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Coordinate homogenisation in Triglav National Park region

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Spatial Information Systems for Protected Areas and Regions in CADSES - SISTEMaPARC

Content

Part 1: Cross border coordinate homogenization at *the Prealpi Giulie - Triglav National Park region*

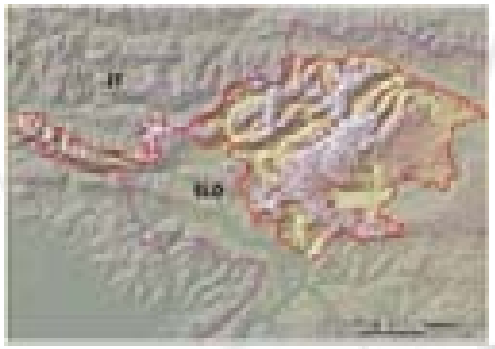
Part 2: Estimation of transformation parameters for the region of Triglav National Park

Part 3: Manual concerning homogenization of spatial data at cross-border region

Motivation

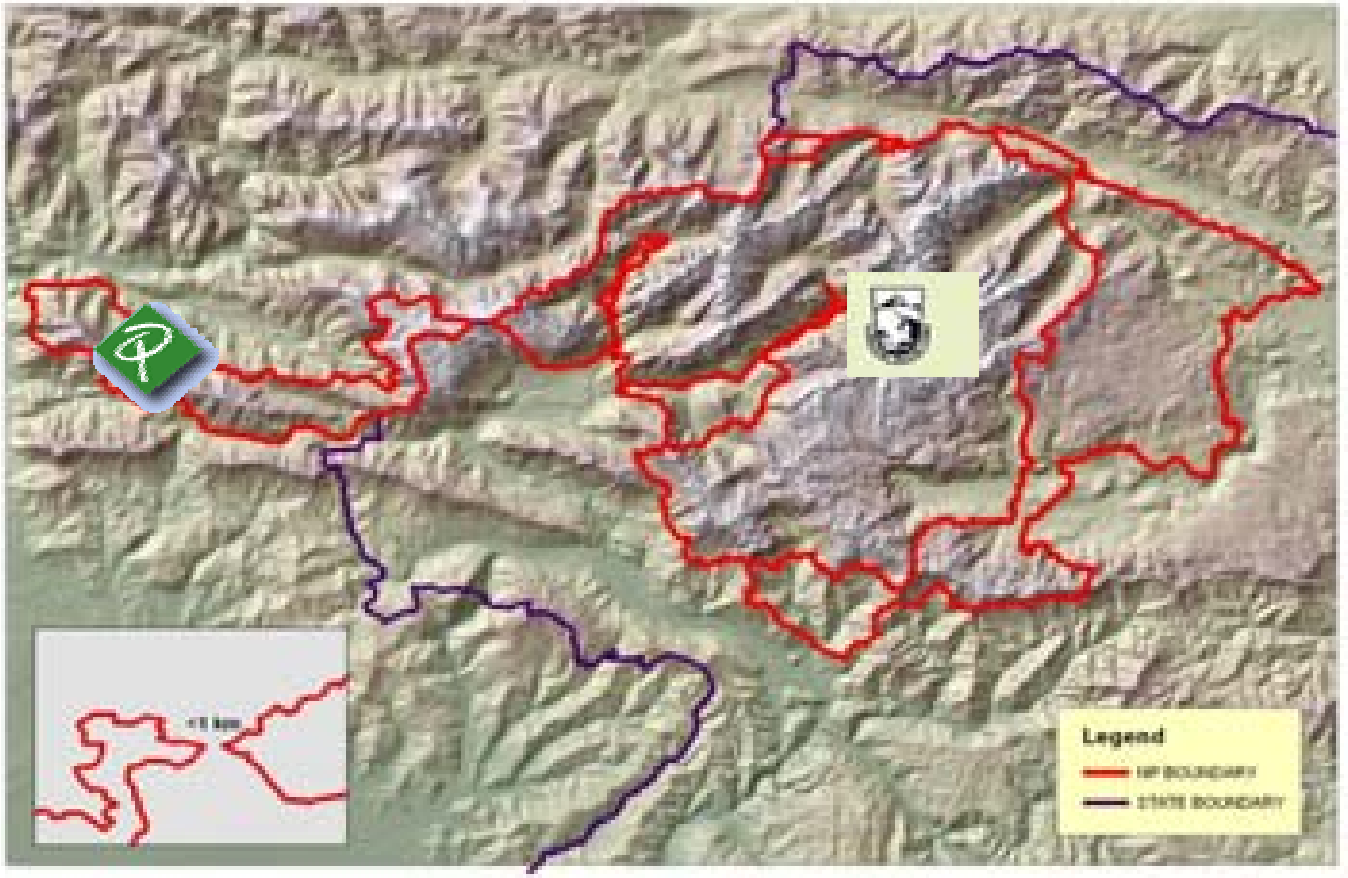
- to improve management on crossborder and transnational level by homogenized data
- initiate the transnational exchange of experiences and know-how
- need for better transformation parameters for the region of Triglav National Park

