



Danish Ministry of the Environment
National Survey and Cadastre

National Report of Denmark

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National Survey and Cadastre

Outline

Permanent GNSS station

Motorized Levelling

New reference network strategy DK

Update of ETRS89 coordinates

Update of geoid model

Uplift models

KMSTrans and KMSTrlib

Permanent GNSS stations



Motorized Levelling continues in DK



New "up to date" guidelines for levelling

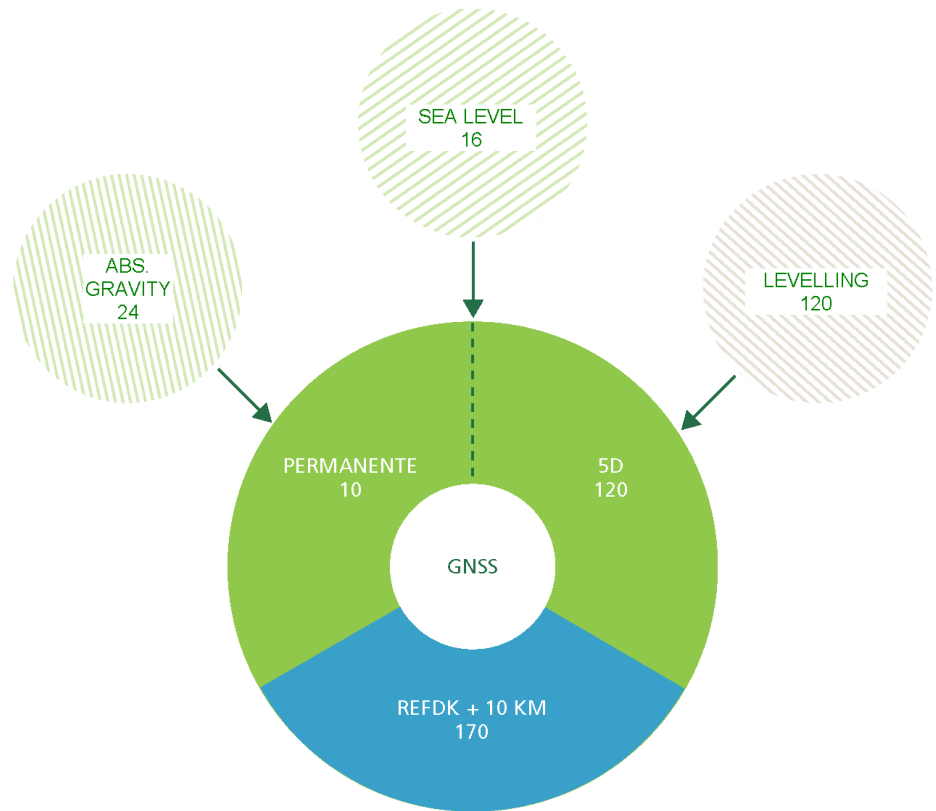


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New reference network strategy



