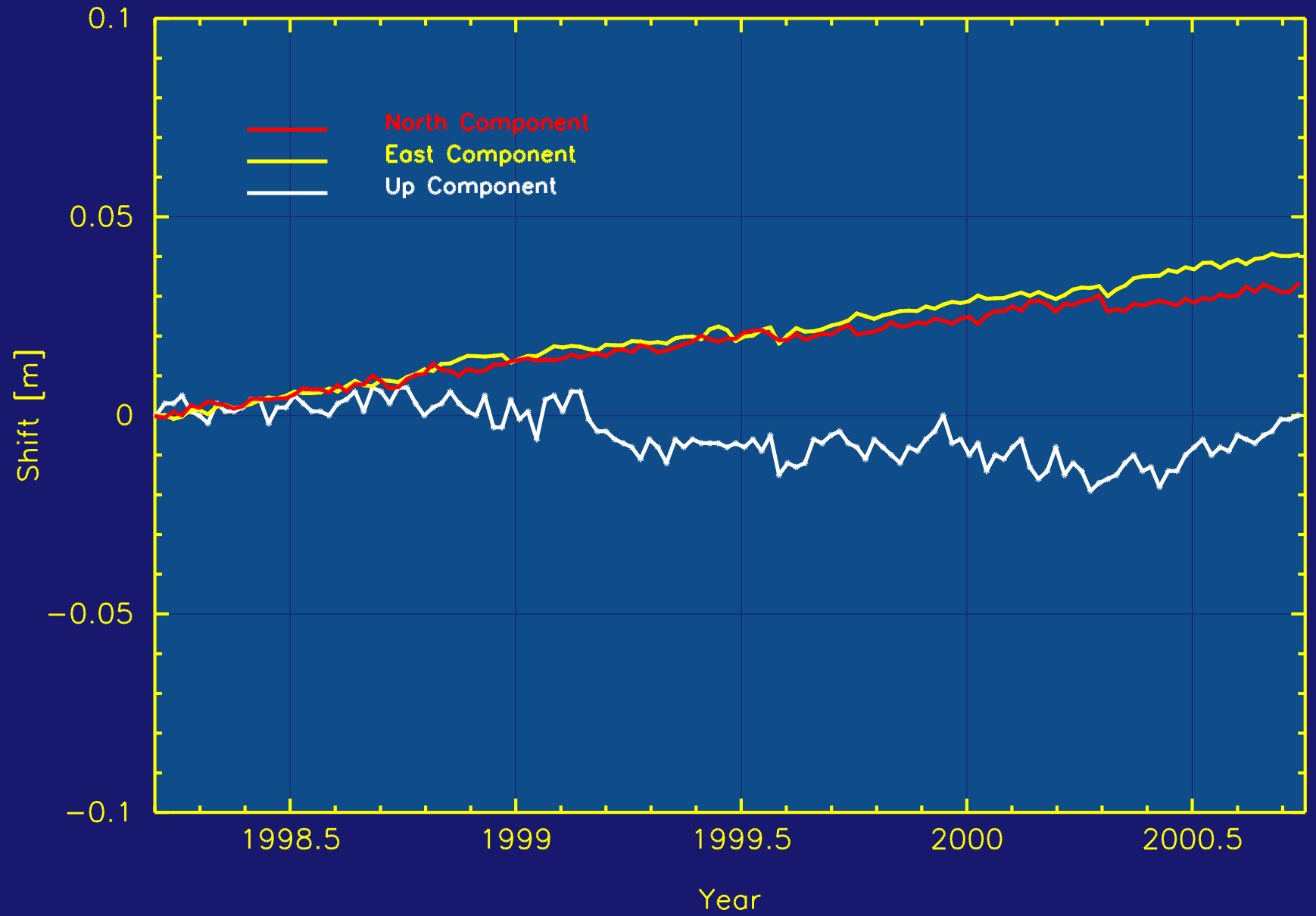


European Geodetic Networks

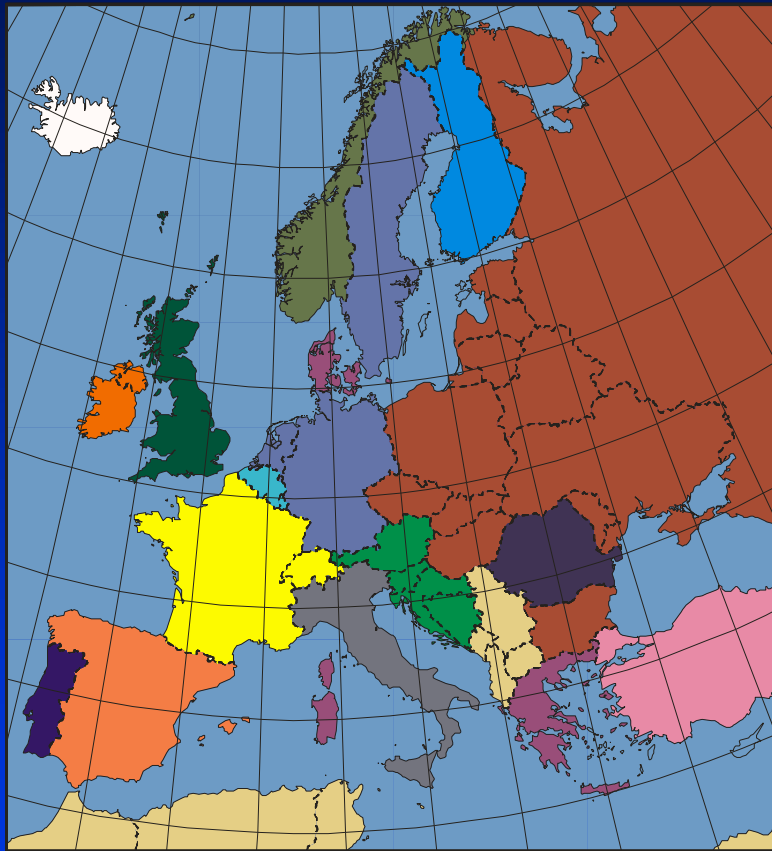
Georg Weber

