



National Report from Denmark

EUREF Symposium 2007, London
6th to 9th June 2007

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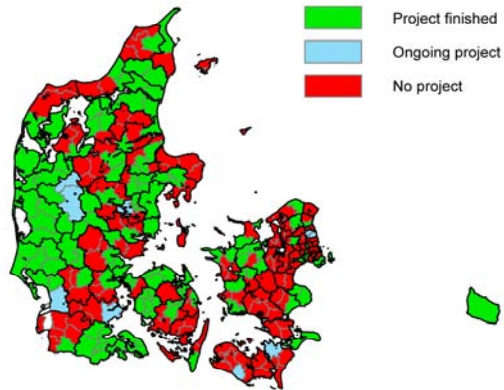


Status 2006

- Levelling activities
- Digital Height Model Model (laser scanned)
- EUVN-DA and 5d network
- Implementation of ETRS89
- NKG General Assambly 2006
- New permanent GNSS stations in DK
- Norm for RTK-services
- Good GNSS survey practise



Levelling activities



Levelling for the Municipalities
(status march 2007)

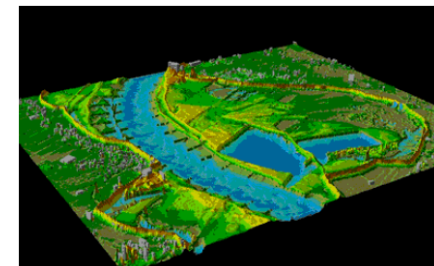


Motorized Levelling on the Highway



NEW Digital Height Model

- At the National Survey and Cadastre, we view our digital elevation model as a part of the foundation for Denmark's geographical infrastructure.
- We have a digital elevation model, but it is based on data that are up to 100 years old and are accurate to within 1½ to 2 meters.
- We have purchased a new digital elevation model. To reinforce this process, we have hired a private consulting firm to research both financing and procurement.
- Financing model: It has been decided that the National Survey and Cadastre will purchase a new digital elevation model in cooperation with other governmental agencies, including the Ministry of Transport and Energy and the Ministry of Defence. Individual municipalities that wish to participate as joint purchasers are able to do so. It is possible for additional municipalities and government bodies to purchase access rights to the digital elevation model at a later date. We are currently developing a business model that meets these requirements.





