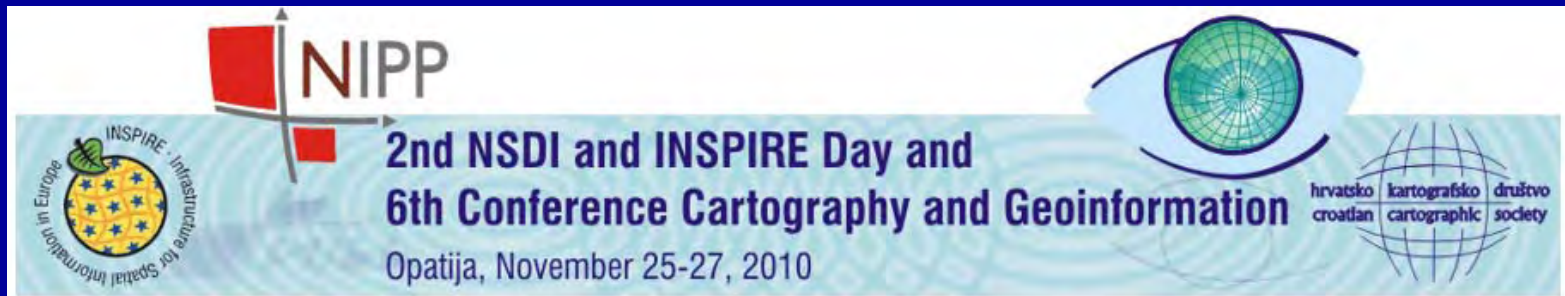


Coordinate Transformation from the Vienna System into the Gauss-Krüger Projection in Croatia

Nedjeljko Frančula
Miljenko Lapaine
Dražen Tutić
Branko Manojlović



Old coordinate systems in Croatia

19th and beginning of 20th century

Kloštar-Ivanić System

Budapest System

Oblique Aspect of Conformal Cylindrical Projection

Vienna System

Schöckelberg System

Krim System

Hungary

Kloštar-Ivanić System

Budapest System

Oblique Aspect of Conformal Cylindrical Projection

Austria

Vienna System

Schöckelberg System

Krim System

Vienna Coordinate System

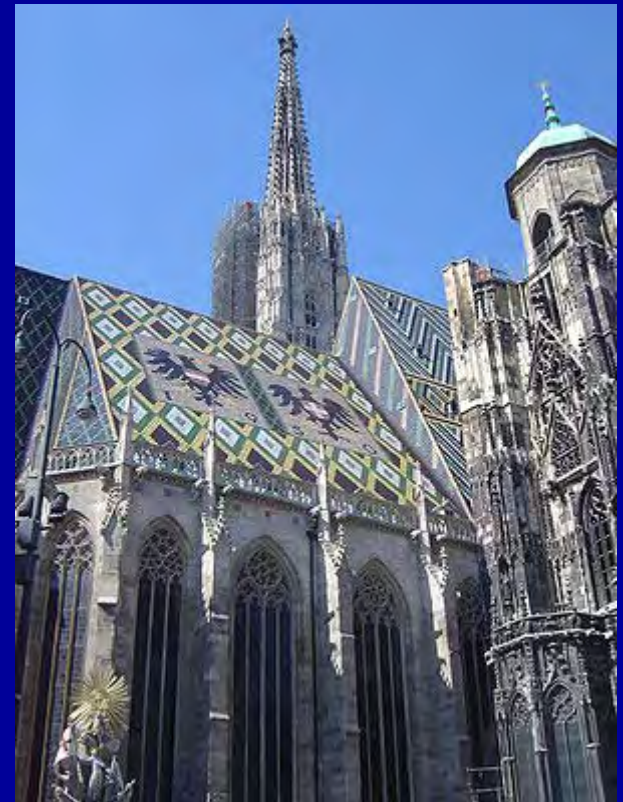
Baseline measurement 1806-1808

Triangulation 1817-1820

Coordinate system origin:

X-axis through St. Stephan's Dom

Y-axis 48 miles South from Vienna



Vienna Coordinate System



Conclusion

St. Stephan's Dom or 48 miles south ?

