REALIZATION OF NATIONAL AND EUROPEAN REFERENCE SYSTEMS RELATIONSHIPS

Klobušiak M., Leitmannová K., Ferianc D., Kováčik J., Hudec M., Šalátová E.

Geodetický a kartografický ústav Bratislava
Chlumeckého 4
Bratislava

Main Tasks

Resolution No. 2 (Toledo, 4-7 June 2003)

The IAG Subcommission for Europe (EUREF)

- *Considering* the adoption of ETRS89 as its official and unified Terrestrial Reference System (Resolution No. 1, Florence Symposium, 28 - 31 May 1990),
- *asks* the European countries who have not yet adopted the ETRS89 as a basis for the re-definition of their national systems, to do so at their earliest convenience.

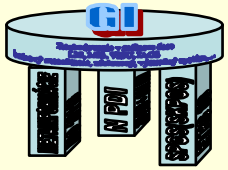
Resolution No. 3 (Toledo, 4-7 June 2003)

- *Recognising* the importance of the pan-European reference systems ETRS89 and EVRS as a backbone for Geodetic Reference Data as part of an European Spatial Data Infrastructure,
- *Noting* the need for the transformation of geographic information based on national coordinate reference systems into the pan-European reference systems with the highest possible accuracy,

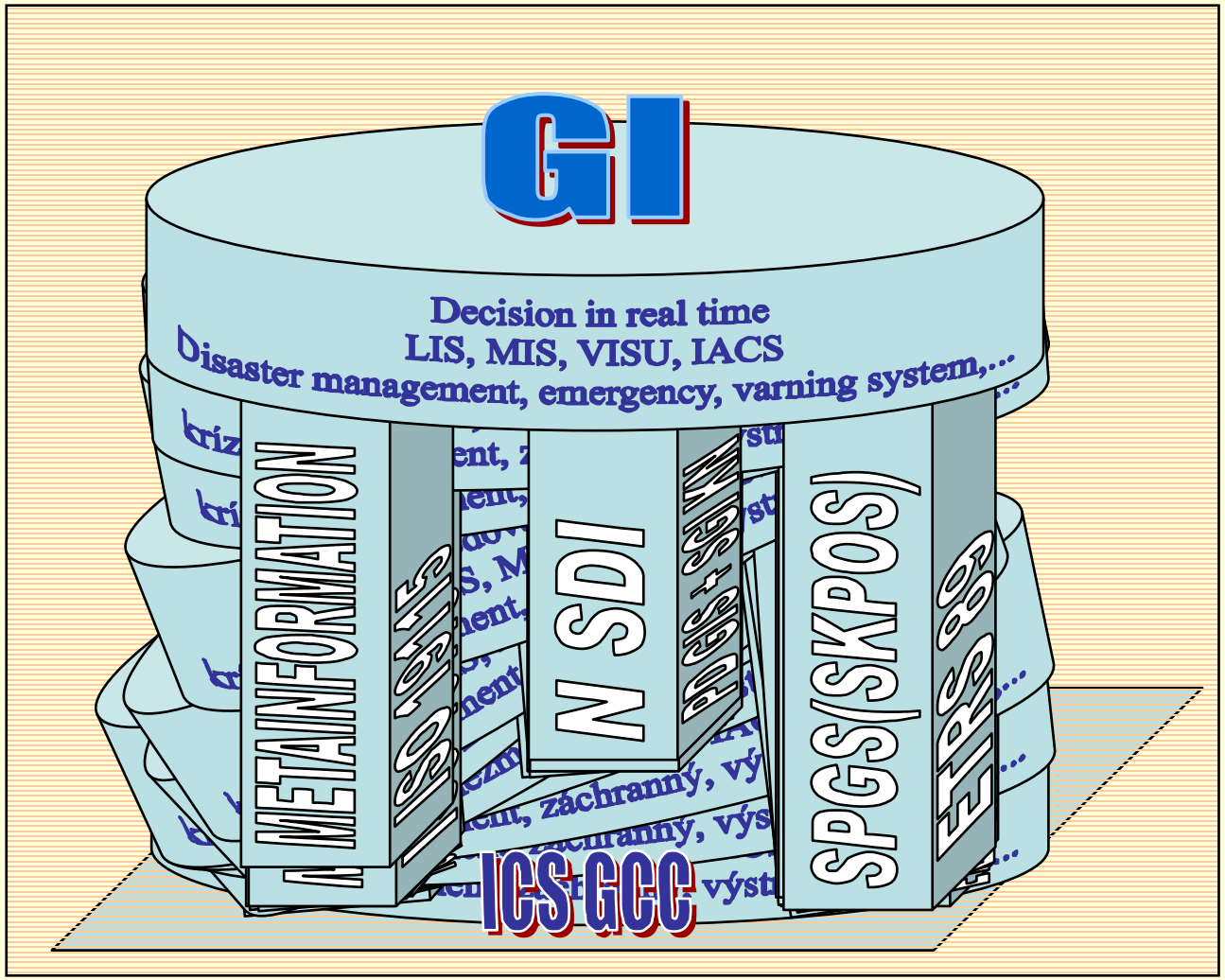
New Vision of Slovak NMCA in creating Reference Data for GI

Three-pillar Strategy

- Increase of significance direct object addressing by means of high-accuracy co-ordinates
- EuroGeographics Vision : it should associate NMCA's, not only NMA's
- Linking GIS (topographic themes) with Geodetic Information of Real Estate Cadastre
- Amendment of Act NR SR No. 215/1995 Z.z. on Geodesy and Cartography, No.423/2003 Z.z. – provide operation of SPGS for real time spatial positioning



