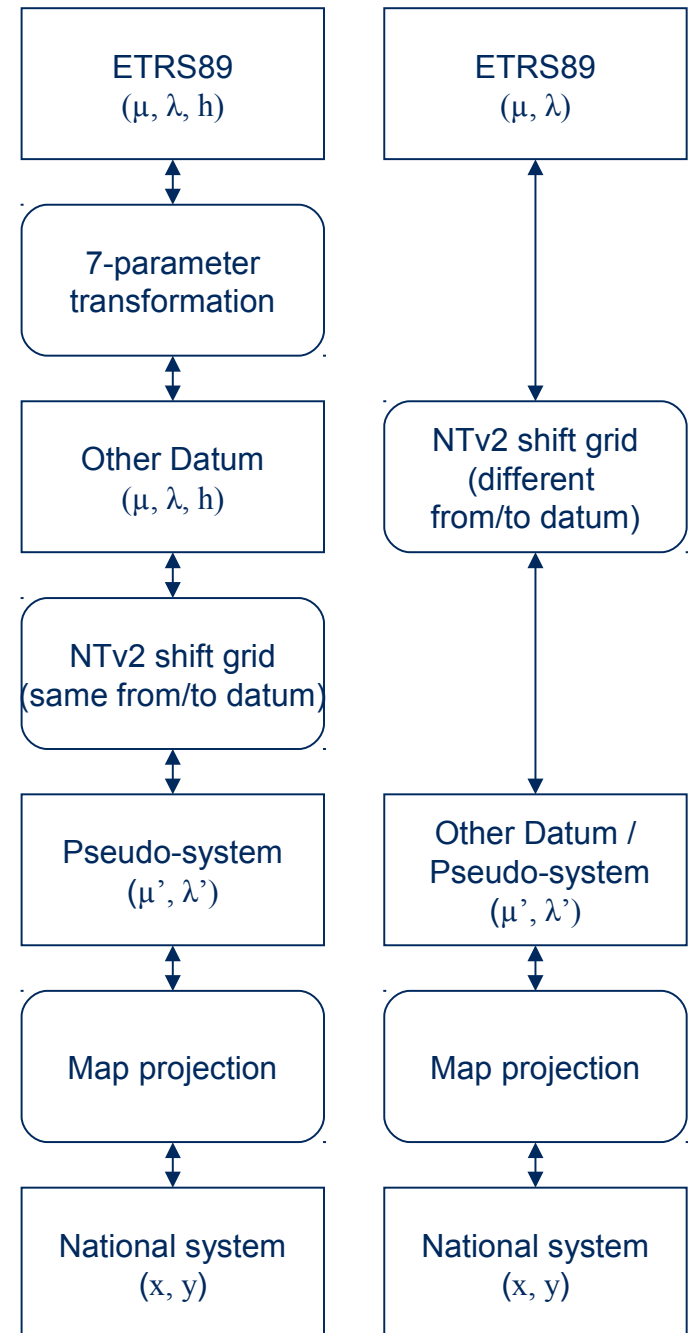
Comparison for 10 second grid at h=43m



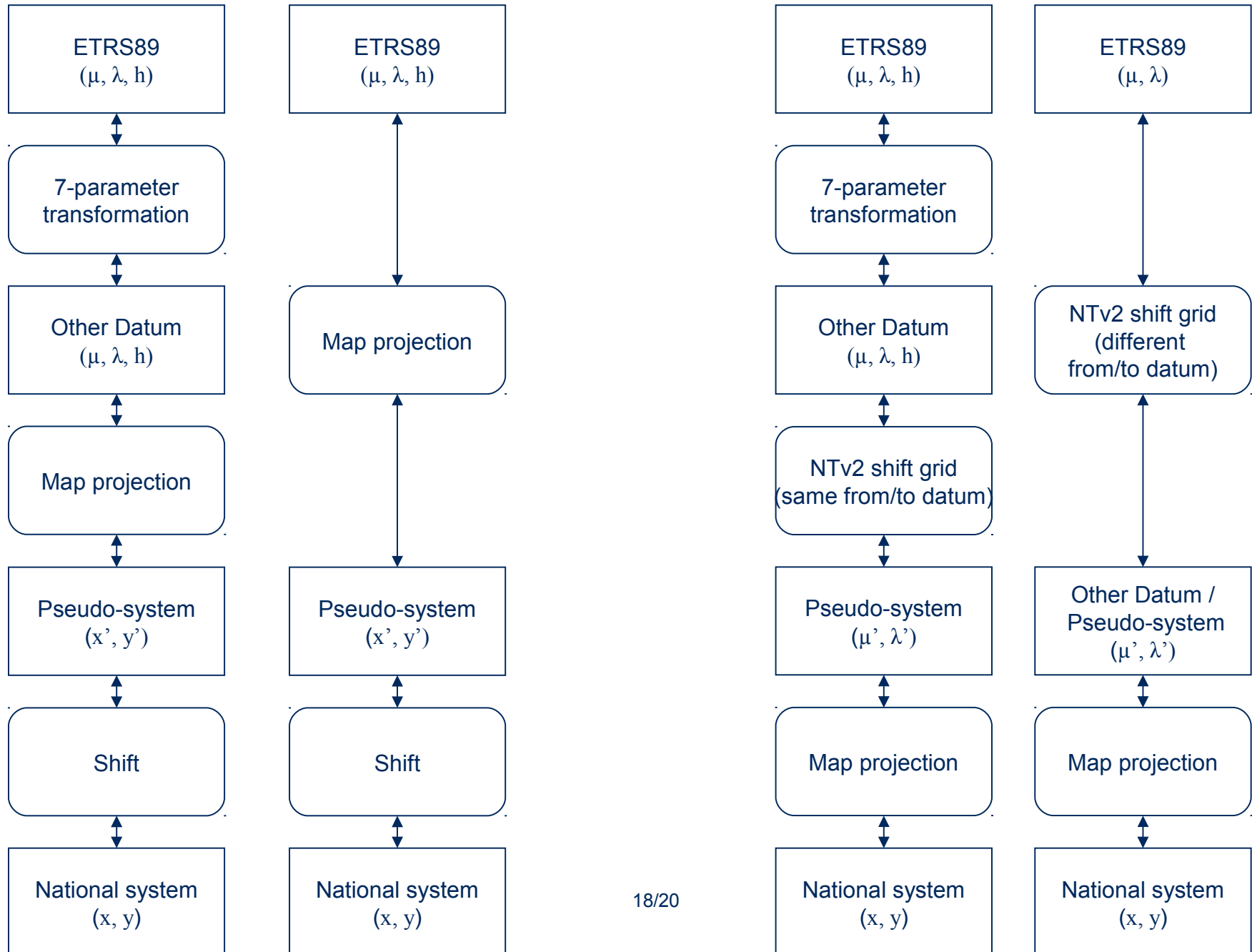