Federal Agency for Cartography and Geodesy, Frankfurt

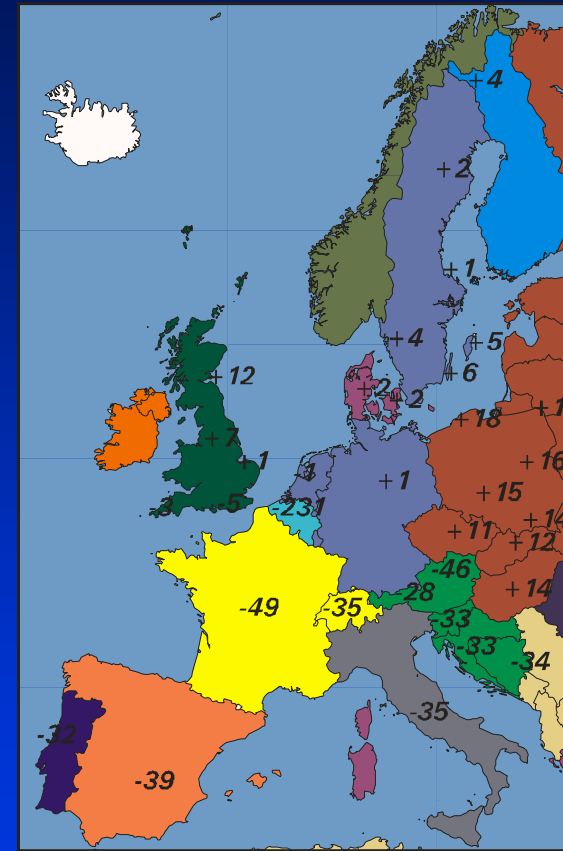
GPS Permanent Station Frankfurt/Kloppenheim, ITRS Coordinates