BEČ Sv. Stjepan
VIENNA St. Stephan

+ 80 000 + 60 000

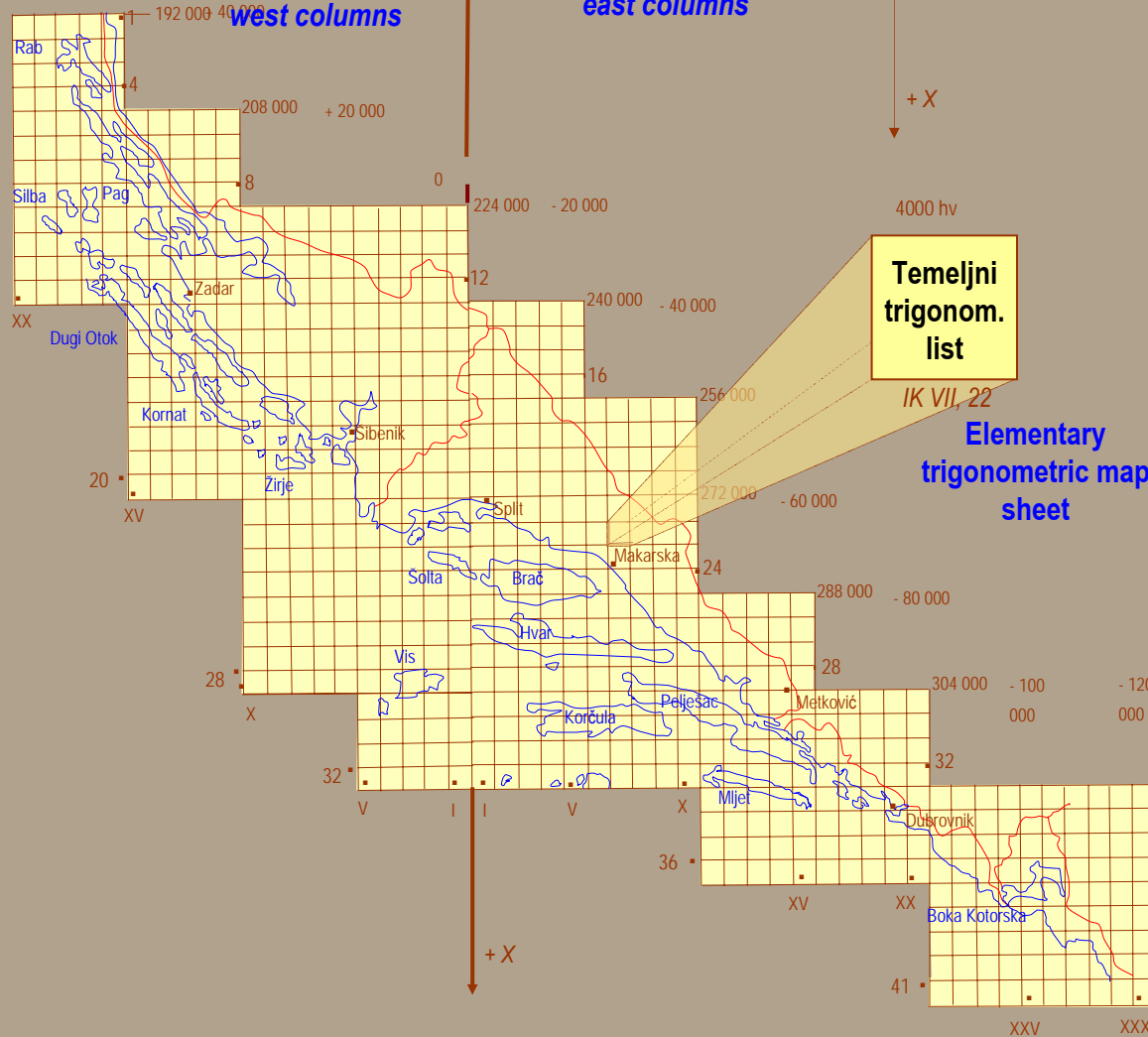
ZK – zapadno
west columns

IK – istočno
east columns

Beč 0,0

+ Y - Y

