

OUTLINE

status of current infrastructure

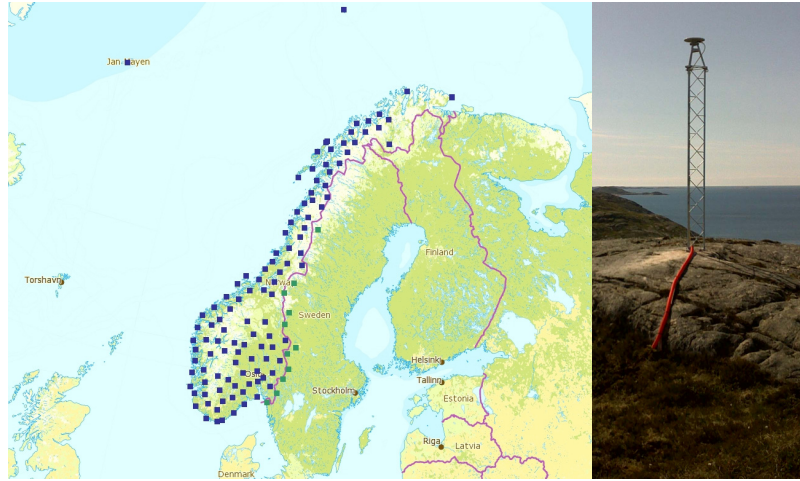
how it was established.

N2000 - A new height system in Norway

calculation and implementation

Continuously Operating Reference Stations (CORS)

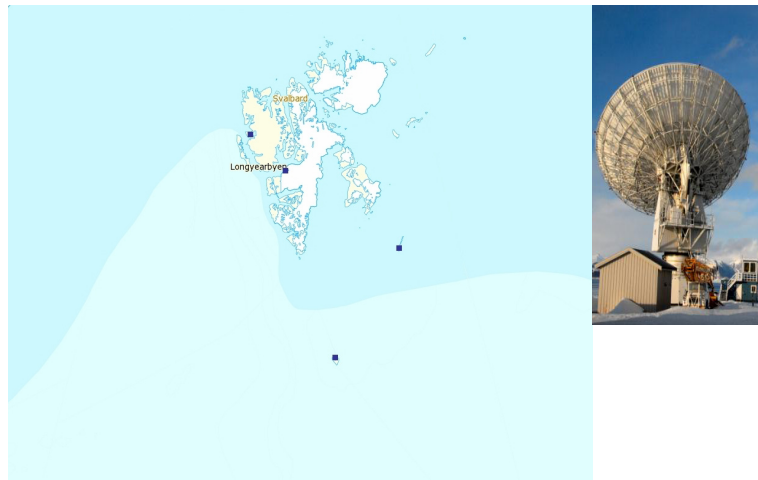
Main Land



POSITIONING DATA – FOR BENEFIT OF THE SOCIETY

Continuously Operating Reference Stations (CORS)

In the Arctic



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REFERENCE NETWORK

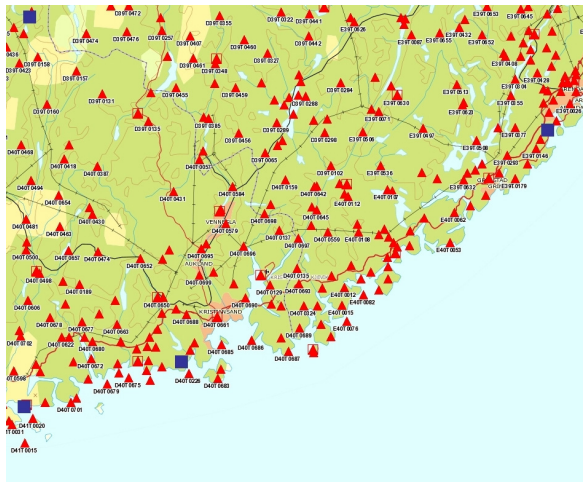
First order, called Stamnett



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REFERENCE NETWORK

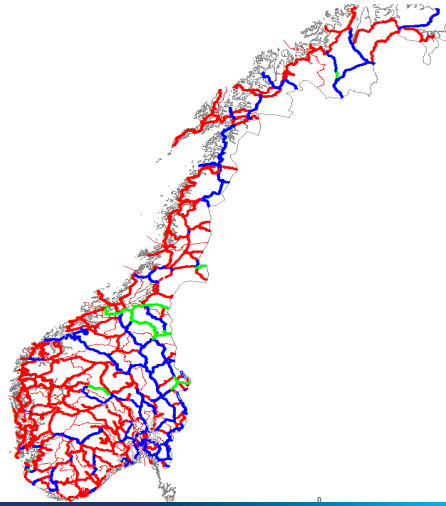
Second order, called Landsnett.



