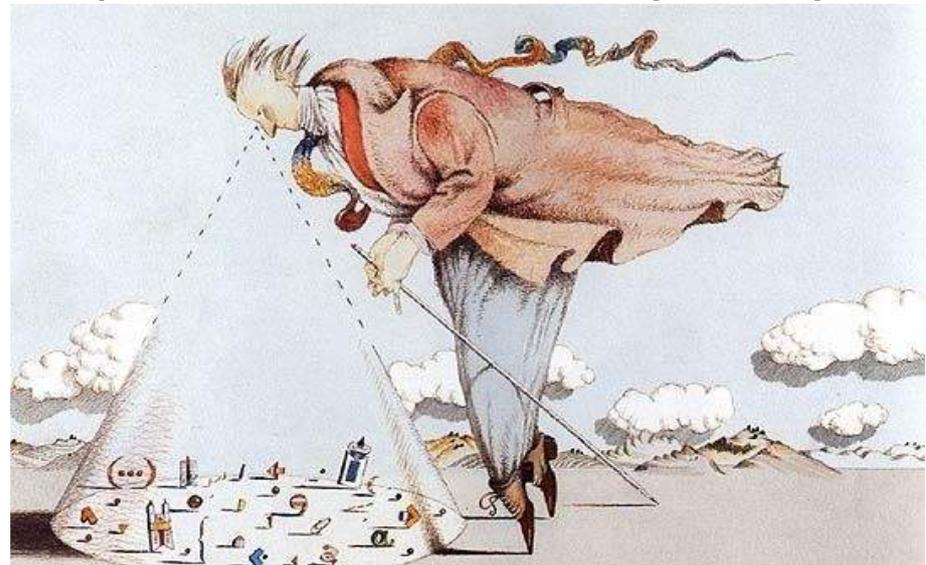


The eye of the beholder

Maps and the shaping of a perception of the world through images



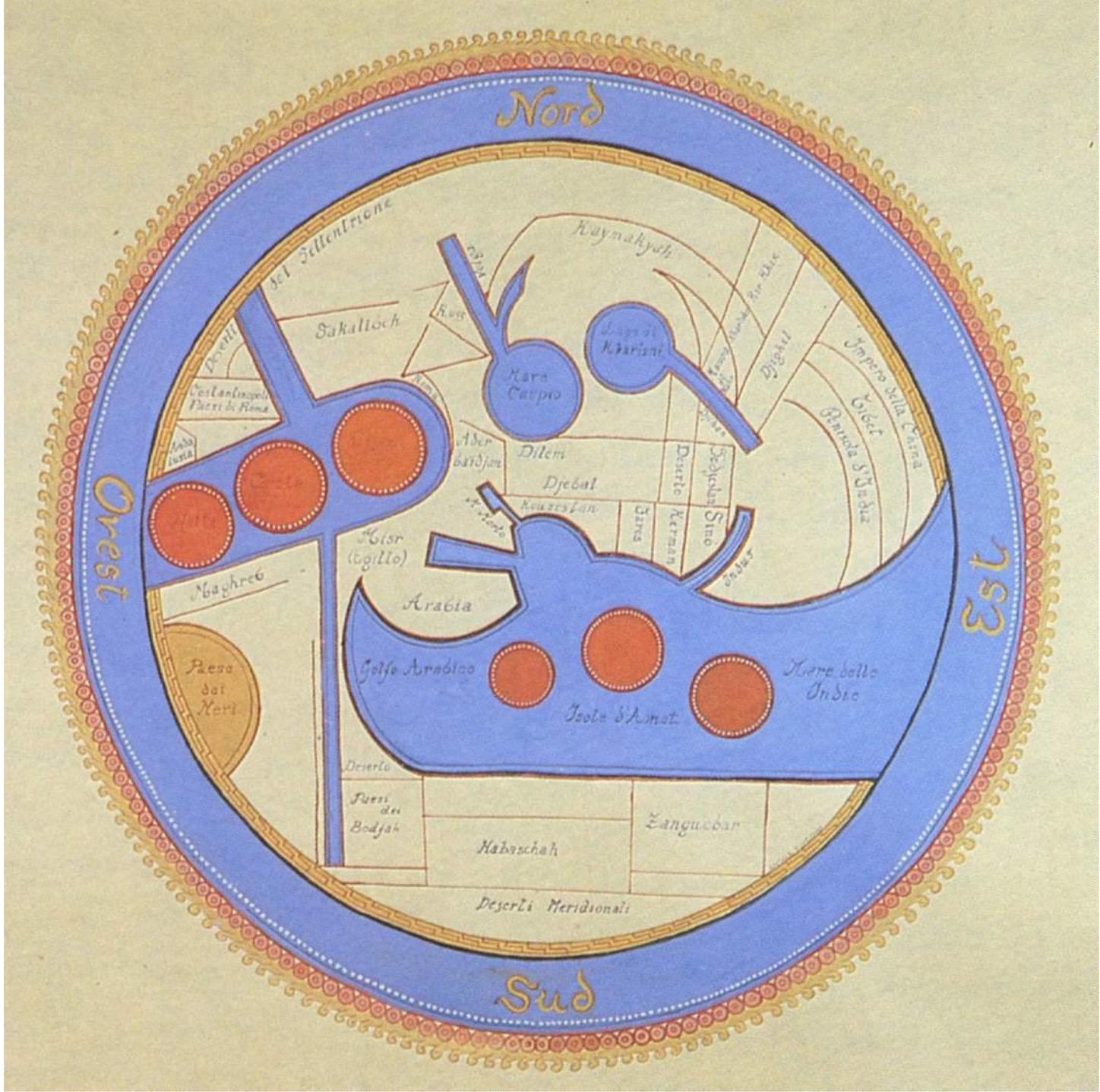
- Do maps lie?
 - Maps for planners – part A
 - A graphic form of reasoning
 - Maps for planners – part B
 - Visual computations
 - Spatial form of logical, multivariable, reasoning
 - Sustainable maps
 - Meaningful games
-

Do maps lie?