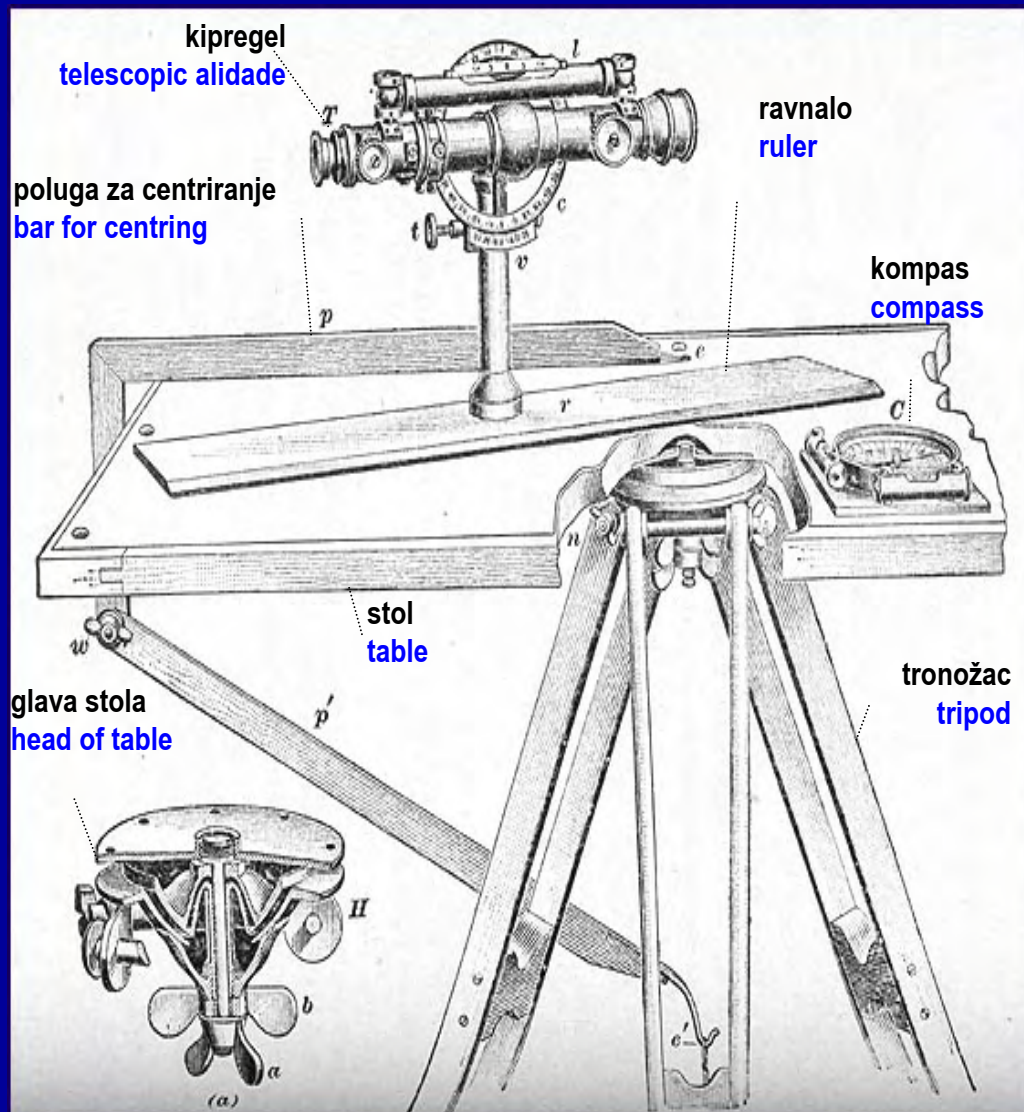
+ X



Temeljni
trigonom.
list

IK VII, 22

Elementary
trigonometric map
sheet



Vorschrift zur Zeichnung der Katastral Pläne Kultur Gattungen.