Pillar of the New Strategy of Capturing and Providing of GI

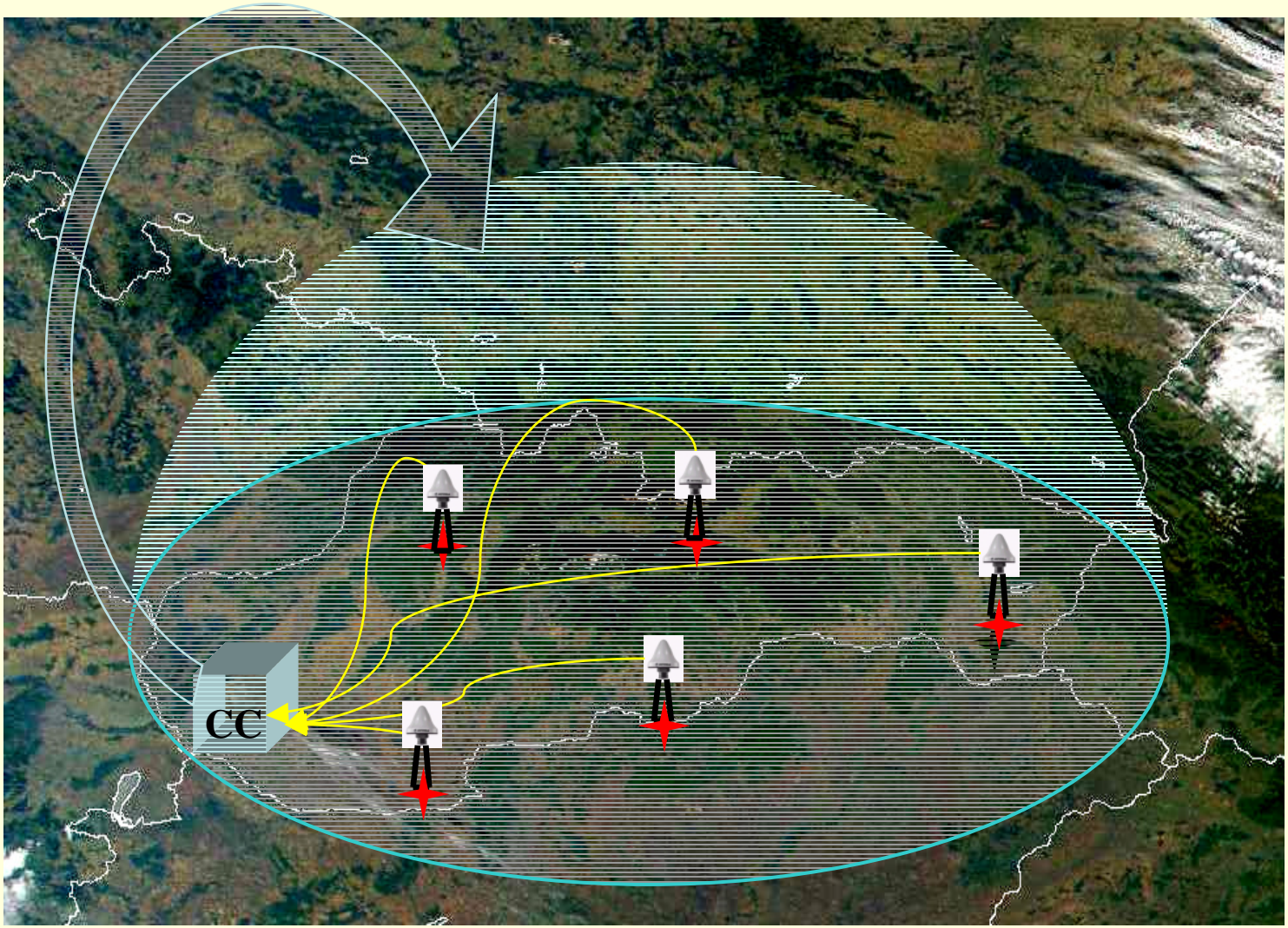


SPGS(SK*POS*)