Maps, mapping and urban planning

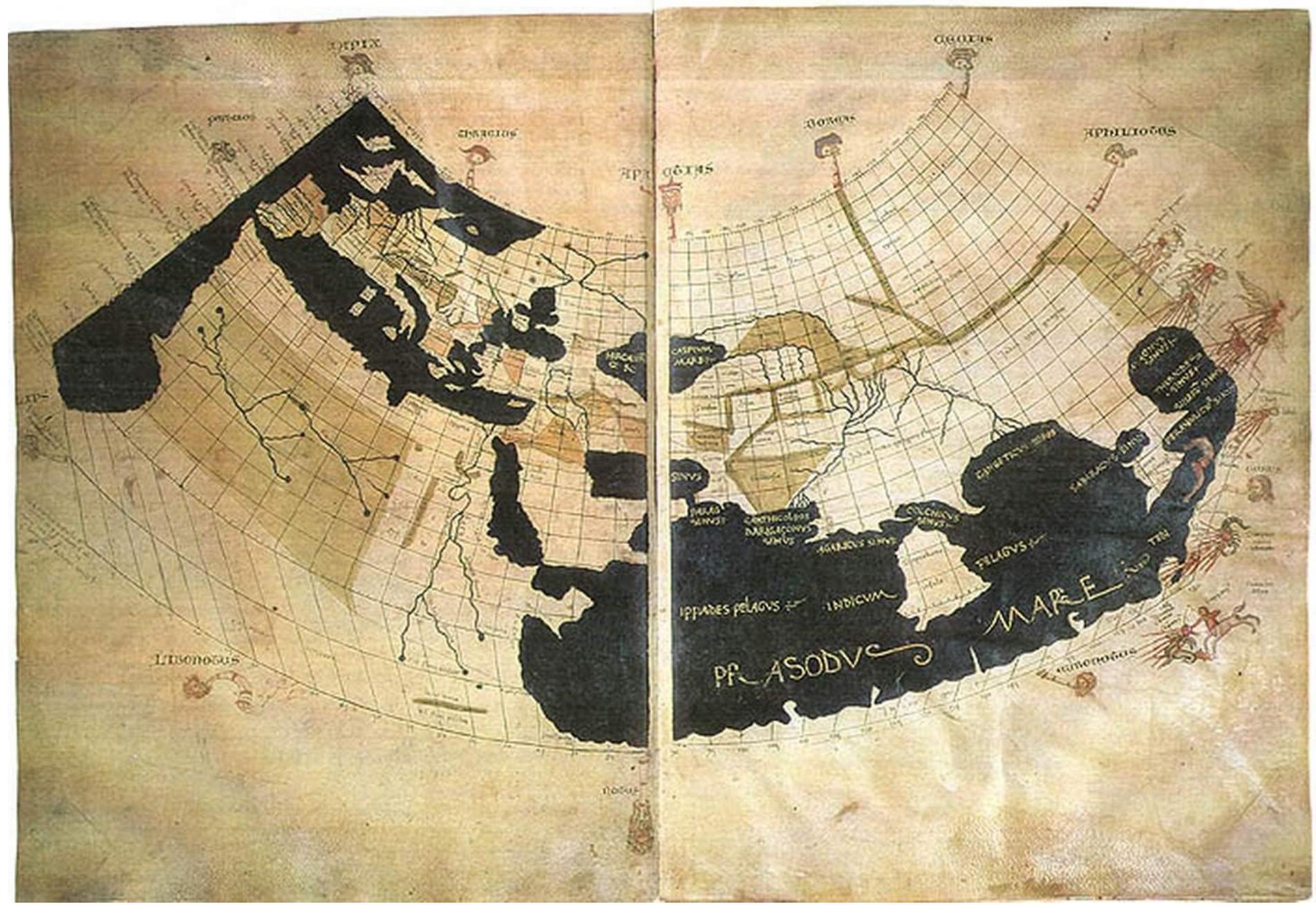


610-546 B.C
X century
↓



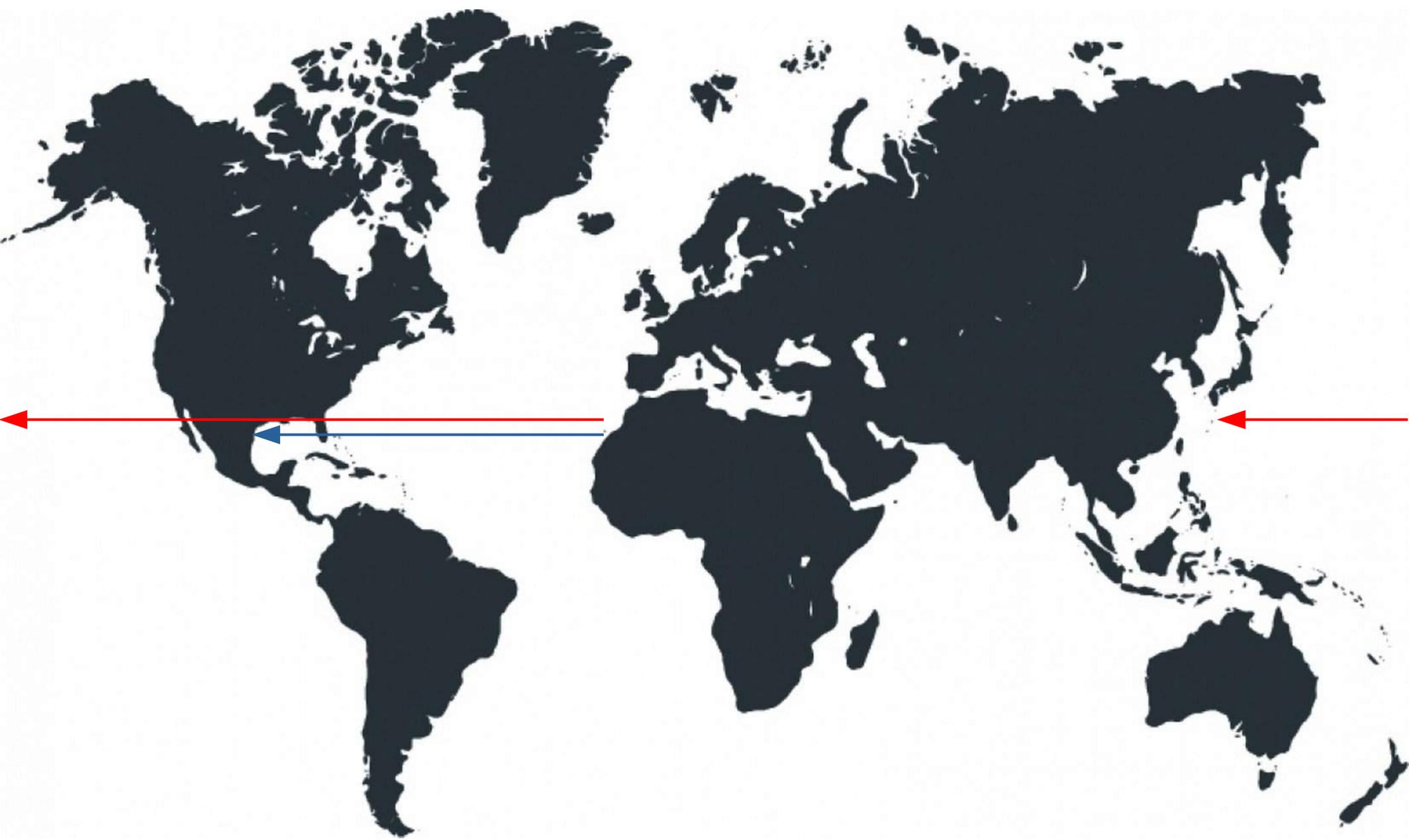
Al Istakhri's planisphere

610-546 B.C. | X century | XV century | 



Tolomeo's planisphere

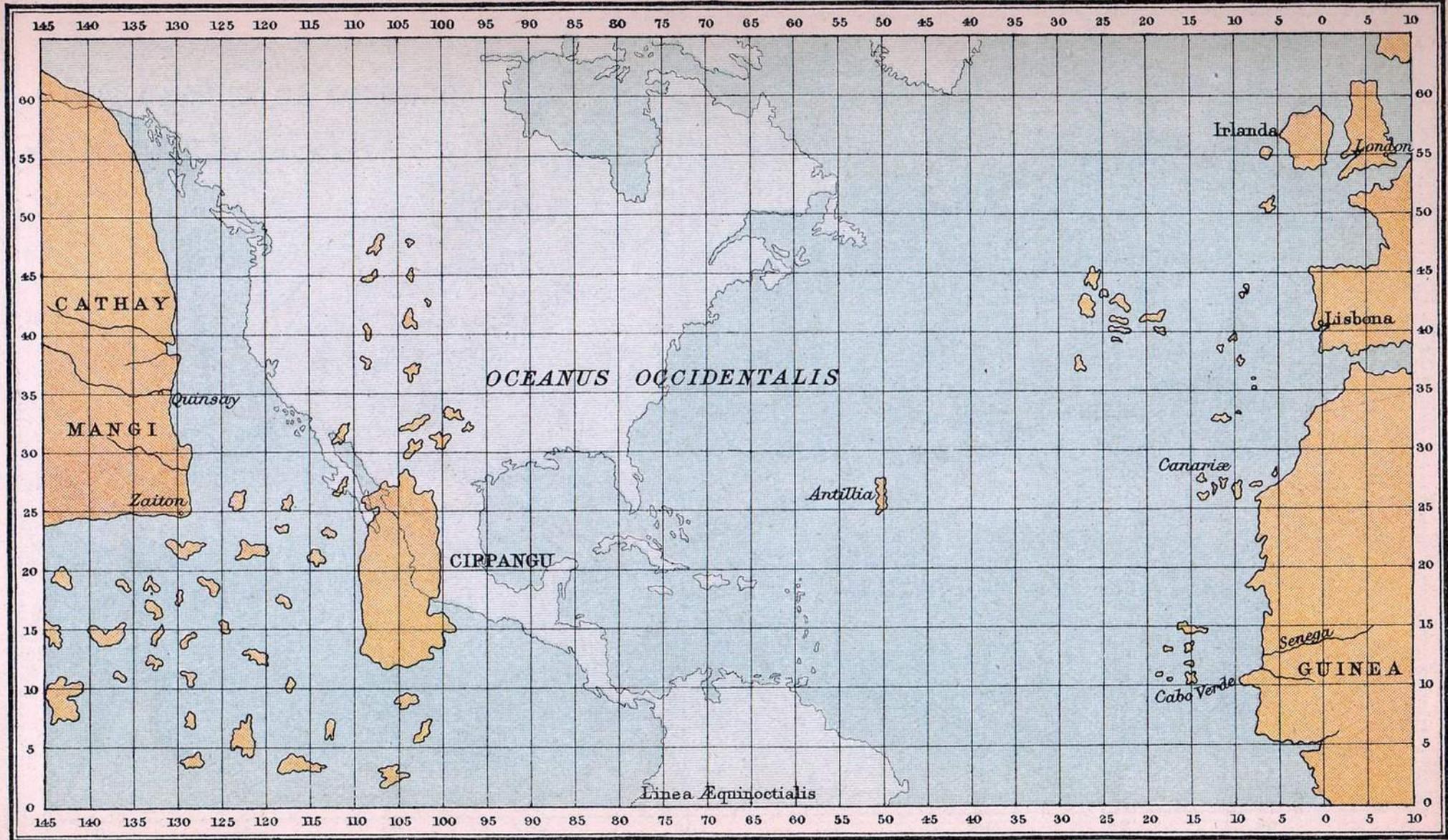
610-546 B.C | X century | XV century



Tolomeo's planisphere

610-546 B.C | X century | XV century →

ATLANTIC OCEAN, TOSCANELLI, 1474



The Correct outline of North America is shown in light blue tint



Leon Battista Alberti
Descriptio urbis Romae, 1445

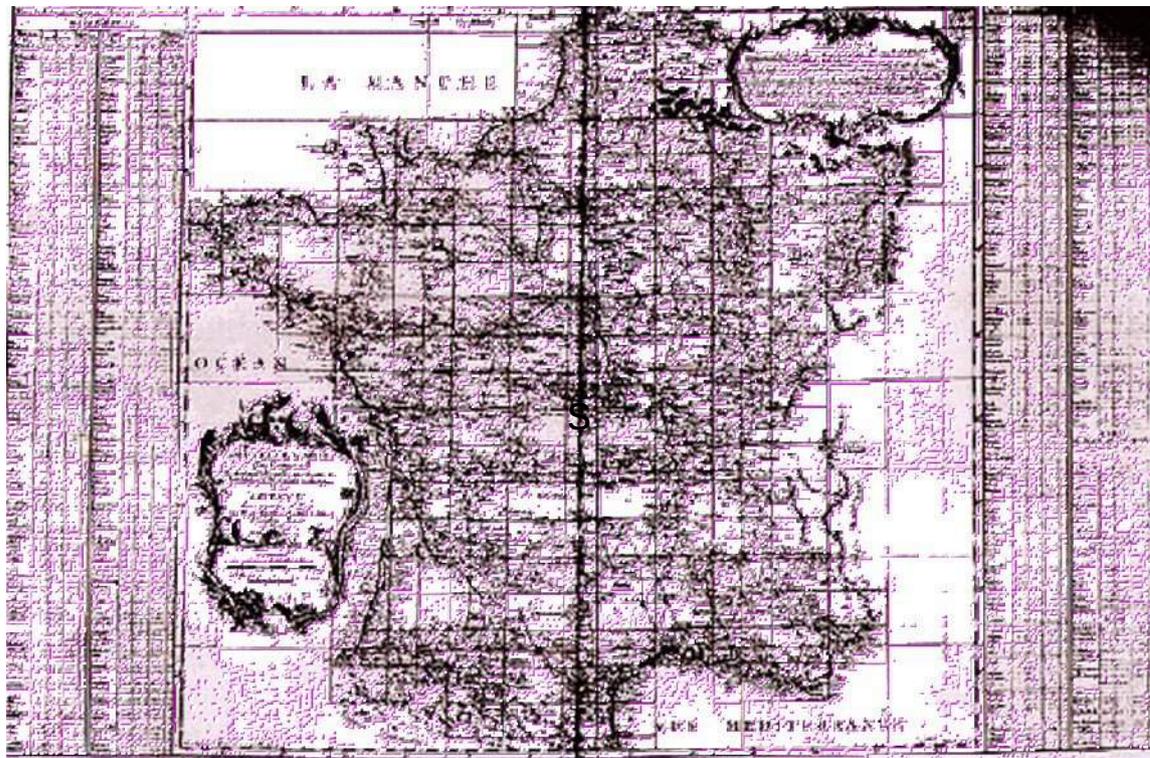


610-546 B.C | X century | XV century →

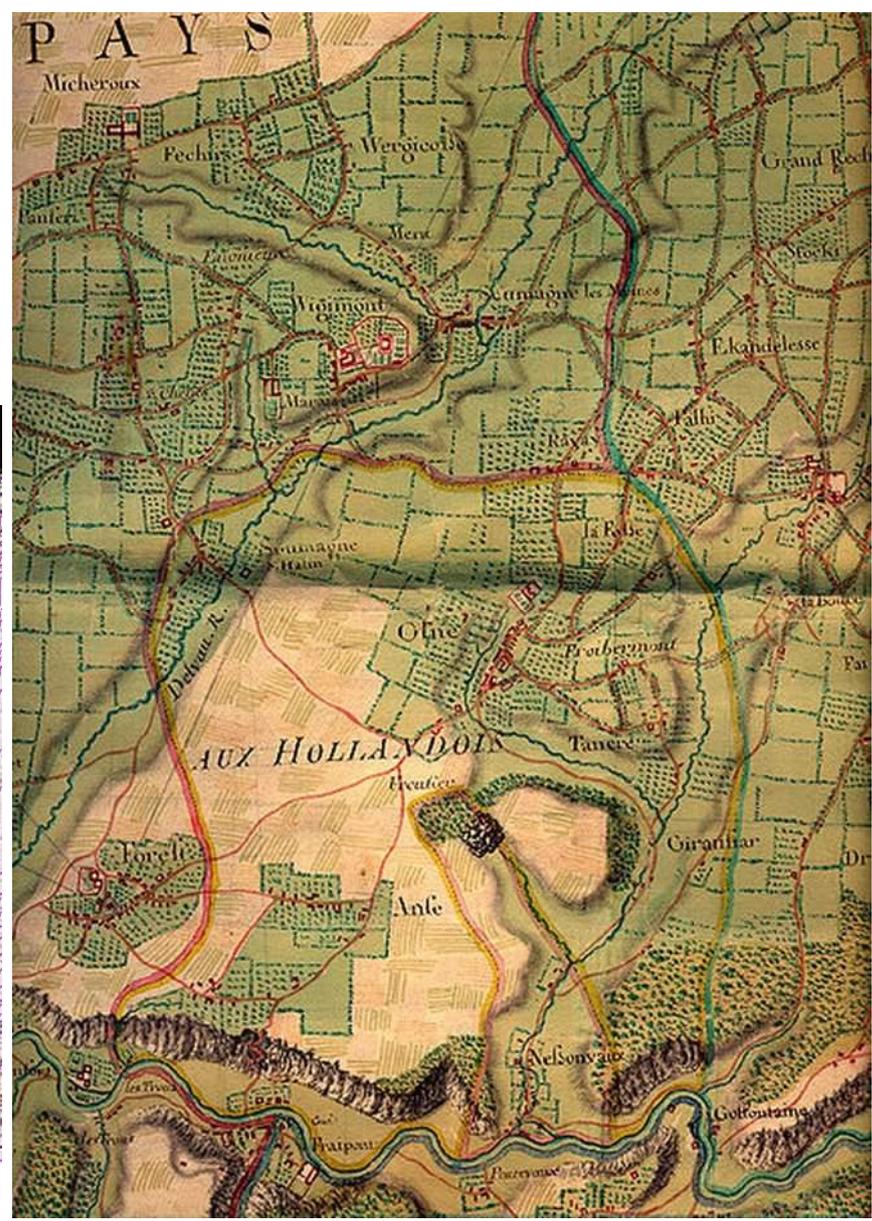


The chain map 1471-1482

610-546 B.C | X century | XV century | XVIII century

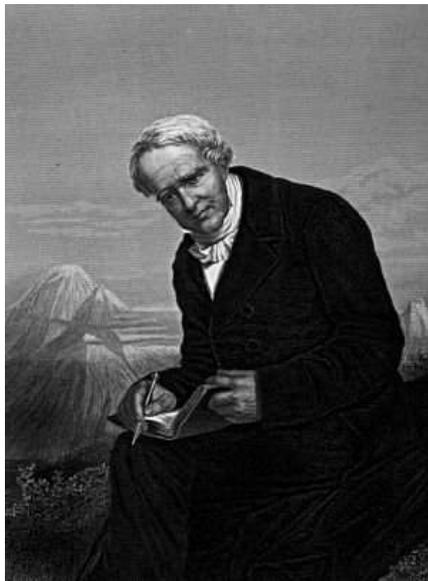
carta di Cesar Fracoise Cassini





The geographer is a topographer?
We need to measure the earth or to explore the world?

Der erdkunde end of XIX century



Alexander von Humboldt



Carl Ritter



Friedrich Ratzel

In the mapping activity we can discover two different aims:

- One directed to describe places



- One directed to measure spaces



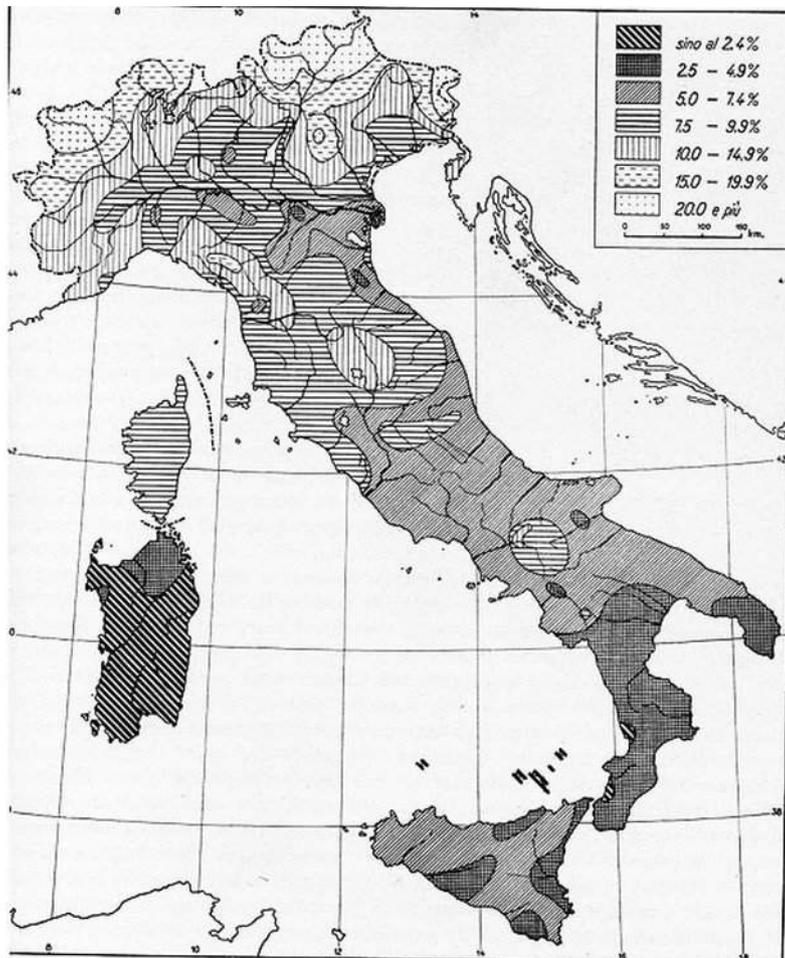
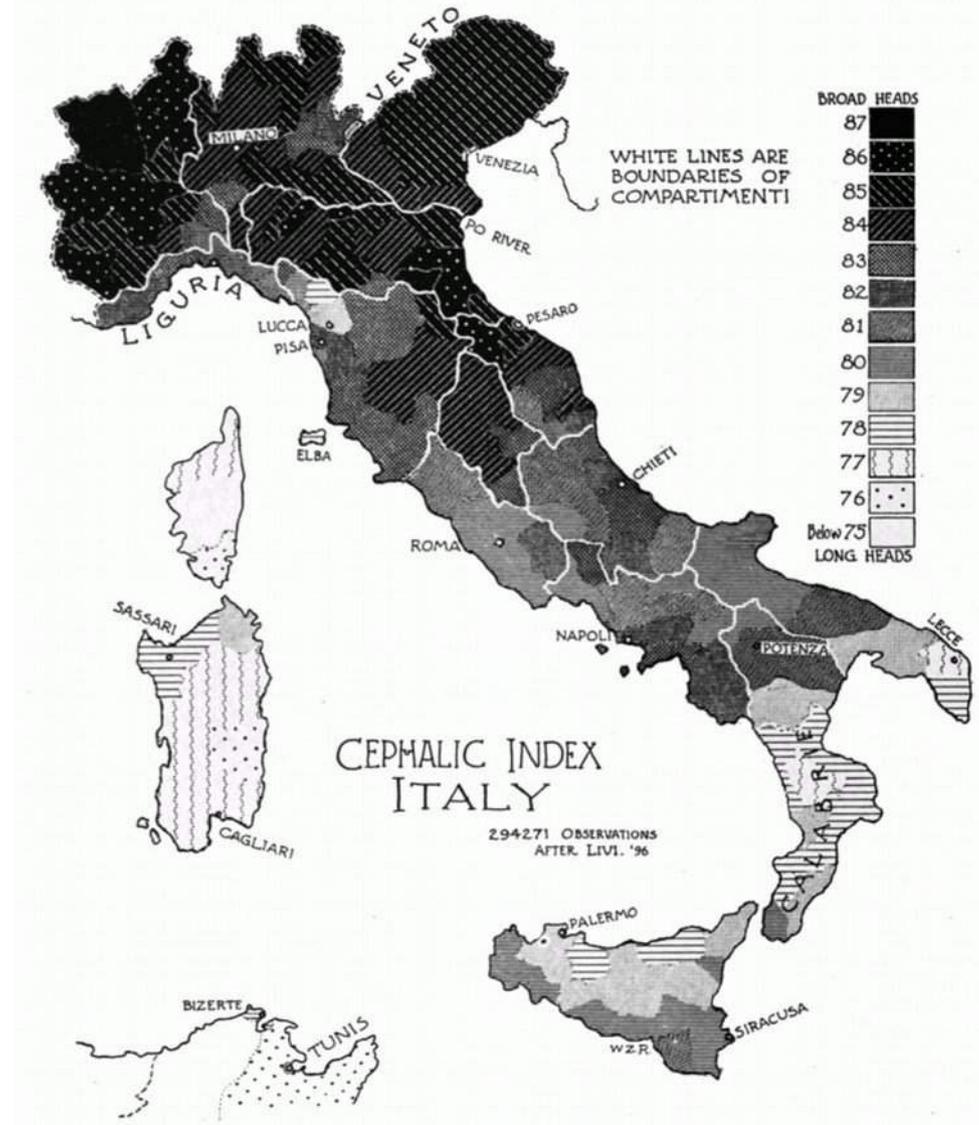


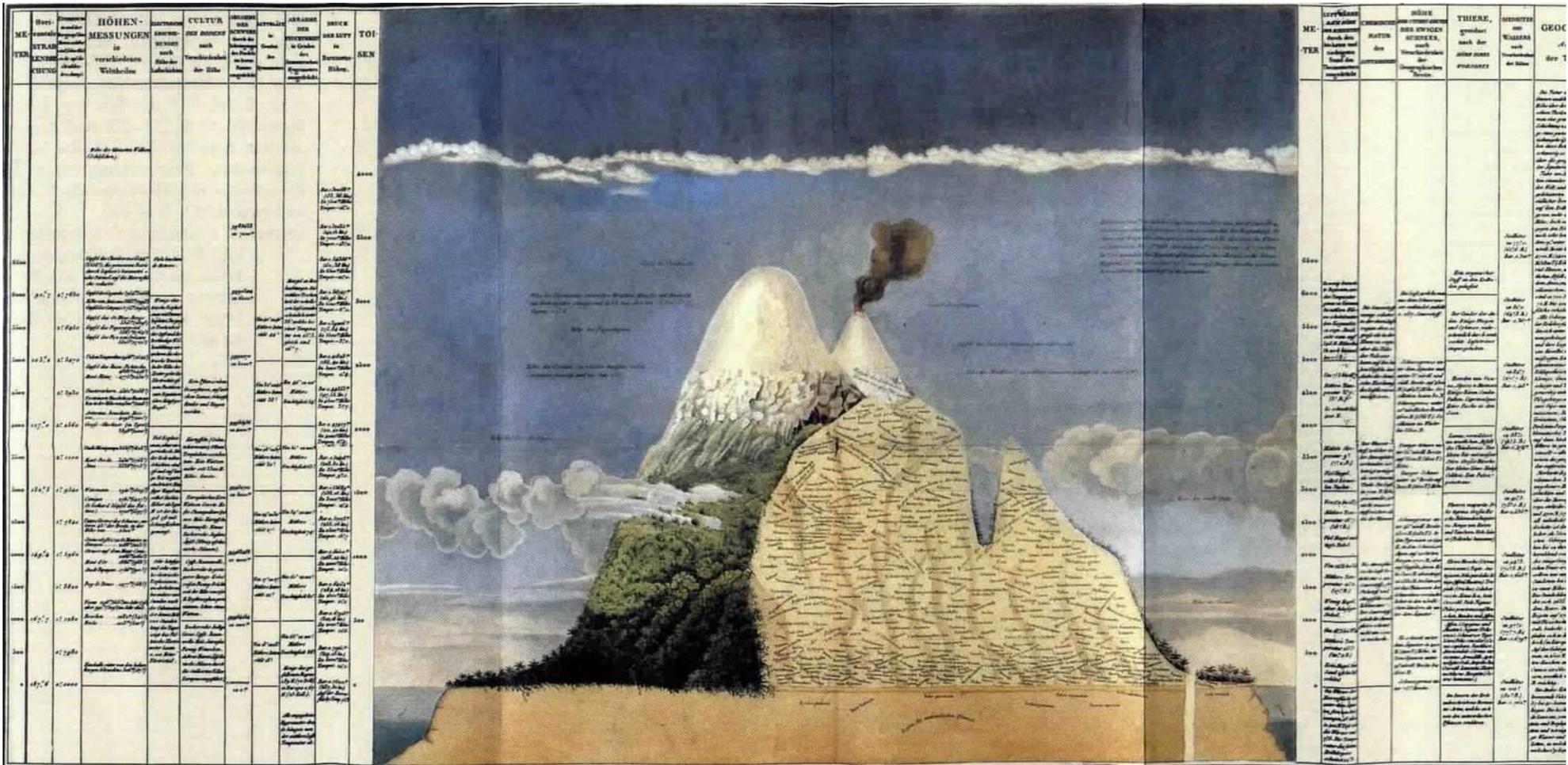
Fig. 52. Distribuzione delle percentuali di capelli biondi nella regione italiana (R. Biasutti). Uet

(tipo biondo misto), quindi degli individui con capelli neri e occhi castani o neri (tipo bruno misto). Allo studio dei tipi misti egli dette anzi la considerazione maggiore.

Il tipo biondo puro risulta effettivamente molto raro, andando da un minimo del 0,5% in vari circondari della Sardegna, al massimo di 11,3% in quello di Aosta.