Referencenet for Danmark
Status, strategi og udvikling



Miljøministeriet
Kort & Matrikelstyrelsen

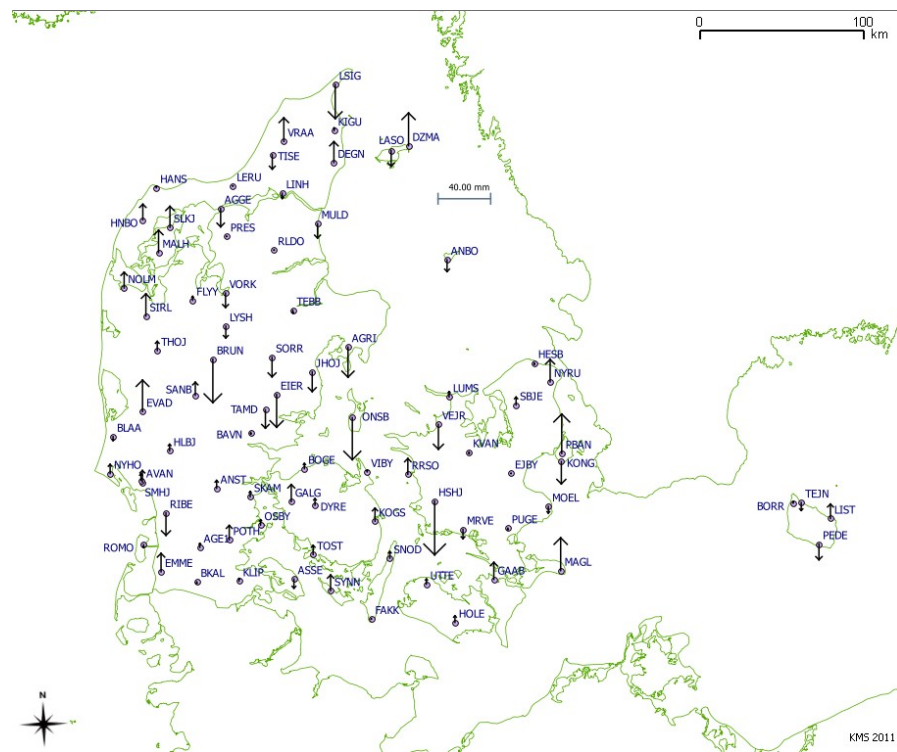
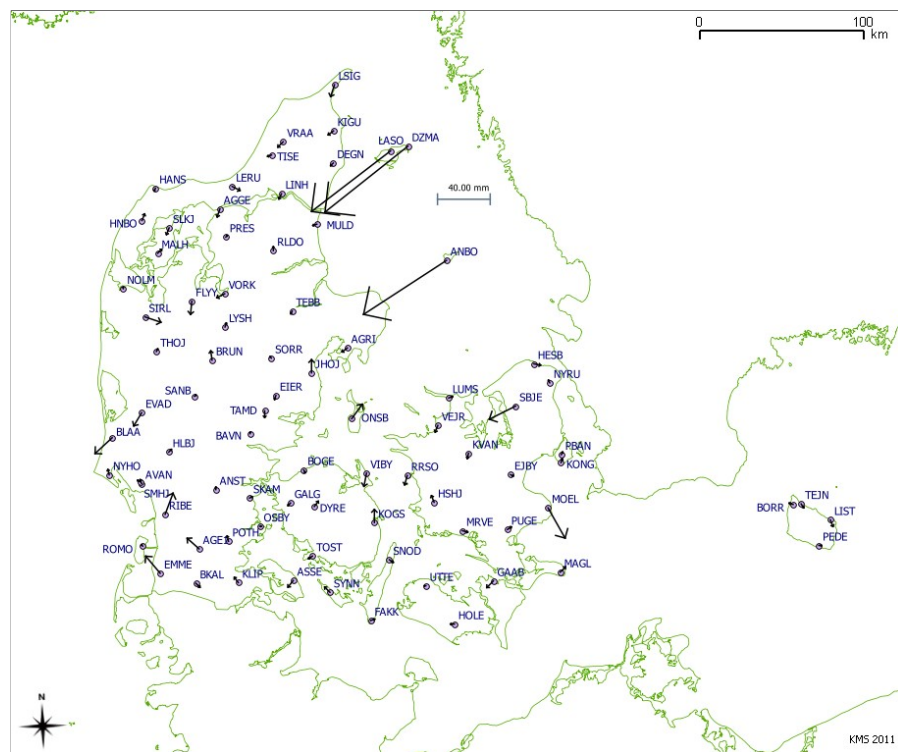


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SIDE5

Update of ETRS89 coordinates for the national network - REFDK

- Diff. in plane: < 2 cm (except two small islands)
- Diff. in ellipsoidal heights: between -4 cm and +3 cm

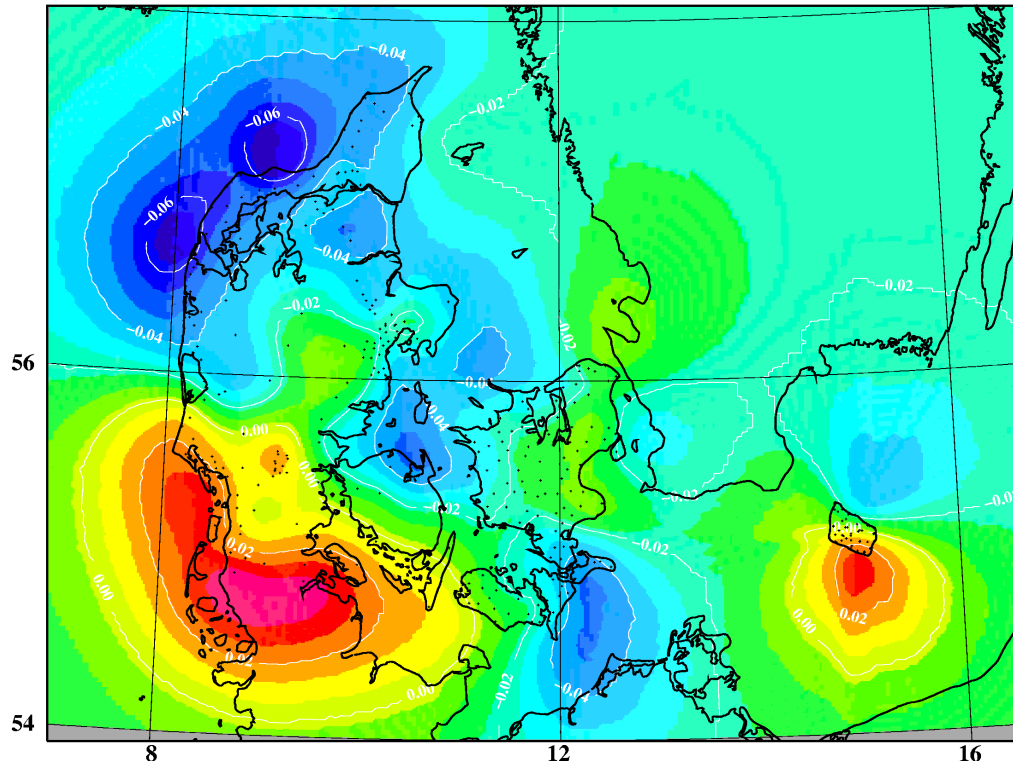


Update of geoid model – preliminary results

- Update of REFDK coordinates = > update of geoid model
- Heading towards the 1 cm geoid model!