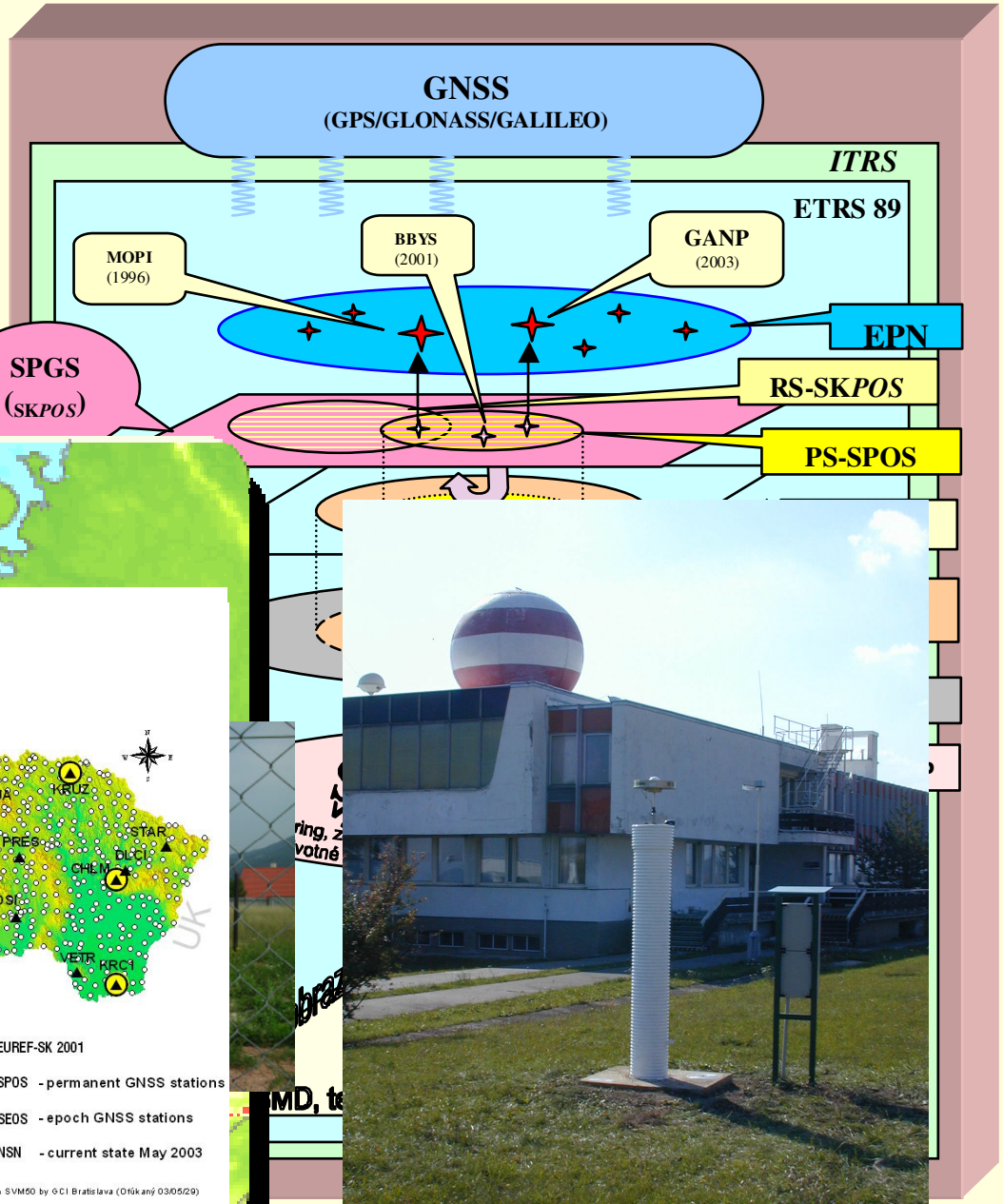
SK*POS* - mm

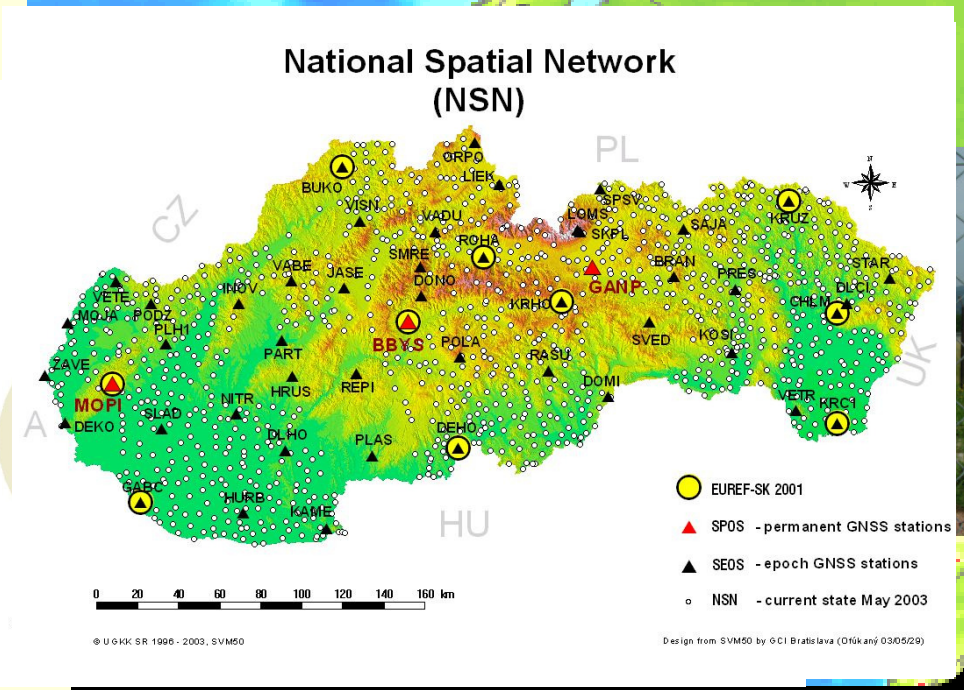
SK*POS* - cm

SK*POS* - dm

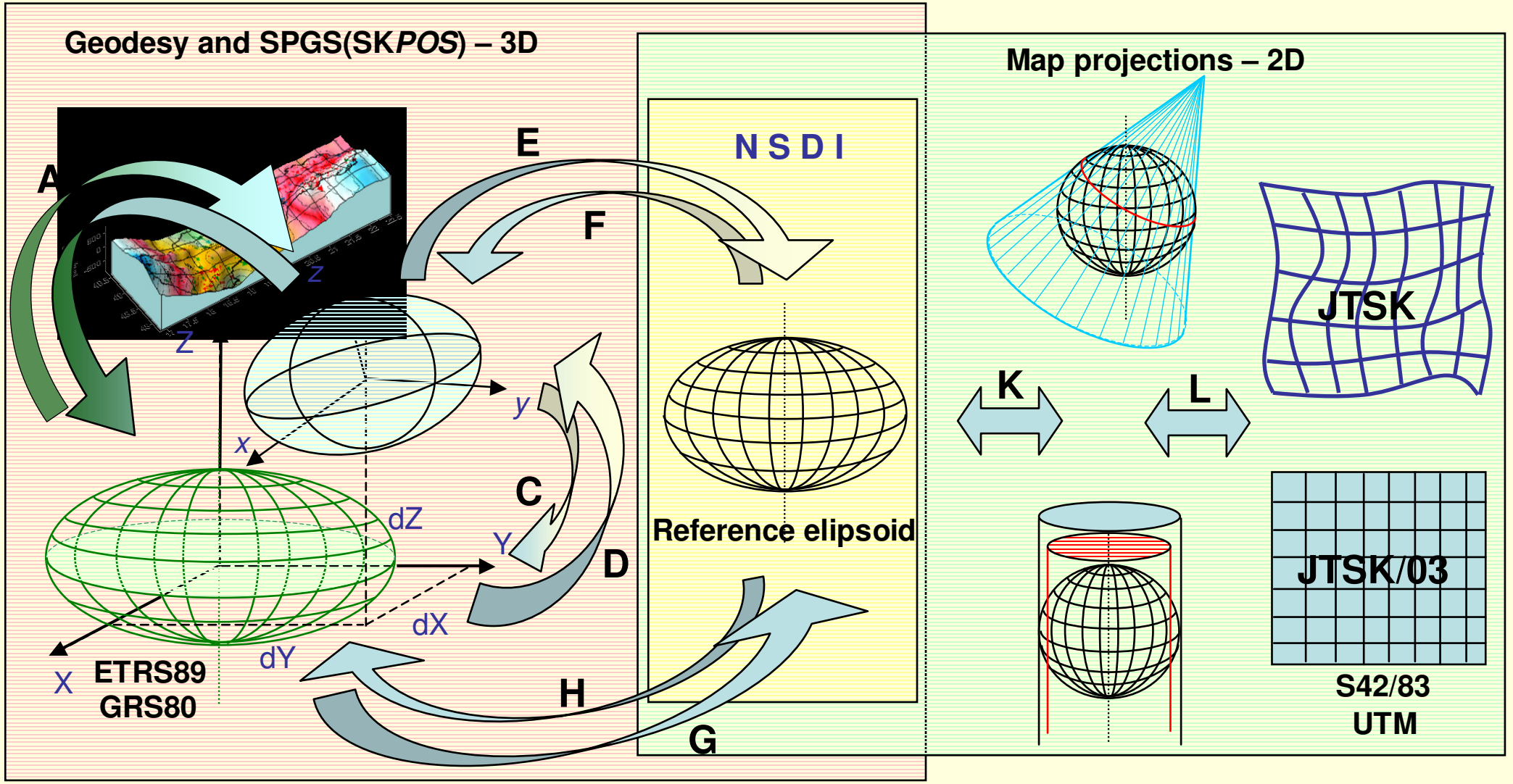


Metrological Traceability of





Connection
ETRS89 ⇔ JTSK/03 ⇔ JTSK



Function relations between Reference Systems

ETRS89 → **S-JTSK**

$$P_{ETRS89}[X,Y,Z] \equiv P_T[B,L,H] \xrightarrow{f(E_1,T)} P_Q[B,L,H-h_P(T)] \xrightarrow{f(E_1,Q)} *$$

$$* P_{E_1}[B,L,H-(h_P(T)+\eta_P(Q))=0] \xrightarrow{f^{-1}(E_1,E_2)} P_{E_2}[B,L] *$$