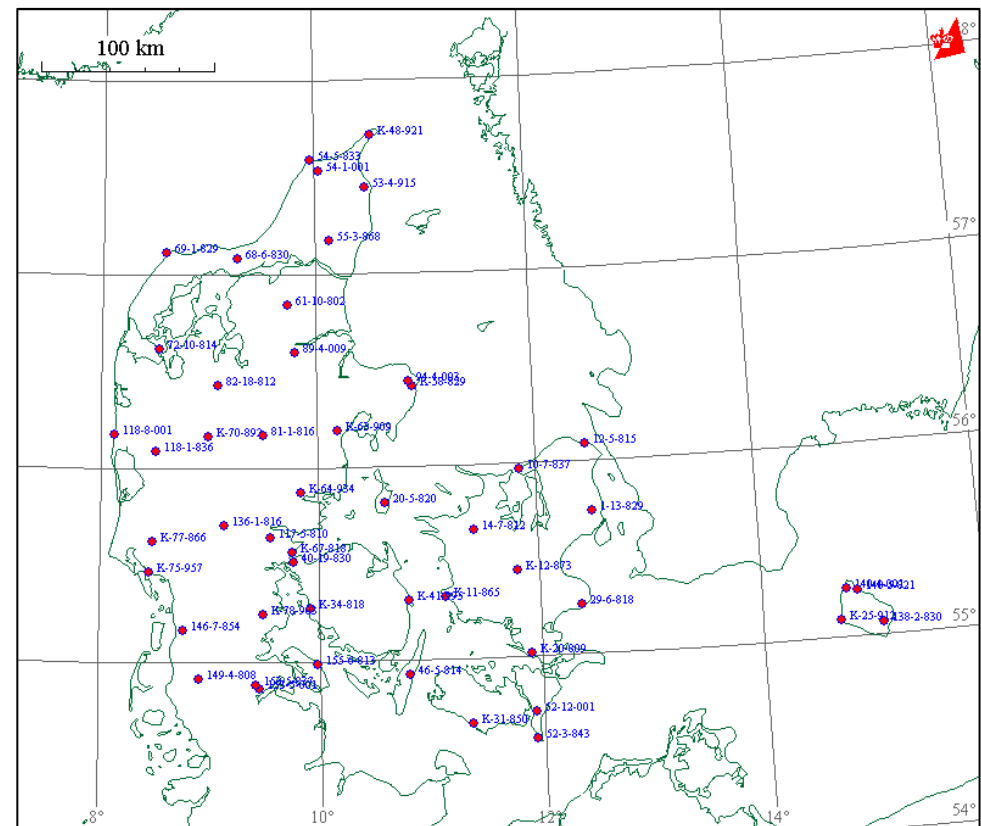
NEW Digital Height Model

- Bidding process: A joint venture between Scankort A/S and Blominfo A/S won the contract. In the first instance, our interest lies in the purchase of the terrain model, but our request for proposals also covers the purchase of a surface model as well as the point-elevation dataset.
- Specifications:
Airborne laser scanning conducted during the leaf-off periods in early spring and late autumn.
- Elevation accuracy: 15-30 cm.
- Data delivery in 2x2-metre grids.



EUVN-DA and 5d network

39 points observed in
2004 – and the Danish
contribution to EUVN-
DA (5d Fase one)



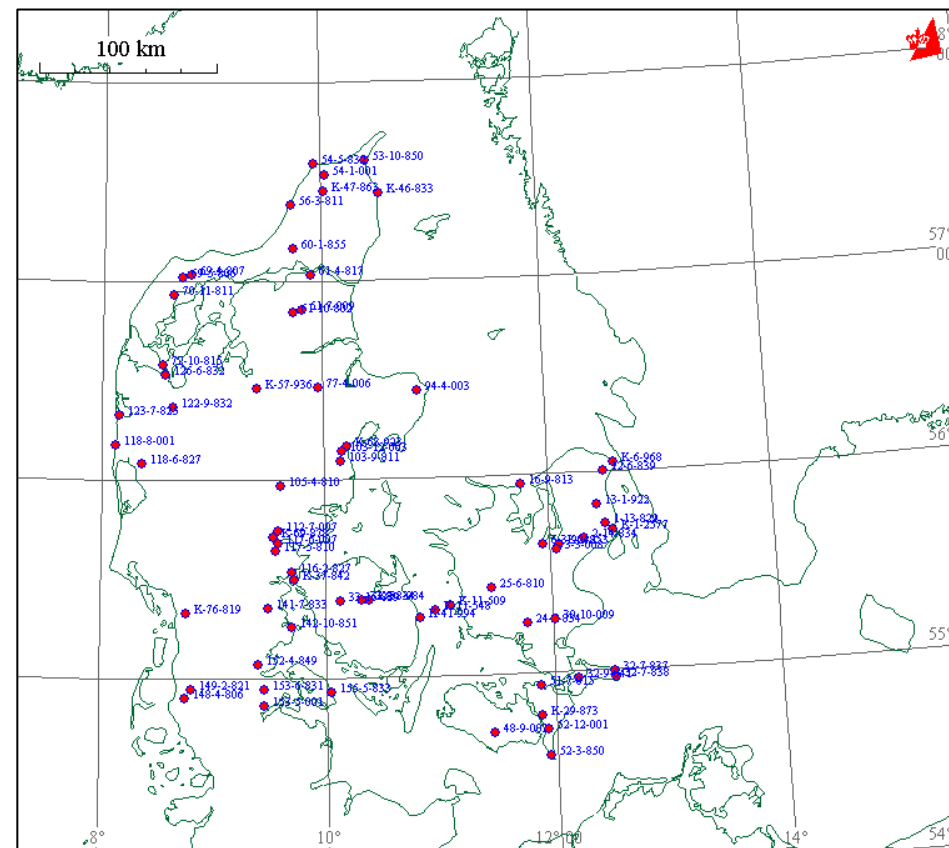


5d - network

59 points in (5d Fase 2)