Comparison for 10 second grid at h=43m



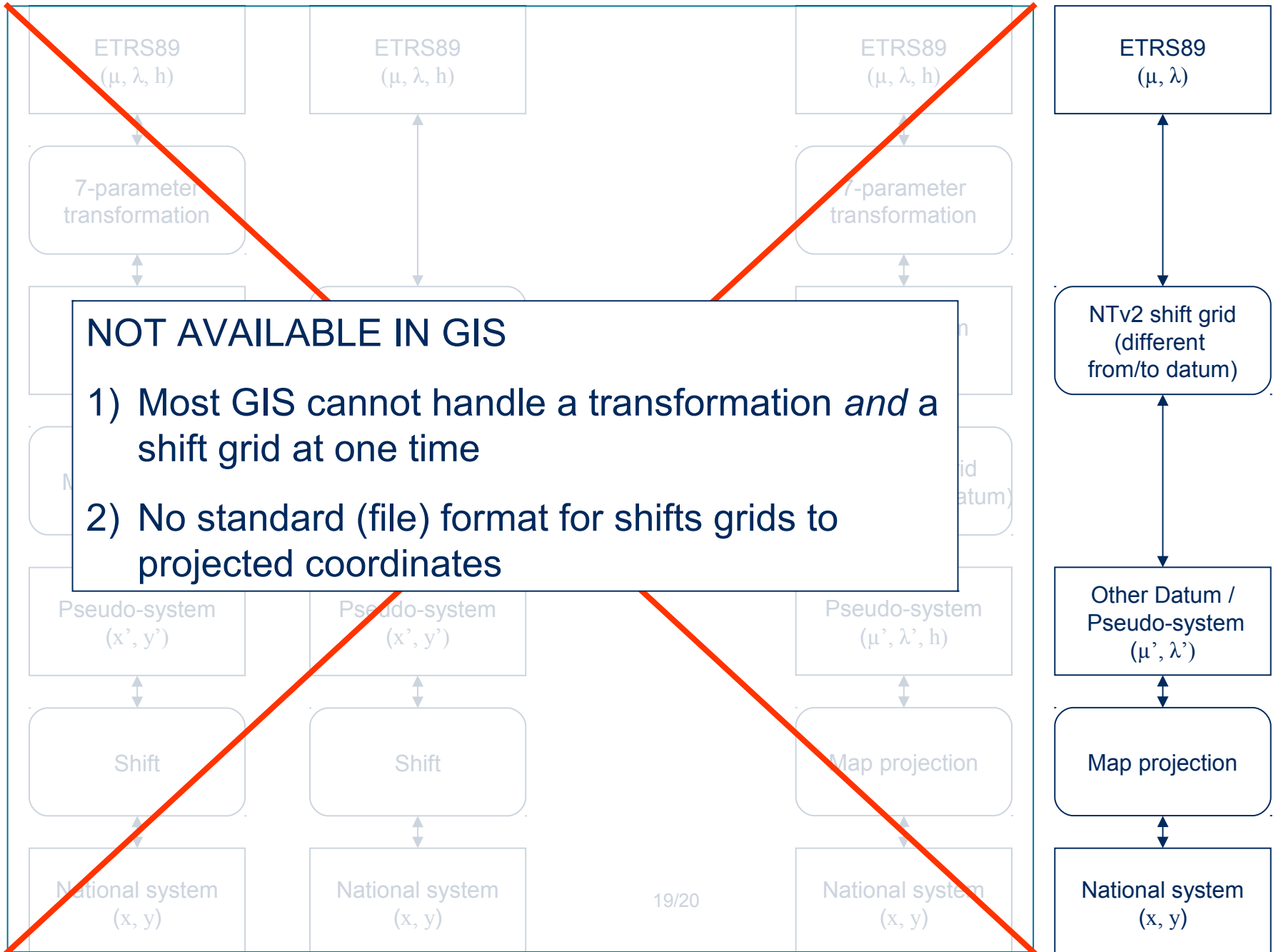
Procedures



Procedures

