# Changing the Geodetic Infrastructure

**Case study: Sweden**

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## National and International trends

- The need of spatial information is increasing
- Many producers and users, different data sources
- Global techniques as GNSS

To work efficient we e.g. need to have

- a common, time-valid and cross-boundary geodetic infrastructure
- as well as standardised way of sharing spatial data (e.g. ISO standards)



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## … to achieve this in Europe

- **IAG** Subcommission for Europe (EUREF): ETRS 89, UELN (1994), EPN (1995), EUVN (1997), ECGN (2003)
- **CERCO** WG 8 Geodesy, from 2001 **EuroGeographic**s ExGG
- Standardisation: e.g. ISO/TC211 (ISO 19111)
- Series of **EC workshops**:
  Spatial Reference Frame 1999
  Map Projection 2000
  EuroGrid 2003
  Vertical Reference Systems in Europe 2004
- INSPIRE/EuroSpec (Infrastructure for Spatial Information in Europe Initiative in 2001)



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## Recommendations for the European Commission (I)

- European Geodetic Datum
  - Adopts ETRS89 as the geodetic datum for the geo-references co-ordinates of its own data.
  - Promotes the wider use of ETRS89 within all member states.
- Geographical co-ordinate system
  - Normally expresses positions related to ETRS89 datum in ellipsoidal type co-ordinates
- European map projections
  - Use ETRS89 Lambert Azimuthal Equal Area (ETRS-LAEA) for statistical analysis and display
  - Use ETRS89 Lambert Conic Conformal (ETRS-LCC) for conformal pan-European mapping at scales smaller or equal to 1:500000.
  - Use ETRS89 Transverse Mercator (ETRS-TMzn) for conformal pan-European mapping at scales larger than 1:500000



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## Recommendations for the European Commission (II)

- European Vertical Datum
  - Adopts the results of the EUVN/UELN initiatives when available, as definitions of vertical datum and gravity-related heights
  - Promotes the wider use of European vertical reference system within all member states.
- Relationship with National co-ordinate Reference Systems
  - National transformation parameters and algorithms to and from ETRS89 providing co-ordinates of accuracy at the 1-2 m level should be placed in the public domain. The availability of more accurate transformations should also be indicated (with the achievable accuracy's) and the official source of information.

http://crs.ifag.de/



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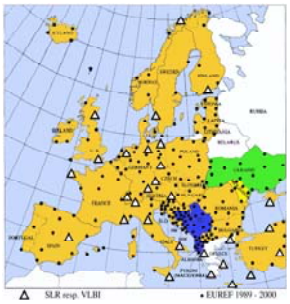
## EUREF-campaigns




## UELN

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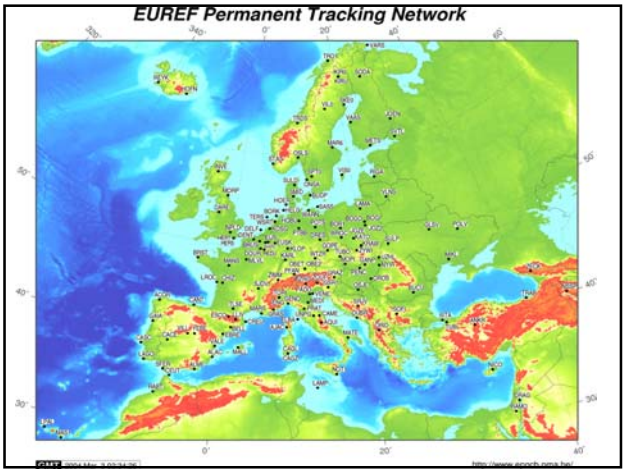


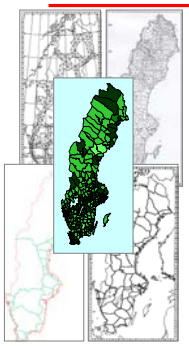

## Case Study: Sweden

To work efficient in the future we are:

- introducing an ETRS 89 solution for surveying and mapping (SWEREF 99)
- introducing an EVRS-solution for our new height system (RH 2000)
- using permanent GPS stations (SWEPOS™) as efficient as possible in our daily work (active stations)
- Active stations part of the geodetic infrastructure



## Several networks to deal with



National

- two height systems
- two + 12 regional plane systems

Local

- ≅ 300 height systems
- ≅ 300 plane systems

Trend

- Local authorities adopting SWEREF 99 also locally



## SWEPOS™

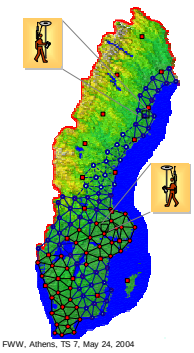
21 complete stations

>40 simple stations

- **5 IGS stations**: Kiruna, Mårtsbo, Borås, Onsala, Visby
- **7 EPN stations**: Kiruna, Mårtsbo, Borås, Onsala, Visby, Skellefteå, Vilhelmina



## ACCESS TO THE REFERENCE FRAMES



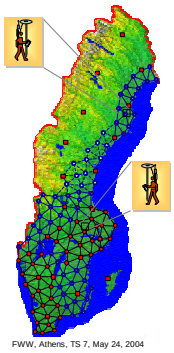
through

Active reference stations
- Network-RTK
- SWEPOS-services in general

Passive reference points as
- Benchmarks



## SWEPOS Network RTK-service



- started 1st of Jan, 2004
- Operating cost through user fee
- No geographical limits
- Plans for populated areas of Sweden. 2006

## Conclusions

Europe working towards harmonisation of
- Horizontal reference system
- Vertical reference system

to facilitate the sharing and use of spatial data

EC, Eurogeographics and IAG (EUREF) active

Several countries changing infrastructur to
- ETRS 89 national realization
- EVRS realization
- active reference stations

for surveying and mapping



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