Basic facts

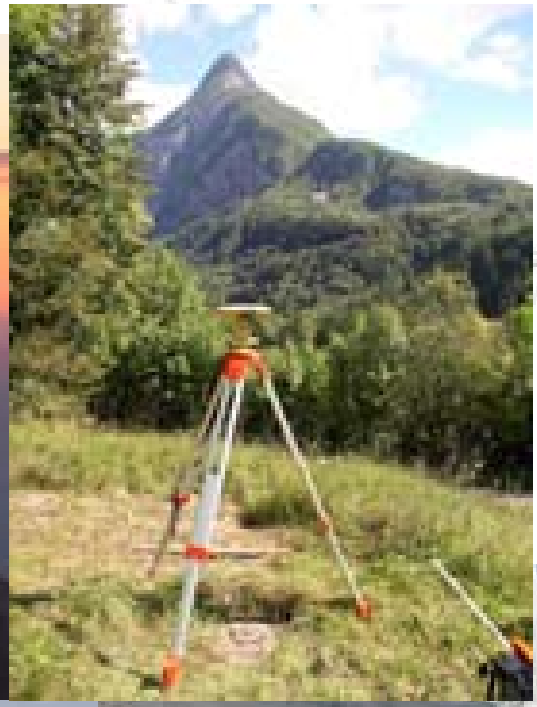


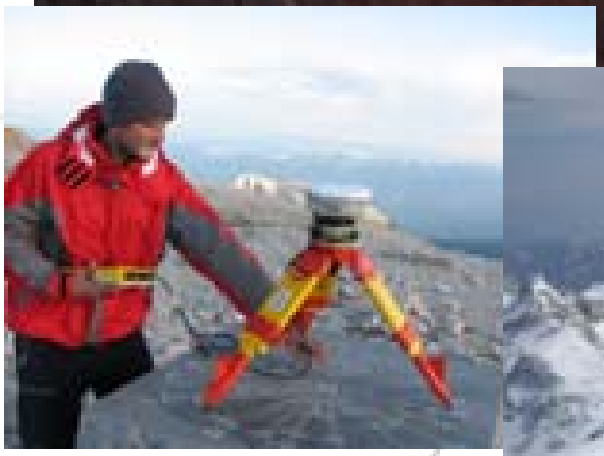
	PREALPI GIULIE NATURE PARK	TRIGLAV NATIONAL PARK
Established	1996	1924
Area	10 000 hectares	83 807 hectares
Natural features	The Karst phenomenon, both superficial and underground (around a thousand caves), Mount Canin, the Musi mountain range, rich flora and fauna	Mt.Triglav (2864m), JulianAlps, watershed between Soca and the Sava river, glacial lakes, waterfalls, rich flora and fauna, many indigenous species, traces of older settlements, remnants of First World War, rural architecture and churches