Zier Gärten.	Obst Gärten.	Gemüse Gärten.	Wein Gärten.	Hopfen Gärten.	Selbstanbau.	Grapp Bau.	Toback Bau.
Trockene Wiesen.	Nasse Wiesen.	Wiesen = Obstbäumen.	Weiden.	Gemeinde Weiden.	Sümpfe.	Sümpfe = Rohrwuchs.	
Aecker.	Rott = Trieb Aecker.	Aecker = Obstbäumen.	Aecker = Öhlbäumen.	Aecker = Weinschen.	Aeck = Bäum. = Wein.	Reis Felder.	
Englische Anlagen.	Kastanien Wälder.	Olivon Wälder.	Laubholz = Wälder.		Nadelholz = Wälder.		
Sand u. Schotter Grube.	Lehm Gruben.	Forstliche.	Mess Salinen.	Gratripp.	Remisen.	Gemischte Wälder.	

Instrukzion für Messtischaufnahme, 1820

**SPECIFIKACIJE ZA VEKTORIZACIJU
KATASTARSKIH PLANOVA
koji se izrađuju sa CAD/GIS software-ima**

Verzija 2.9.2. (23.11.2007)

**Republika Hrvatska
Državna geodetska uprava
Zagreb**

SPECIFIKACIJE ...

Cronglish

Croatian

software	softver
software-ima	softverima
kropanje	obrezivanje
verteks	vrh
insertirati	umetnuti
layer	sloj

SPECIFIKACIJE ...

Cronglish

Croatian

grid	pravokutna mreža
text	tekst
break-anje	prekidanje
visible	vidljiv
invisible	nevidljiv
meni	izbornik

SPECIFIKACIJE ...

Cronglish

Croatian

scale factor	faktor mjerila
GIS sustav	GIS
plotano	iscrtano
sledeće	sljedeće
redosljed	redoslijed
basepoint	osnovna točka

SPECIFIKACIJE ...

Cronglish

Croatian

očišćena	očišćena
Knjižni dio od Igee se popravi (ako već nije)	
van	izvan
file	datoteka
Ban Josip Jelačić	ban Josip Jelačić
Autocad-a	Autocada, AutoCAD-a

SPECIFIKACIJE ...

"Specifikacije su verificirane od strane Središnjeg ureda DGU i stupaju na snagu 29.04.2007. Nakon tog datuma moraju ih se pridržavati svi koji rade vektorizaciju i ažuriranje digitalnog katastarskog plana."

Conclusion

Cronglish -> Croatian

I recommend to SGA that a language professional and/or professor from the Faculty of Geodesy check all official texts before their publication.

SPECIFIKACIJE ...

Str. 3:

"Zbog grubih grešaka potrebno je mreže izračunane po Borčiću provjeriti na slici SRPJ (Središnji registar prostornih jedinica)."

What does "Borčić" mean?

And what if there is no possibility to apply "Borčić"?

B. Borčić, N. Frančula:

Stari koordinatni sustavi na području SR Hrvatske i njihova transformacija u sustave Gauss-Krügerove projekcije

**Zavod za kartografiju Geodetskog fakulteta
Sveučilišta u Zagrebu, 1969**

B. Borčić, N. Frančula:

**Old Coordinate Systems on the territory of SR Croatia
and its Transformation into Gauss-Krüger Map
Projection**

**Institute for Cartography, Faculty of Geodesy,
University of Zagreb, 1969**

For the old Vienna System "Borčić" gives transformation parameters for the town of Split only.

