

Planimetric Accuracy Assessment of the *Nuova carta geografica dello Stato Ecclesiastico*

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- Map – accurate
- Before using
their quality
- Planimetric and
bearings between
coincide with
- Planimetric and
geografica d
R. Bošković for
positions



area

o – assessing

distances and
on a map
on

e *Nuova carta*
Ch. Maire and J.
mapped city

Planimetric Accuracy Assessment

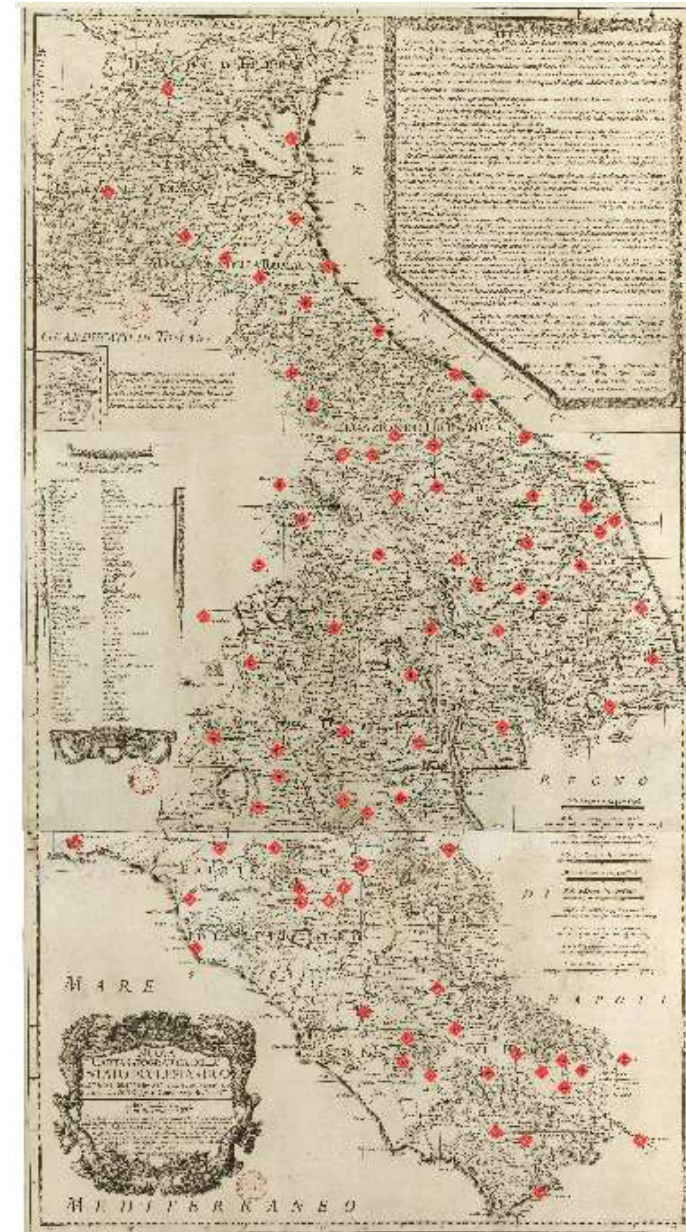
- *De Litteraria...* – Maire and Bošković, 1755
- Table – list of geographical coordinates (deg, min, sec) for the 84 cities depicted on the map
- Comparison – contemporary and geographical coordinates from the map
- Values of longitude differs
 - Maire and Bošković determined coordinates in relation to the prime meridian Ferro
 - scientists began deal with the problem of determination of longitude at the beginning of the 18th century

Planimetric Accuracy Assessment

- Sphere $R=6\,370\text{ km}$
 - Degree of latitude – 111.18 km
 - Minute of latitude – 1.85 km
 - Second of latitude – 30.88 m
- *Nouva carta...* – M 1:370 000
 - Minute of latitude – 5.01 mm
 - Second of latitude – 0.08 mm
 - Size of the signature of the cities – $4\text{--}8\text{ mm}$
- Maire and Bošković's assessment of the measurements
„On this map all cities are located at their place ...
without the risk of one minute error in their positions
because they are measure by trigonometry...”