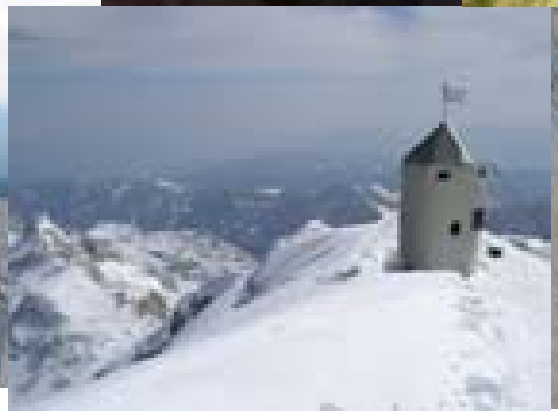
Location of the Parks



Work and pleasure





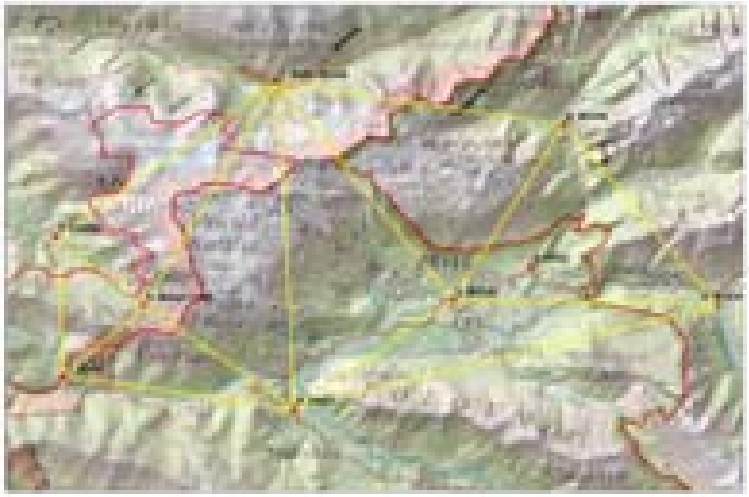


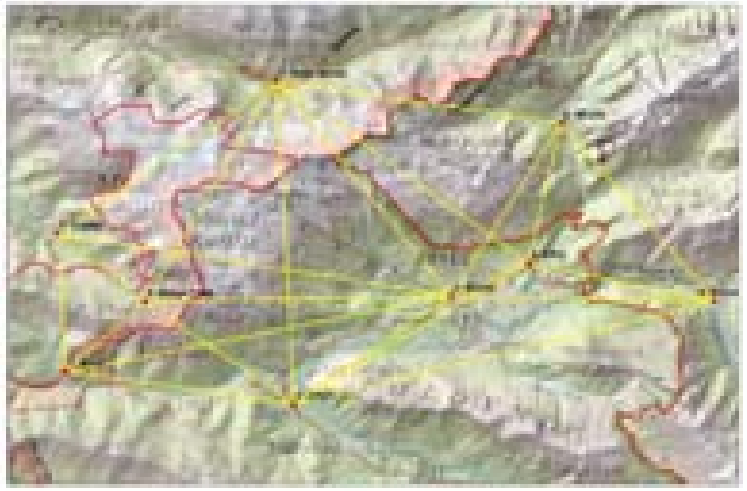
Part 1

GPS network

- 9 measured GPS points in both National C.S. and WGS84
- 4 on Italian, 5 on Slovenian side
- we prepared **two network solutions** with standard relative errors;

the small network (15 baselines) takes in account only the data of the permanent station of Bovec, on the contrary wider network (23 baselines) also the point station of Kriz