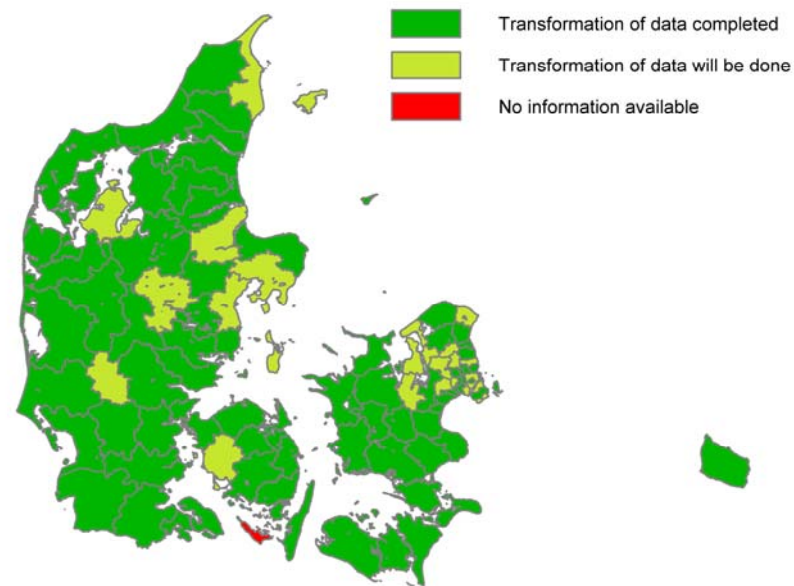
EUVN-DA + Fase 2 = 5d
Network. (98 points)

The repeated GPS observations will not only **replace the national precise levelling campaigns**, the purpose of the GPS network will also be to observe both horizontal and vertical regional land displacements and to separate vertical land displacements from mean sea level changes. The latter will also require levelling from selected GPS points to tide gauge bench marks. The time series for each GPS point will contain geographical coordinates ϕ and λ , ellipsoidal height h and height above mean sea level H . Furthermore, relative gravity measurements Δg will be performed at each GPS point. In this way we have 5 types of information (5 "dimensions") for each point and the new network is therefore called "5D" network.





Introducing ETRS89



Status (march 2007) of the implementation of UTM/ETRS89 in the municipalities.