BiodiversityForum.com



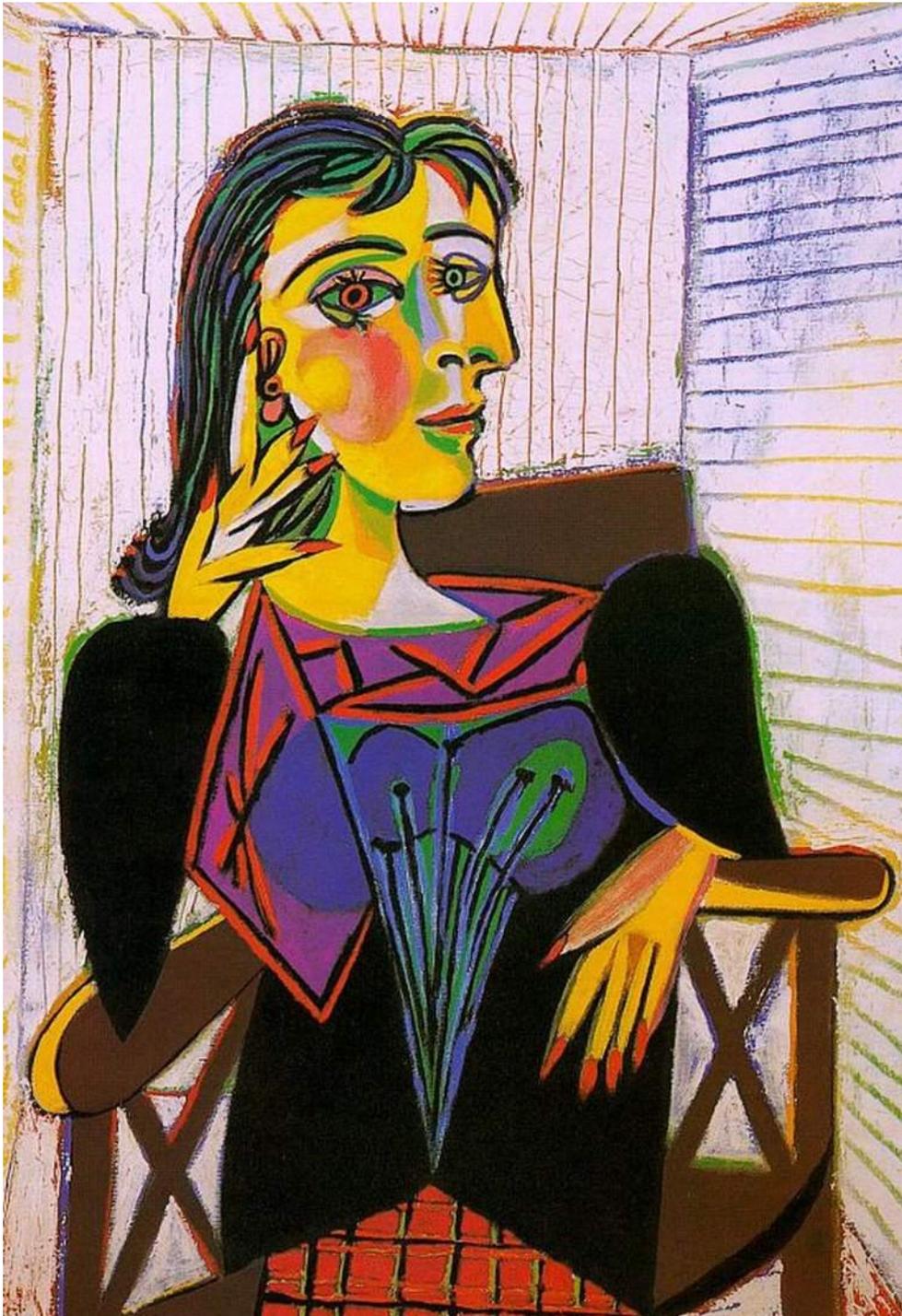


Geographie der Pflanzen in den Tropen-Ländern;
ein Naturgemälde der Anden,
gegründet auf Beobachtungen und Messungen, welche vom 10.^{ten} Grade nördlicher bis zum 10.^{ten} Grade südlicher Breite angestellt worden sind; in den Jahren 1791-1795
von ALEXANDER VON HUMBOLDT und A. G. BONPLAND.

Alexander von Humboldt

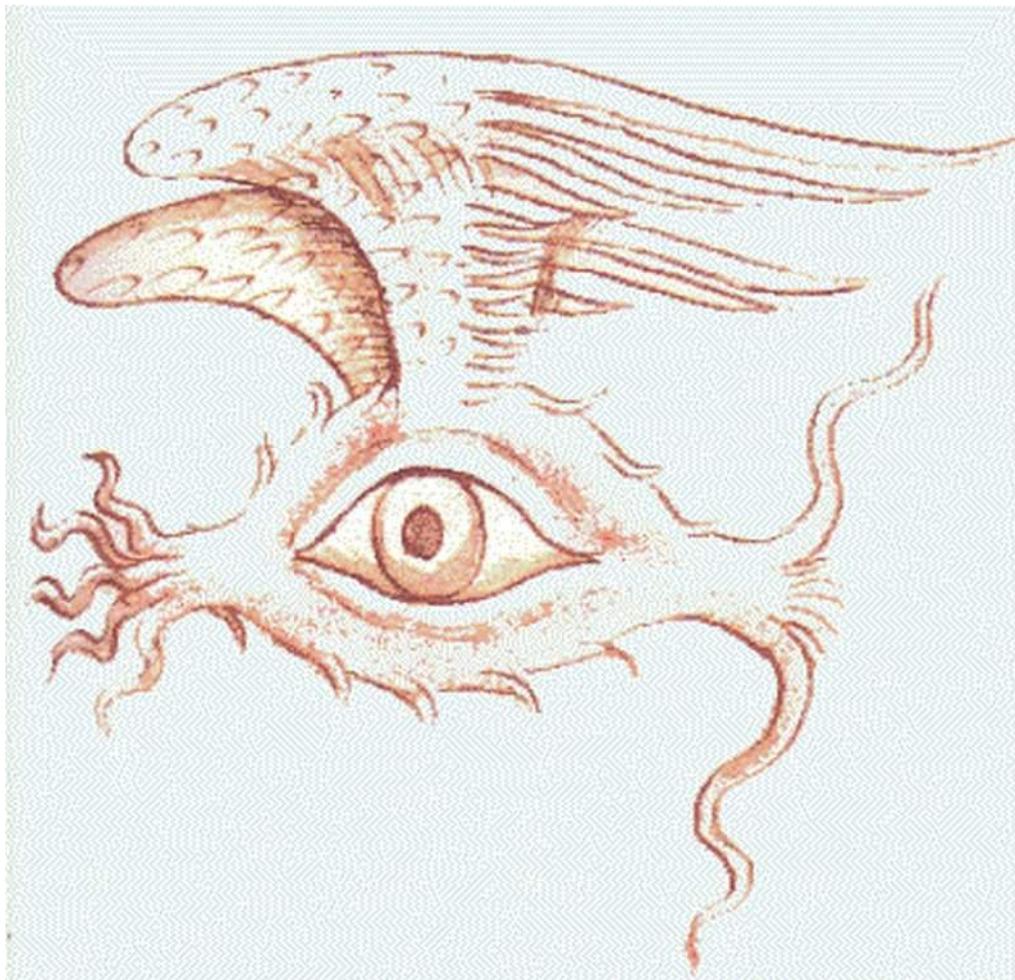
“... la rappresentazione geografica, facendo appello al senso comune, produce con-senso, genera cioè nei soggetti immagini spaziali *normalizzate* [...] da cui derivano comportamenti anch'essi <<normali>>.”

“... the geographic representation, by appealing to common sense, generate con-sensus, that is it generates in people normalised images [...] that are at the origin of equally «normal» behaviours.”



P. Picasso, the portrait of Dora Maar - 1937

The map after L.B. Alberti, through the perspective, shows a single point of view



Do maps lie?



LEO BELGICVS

Scala Althar Germa
2 4 6

Artificioſa
& Geographica
cabula ſub Leonis
figura 17. inferioris
Germaniae Provincias
repreſentans, cui addi-
ta ſunt ſingularum inſig-
nia, una cum ordinaria
Praefectarum diſtinc-
tione earum, Praefec-
tis; prout à 1550. à ſu-
premo earumdem Ma-
giſtratu diſtributa
anq. conſtituta
fuerunt.

Catalogus Civitatum Paſſi-
rum in ſingulis Provinciis

Comitatus Flandriae	30	1400
Comitatus Zeelandiae	5	101
Comitatus Andriae	50	1144
Comitatus Artoſiae	12	744
Comitatus Namurum	24	950
Comitatus Limburgum	4	1185
Ducatus Brabantiae	26	702
Ducatus Luxemburgi	2	1090
Ducatus Lincburgenſis	23	900
Archidiaconatus Sepſimii	1	0
Dominus Mechliniae	1	0
Dominus Ultraburgi	4	703
Dominus Friburgi	13	400
Dominus Trajectum	11	101
Dominus Gronovae	1	148

ANGLIA
Catheter
PARIS
London
Tilber
Recheſter
Dover



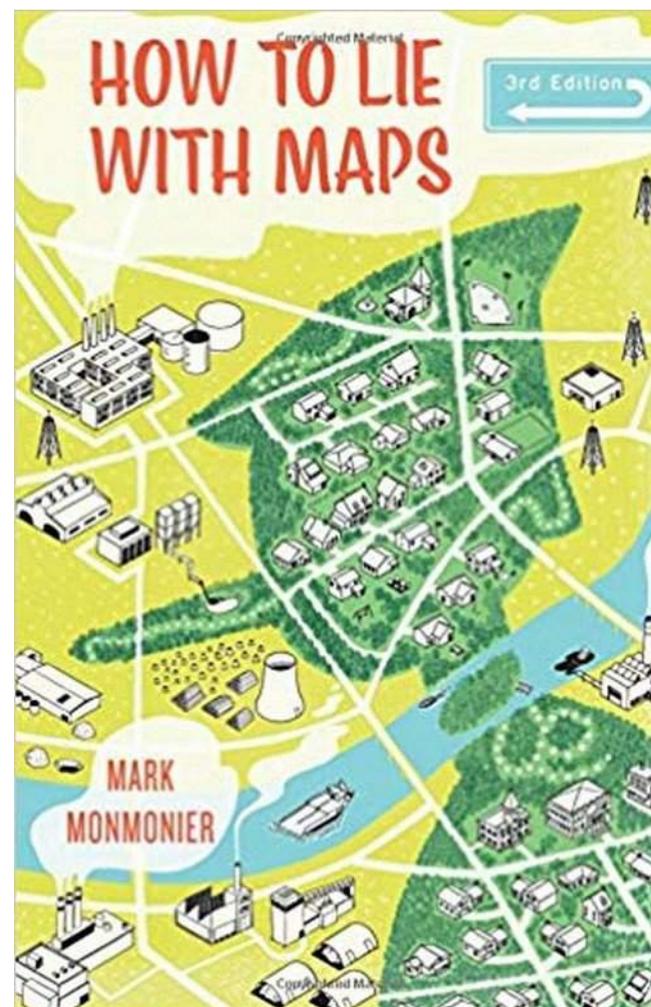
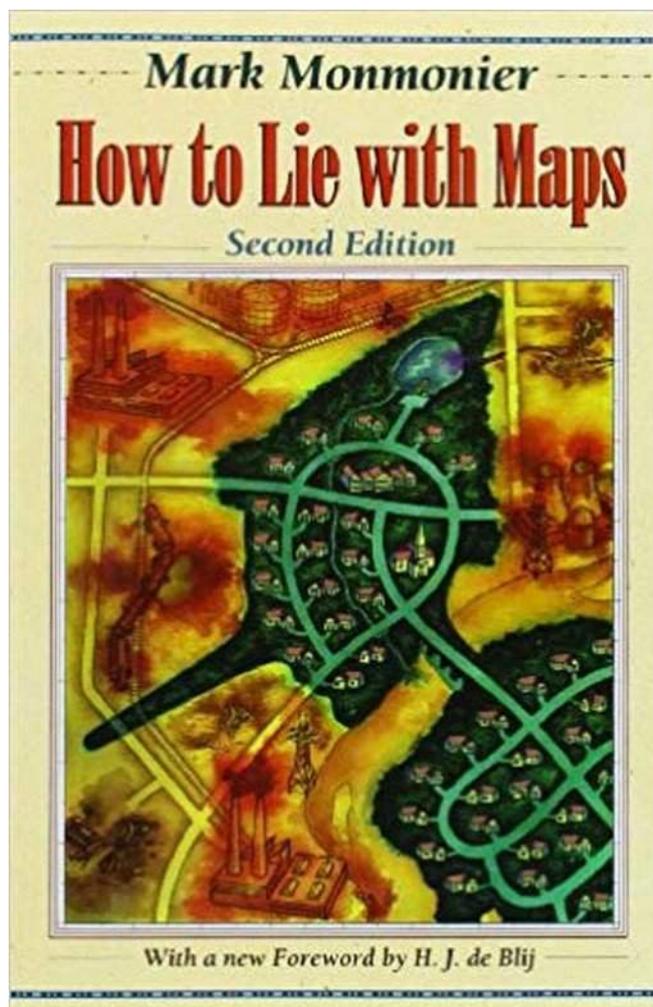




1996







Do maps lie?

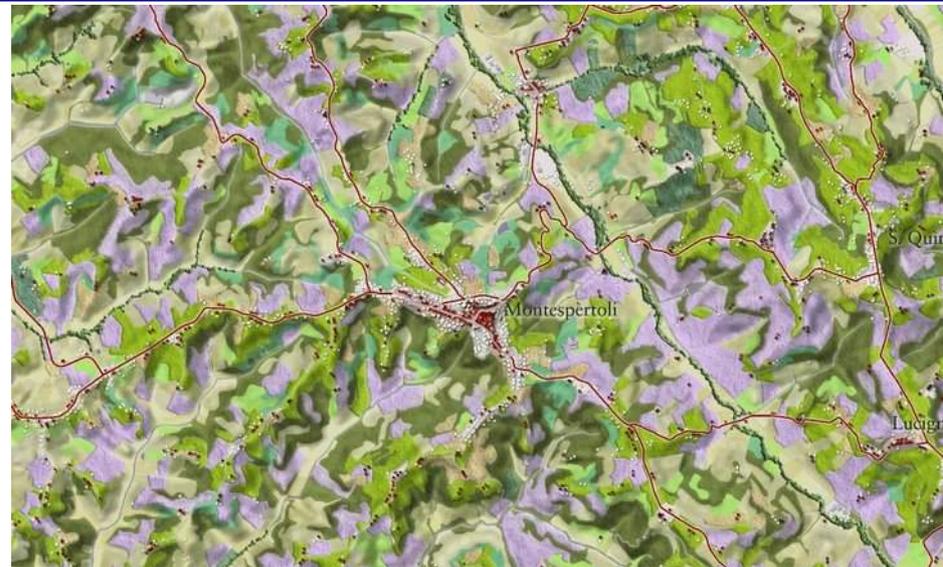
Maybe they don't (sometimes) but

A map is never the reality, never the truth

We can think of a map as a metaphor

Strongly intentional

Maps for planners (but not only for planners) – part A



Regione Toscana - SITA: Cartoteca

Guida

Trova | Legenda interattiva | Info

Filtro: X

- Download
 - Carta Tecnica Regionale
 - Immagini aeree
 - Database topografico
 - Uso e Copertura del Suolo
 - Grafo stradale
 - Morfologia
 - Inquinamenti fisici
 - Toponomastica
 - Ambiti amministrativi
 - Aree protette
 - Alberi monumentali
 - Geotopi di importanza regionale
 - Aree RAMSAR
 - Siti di Interesse Regionale (SIR)
 - Siti Natura 2000
 - Habitat nei Siti Natura 2000 (HASCITU)
 - Territori montani
 - Zone di produz. vini
 - Zone DOP e IGP
 - Zone svantaggiate (artt.31 e 32, UE 1305/2013)
 - Inquadramenti CTR
 - Geologia
 - PIT con valenza di Piano Paesaggistico
 - Pedologia
 - Grotte e carsismo
 - ISTAT
 - Periodizzazione dei sedimi edilizi
 - Centri matrice della toscana
 - Piano Faunistico Venatorio
 - Scuole
 - Elementi del mosaico catastale raster 5k
 - Cartografia Storica Regionale (CASTORE)
 - Uso del Suolo Agroforestale Ottocentesco
 - REpertorio TOponastico REGIONALE (RETORE)
 - Opifici manifatturieri nella Toscana del XIX secolo
 - Fonti rinnovabili
 - Carta topografica 1:25.000
 - Regio decreto 3267/1923
 - Toponimi

20 km / 10 mi | 1 : 1.185.245



“Un'ipotesi: esiste la possibilità di mostrare attraverso la cartografia i caratteri del paesaggio (insieme alla sua evidenza fenomenologica e le regole che lo strutturano); e, nello stesso tempo, che questa possibilità possa realizzarsi senza allontanarsi dal rigore della topografia e della costruzione metodica dei materiali descrittivi”

“An hypothesis: it is possible to show, through cartography, the characters of the landscape (with its phenomenological patency and structural rules); and, at the same time, it is possible to realise this without going away from the rigour of topography and of the methodical construction of the description”



This is based on:

- Selection
- Generalisation
- Symbolisation

**INSEDIAMENTI
E INFRASTRUTTURE**

-  centri matrice
-  insediamenti al 1850
-  insediamenti al 1954
-  insediamenti civili recenti
-  insediamenti produttivi recenti
-  percorsi fondativi
-  viabilità recente
-  aeroporti
-  aree estrattive