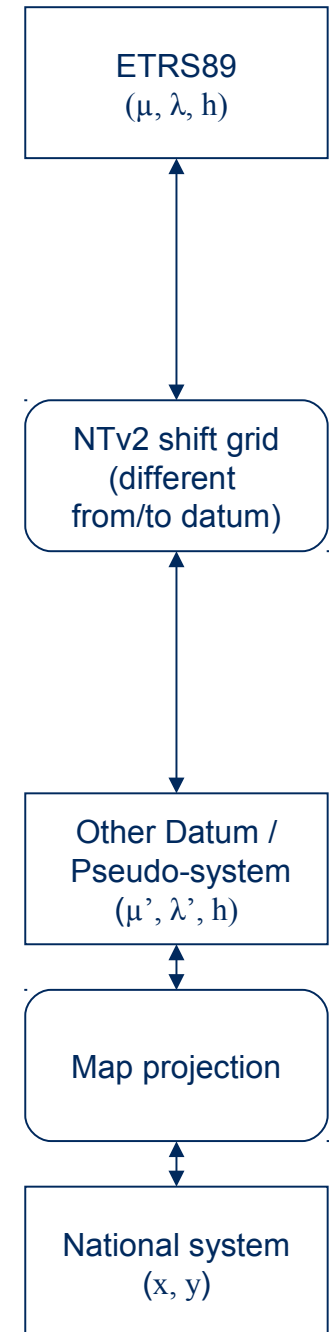


Procedures

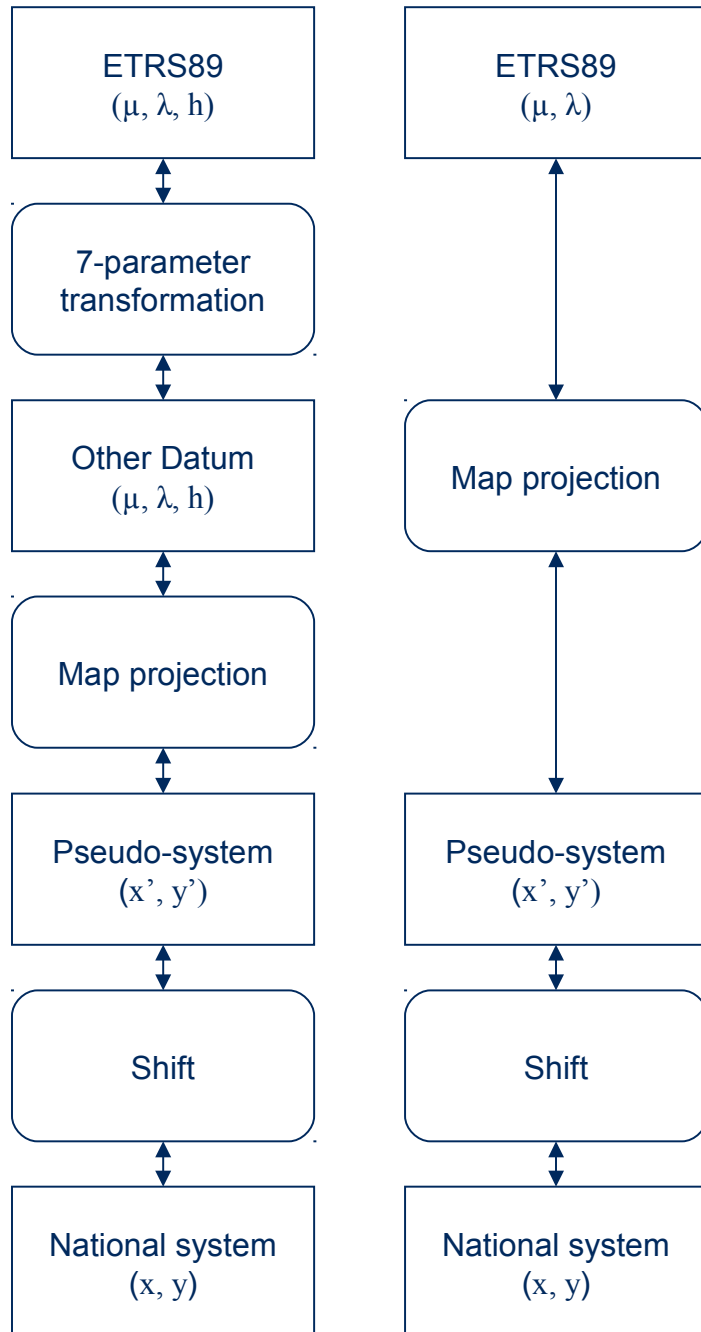


Procedures - conclusions