$$* \xrightarrow{f^{-1}(R_{JTSK},E_2)} P_{JTSK}[x,y,h_P(T),\eta_P(Q)],$$

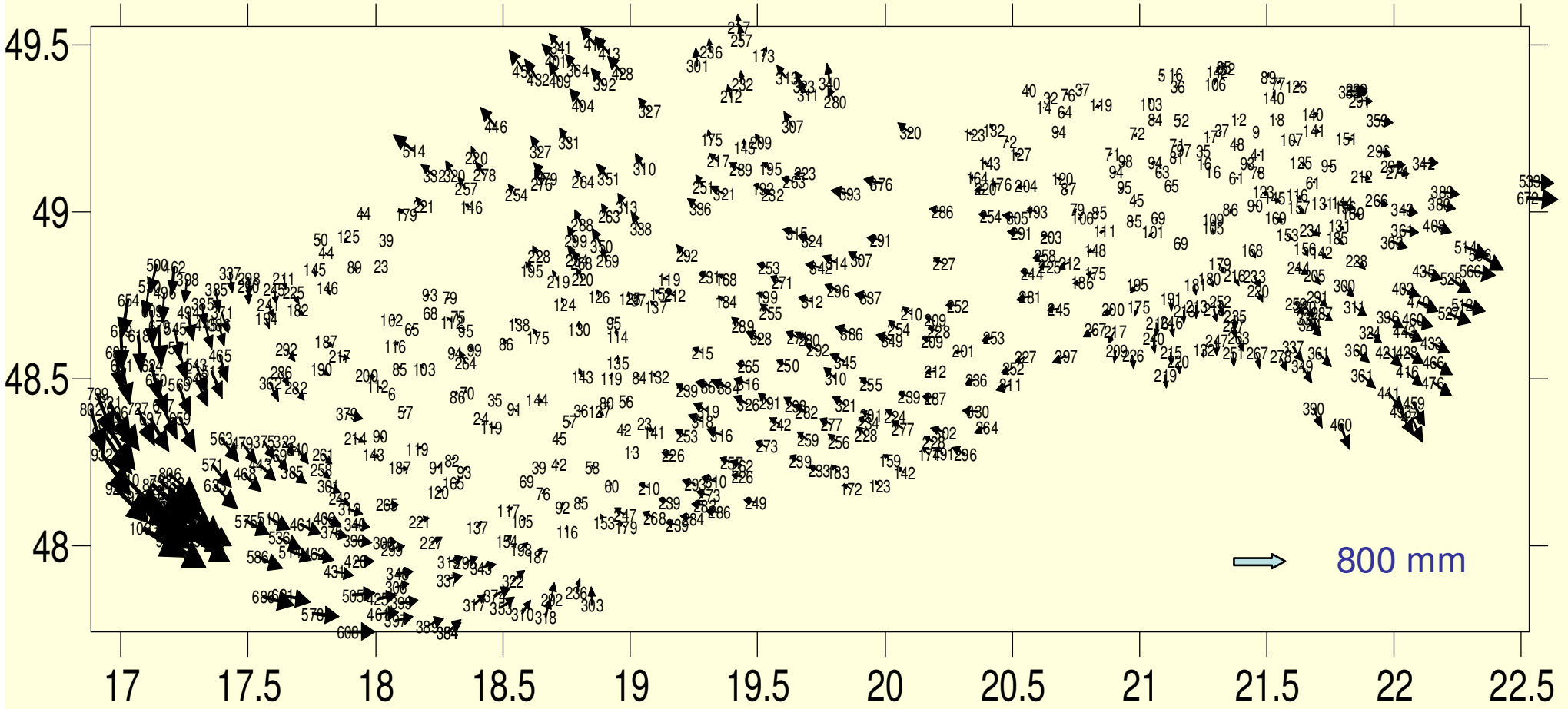
S-JTSK → **ETRS89**

$$P_{JTSK}[x,y] \xrightarrow{f(R_{JTSK},E_2)} P_{E_2}[B,L] \xrightarrow{f(E_2,E_1)} P_{E_1}[B,L] \xrightarrow{f(E_1,Q)} *$$

$$* \rightarrow P_Q[B,L,\eta_P(Q)] \xrightarrow{f(E_1,T)} P_T[B,L,h_P(T)+\eta_P(Q)] \equiv P_{ETRS89}[X,Y,Z],$$

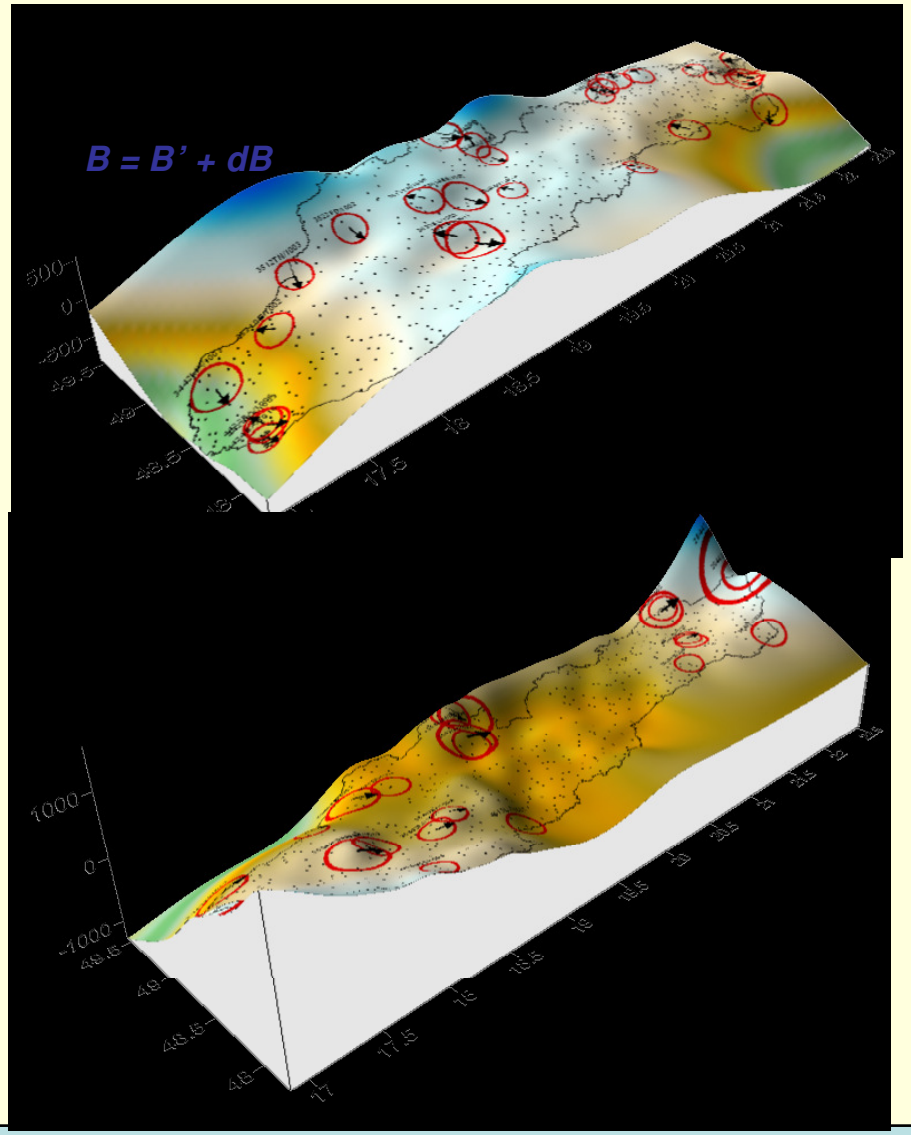
Global Residuals after 7th Parameter Transformation Model