**COLTIVI
E SISTEMAZIONI IDRAULICHE-AGRARIE**

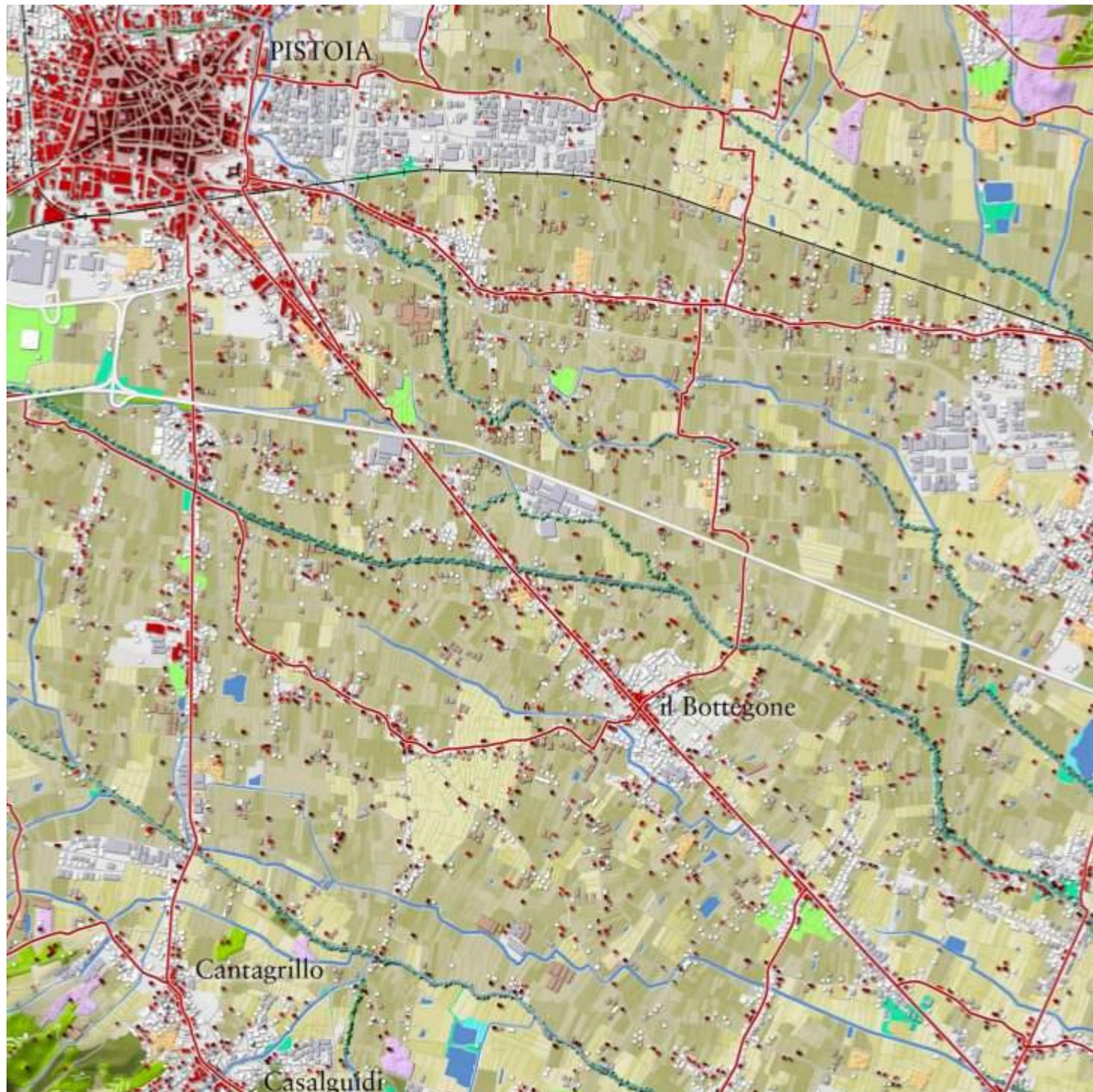
-  trama dei seminativi di pianura
-  aree a vivaio
-  serre
-  vigneti
-  zone agricole eterogenee
-  vigneti terrazzati
-  oliveti terrazzati
-  zone agricole eterogenee terrazzate

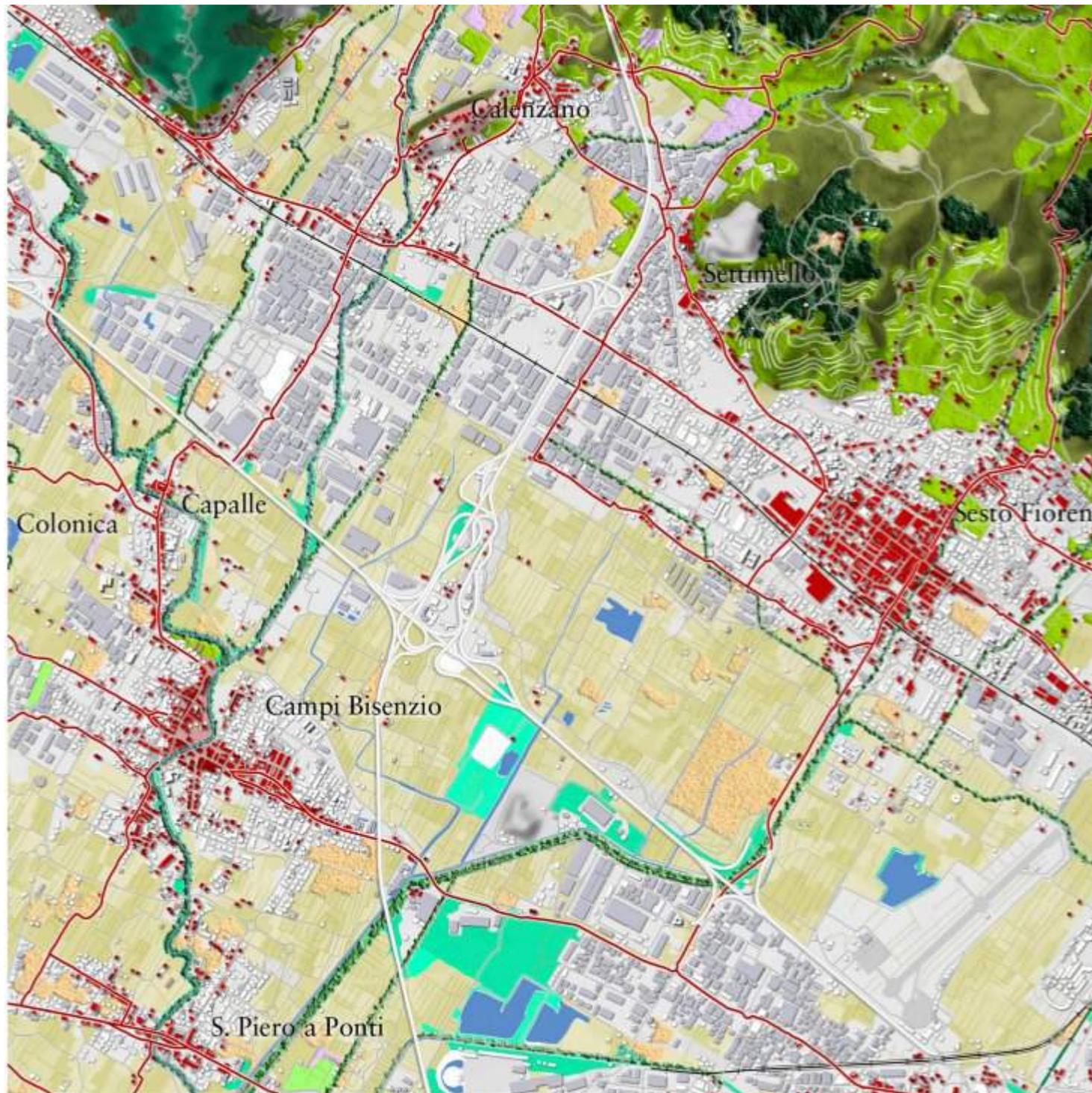
**CARATTERIZZAZIONE VEGETAZIONALE DEI BOSCHI
E DELLE AREE SEMI-NATURALI**

-  boschi a prevalenza di leccio
-  boschi a prevalenza di sughera
-  boschi a prevalenza di rovere
-  boschi a prevalenza di faggio
-  boschi a prevalenza di pini
-  boschi a prevalenza di cipresso
-  boschi di abete rosso
-  boschi di abete bianco
-  macchia mediterranea
-  gariga
-  vegetazione ofiolitica
-  pascoli e incolti di montagna
-  castagneti da frutto
-  vegetazione ripariale
-  boschi planiziali

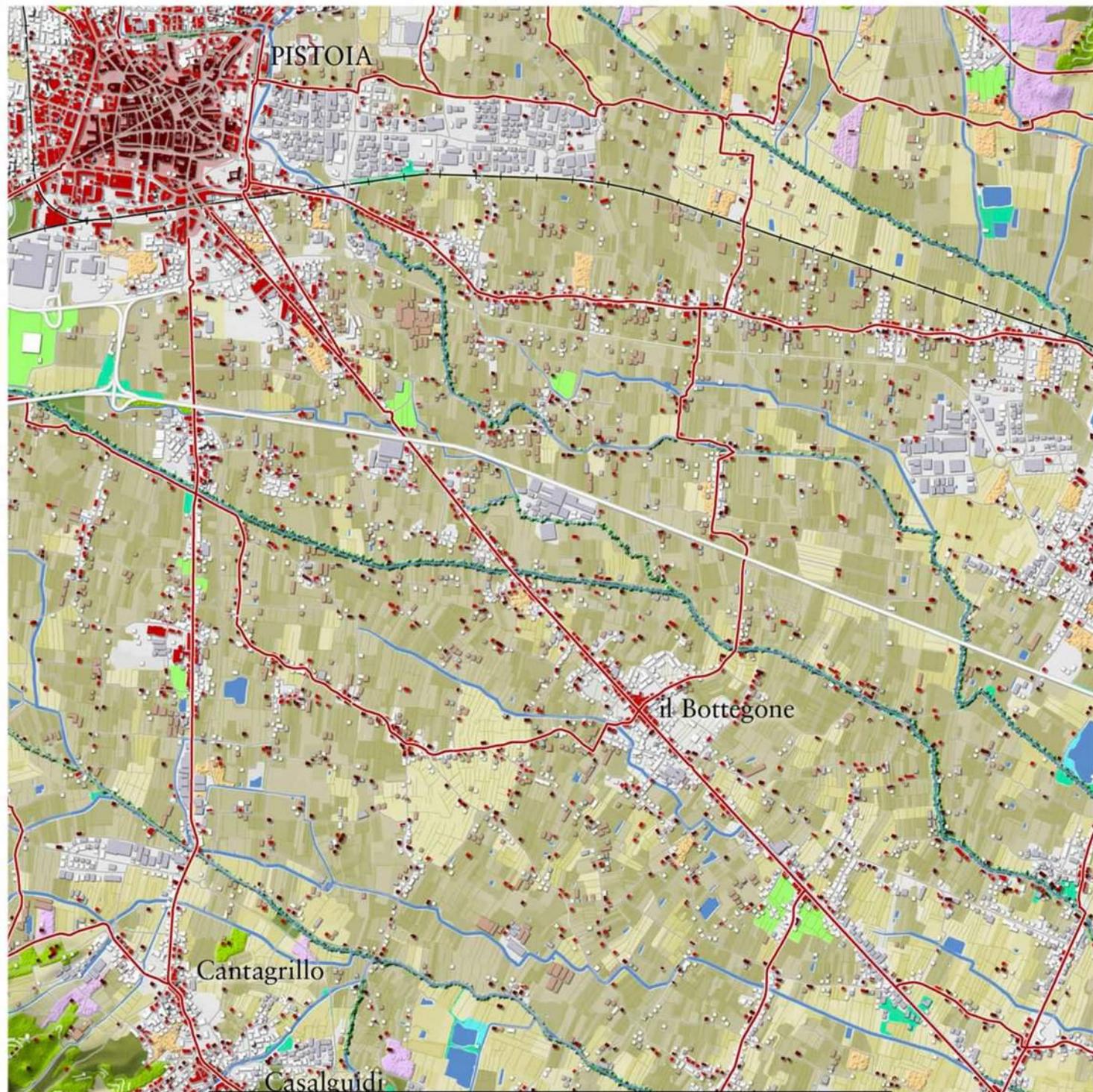
AREE UMIDE ED ELEMENTI IDRICI

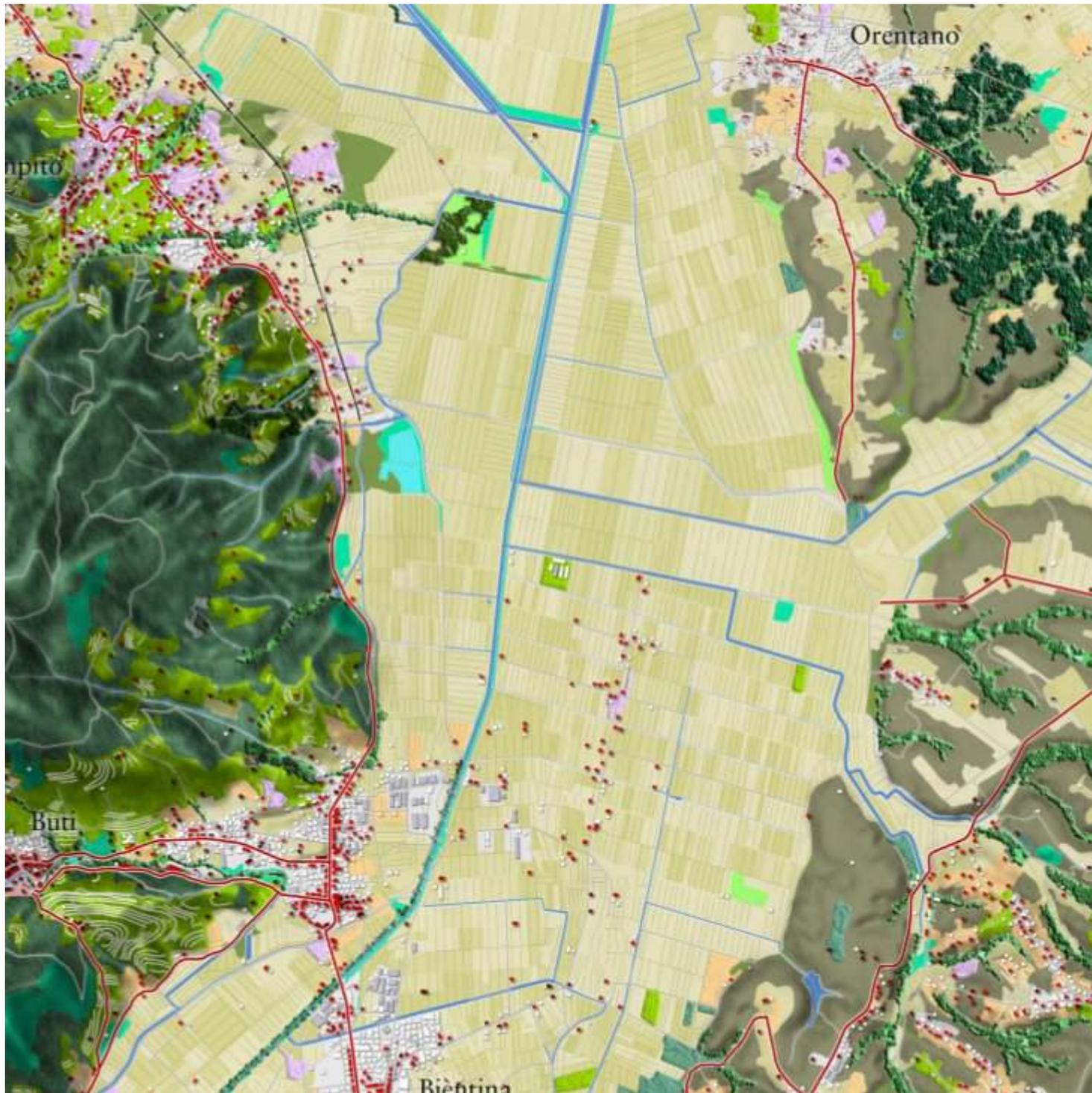
-  aree umide
-  corsi d'acqua
-  bacini d'acqua