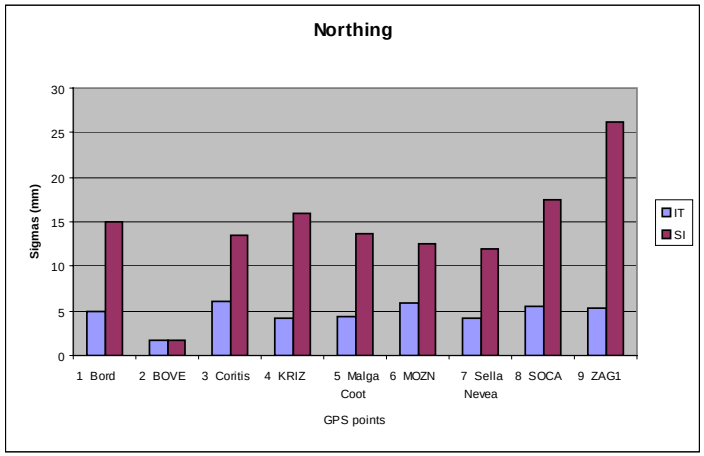
Processing of GPS data

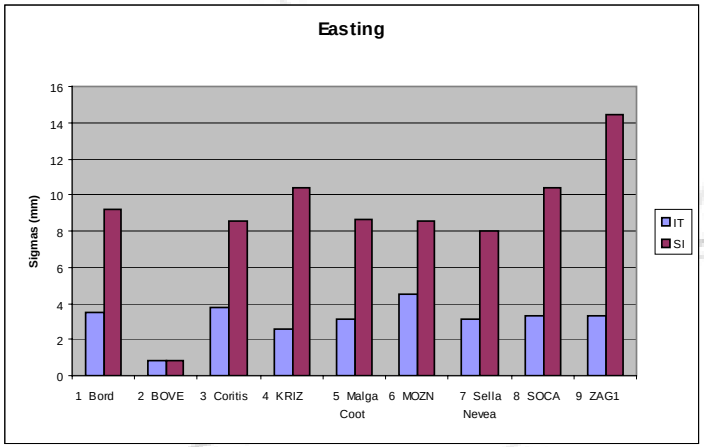
- Each side used different GPS receivers(Italian colleagues used Topcon receivers that were able to receive also Glonass satellites).
- In the processing of GPS data we included an additional point (permanent station Bovec), which also the fixed point of network.
- GPS data were processed by a commercial software Pinnacle (Italian side) and GP Survey (Slovenian side).

Results

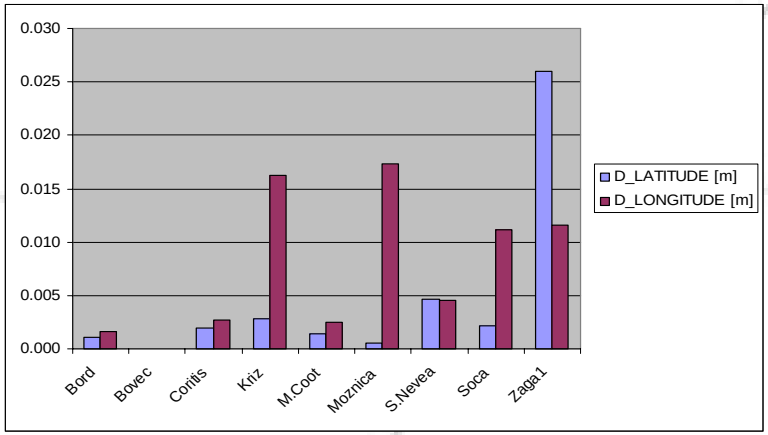
- The results are coordinates of all network points in ETRS89 system.
- Coordinates processed by Slovenian side are obtained by adjustment of baselines in ETRS 89 coordinate system
- Results processed by Italian side were obtained in WGS 84 reference system and then transformed to ETRS 89 reference system

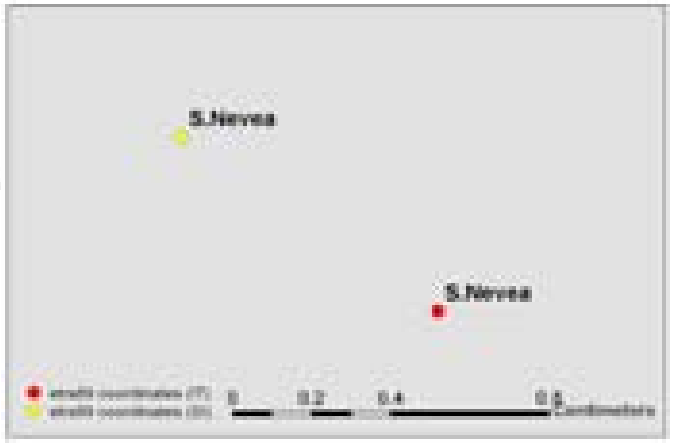
- We compared processed results using Sigma (δ) values for Northing nad Easting