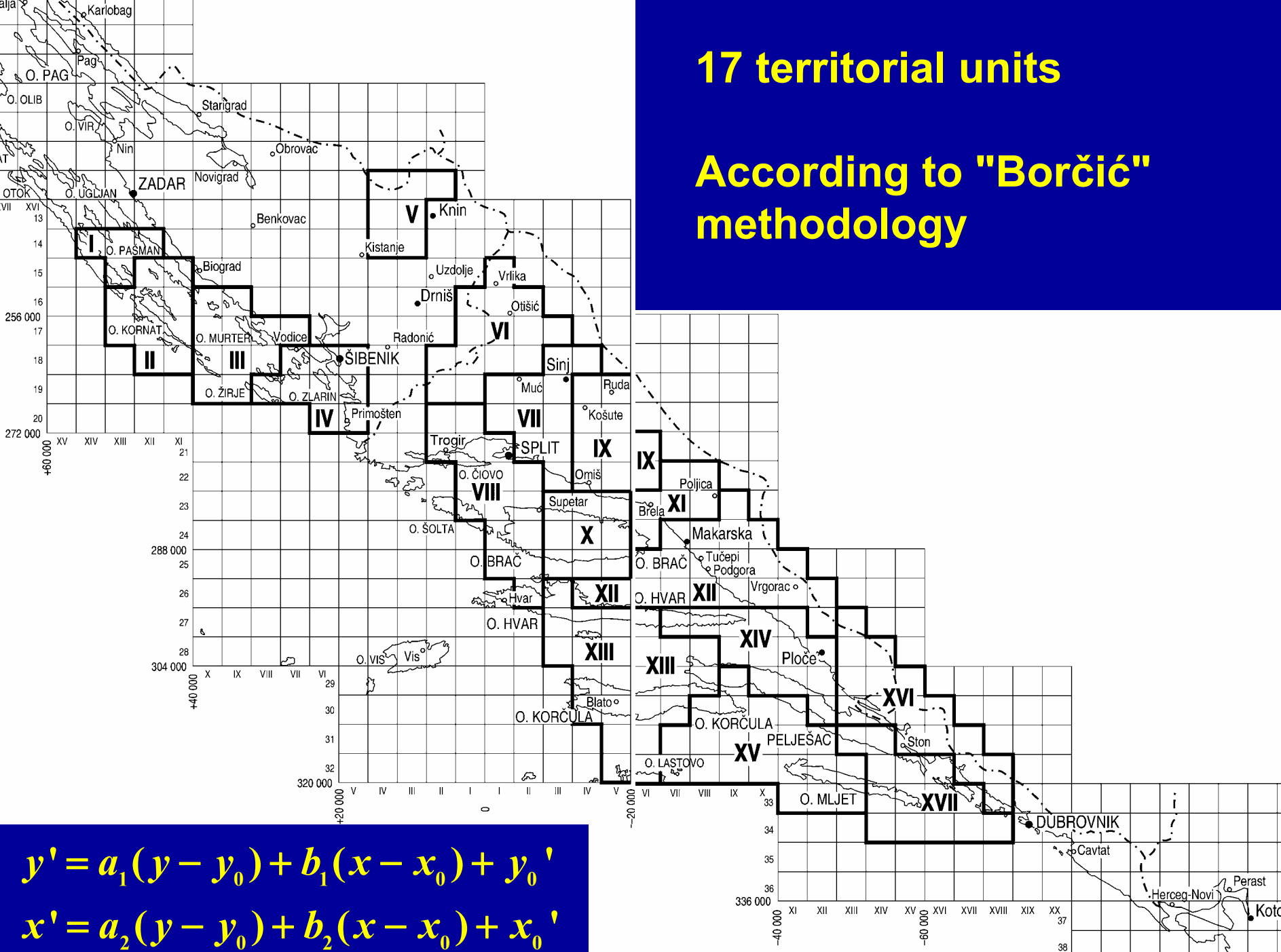
The reason: lack of data in 1960's

Meanwhile, a list of coordinates from Vienna System was obtained from Vienna

Small research gave 52 points in both coordinate systems: old Vienna System and Gauss-Krüger Map Projection