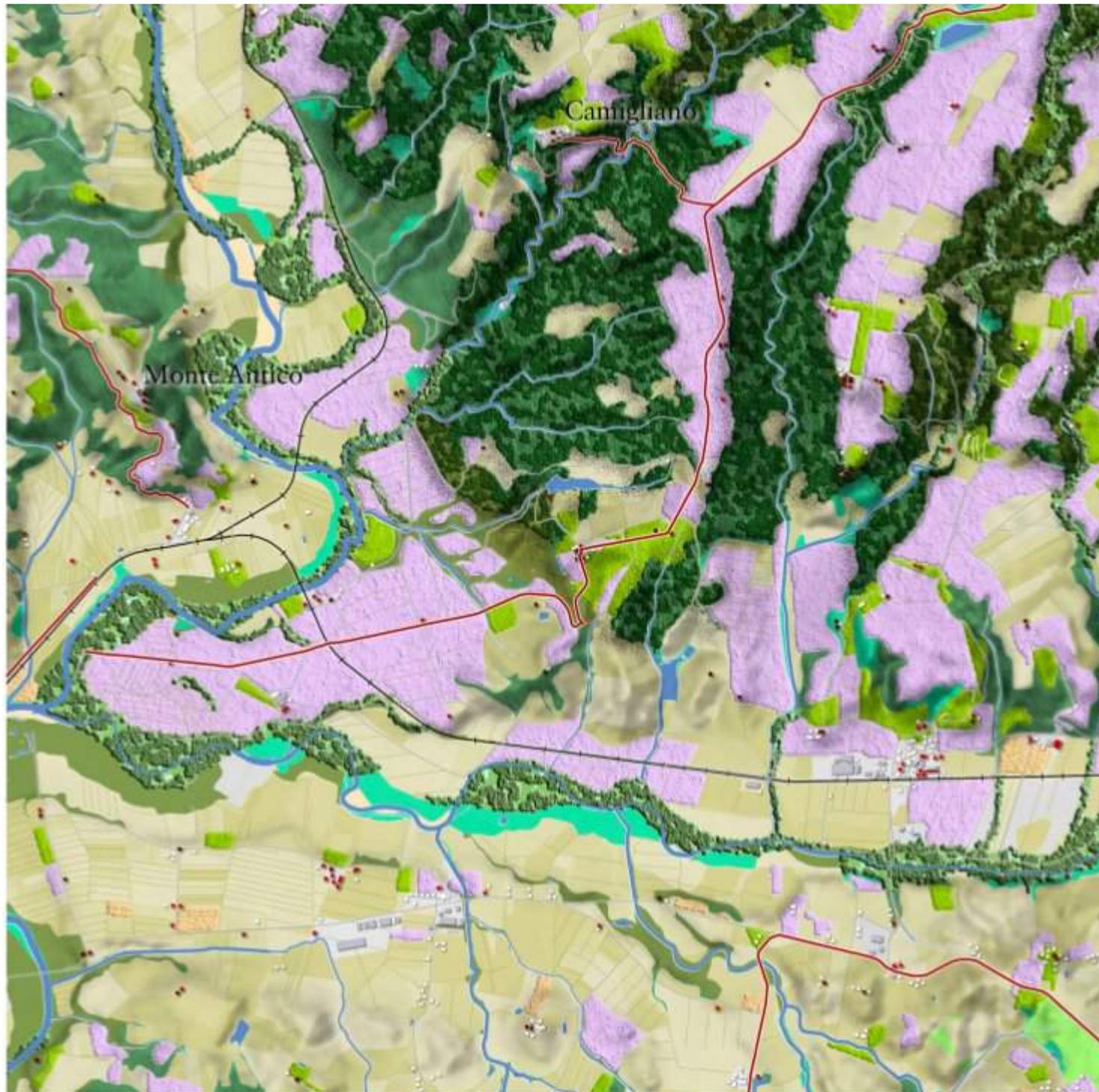


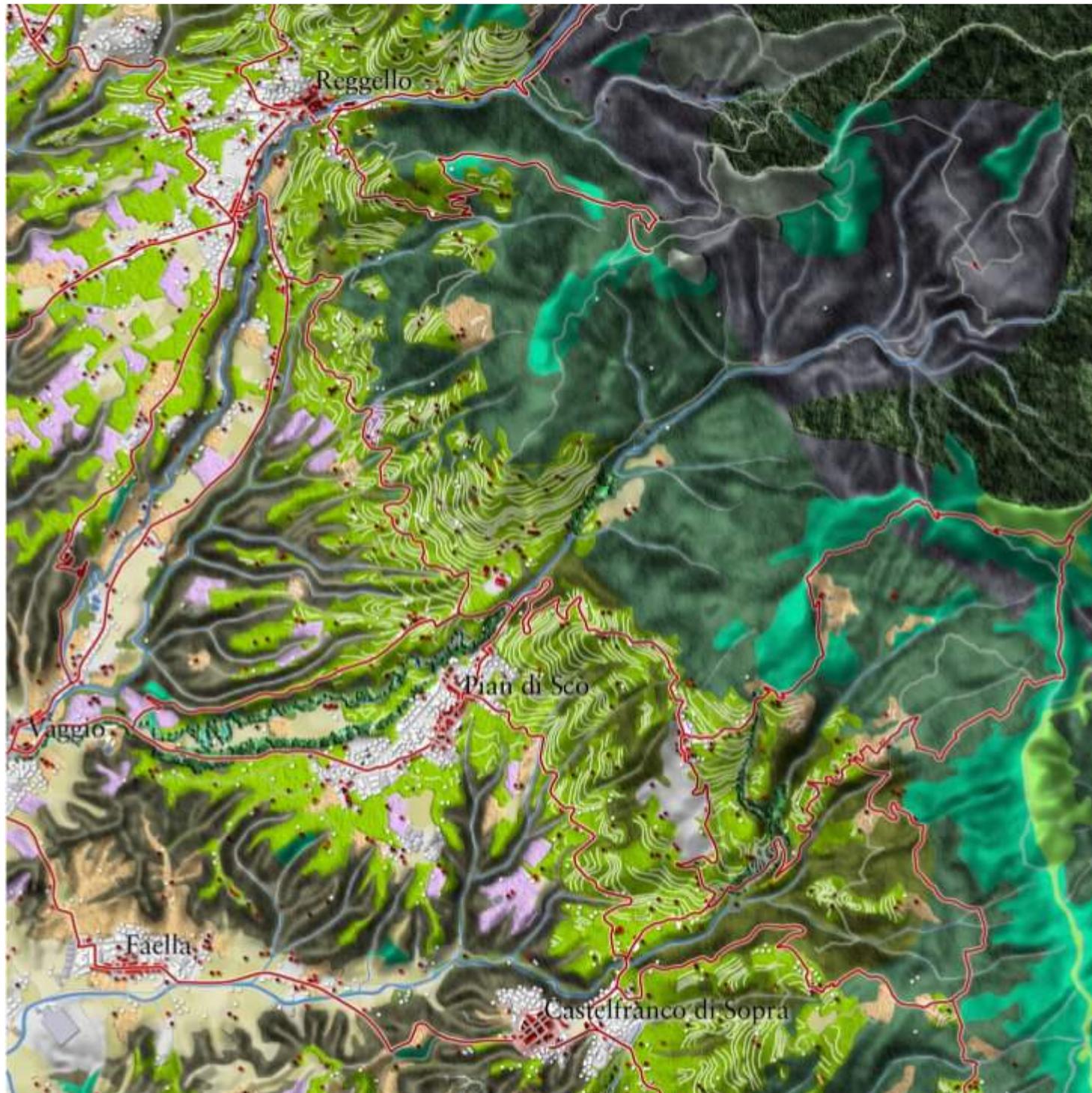


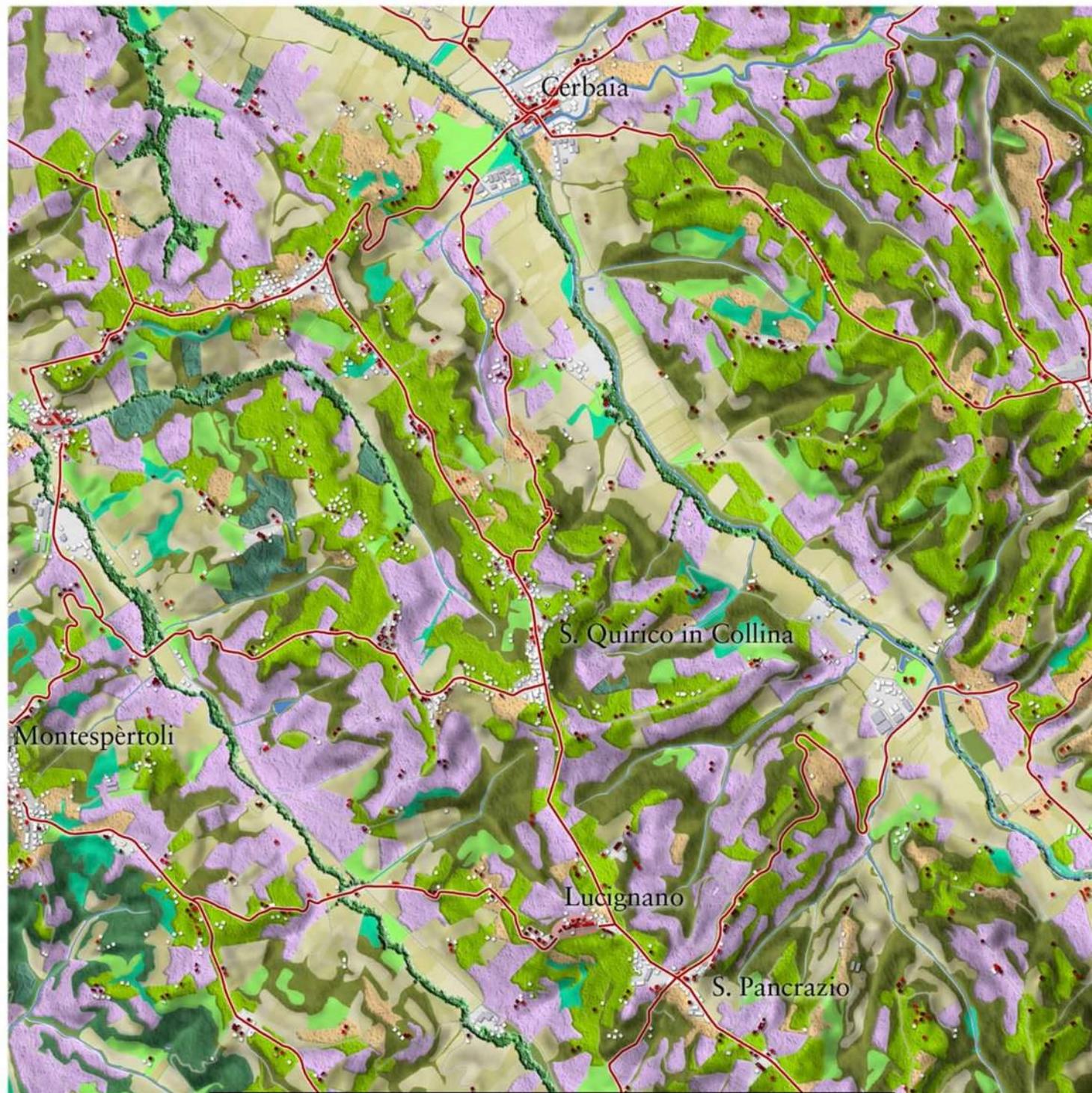


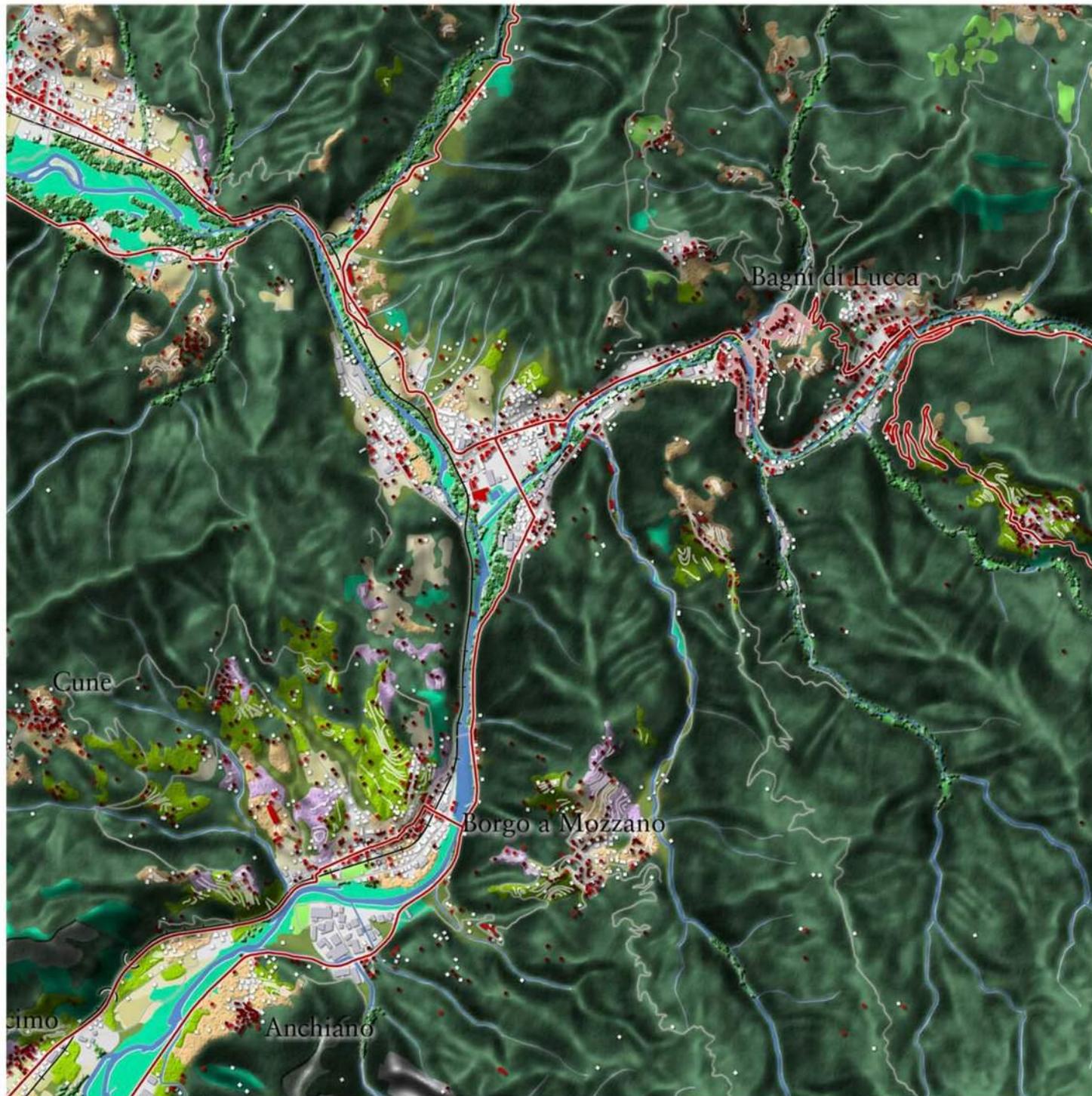


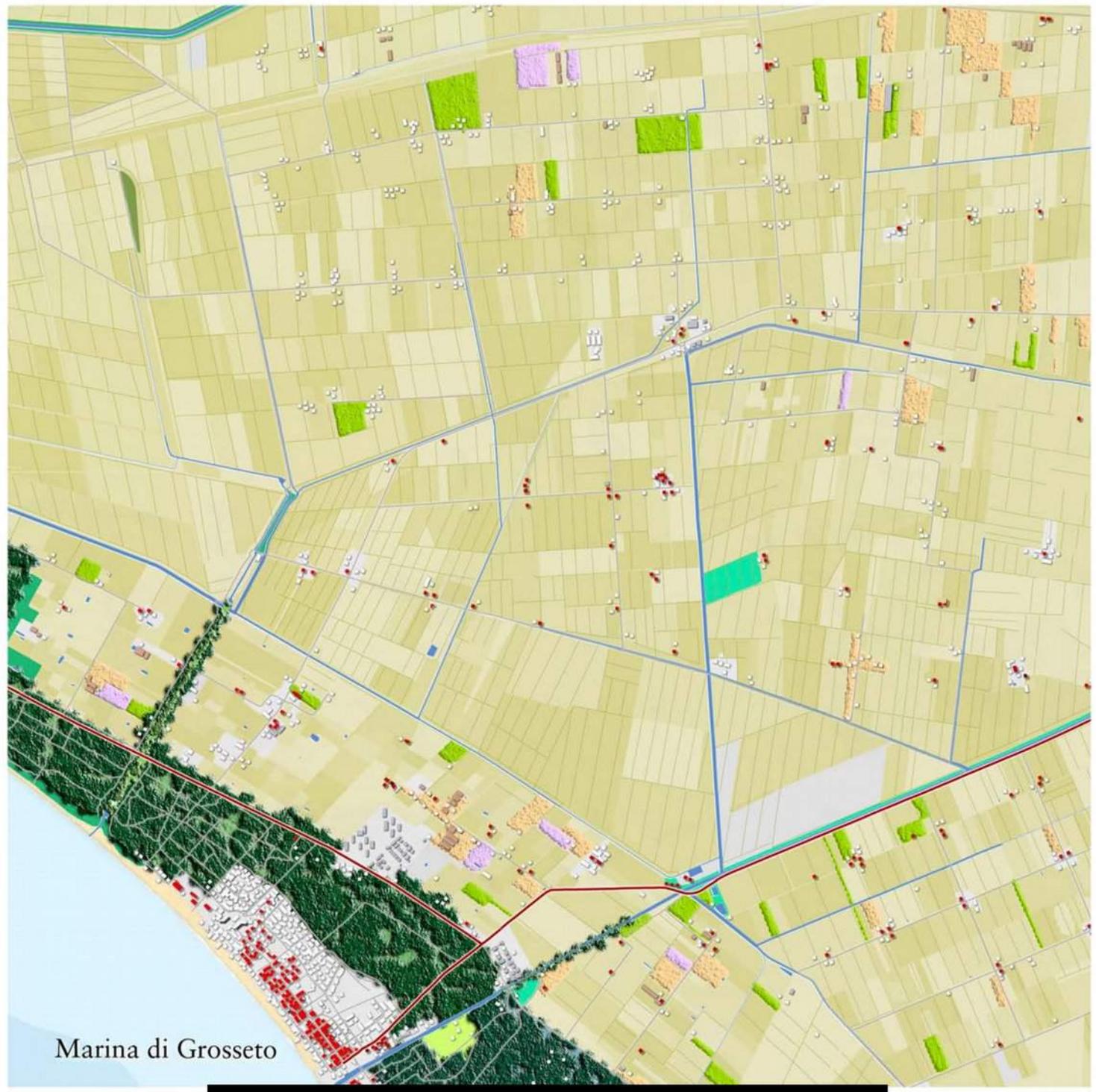






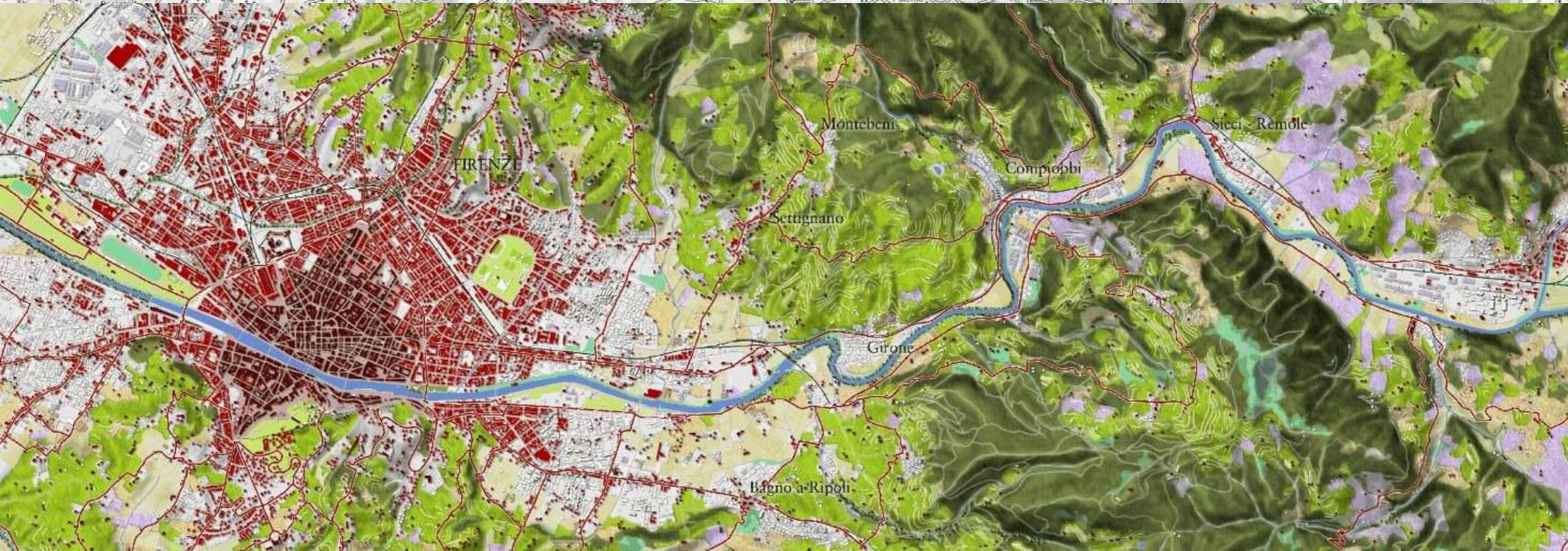
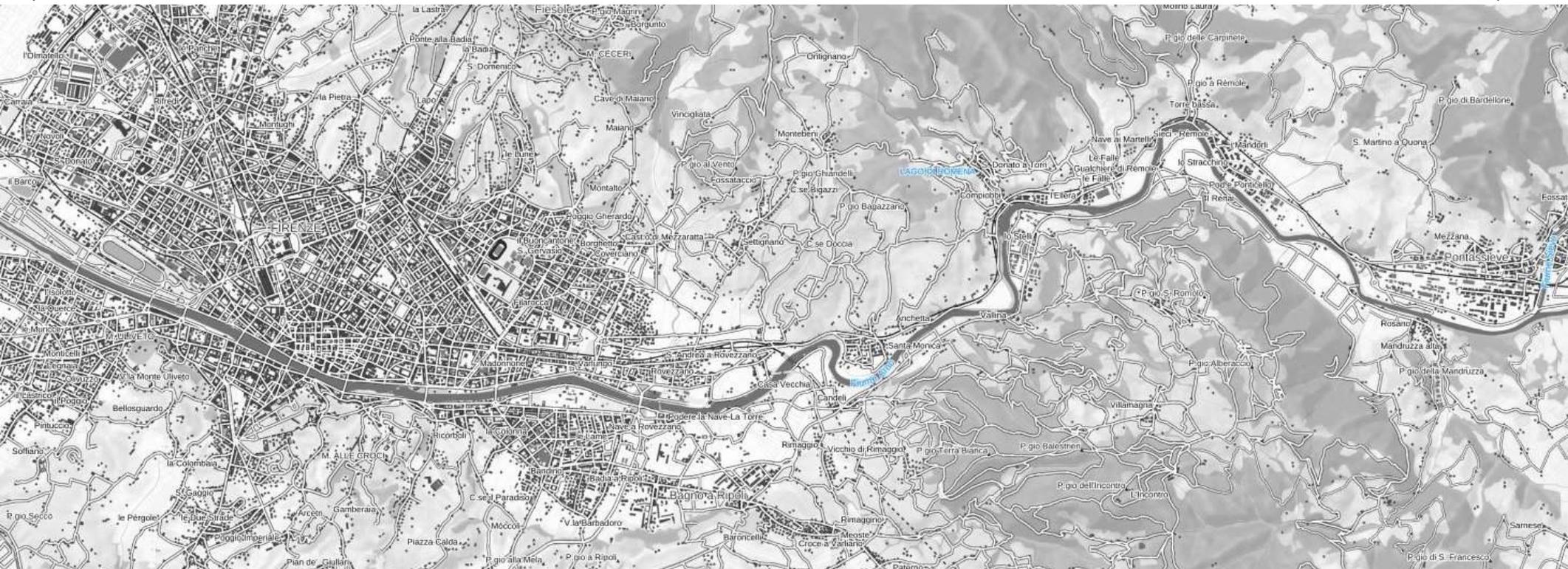






Marina di Grosseto

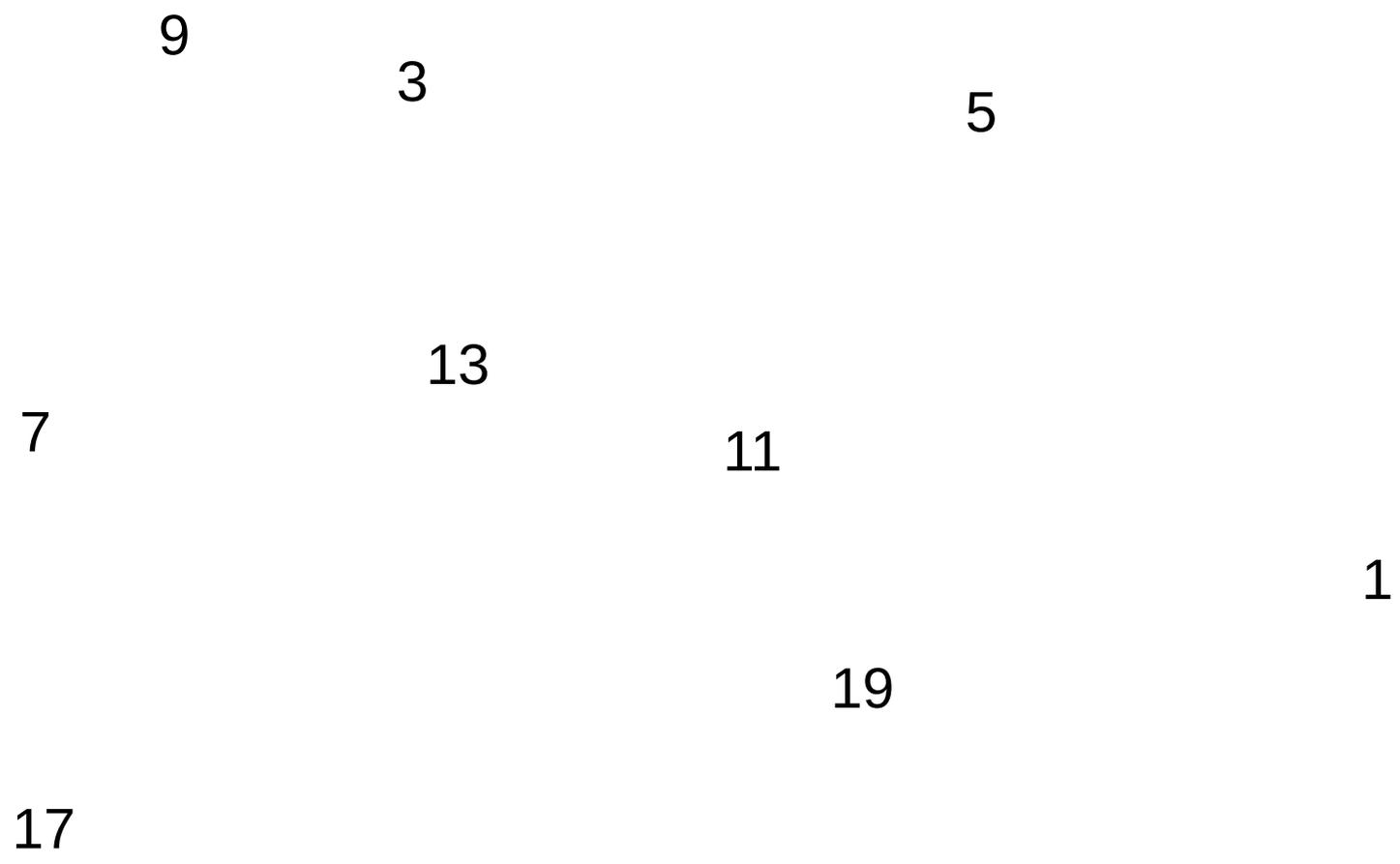




A graphic form of reasoning



1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20



9
3
5
7
13
11
19
17
15
1

Please sum it in 10 seconds

9

3

5

13

7

11

1

19

17

Please sum it in 10 seconds

0:10

ID											Sum
1	1										1
2	1	3									4
3	1	3	5								9
4	1	3	5	7							16
5	1	3	5	7	9						25
6	1	3	5	7	9	11					?
7	1	3	5	7	9	11	13				?
8	1	3	5	7	9	11	13	15			?
9	1	3	5	7	9	11	13	15	17		?
10	1	3	5	7	9	11	13	15	17	19	

Please sum it in 10 seconds

ID											Sum
1	1										1
2	1	3									4
3	1	3	5								9
4	1	3	5	7							16
5	1	3	5	7	9						25
6	1	3	5	7	9	11					?
7	1	3	5	7	9	11	13				?
8	1	3	5	7	9	11	13	15			?
9	1	3	5	7	9	11	13	15	17		?