European Height Systems



Tide Gauges of National Height Systems

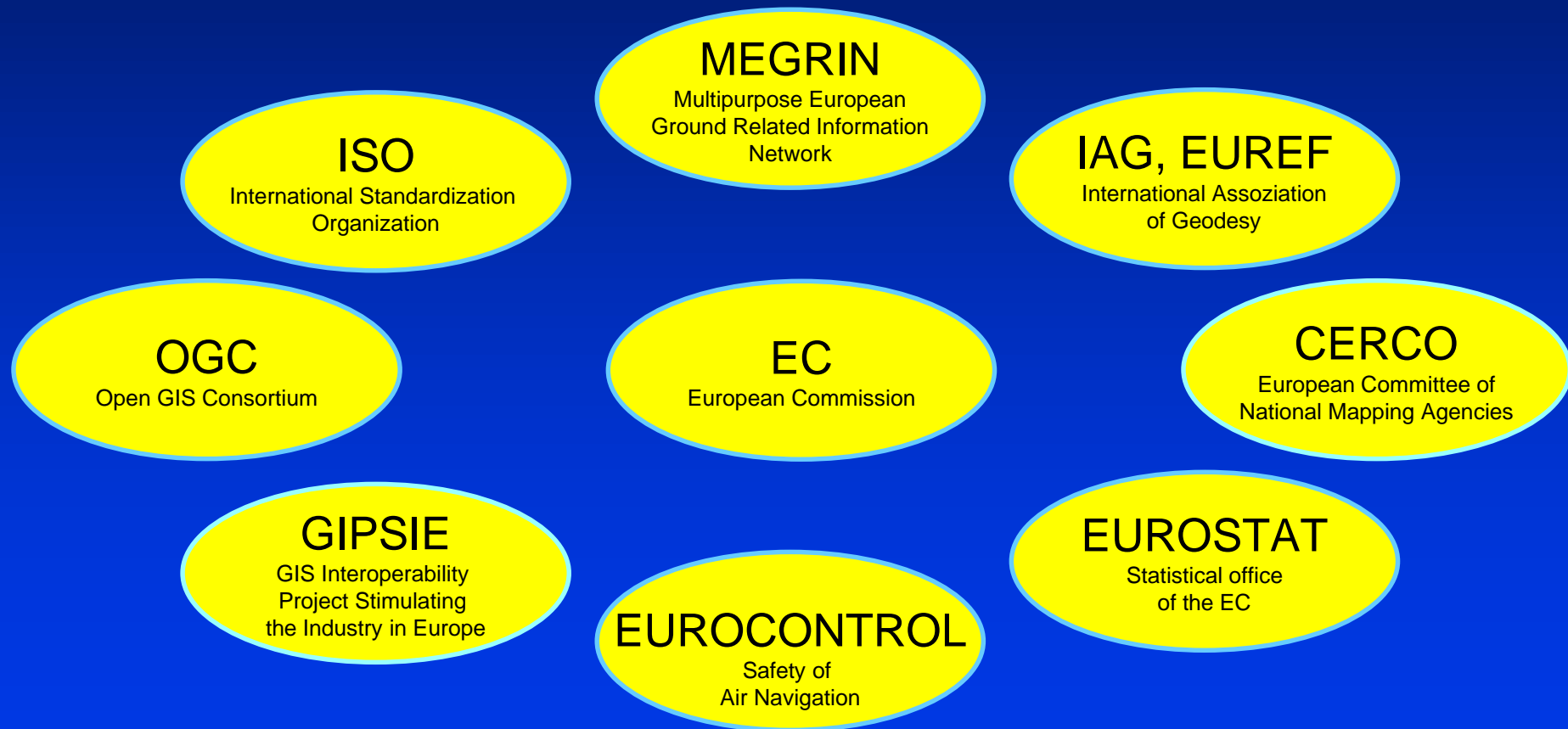


Systematic Differenzen (cm)

- | | | | |
|-------------|-------------|--------------|------------------|
| ■ Alicante | ■ Constanta | ■ Malin Head | ■ Tregde |
| ■ Amsterdam | ■ Genova | ■ Marseille | ■ Trieste |
| ■ Antalya | ■ Helsinki | ■ Newlyn | ■ no information |
| ■ Cascais | ■ Kronstadt | ■ Ostende | ■ other |

EC Activities for Spatial Referencing

Spatial Reference Workshop (Paris, November 1999) was an initiative of the European Commission (EC) to use European Reference Systems for Geographic Information Systems



The Spatial Reference Workshop, Paris, November 1999, Recommends that the European Commission:

- **European Geodetic Datum:** Adopts **ETRS89** as the geodetic datum for the geo-referenced coordinates of its own data; Promotes the wider use of ETRS89 within all member states.
- **Geographical Coordinate System:** Normally expresses positions related to ETRS89 datum in **ellipsoidal** type co-ordinates
- **European Map Projections:** Defines its various needs for map projections(s) / obtains further expert advice to determine the appropriate projections (**UTM**).
- **European Vertical Datum:** Adopts the results of the **EUVN/UELN** initiatives when available, as definitions of vertical datum and gravity-related heights (**EVRS**);
- **Results Dissemination:** Disseminates widely the results of the meeting and follow-up activities to the **GIS** industry, standards authorities, and potential users.