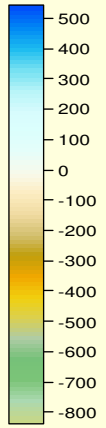
In horizon

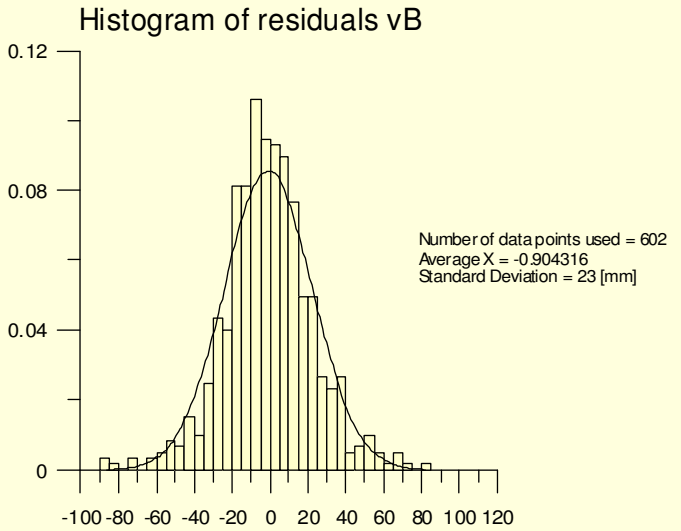


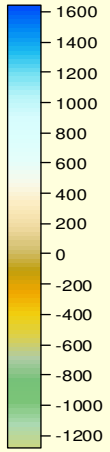
ETRS89 - JTSK

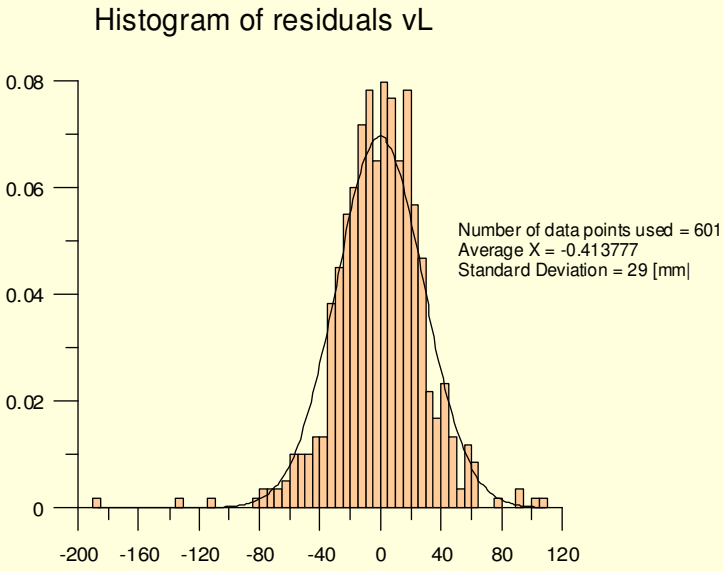
Digital models of residuals





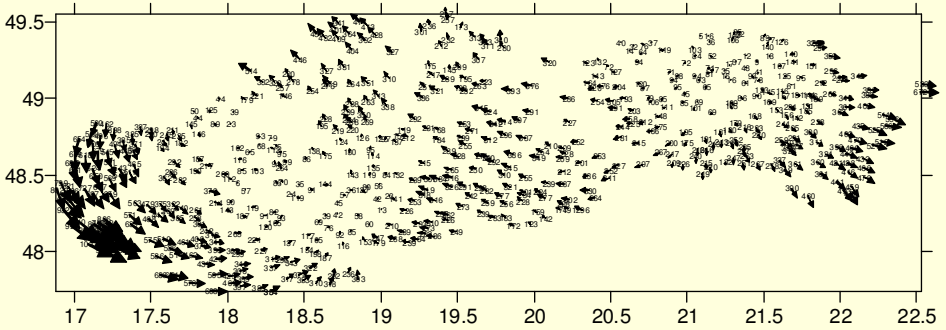






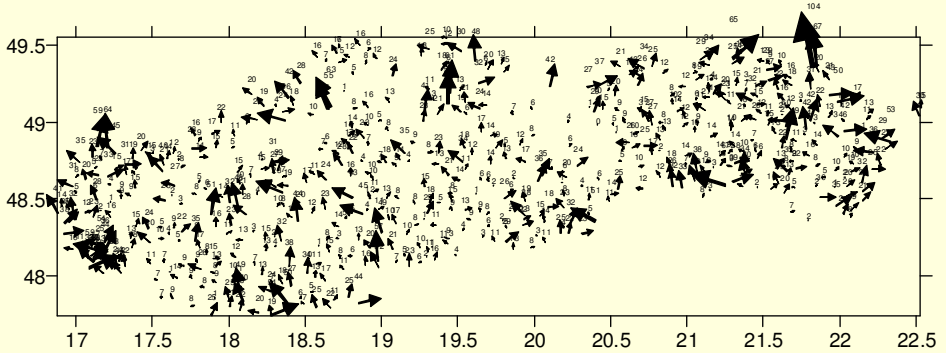
Global and Local Residuals

Global residuals before modeling in horizontal plane



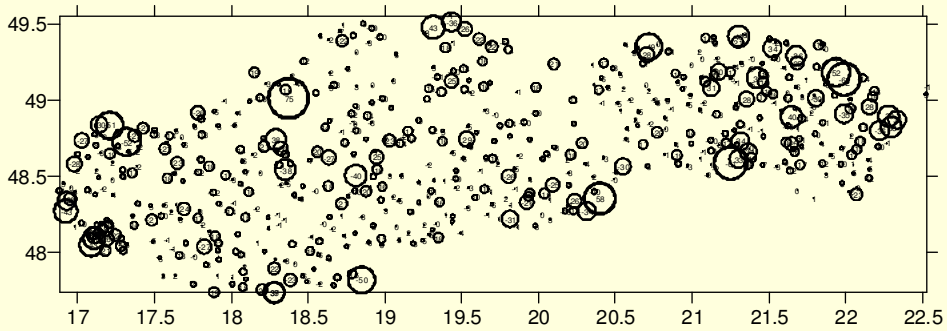
⇨ 800 mm

Local residuals after modeling in horizontal plane



⇨ 50 mm

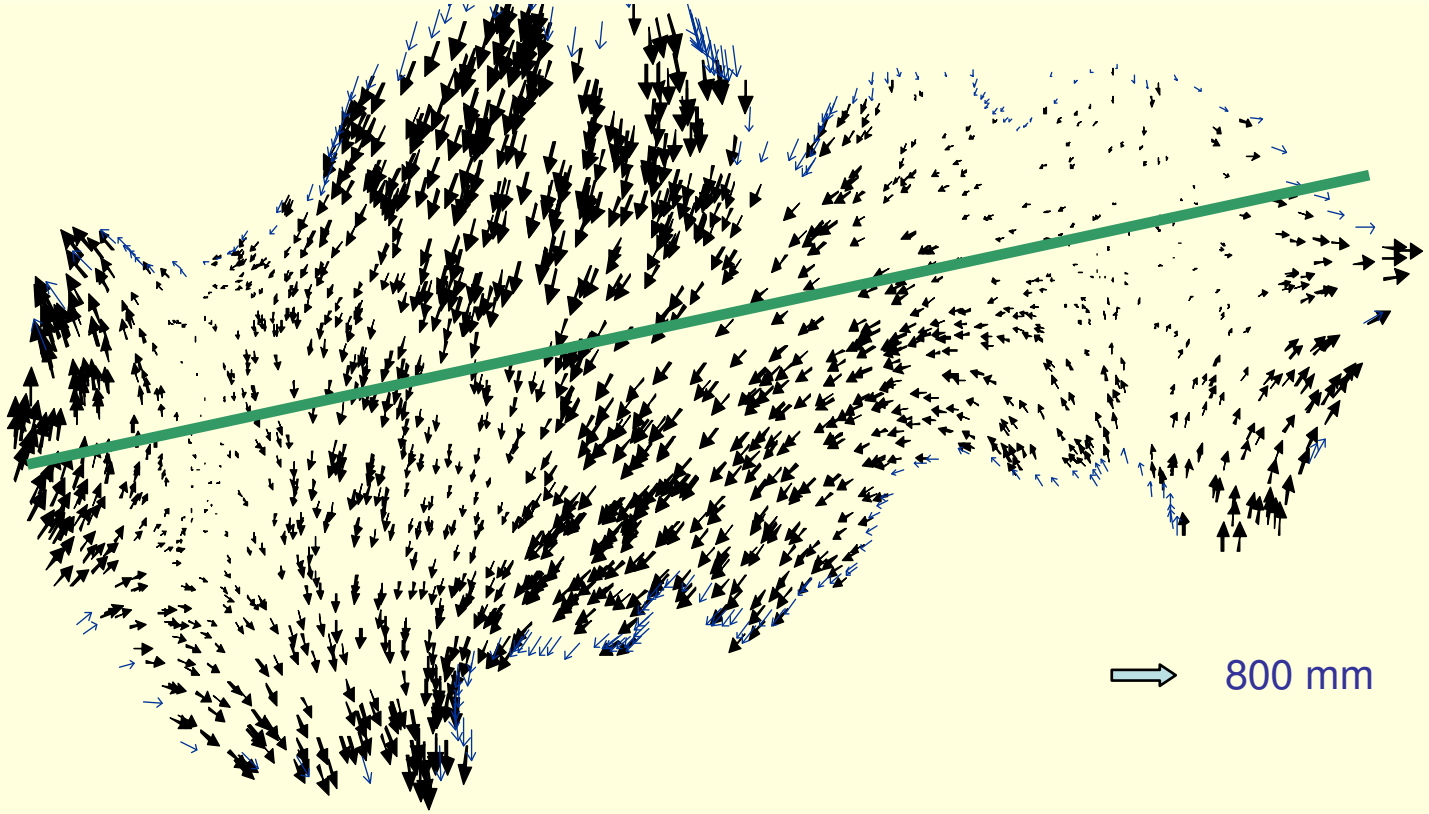
Local residuals after modeling in UP direction