Planimetric Accuracy Assessment

- Contemporary coordinates of 82 cities – GoogleMaps
- „Old” coordinates – *De Litteraria...*, Maire and Bošković, 1755
- Very important – choose a good and reliable control points
- *Nuova carta...* – centre of signature
- GoogleMaps – church spire in the old part of the town



Name of the city	Contemporary coordinates		Coordinates from <i>De Litteraria...</i>		Differences	
	φ [° ′ ″]	λ [° ′ ″]	φ [° ′ ″]	λ [° ′ ″]	φ [′ ″]	λ [° ′ ″]
Albano	41°43'50"	30°10'31"	41°43'50"	12°39'26"	0'0"	17°31'5"
Bagnarea	42°38'9"	29°38'22"	42°37'35"	12°5'41"	0'33"	17°32'40"
Camerino	43°6'25"	(30°56'33″)				(17°52'43″)
		30°36'33"				17°32'42"
Citta della Pieve	43°0'6"	29°31'27"	42°57'9"	12°0'14"	2'57"	17°31'13"
Comacchio	44°40'27"	29°42'17"	44°41'45"	12°10'56"	-1'19"	17°31'21"
Pennadi Billi	(43°29'23″)	29°47'10"			(19'39″)	17°31'13"
	43°49'23"				0'21"	
Perugia	43°6'46"	29°54'28"	43°6'45"	12°23'19"	0'0"	17°31'9"
Ravenna	44°25'5"	(29°23'6″)				(17°11'19″)
		29°43'6"				17°31'19"
Recanati	43°25'44"	31°3'38"	43°24'23"	13°32'39"	1'21"	17°30'59"
Sarsina	43°55'21"	29°42'20"	43°55'8"	12°8'38"	0'13"	17°33'42"
Sutri	(41°13'34″)	29°44'26"			(-1°0'55″)	17°30'51"
	42°13'34"				-0'55"	
Tolentino	(45°12'30″)	30°48'28"			(2°0'0″)	17°31'19"
	43°12'30"				0'0"	
				Σ/n	0'11″	17°31'7″

Longitude differences

- Difference between prime meridian Ferro and Greenwich – about $17^{\circ}30'$
- Longitude average deviations
 - Difference between prime meridians $17^{\circ}30' - 1'6''$
 - Difference between prime meridians $17^{\circ}31' - 0'6''$

Name of the city	Contemporary coordinates		Coordinates from <i>De Litteraria...</i>		Differences	
	φ [° ' "]	λ [° ' "]	φ [° ' "]	λ [° ' "]	φ [' "]	λ [° ' "]
Albano	41°43'50"	30°10'31"	41°43'50"	12°39'26"	0'0"	17°31'5"
Bagnarea	42°38'9"	29°38'22"	42°37'35"	12°5'41"	0'33"	17°32'40"
Camerino	43°6'25"	30°36'33"	43°7'55"	13°3'50"	-1'30"	17°32'42"
Citta della Pieve	43°0'6"	29°31'27"	42°57'9"	12°0'14"	2'56"	17°31'13"
Comacchio	44°40'27"	29°42'17"	44°41'45"	12°10'56"	-1'19"	17°31'21"
Pennadi Billi	43°49'23"	29°47'10"	43°49'2"	12°15'56"	0'21"	17°31'13"
Perugia	43°6'46"	29°54'28"	43°6'45"	12°23'19"	0'0"	17°31'9"
Ravenna	44°25'5"	29°43'6"	44°25'14"	12°11'47"	-0'9"	17°31'18"
Recanati	43°25'44"	31°3'38"	43°24'23"	13°32'39"	1'21"	17°30'59"
Sarsina	43°55'21"	29°42'20"	43°55'8"	12°8'38"	0'13"	17°33'42"
Sutri	42°13'34"	29°44'26"	42°14'29"	12°13'35"	-0'55"	17°30'51"
Tolentino	43°12'30"	30°48'28"	43°12'30"	13°17'9"	0'0"	17°31'19"
				Σ/n	0'11"	17°31'7"

Name of the city	Deviations		Mean deviations
	φ [mm]	λ [mm]	[mm]
Citta della Pieve	14,77	1,09	14,81
Sarsina	1,09	13,52	13,57
Camerino	-7,51	8,60	11,42
Acqua-pendente	4,17	-9,77	10,62
Bagnarea	2,84	8,43	8,89
Civita Vecchia	-1,42	-7,68	7,81
Recanati	6,76	-0,08	6,76
Comacchio	-6,51	1,75	6,74
Ponte Corvo	4,17	4,67	6,27
Citta di Castello	3,34	-4,59	5,68
Urbania	-1,09	5,26	5,37
Terracina	4,42	-2,92	5,30
Terni	3,84	3,42	5,14
Corneto	0,75	-5,01	5,06
...	...	...	...