GPS/GLONASS Orbits

Precise global
Orbits for
GNSS Satellites

EUREF

European-wide
Combination of
National Networks

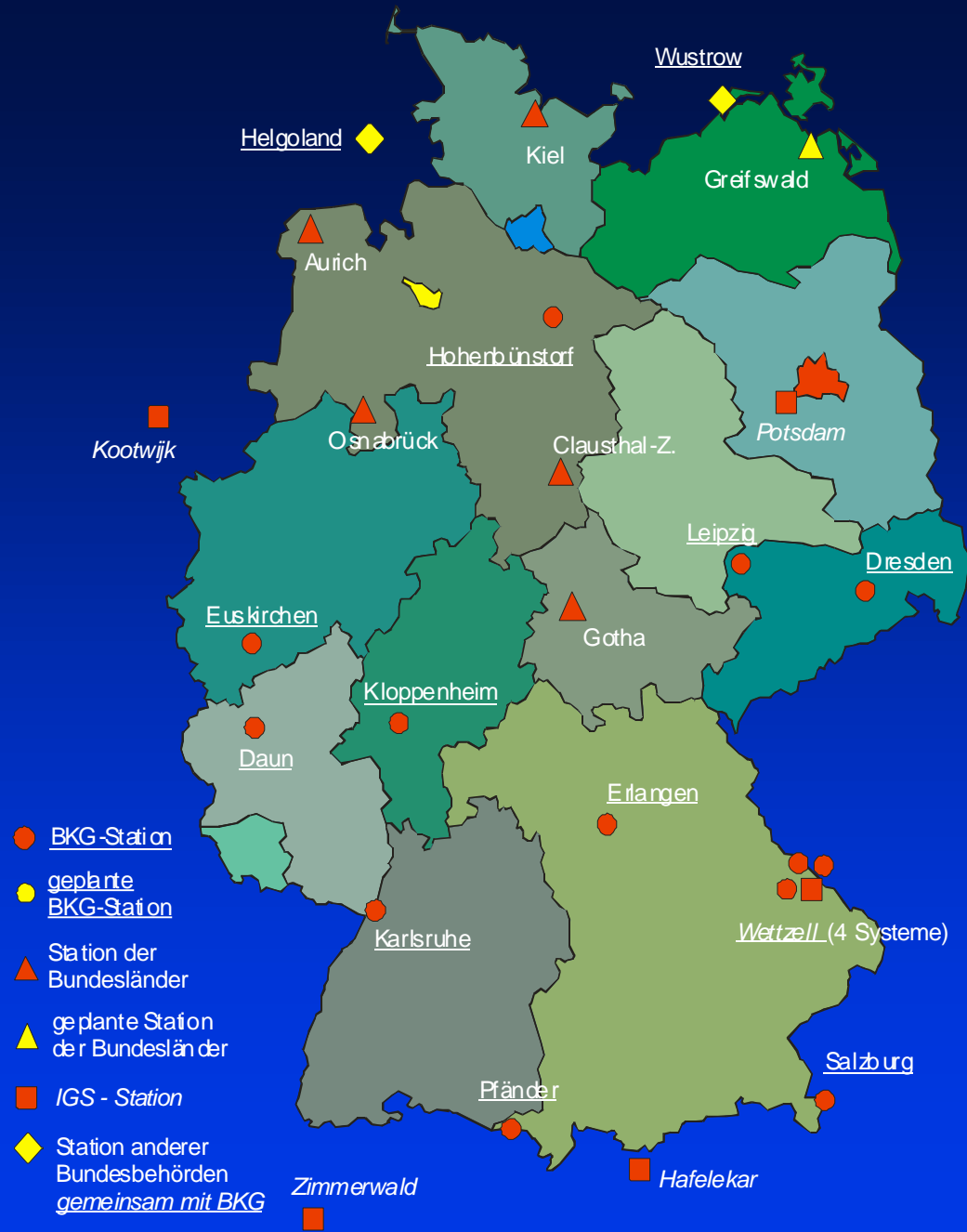
GREF

National Geodetic
GPS Reference
Network

Sub-Networks

Regional
Sub-Networks

GRAF Germany



- BKG-Station
- geplante BKG-Station
- ▲ Station der Bundesländer
- ▲ geplante Station der Bundesländer
- IGS - Station
- ◆ Station anderer Bundesbehörden gemeinsam mit BKG

EUREF - National Contribution



Sub-Networks



RTK 1-5 cm, Land Applications

- Surveying
- GIS Industry
- Phase measurements
- 2-Freq receivers, GPS+GLONASS
- Communication via GSM
- Base station every 50...100 km
- Virtual reference station concept