17 territorial units

According to "Borčić" methodology



$$y' = a_1(y - y_0) + b_1(x - x_0) + y_0'$$

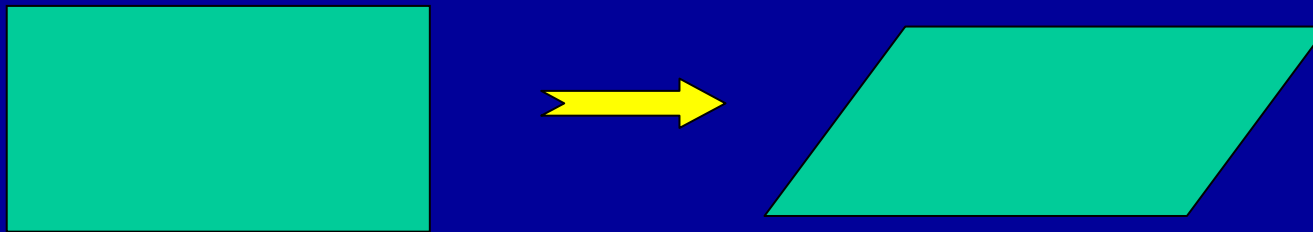
$$x' = a_2(y - y_0) + b_2(x - x_0) + x_0'$$

Affine transformation can be interpreted as an approximation of any other transformation

$$y' = a_1(y - y_0) + b_1(x - x_0) + y_0'$$

$$x' = a_2(y - y_0) + b_2(x - x_0) + x_0'$$

Parallel lines are mapped into parallel lines



Area unit	a_1 a_2	b_1 b_2	y_0 x_0	y_0' x_0'	s [m]
I	-1,9098580 -0,1051032	0,1044893 -1,9099143	44000,00 245000,00	5530665,29 4876396,21	0,72
II	-1,9099667 -0,1050355	0,1045153 -1,9100326	39000,00 249000,00	5540633,43 4869282,34	1,19
III	-1,9105014 -0,1043709	0,1045351 -1,9101547	26000,00 255000,00	5566097,78 4859178,17	1,81
IV	-1,9100037 -0,1048088	0,1032321 -1,9093285	18000,00 260000,00	5581904,06 4850464,60	2,26
XVII	-1,8962489 0,0349487	-0,0353689 -1,8960292	-46000,00 312000,00	6455053,60 4748517,59	0,89

