

National Report of Norway

B. G. HARSSON¹

EUREF89 (ETRS89) was adapted as national, official geodetic datum in 1993. The realisation of it was completed in 1997, with a network of 930 stations named "Stamnettet" covering the whole nation. Since 1998 all computations of coordinates on the national level have been carried out in EUREF89 and in the UTM map projection system. For all new maps in the map series of scale 1: 50 000 the grid net has been changed to EUREF89.

UTM is a widely used map projection system, and it has therefore been natural to concentrate on UTM as a common map system for Fennoscandia. The main problem with UTM in the northern areas, however, is the Zone Width, which is related to the scale factor.

In UTM the amount of change in scale increase with the square of the distance from the Central Meridian. In this way, the scale factor of -400 ppm at the Central Meridian gradually changes to a value of +400 ppm approximately 260 km away from the Central Meridian.

All meridians of longitude naturally converge towards the Poles. Therefore, the Zone becomes narrower as latitude increases, when its width is measured in km. The UTM Zone Width, meanwhile, is defined to be 3 of longitude to each side of the Central Meridian.

Once the Zone Width in km has reduced to 180 km, the range of scale factor values has reduced to between -400 and 0 ppm. Conversely, if a desired scale factor range -400 to +400 ppm is allowed to determine the Zone Width, then the width can be increased, regardless of latitude, to 260 km.

The fact that the existing standard UTM design defines that the 6 Zone Width is retained up to a latitude of 72 N means that the advantages of this scale factor arrangement are not available at more northerly latitudes. A distance of 260 km from the Central Meridian is the equivalent of 3 of longitude at approximately latitude 39 N.

Based on purely cartographic and geodetic considerations, and judging from informal discussions with mapping organisations in Sweden and Finland, it has been suggested to use only three UTM Zones in Fennoscandia. This is to say Zone 33 and Zone 35 each take up half of Zone 34,

which in this case no more exists north of 56° N. In practice this means that the Zone definition system used for the Spitzbergen (Svalbard) area is extended southwards to 56 N instead of the present limit of 72 N.

The idea of broadening the UTM Zones has also been discussed in a special study group in The Nordic Commission for Geodesy (Nordiske kommisjonen for geodesi, NKG), in the NKG presidium and the proposed solution has been strongly supported. We also hope for a favourable recommendation from EUREF.

Cadastral and municipality map series are in the process of changing from the old geodetic datum NGO1948 to EUREF89. At the moment only two municipalities in Norway have changed completely, but a lot of municipalities are preparing the change.

A computer program for transforming coordinates between the three official geodetic datums EUREF89, NGO1948 and ED50 was developed. It operates on two levels, one at the national level and one at the county level. The one at national level was finished in 1997 at sub metre accuracy. The one at county level is at the moment covering approximately 50 % of Norway at a sub decimetre accuracy. The transformation program, which is named WSKTRANS, also converts geodetic coordinates to coordinates in UTM or Gauss-Krüger as well as to Earth-centred Cartesian coordinates. For converting from ellipsoidal heights to orthometric heights a geoid model is included.

A seven-parameter transformation formula between EUREF89 and NGO1948 at the 2-3 metre accuracy is free of charge. A copy of the WSKTRANS costs some 800 Euro.

Norway has 11 permanent GPS stations running, of which 2 are IGS stations and 4 are EUREF stations. The remaining 5 are part of the national permanent station system, called SATREF.

The program for the new national levelling network is approximately 80 % finished. It is related to a Nordic levelling program. A new national height system is scheduled to be announced in 2005.

¹ Björn Geirr Harsson: Norwegian Mapping Authority, Kartversveien 21, N - 3504 Hønefoss, Norway; Fax: +47-32-118101, Tel.: +47-32-118100, E-mail: bjorn.geirr.harsson@statkart.no