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LEVELLING NETWORK

First order



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STATUS

Reference frames

36 continuously operating reference stations (CORS)

Most covering the entire main land Norway

about 70 km between them

1st order reference network was completed in 1997

consists of 790 points with an average of 20 km between them

2nd order reference network completed in 2008

consist of a homogenous network covering the whole main land of Norway



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NN2000 – New height system

Final calculation December 2008

7000 levelling bench marks calculated

. and 2. order points

airway levelling network

extension of the Swedish RH2000- and the Finnish N2000 network

deviates 0 – 1,9 cm from EVRF2007, NN2000 always highest

part of the Nordic Levelling Ring



southwestern part is preliminary due to problems crossing
Sognefjorden.

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Nordic land uplift model

NKG2005_LU

calculated by using:

repeated levelling

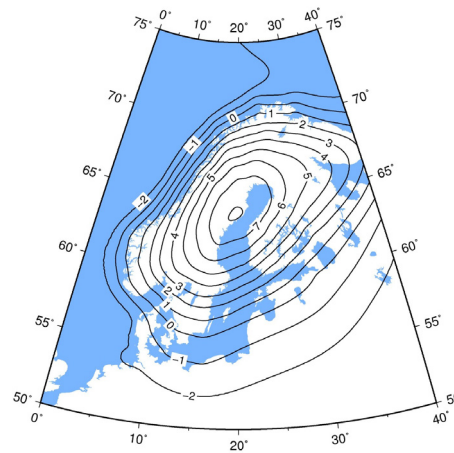
GPS uplift rates

tide gauge uplift rates

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



conversion to values relative
to the ellipsoid:

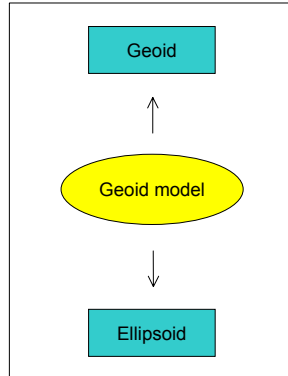


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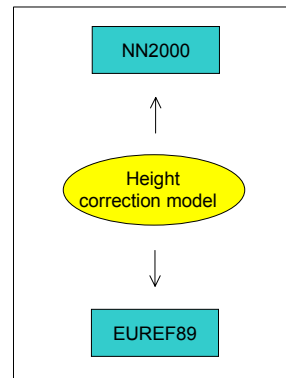
FITTED GEOID MODEL

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

o municipality centre more than 15 km from a GPS/Levelling point

o location on the highway (Riksveg) more than 15 km from a GPS/Levelling point

N2000 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

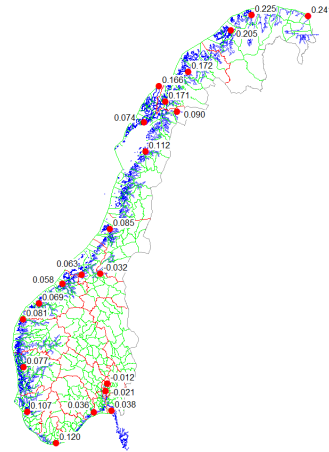
Unconstrained to mean sea level

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

Crucial information for construction close to the water.



NORWEGIAN MAPPING
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A NEW REFERENCE FRAME, IGS05

A new scientific reference frame

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

Main focus in 1997 was the horizontal components

Re-measuring points in our reference network to a spacing of 30 km

Five days of continuous measuring

Processed with the Bernese GPS software

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

Make a grid model of differences for transformation purposes



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thank you for the attention!