⬮ 75 mm

Co-ordinates corrections between JTSK and JTSK/03

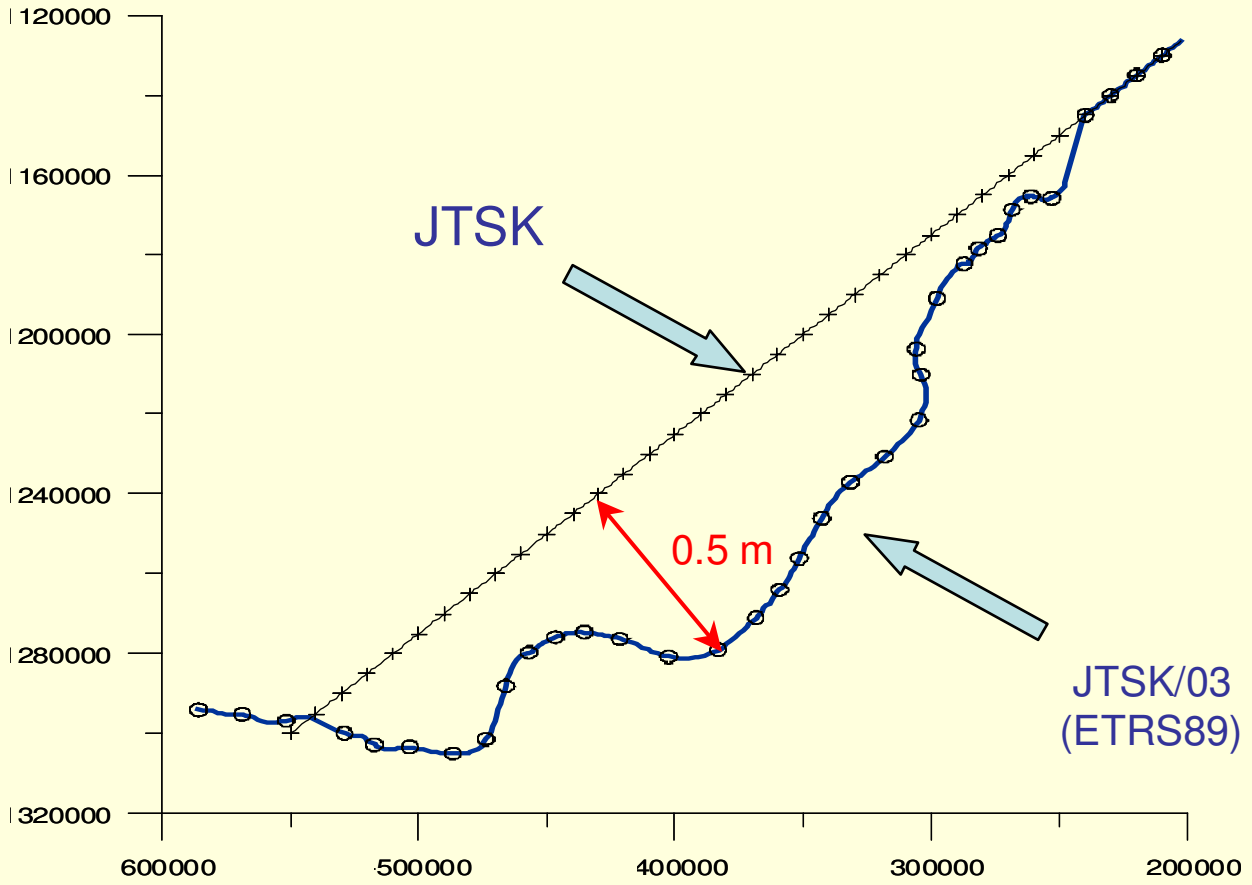
elimination of the global and local scale factors



Korekcie vypoèítané z meraní : ŠPS 2000, ŠPS 2001, AGS 1996 a 1.rád 1997

Vypracoval : Klobušiak, Leitmannová, Priam
Apríl 2003

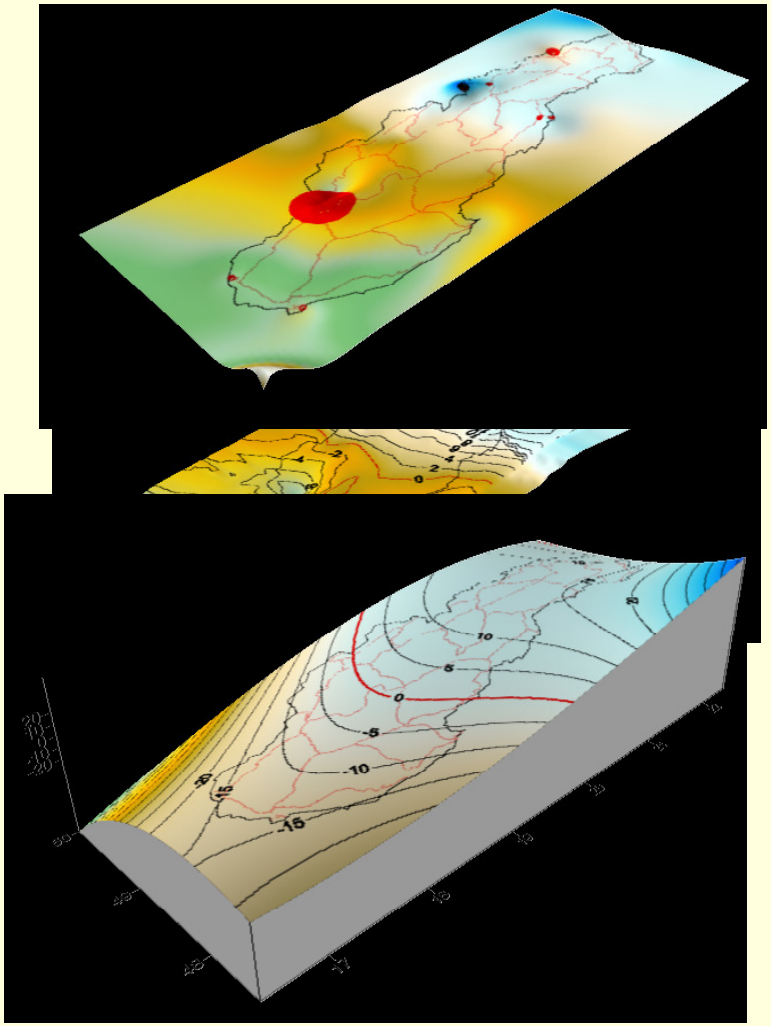
True course of the line in JTSK a JTSK/03