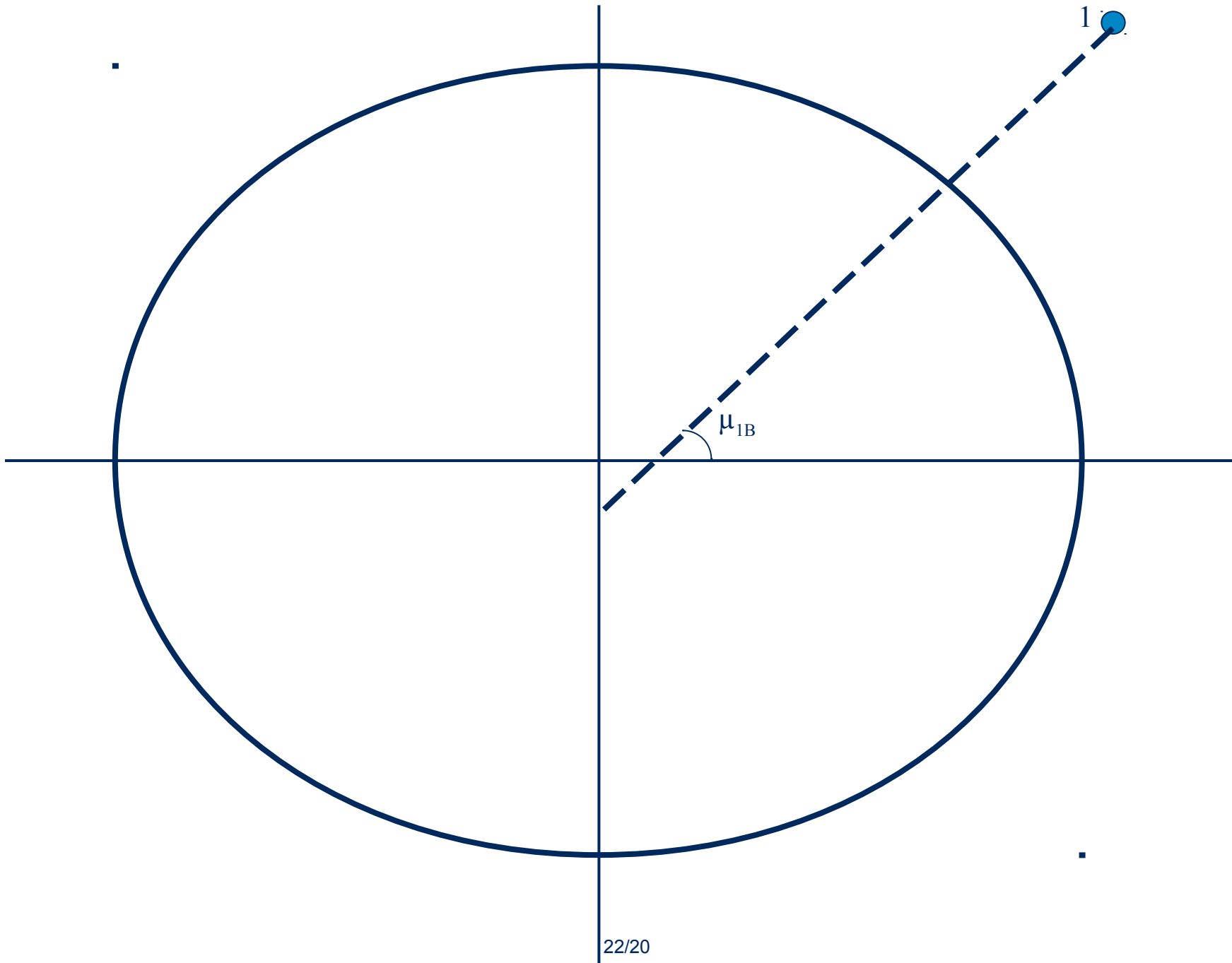
- The remaining procedure is height dependent
- Height dependency caused by
 1. Difference in from / to ellipsoids
 2. Rotation and scale of transformation
- It is not straightforward to adopt NTv2