10	1	3	5	7	9	11	13	15	17	19	10^2

Please sum it in 10 seconds

0:10

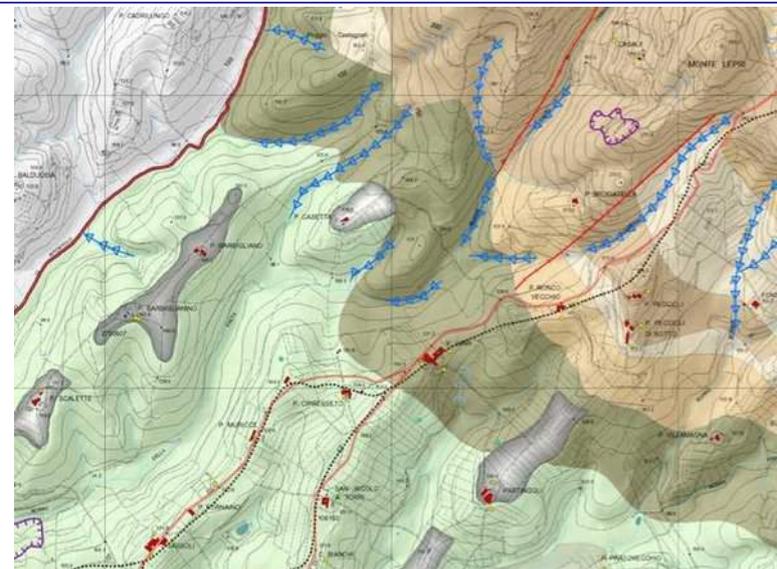
Alexander von Humboldt (1769 – 1859)

The methodology for the territorial survey can be decomposed into three stages:

1. *Eindruck*: the suggestion derived from the direct observation. A pre-scientific, sentimental, phase.
2. *Einsicht*: scientific analysis of the observed object, operated by analytical separation.
3. *Zusammenhang*: The phase of the synthesis, that is the (creative) re-composition of elements that underline the interdependence of the observed phenomena.

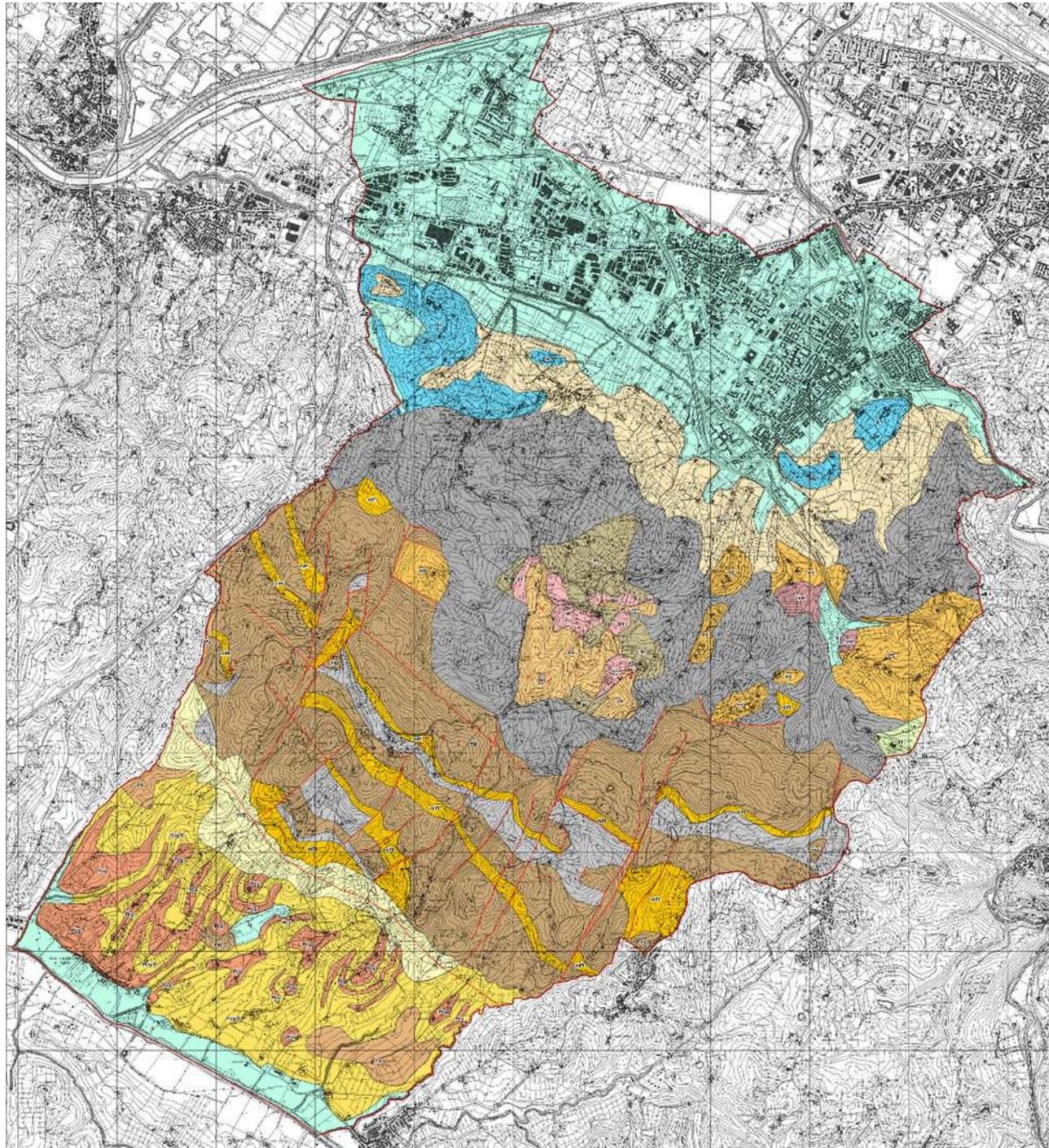


Maps for planners (but not only for planners) – part B

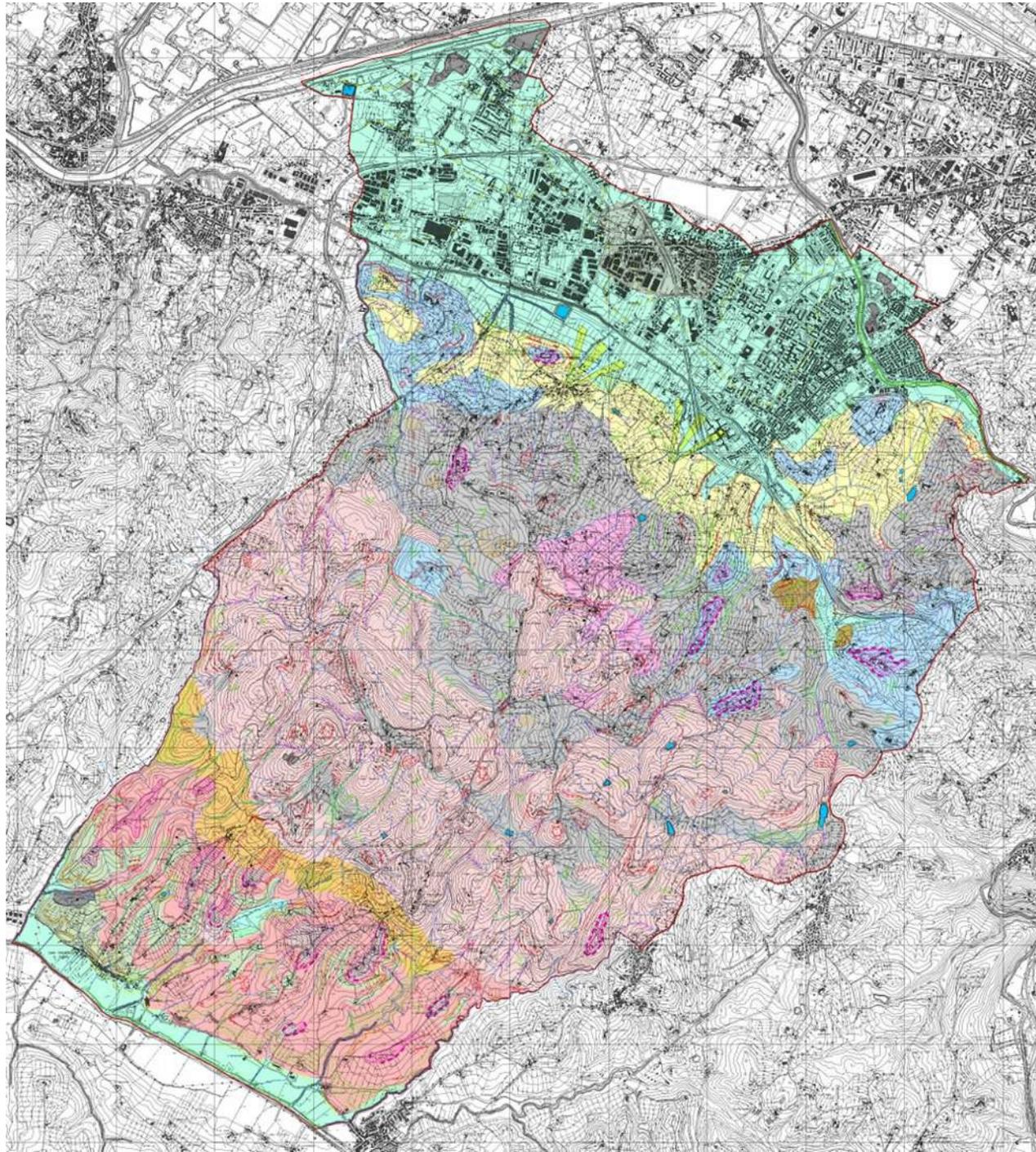


The Italian word 'patrimonio' comes from the Latin patrimonium which has the same root as pater. The meaning is practically the same as the English word 'heritage': "features belonging to the culture of a particular society, such as traditions, languages or buildings, which still exist from the past and which have a historical importance"