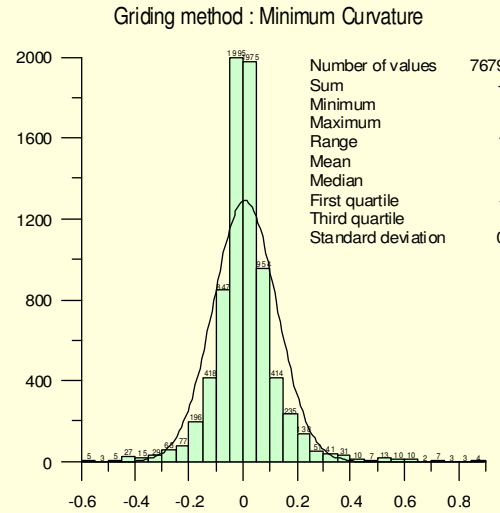


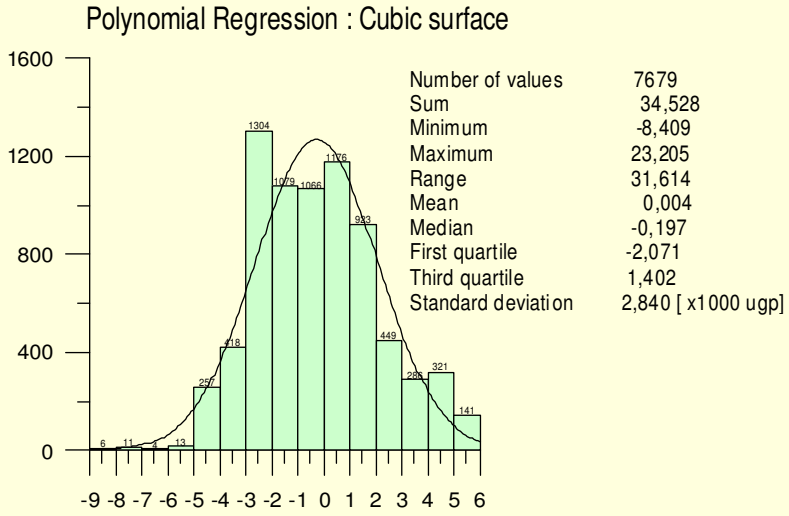
National Height System and EVRS 2000

UELN95/98 - Bpv

Digital models of residuals



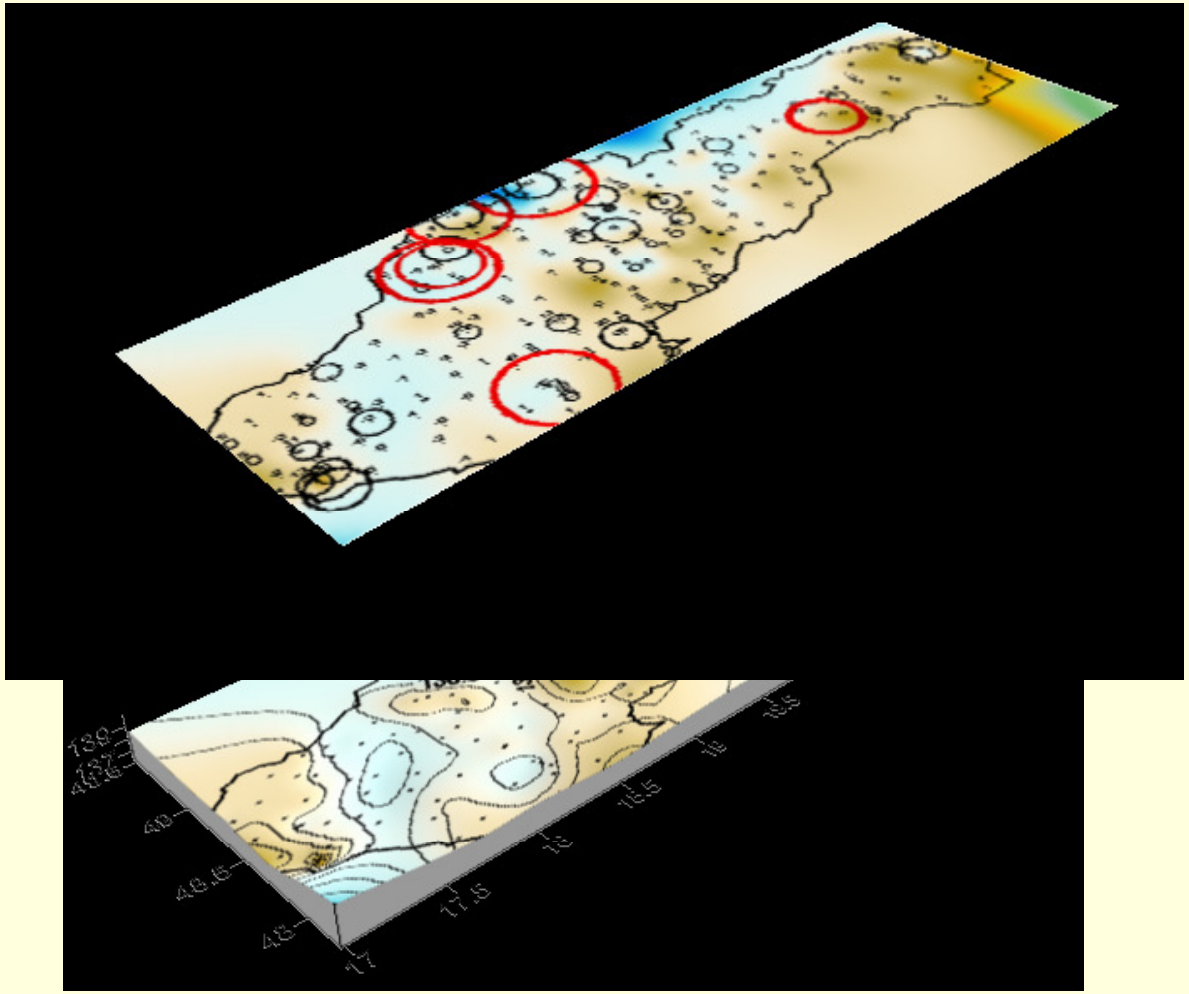


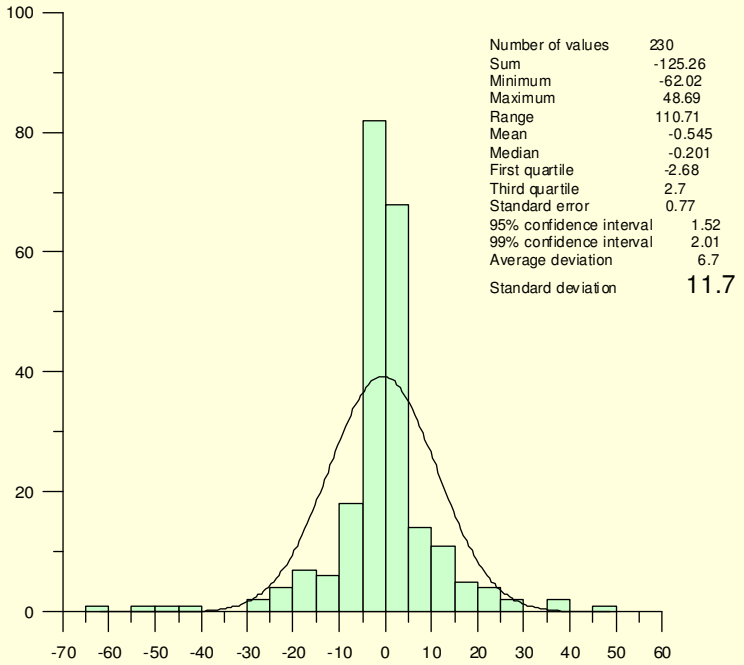


National Gravity System GrS-64 and ISGN71

GrS98 – GrS64

Digital models of residuals





Critical value ○ 36 mikroGal

Conclusion

How do we fulfill Resolutions No.2 and No.3:

1. Quality observations of the geodetic control parameters in European reference systems (ETRS89, EVRS2000, IGSN71)

2. Derivation of reversible relationships between European reference systems and national conventional reference systems