Not just a theory - A practical example

Geoprojekt d.d. from Opatija

Cadastral district Žagrović

Branch office Knin

Distric Aministration for Cadastar Šibenik

State Geodetic Administration

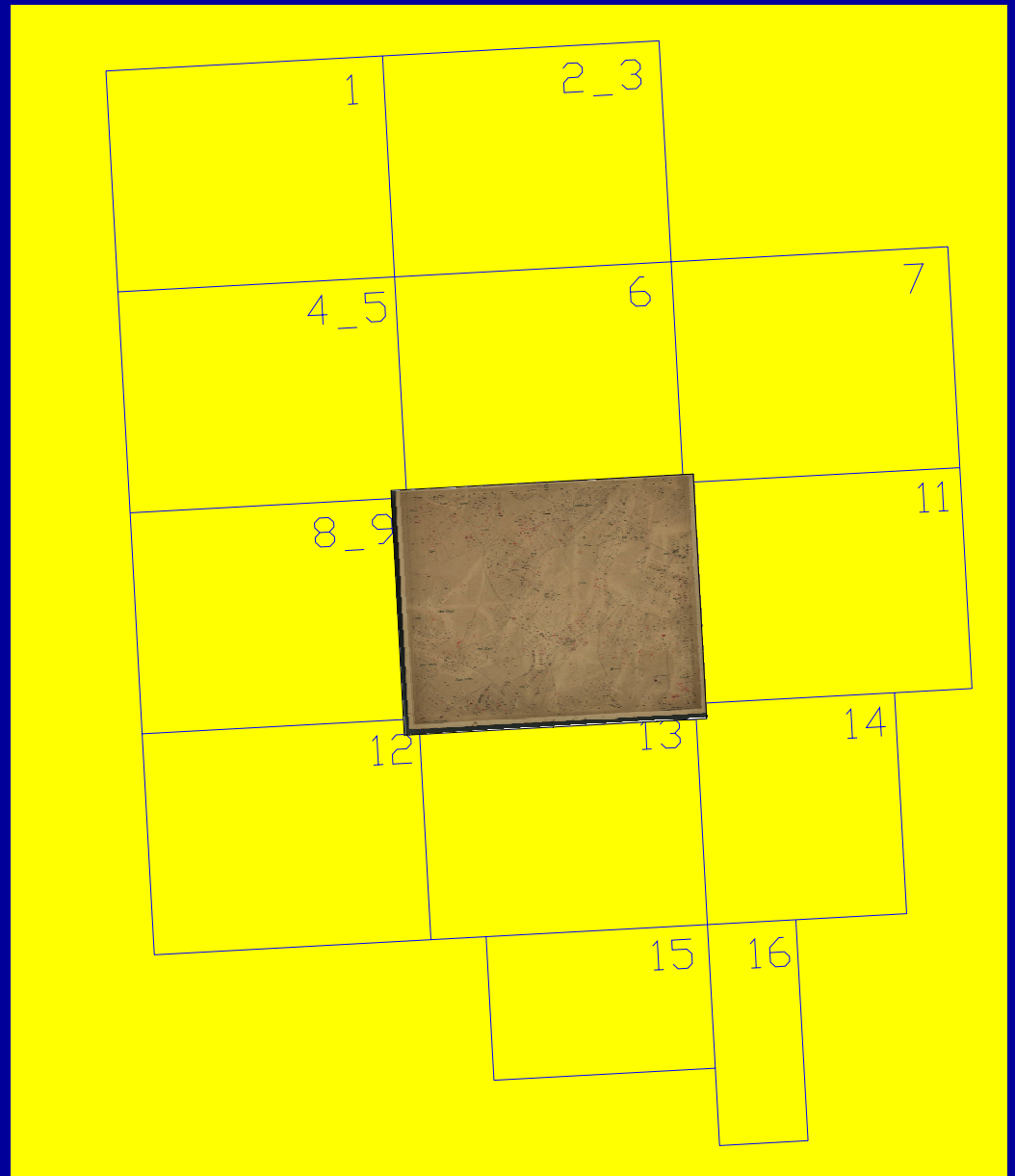
Položaj listova

W.C. IV

W.C. III



By using affine transformation for the area unit V



Conclusion

It works.





Gauss-Krüger ?

HTRS96/TM !

Conclusions

- **Where is the origin of the old Vienna system for Dalmatia ?**
- **Croatian language**
- **Affine transformation for 17 area units**
- **Transformation into HTRS96/TM**

Thank you for your attention!



**2nd NSDI and INSPIRE Day and
6th Conference Cartography and Geoinformation**
Opatija, November 25-27, 2010

hrvatsko kartografsko društvo
croatian cartographic society

The banner features a light blue background with a subtle grid pattern. On the left is the INSPIRE logo, which includes a globe with stars and the text 'INSPIRE - Infrastructure for Spatial Information in Europe'. In the center is the NIPP logo, consisting of a red square and a vertical line with an arrow pointing up, next to the letters 'NIPP'. On the right is a stylized eye logo where the iris is a globe with a grid, and the text 'hrvatsko kartografsko društvo / croatian cartographic society' is positioned below it.

mlapaine@geof.hr