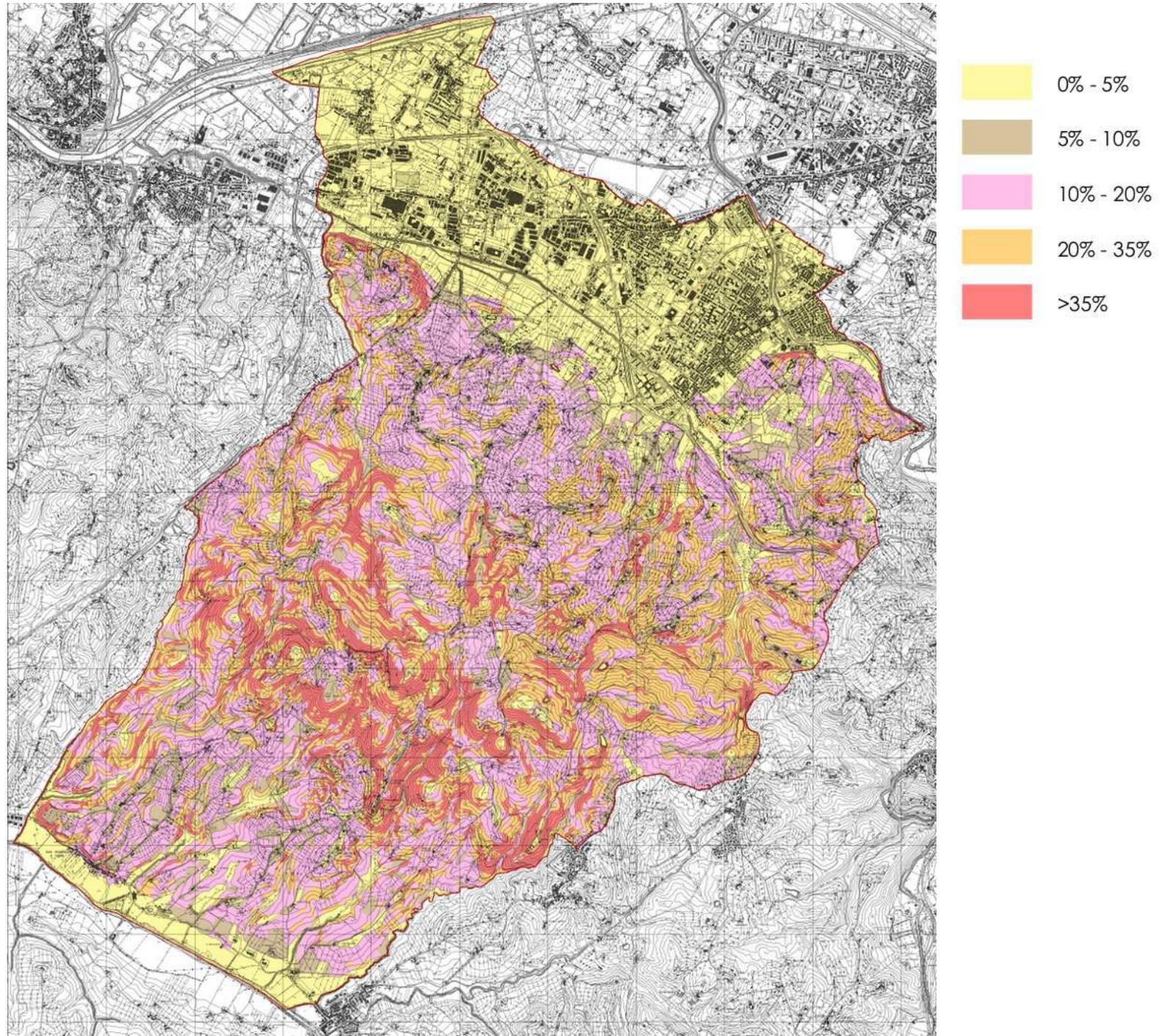
Geology



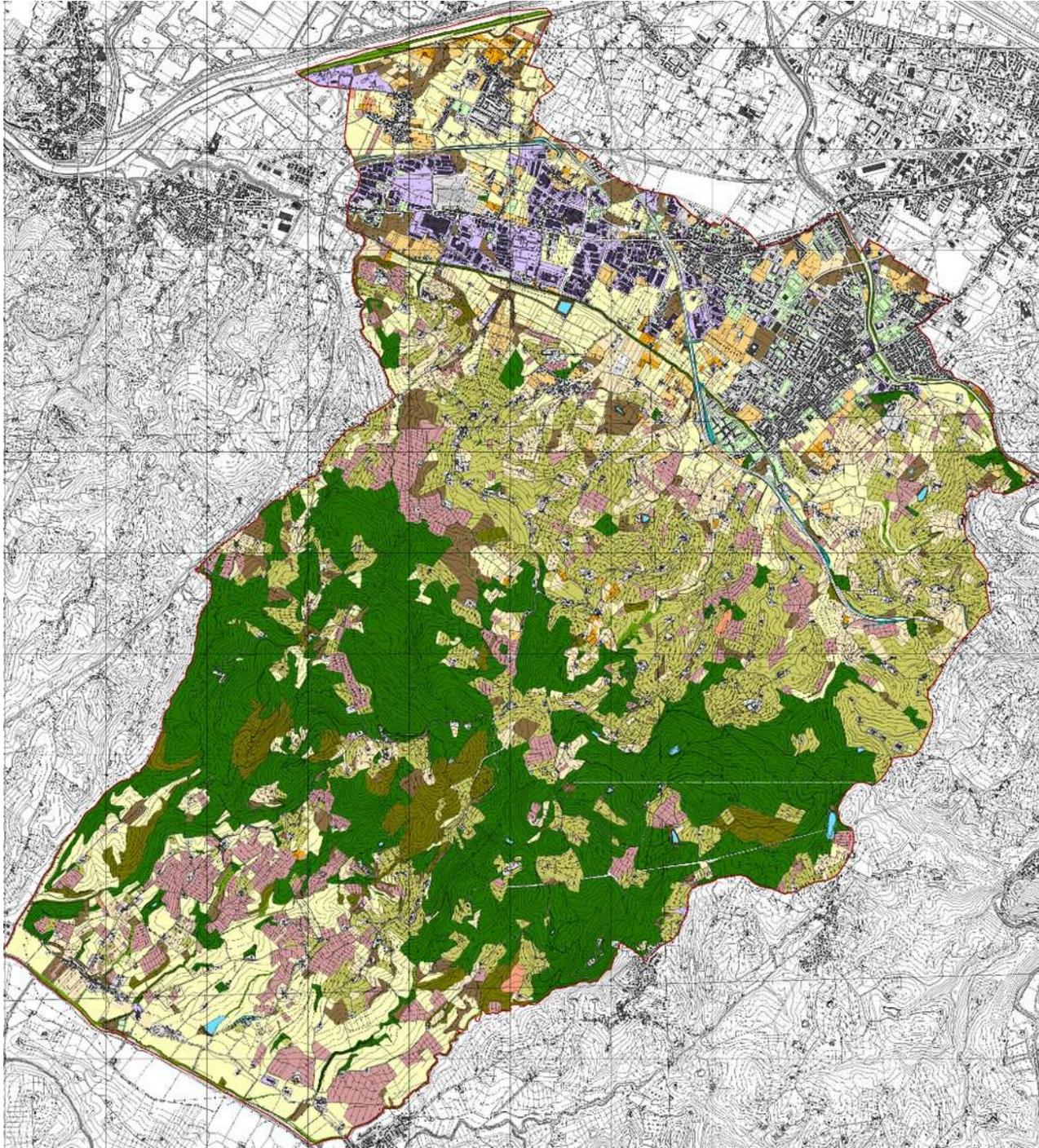
Geomorphology



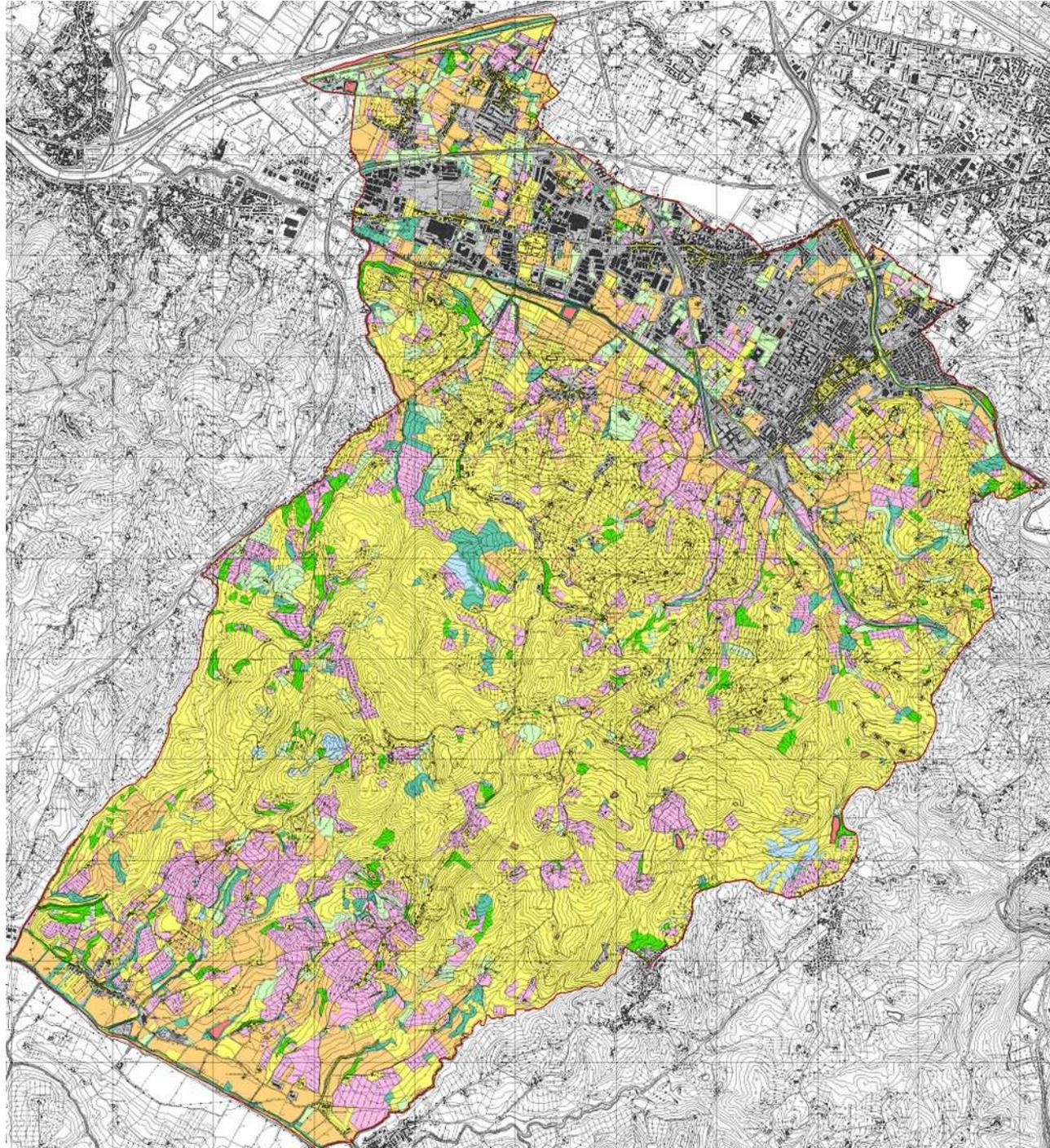
Slope



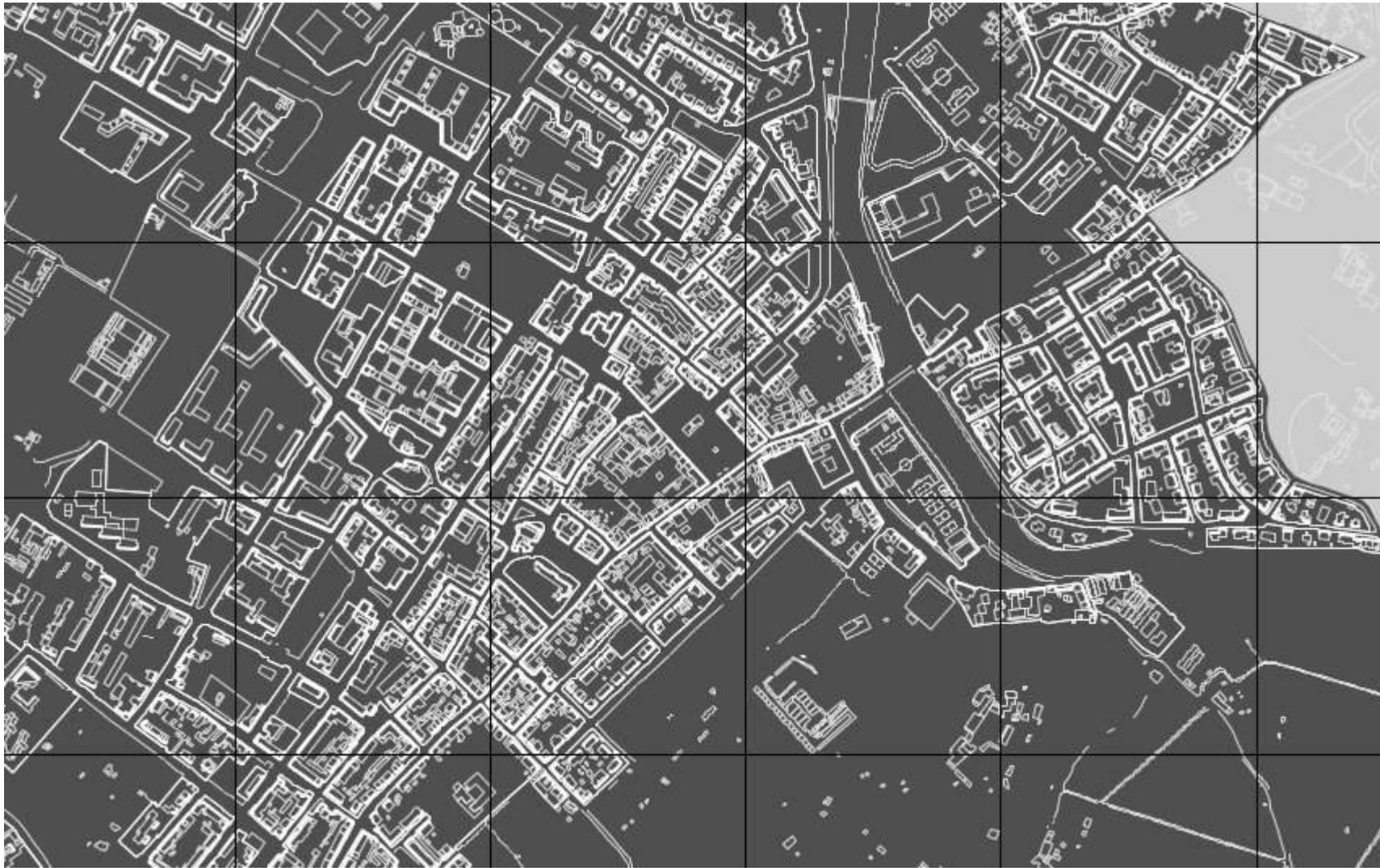
Land use



Dynamic of land use transformation



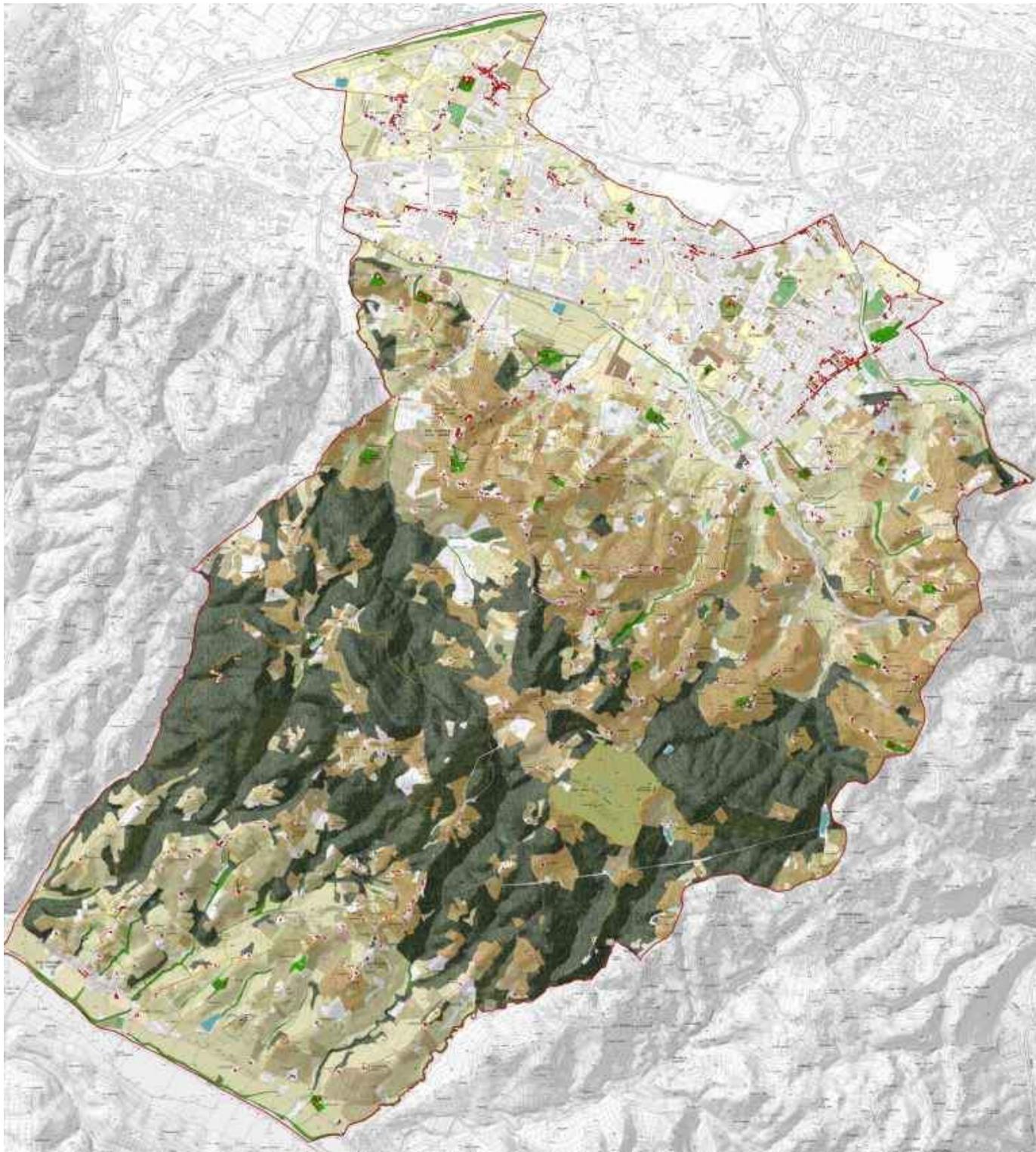
Patterns of the urban tissue

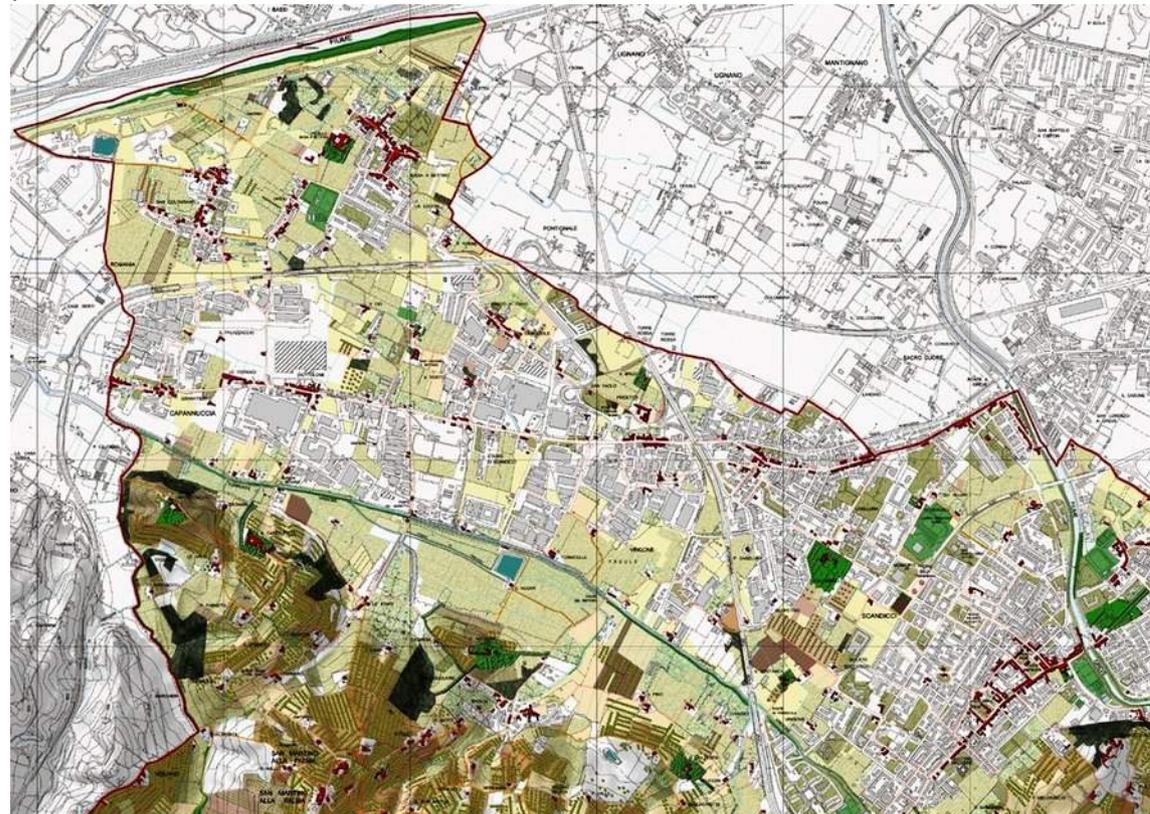


Public utilities



- Edifici sanitari
- Edifici sportivi
- Edifici scolastici
- Edifici d'interesse comune
- Edifici religiosi
- Verde sportivo
- Verde scolastico
- Aree d'interesse comune
- Verde cimiteriale





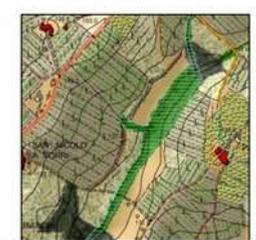
Patrimonio boschivo

-  Bosco denso
-  Bosco rado e cespugliato



Ambiti fluviali e della vegetazione riparia

-  Ambiti fluviali
-  Vegetazione riparia



Trame degli insediamenti e dei percorsi storici

-  Tracciati viari fondativi (Strade principali presenti al 1880)
-  Patrimonio edilizio presente al 1940
-  Strade vicinali



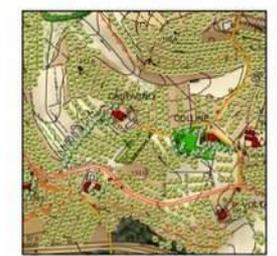