3. Modelling of the systematic effect of residuals

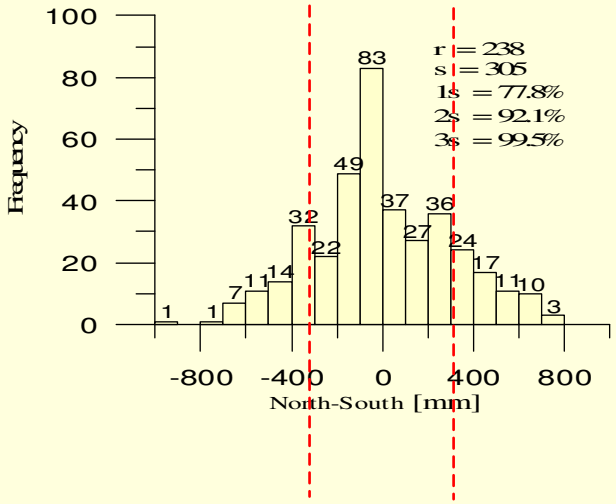
4. Authorization of the digital model of residuals

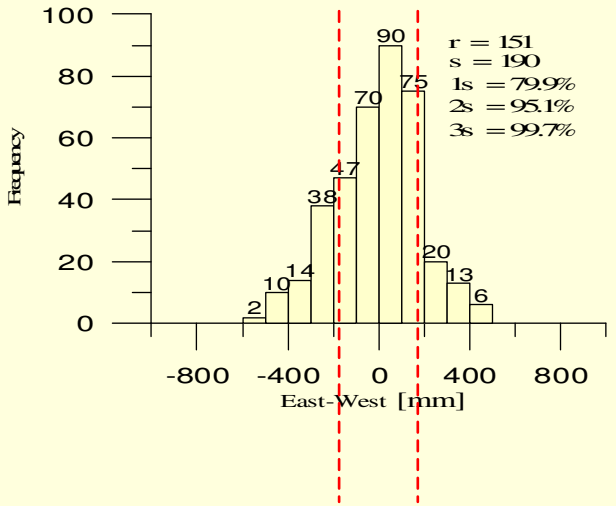
Thank You for Your Attention

E-mail : klobusiak@gku.sk
leitmannova@gku.sk
ferianc@gku.sk

Tel. ++421 2 43334822

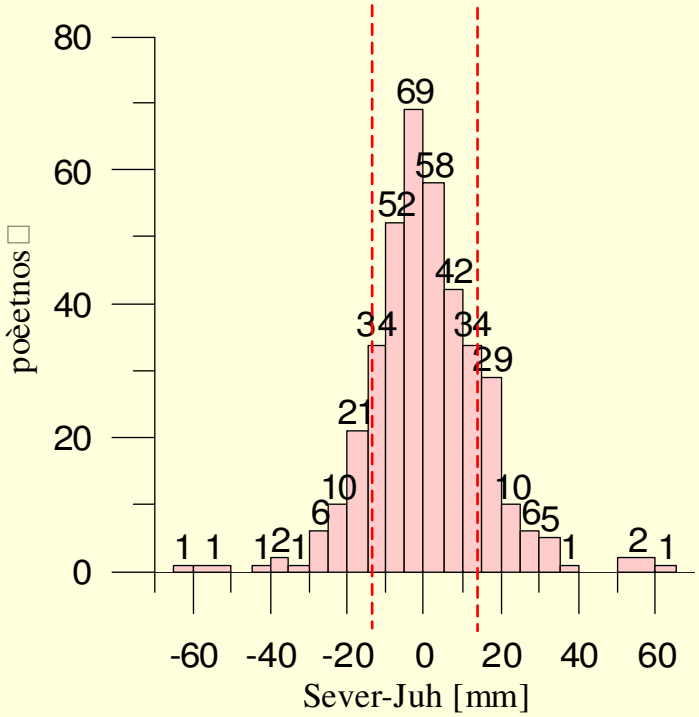
Rozdelenie početnosti opráv medzi JTSK a ETRS 89

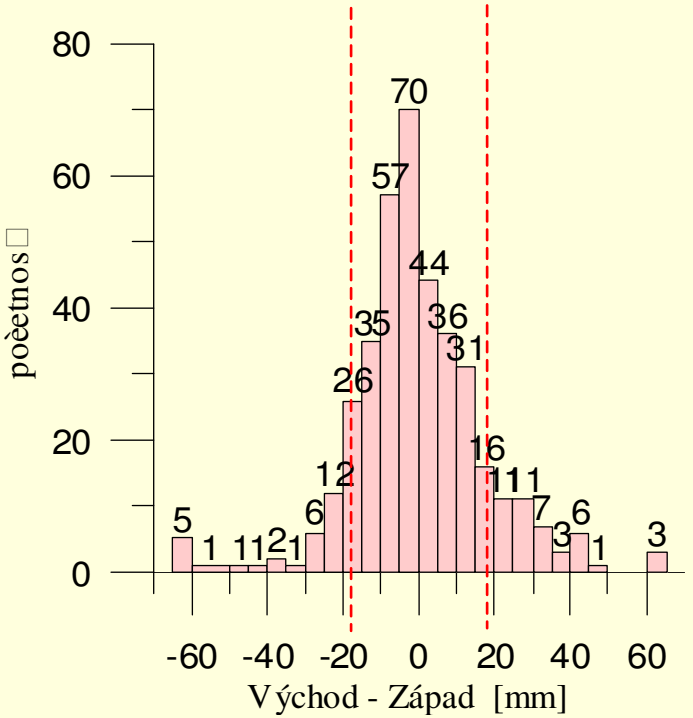


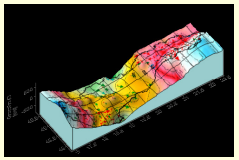


Celkový počet opráv = 386

Rozdelenie početnosti opráv medzi JTSK/03 a ETRS 89







Celkový počet opráv = 386