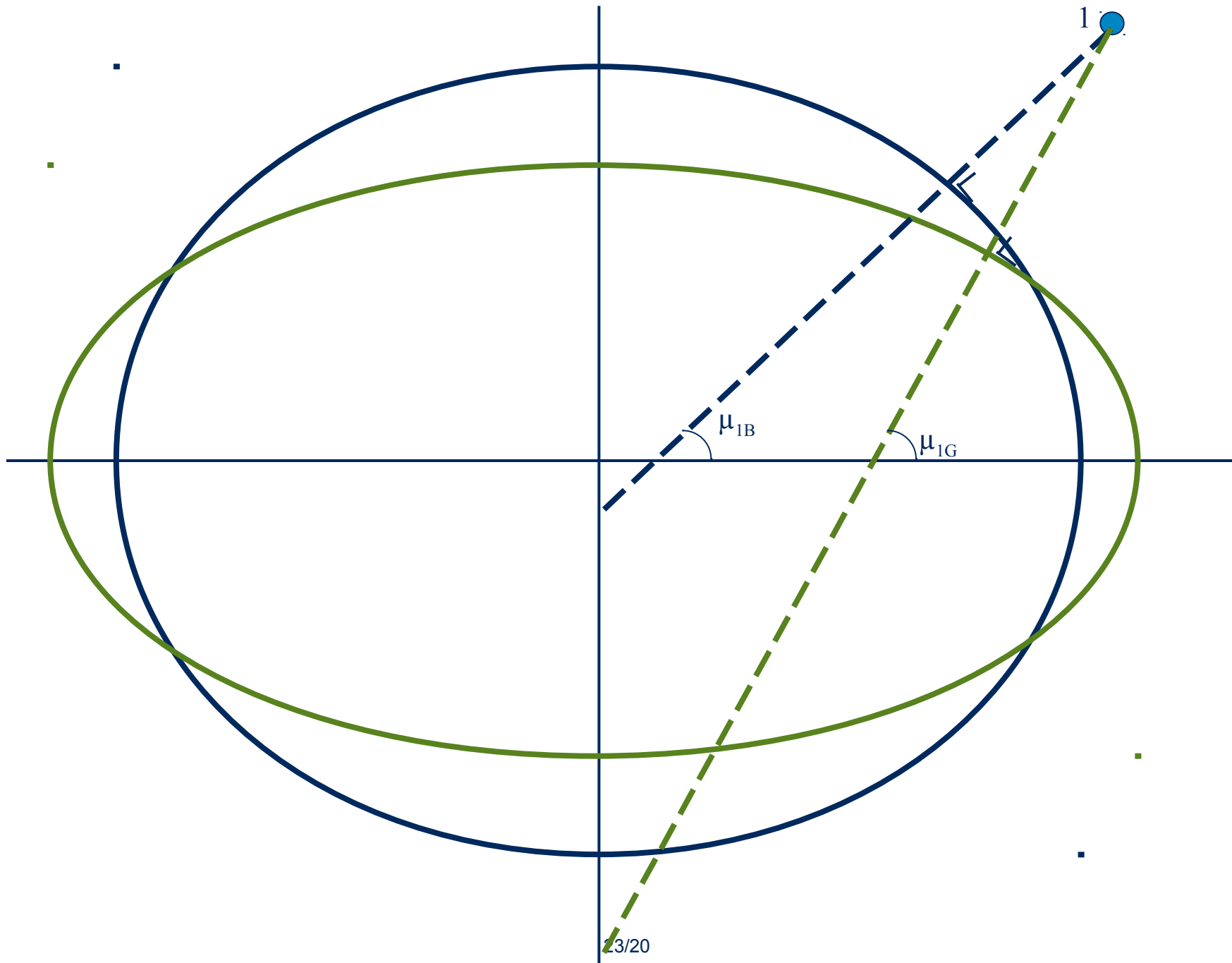


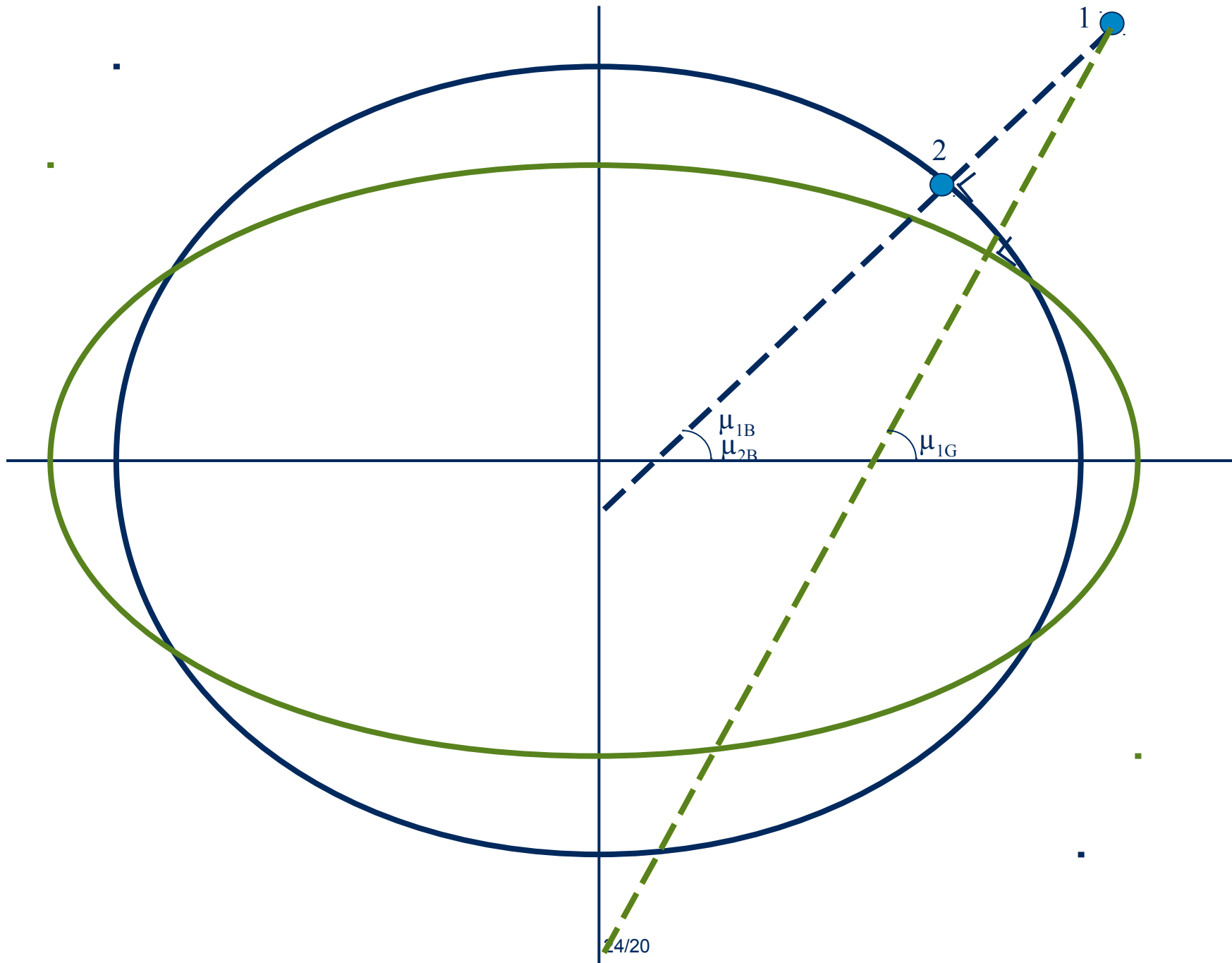
Proposal

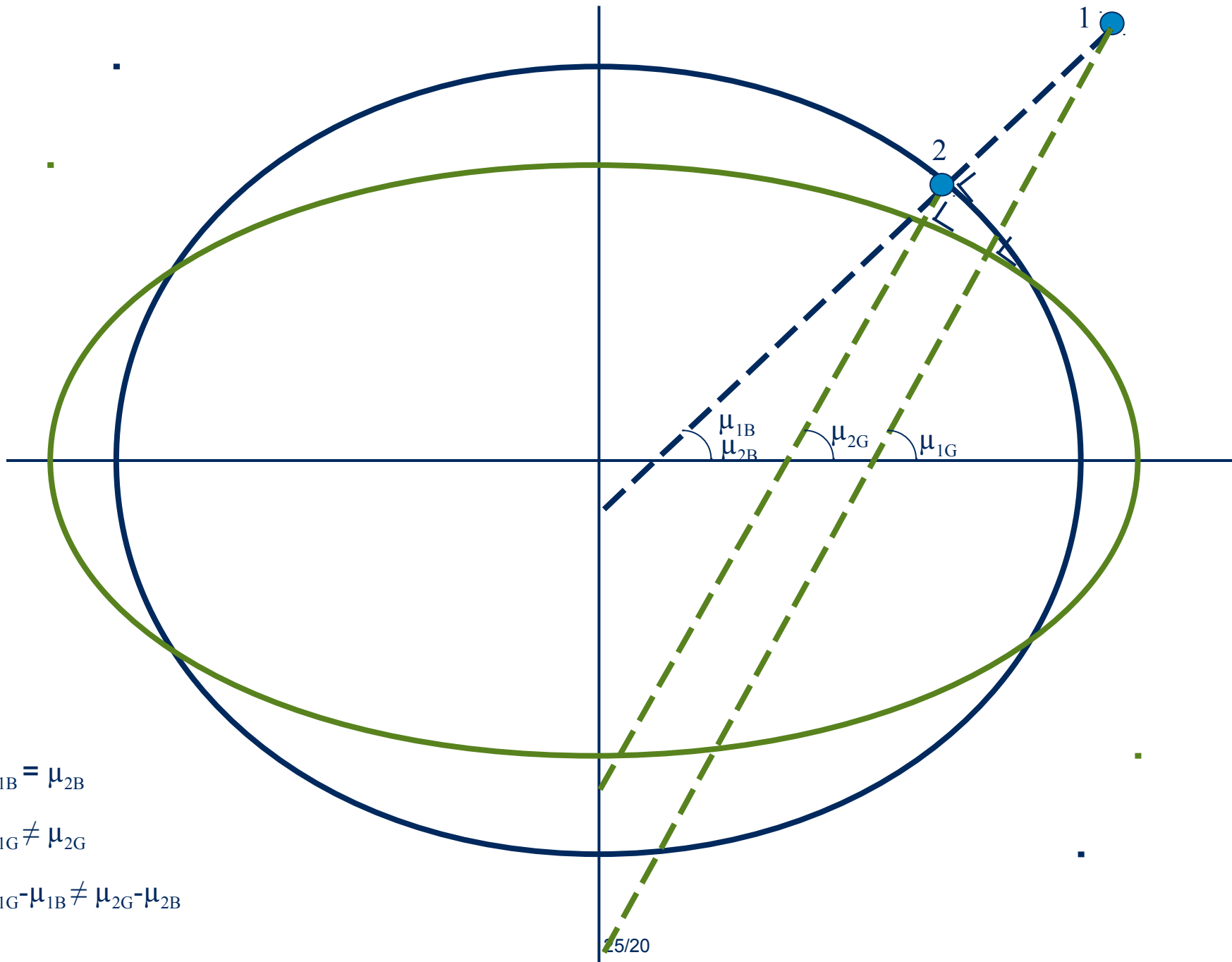


- How can we get our existing transformation procedure implemented in GIS?
- EPSG is the key to implement transformation procedure in GIS
 - Database with transformations and projections used in GIS
 - Supports NTv2
 - *Might support projection to projected coordinates if (and only if) adopted by multiple countries*
- How to proceed?
 - How many countries have the same issue? Contact presenters of national reports?
 - Possibility to adopt (so not necessarily develop) a standard file format and interpolation (PCTTRANS)?









$$\mu_{1B} = \mu_{2B}$$

$$\mu_{1G} \neq \mu_{2G}$$

$$\mu_{1G} - \mu_{1B} \neq \mu_{2G} - \mu_{2B}$$