- Comparison of point's position



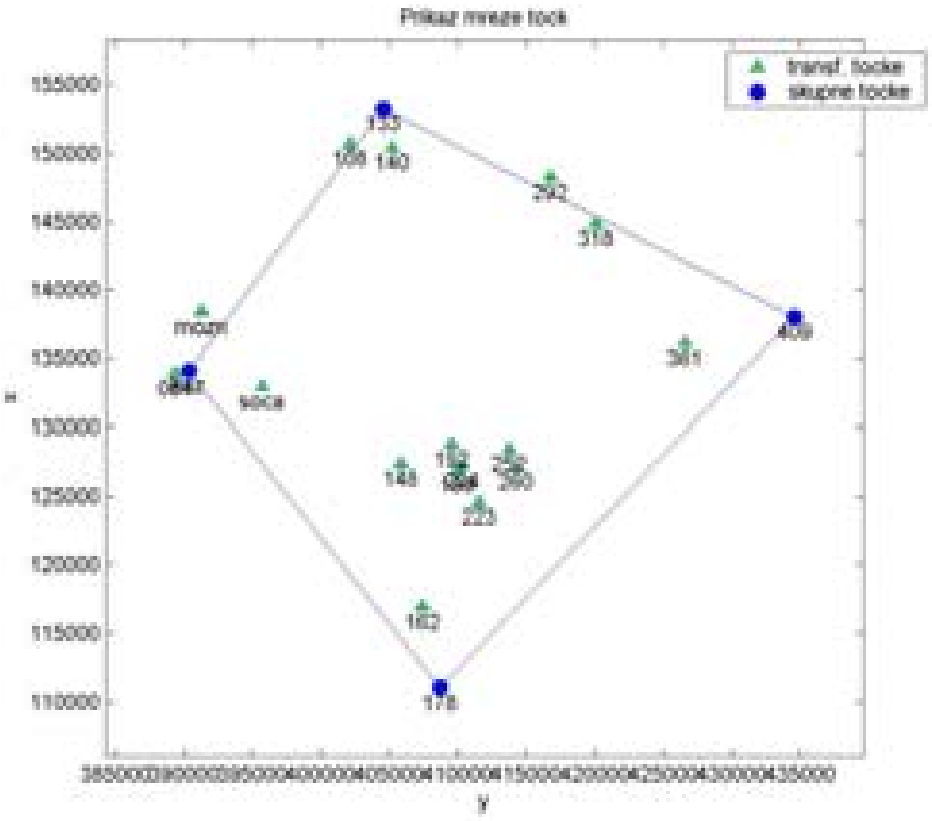


Part 2

Transformation parameters for the region of Triglav National Park

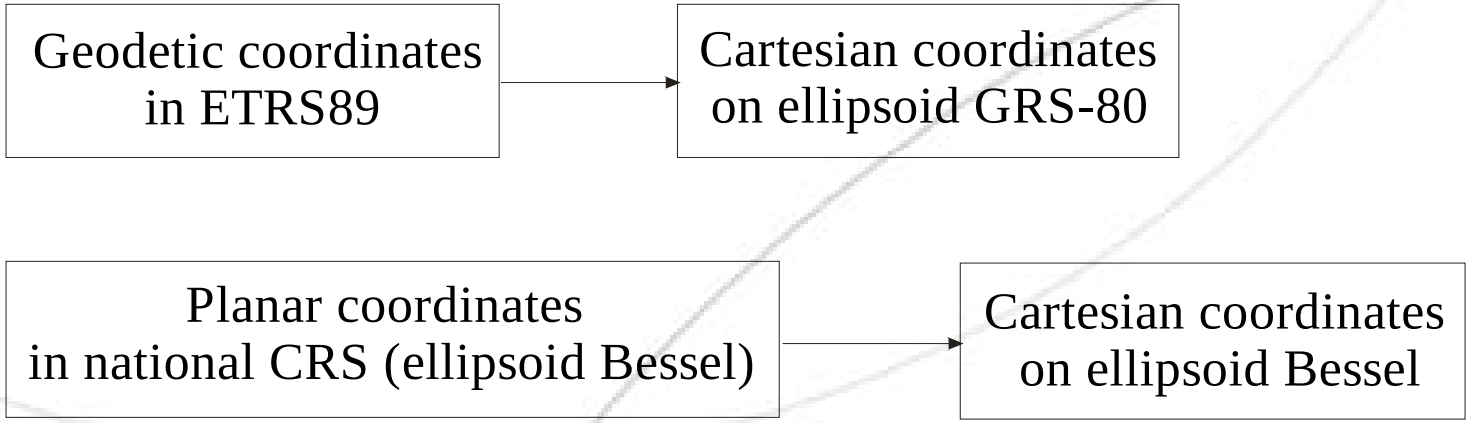
- For the transformation from local datum (D48) to global datum (ETRS89) we used 7-Parameter-Helmert-Trasformation method

- We include 1 point from Cross-border network and 3 points provided by NMA of Slovenia for which the position in D48 and in ETRS89 CS are also available