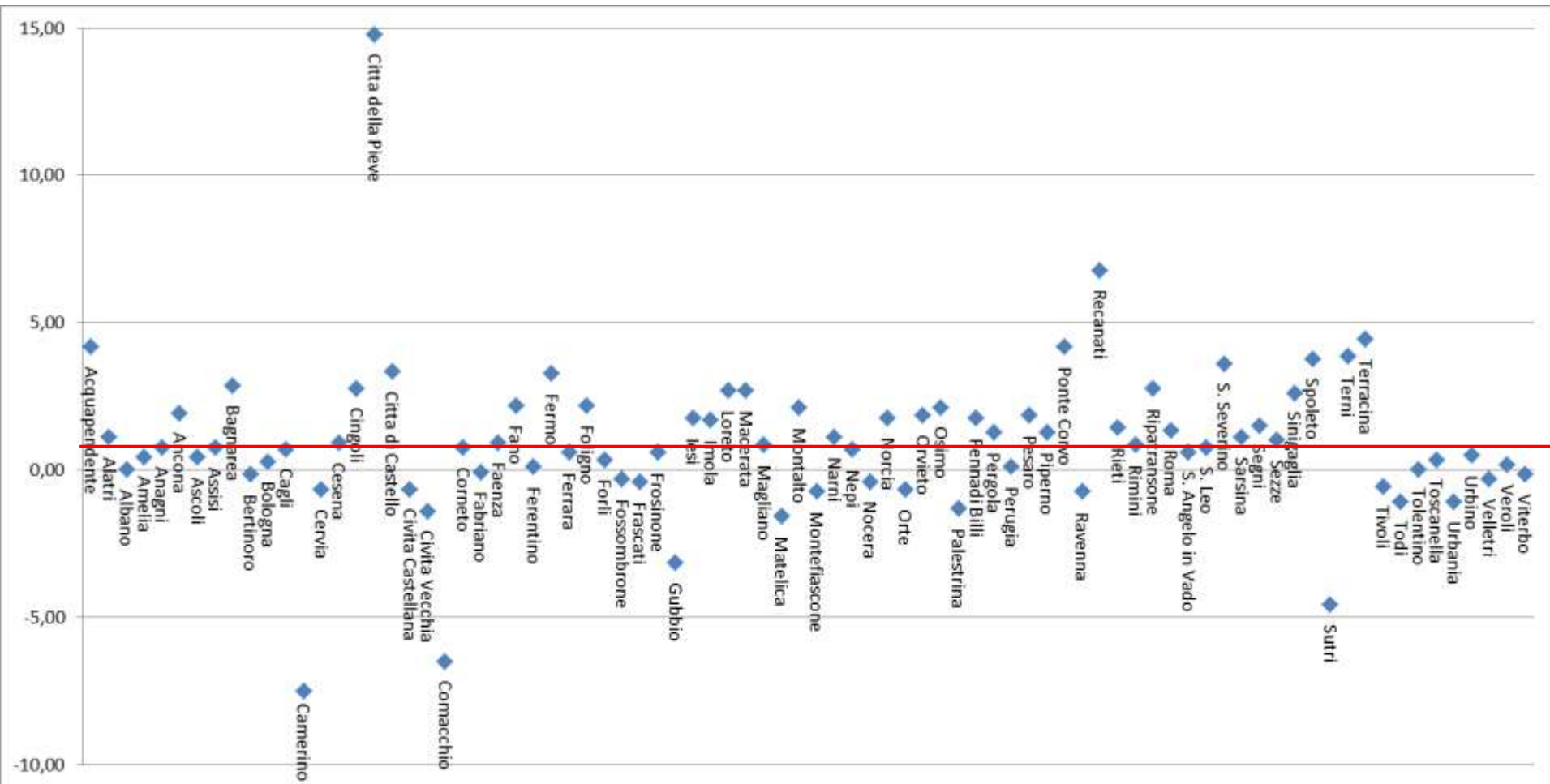
Name of the city	Deviations		Mean deviations
	φ [mm]	λ [mm]	[mm]
Bertinoro	-0,17	0,92	0,93
Faenza	0,92	-0,08	0,92
Urbino	0,50	0,75	0,90
Anagni	0,75	-0,50	0,90
Rimini	0,83	-0,25	0,87
Amelia	0,42	0,75	0,86
Veroli	0,17	0,75	0,77
Perugia	0,08	0,75	0,76
Montefiascone	-0,75	0,00	0,75
Cervia	-0,67	0,17	0,69
Fossombrone	-0,33	-0,58	0,67
S. Angelo in Vado	0,58	-0,17	0,61
Ferrara	0,58	-0,08	0,59
Albano	0,00	0,42	0,42
Velletri	-0,33	0,17	0,37
Σ/n	0,95	0,55	3,07±2,85