NKG General Assembly in Copenhagen, Denmark

- Nordic Geodetic Commission

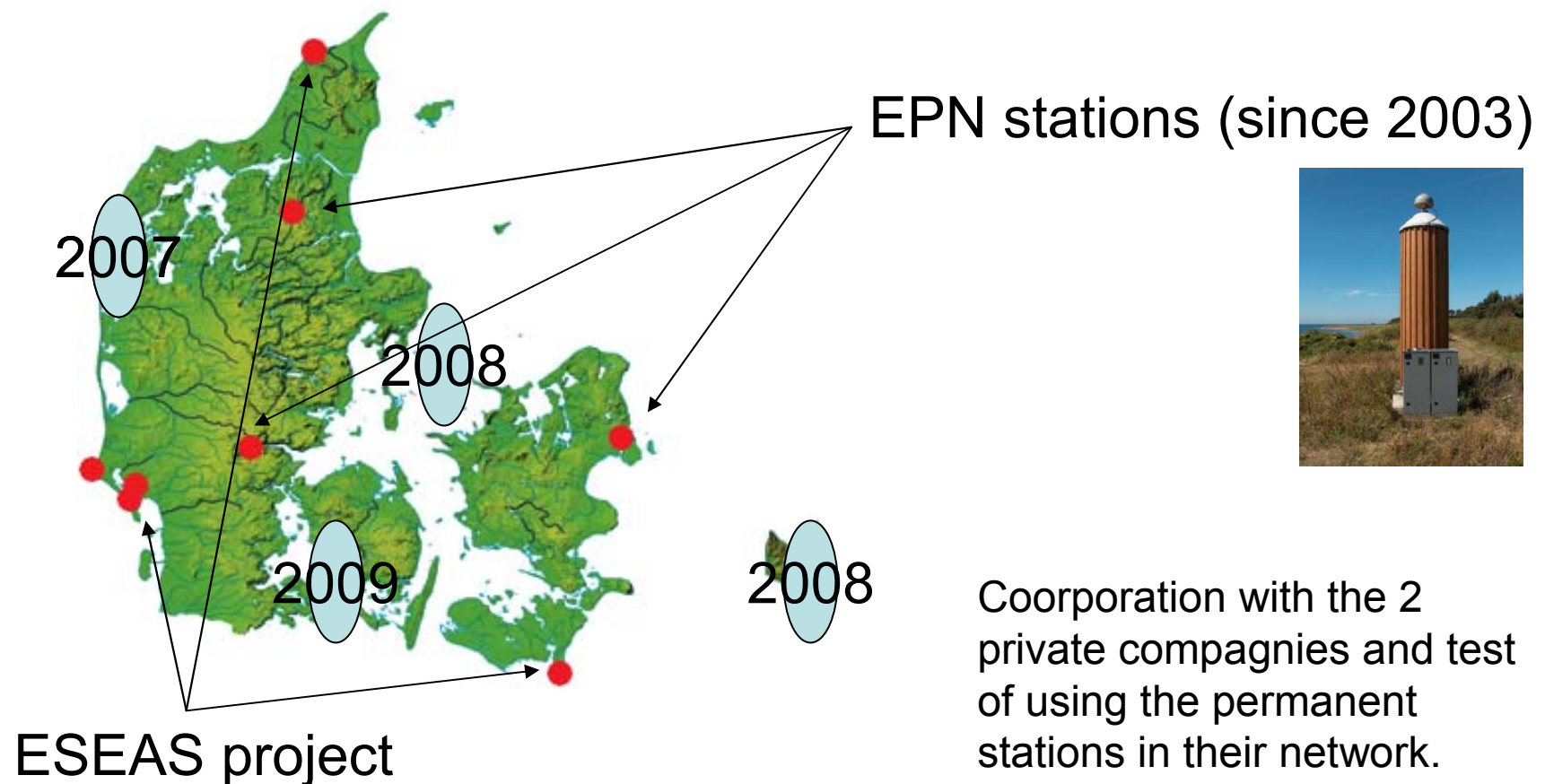
General assembly were held from May 29 to June 2, 2006 in Copenhagen. With more than 70 participant from the Nordic countries.

The purpose of the meeting were to discuss geodetic topics in the Nordic countries. In NKG we have 4 working groups and 2 special task forces.





Plans for 4 new permanent GNSS station





RTK services in Denmark

- In DK, two competing companies are providing nationwide network RTK services.
- Problems with position accuracy, availability etc. has been encountered
- No regulations for positioning (high accuracy/surveying) and navigation on land.



Norm for RTK-services

- Why ?
 - To ensure quality of performance for *public* survey activities
 - Because the quality of surveying is of vital importance for the society (infrastructure, mapping, construction works etc.)
- The law of KMS (§ 3) provides the opportunity to introduce norms and standards for public surveying and mapping



Norm for RTK services, procedure

- Procedure
 - Dialog with existing RTK service providers in Denmark
 - Dialog with SWEPOS in Sweden
 - Dialog with layers
 - Dialog with RTK users in Denmark
 - Process not yet complete
- *'In Denmark; authorisation is needed to sell pizza, but anybody can set up an RTK service'*



Good GNSS survey practise

- Quality of positions determined with an RTK service are also dependent on qualifications of the user (the surveyor)
 - No education, however, is necessary to use the equipment
- Therefore a set of recommendations to be followed by RTK-users are also developed to reduce the risk of poor quality caused by 'human errors' such as:
 - Errors in antenna height registration and centering
 - Use of bad or broken equipment
 - Lack of attention on warnings and error messages