Methodology

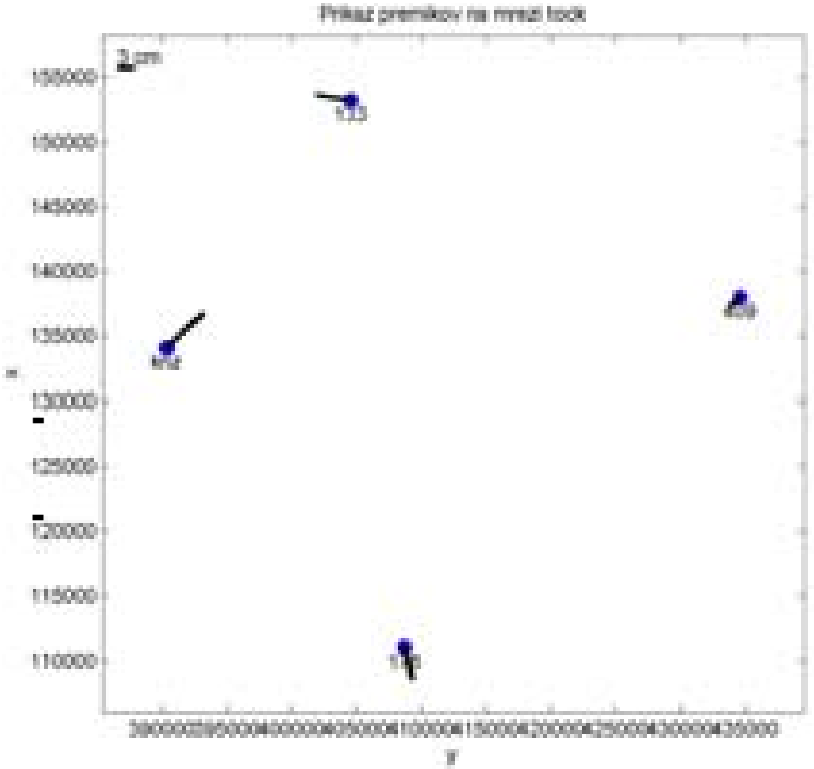
- Seven parameter Helmert transformation is performed on a set of Cartesian coordinates in both coordinates



Results

Transformation parameters between *National Coordinate system and ETRS89 system*, valid for the region of Triglav National Park are:

Translation along x axis (meters)
246.430940
Translation along y axis (meters)
21.429956
Translation along z axis (meters)
531.805292
Rotation around x axis (seconds)
02.613037
Rotation around y axis (seconds)
10.488152
Rotation around z axis (seconds)
09.784625
scale (ppm)
31.443817



Residuals between true position in national CS and transformed position of transformation points

Quality check on transformation parameters

- **Quality was checked by the residuals between transf. ETRS89 and true ETRS89 coord.**

Residual of horizontal position (m)

148	0.16
192	0.22
199	0.22
204	0.22
260	0.20
162	0.28
361	0.04
318	0.19
292	0.01
140	0.09
108	0.07
mozn	0.43
soca	0.28

- **Quality check on transformation parameters valid for the whole area of Slovenia**

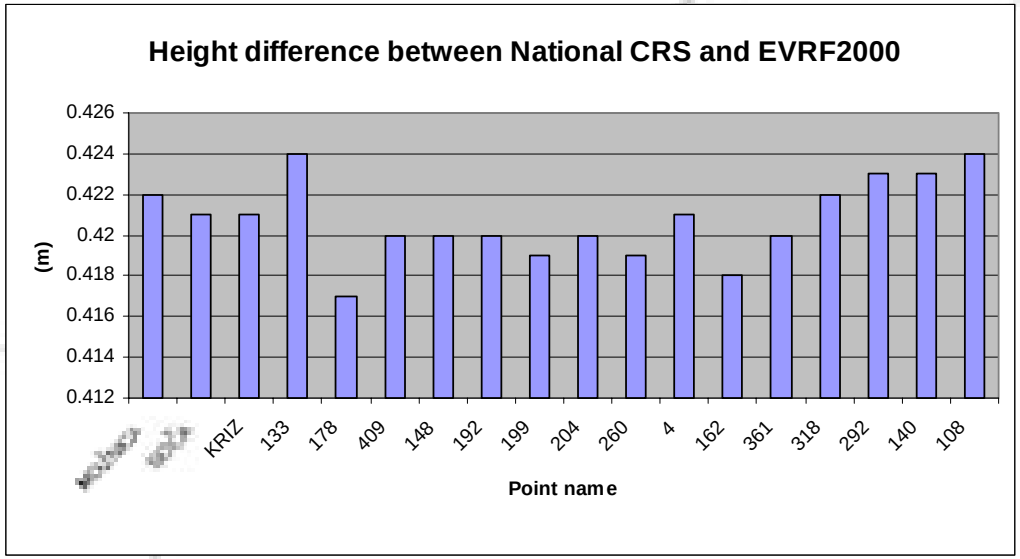
Residual of horizontal position (m)