6,29±2,93 mm → 17°30'

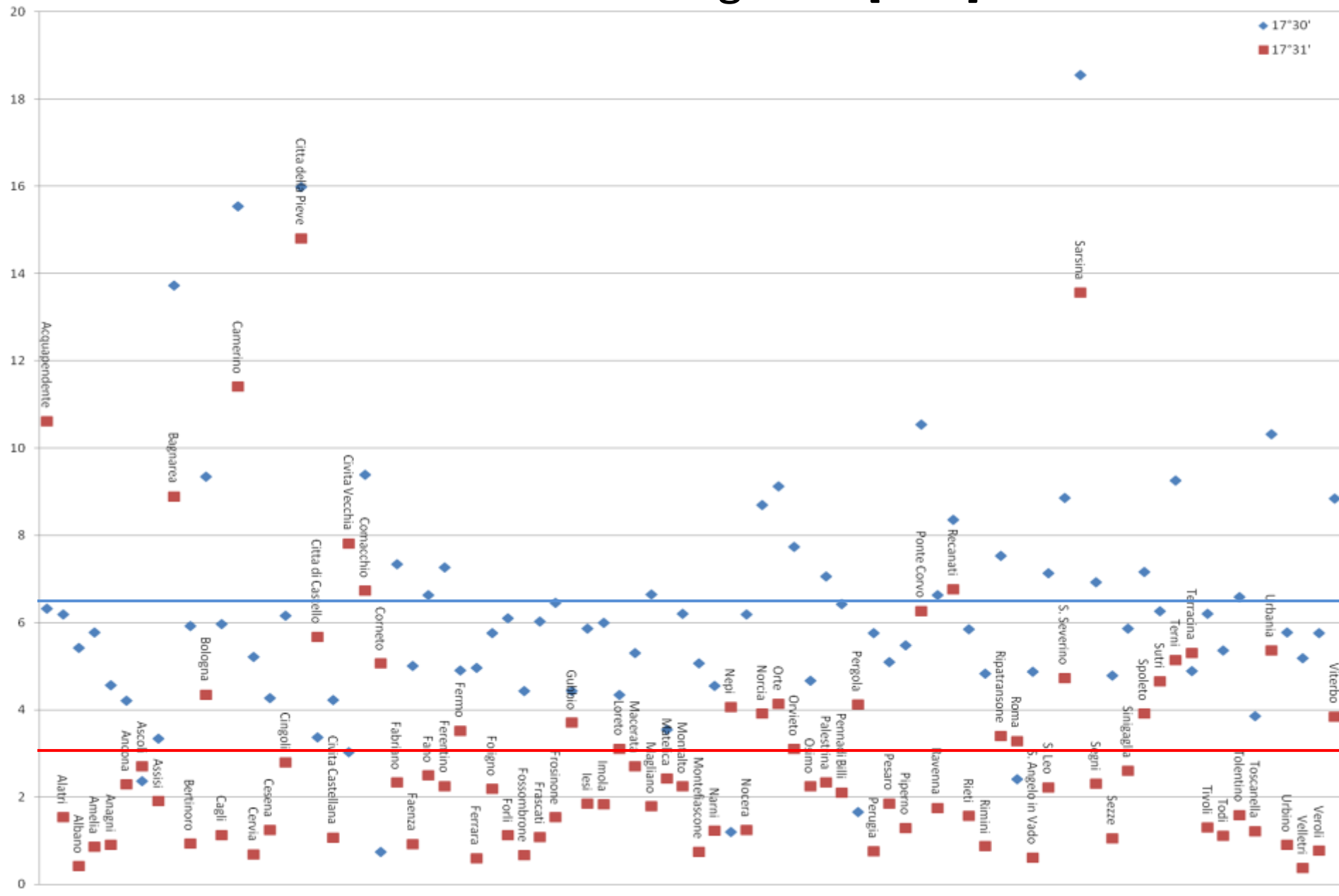


17°31'

Deviations – latitude [mm]



Deviations – longitude [mm]



Instead of conclusion

- Planimetric accuracy assessment – comparison geographical coordinates of position of the cities
- Maire and Bošković's evaluation of determined coordinates – $1' = 5 \text{ mm}$ in the scale of the map
- From the research
 - 14 cities deviate upward of 5 mm
 - Mean deviation – $40'' = 3 \text{ mm}$ in the scale of the map
 - Citta della Pieve, Sarsina, Camerino, Aquapendente deviate upward of 1 cm
 - Ponte Corvo – 6,25 mm
- Future research – planimetric accuracy assessment of other map content – rivers, roads...

Thank you for your attention