Geodetic infrastructure in Norway

OUTLINE

• Status of current infrastructure
  • How it was established.

• N2000 - A new height system in Norway
  • Calculation and implementation
Continuously Operating Reference Stations (CORS)
Main Land

Continuously Operating Reference Stations (CORS)
In the Arctic
REFERENCE NETWORK

First order, called Stamnett.

REFERENCE NETWORK

Second order, called Landsnett.
LEVELLING NETWORK
First order

STATUS
Reference frames

36 continuously operating reference stations (CORS)

- Almost covering the entire main land Norway
- About 70 km between them

Tamnettet, our 1st order reference network was completed in 1997

- Consists of 790 points with an average of 20 km between them

Andsnettet, our 2nd order reference network completed in 2008

- Consists of a homogenous network covering the whole main land of Norway
NN2000 – New height system

Final calculation December 2008

7000 levelling bench marks calculated
and 2. order points
railway levelling network

extension of the Swedish RH2000- and the Finnish N2000 network

eviates 0 – 1.9 cm from EVRF2007, NN2000 always highest
art of the Nordic Levelling Ring

Nordic land uplift model

NKG2005_LU

calculated by using:
repeated levelling
GPS uplift rates
ide gauge uplift rates

ives values relative to the rising mean sea level
(Apparent values)

onversion to values relative the ellipsoid:
FITTED GEOID MODEL
A height correction model

“Gravimetric model”

“Practical model”

GPS/LEVELLING POINTS
Connection between geometrical and geophysical reference frame

800 leveled points in the Reference Network

- Validation of gravity based geoid models
- Connection points for Height Correction Models

- More points necessary
  - If municipality centre more than 15 km from a GPS/Levelling point
  - If location on the highway (Riksveg) more than 15 km from a GPS/Levelling point

NN2000 in the reference network will be calculated using a Height Correction Model

About 700 km remain to be levelled to obtain more GPS/levelling points.
NEW HEIGHTS RELATIVE TO MEAN SEA LEVEL

Unconstrained to mean sea level

The zero level in the height system (the geoid) is not coinciding with mean sea level.

Differences from -3.2 cm to +24.1 cm

The geoid is usually above mean sea level.

Critical information for construction close to the water.

A NEW REFERENCE FRAME, IGS05

A new scientific reference frame

Uncertainty about the accuracy of the ellipsoidal heights in our existing reference frame EUREF89

The focus in 1997 was the horizontal components.

Measuring points in our reference network to a spacing of 30 km

Five days of continuous measuring

Processed with the Bernese GPS software

Calculating the whole reference network, 1st - and 2nd order network

Make a grid model of differences for transformation purposes.
thank you for the attention!