148	0.55
192	0.61
199	0.58
204	0.58
260	0.52
162	0.54
361	0.38
318	0.53
292	0.58
140	0.75
108	0.78
mozn	0.96
soca	0.84

Vertical coordinate reference system

- We performed transformation between national vertical reference coordinate system (datum Trieste) and common EVRF2000 system by 3 parameter height transformation

- We transformed vertical position of 18 trigonometric points from national vertical CRS to common EVRF 2000*

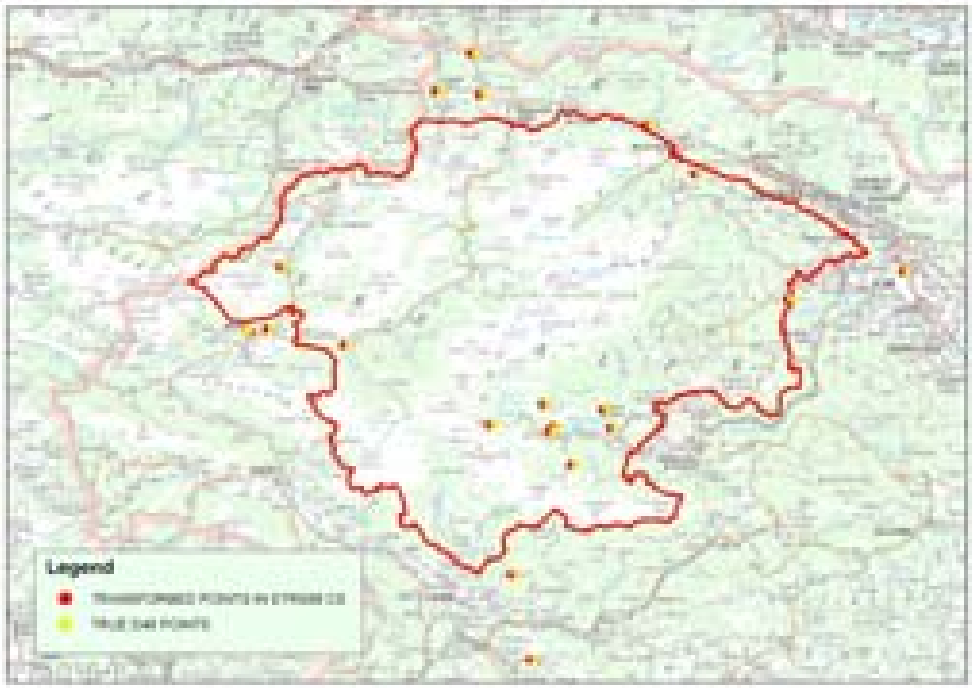


* parameters used for the transformation were obtained from the Web site of Eurographics

Processing of trigonometric points in Triglav National Park using ArcGIS

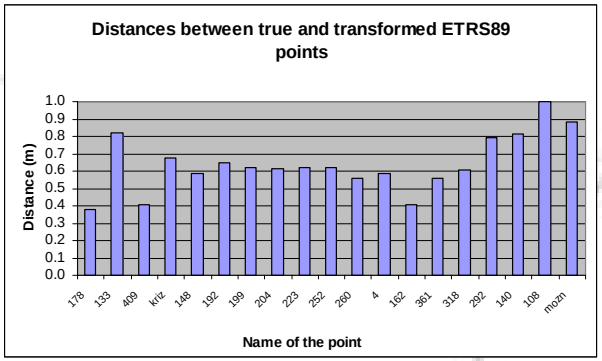
- We performed transformation from National CS D48 to ETRS 89 CS

- ArcGIS 9 uses the same transformation parameters as obtained by EuroGeographics



Testing results obtained by transformation in ArcGIS

- distances between true points in ETRS89 CS provided by NMA of Slovenia and transformed ETRS 89 points with ArcGIS are in **sub-meter** range



Conclusion

- difference between transformed and true coordinates of our datasets is in range of a few decimetres

- difference between transformed coordinates with state transformation parameters and true coordinates of our datasets is in sub-meter range

Thank You