Diff between existing and updated model

DKGEOID02 corrector



GPS differences: meter	mean	std.dev.
Before fit	-0.110	0.033
After collocation fit	0.000	0.008

The cm-geoid is here!

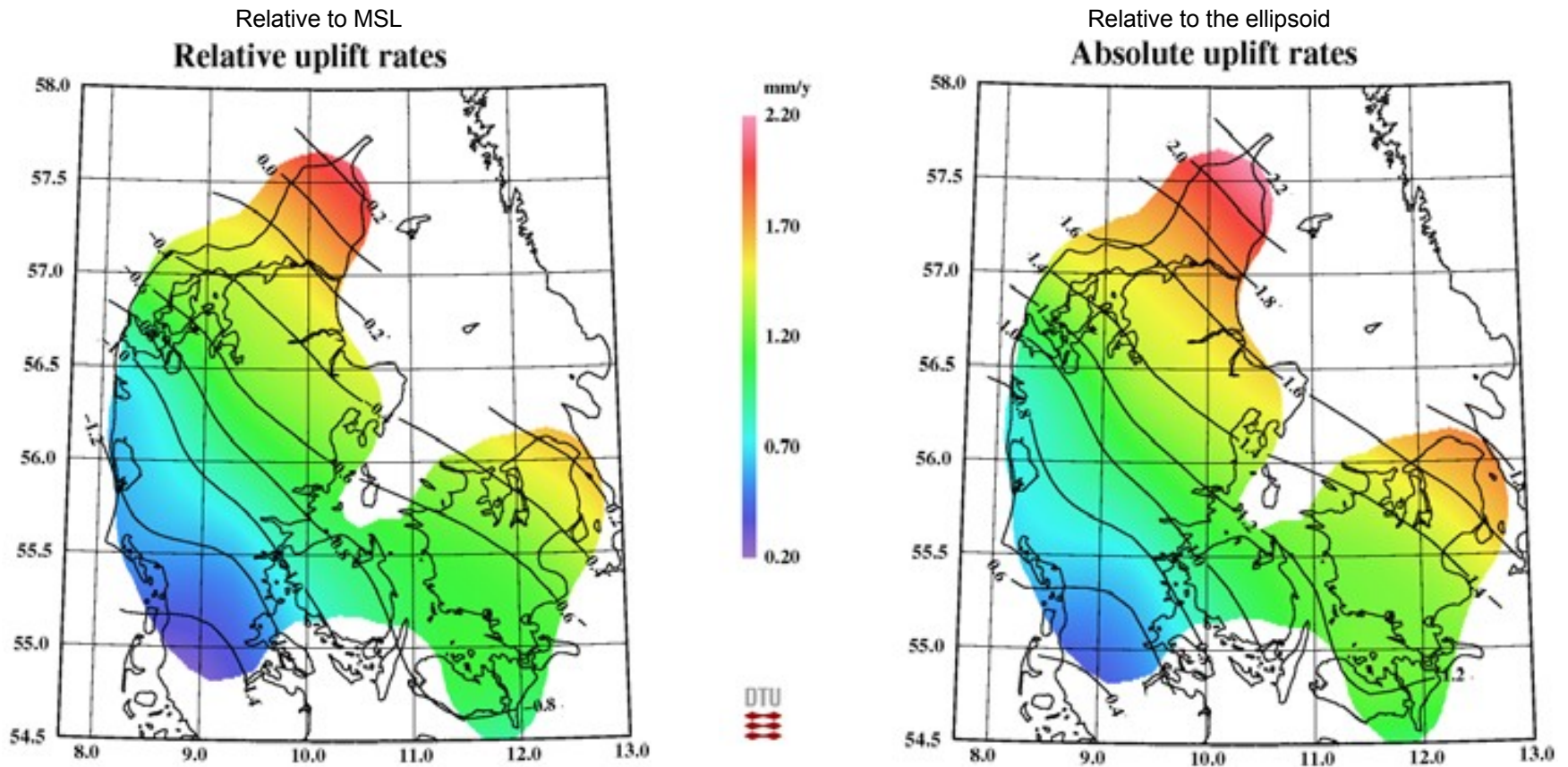
*.. if the country is flat
.. and gravity free of
systematic errors*

**Challenge: get 1 cm geoid
without using (very much)
GPS-levelling ..**



Uplift models based on levelling and GNSS

- Errors of relative uplift rates: 0,15-0,25 mm/year
- Error of absolute level: 0,2-0,3 mm/year



KMSTrlib – the transformation engine

- trlib: 50 years old - and younger than ever.
- Open source - <http://bitbucket.org/KMS/trlib/>
- Self checking pipeline integrating map projections and datum handling
- Providing support for Danish coordinate systems in a multitude of commercial GIS etc.