Risorse di interesse paesistico, ambientale e sociale

-  Parchi
-  Parchi storici (pertinenze paesistiche delle ville e dei complessi rurali)
-  Giardini formali (pertinenze paesistiche delle ville e dei complessi rurali)
-  Formazioni arboree decorative
-  Verde di uso pubblico
-  Verde Sportivo

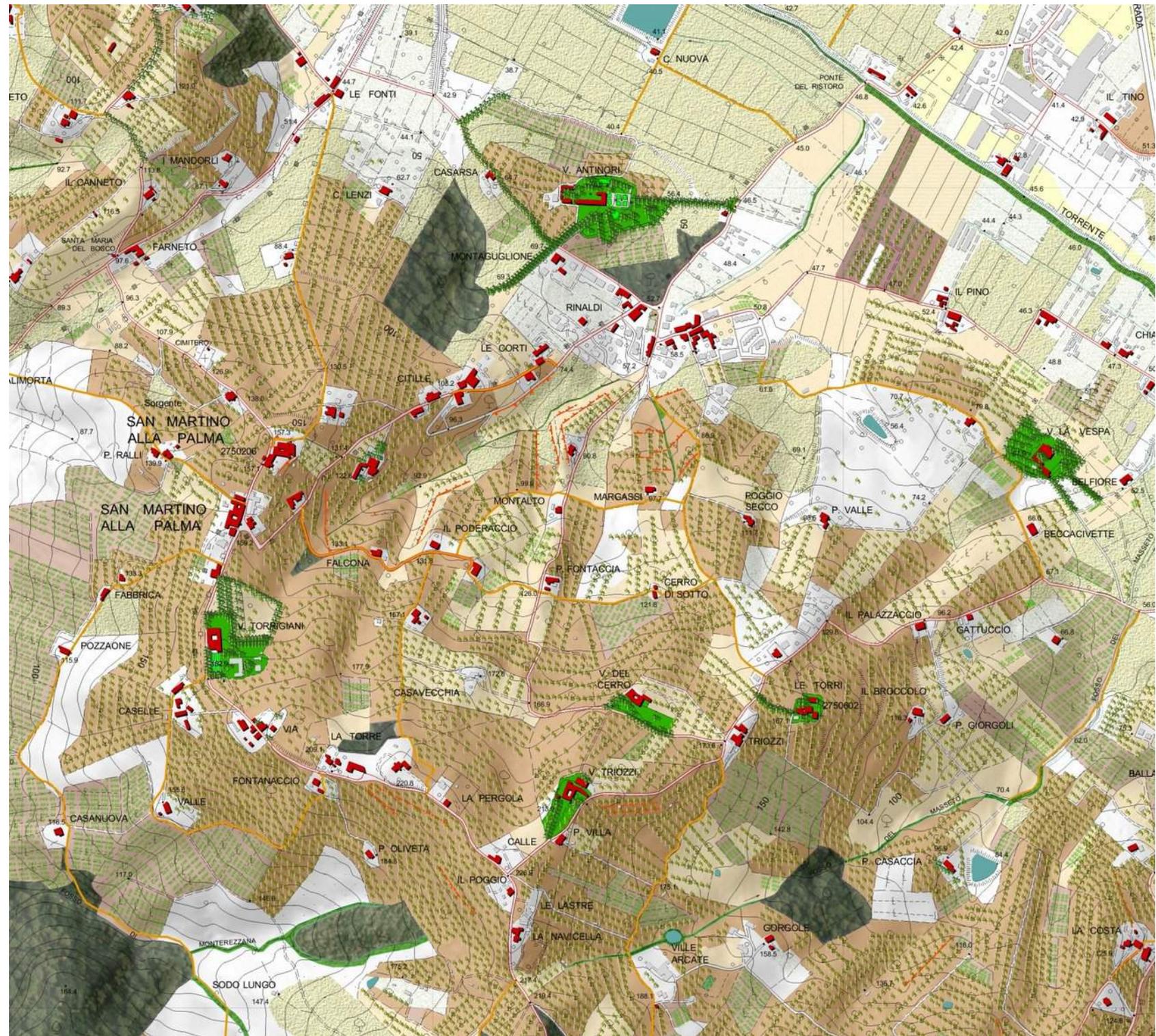


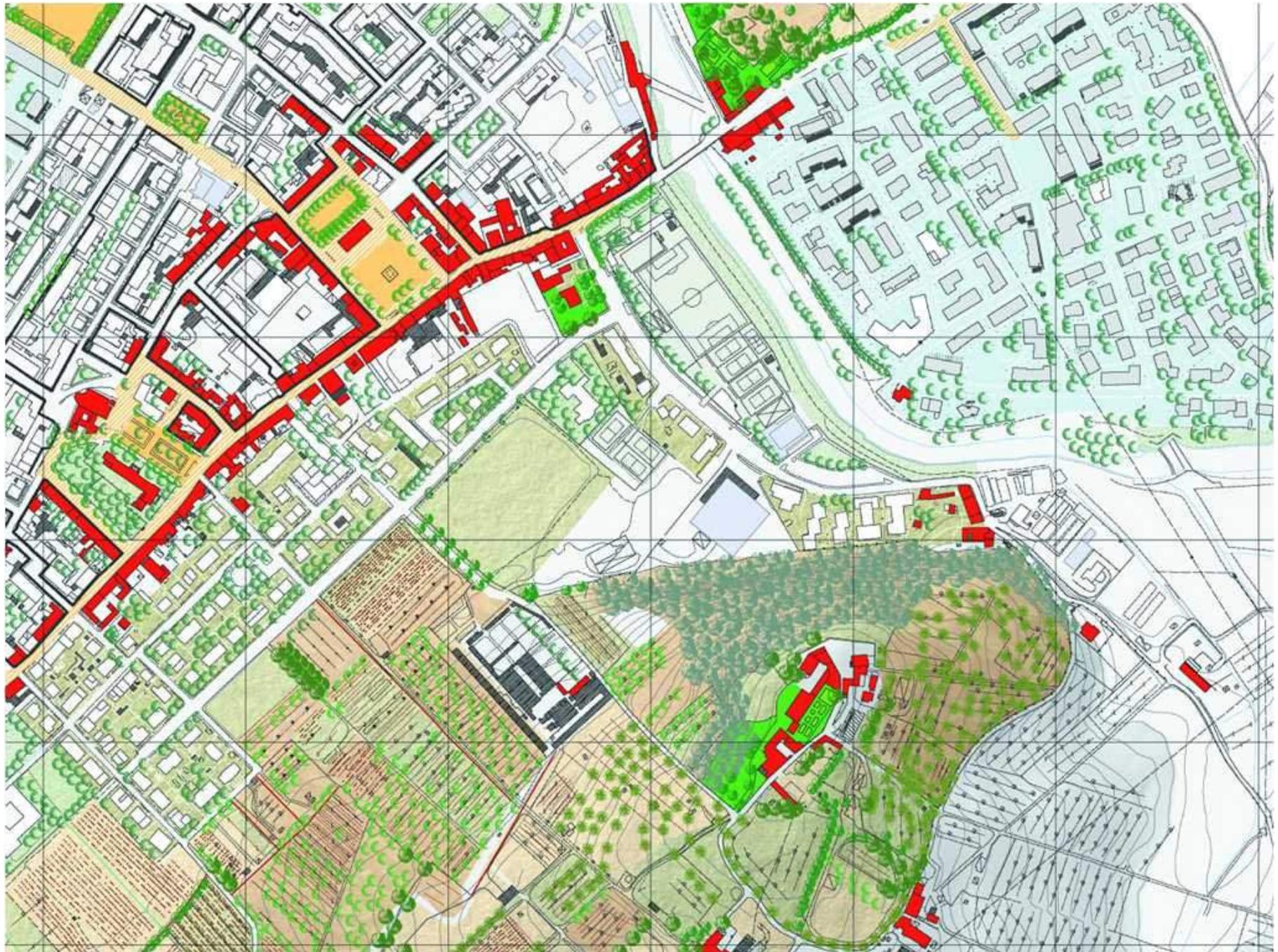
Coltivi e sistemazioni agrarie

-  Terrazzamenti
-  Seminativi
-  Seminativi arborati
-  Incolti e prati
-  Vigneti
-  Vigneti a sostegno vivo
-  Oliveti
-  Frutteti
-  Colture orticole e vivai
-  Olivi
-  Alberi da frutto
-  Vigne







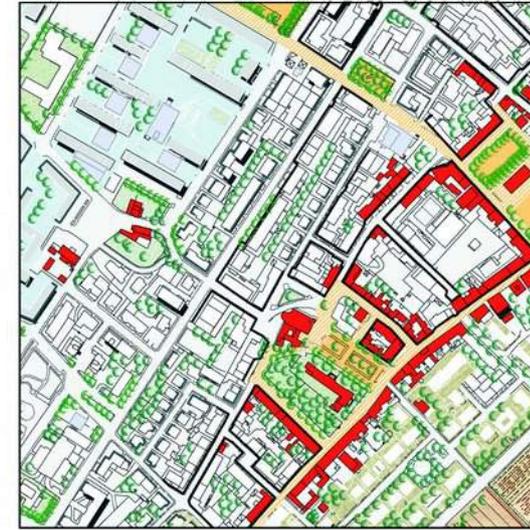


Risorse di interesse paesistico, ambientale e sociale



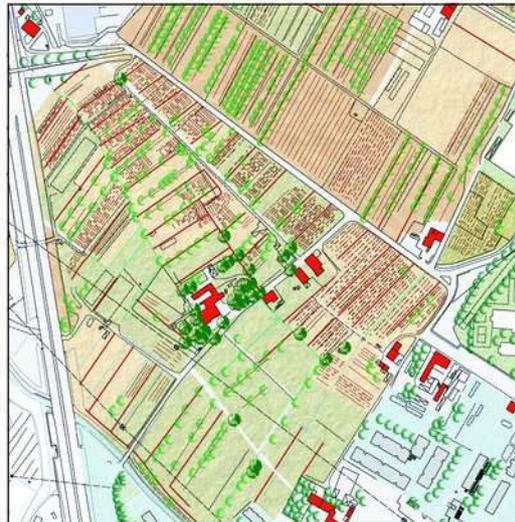
- Parchi storici (pertinenze paesistiche delle ville e dei complessi rurali)
- Giardini formali (pertinenze paesistiche delle ville e dei complessi rurali)
- Alberi decorativi
- Verde sportivo
- Verde di uso pubblico
- Piazze principali
- Elementi ordinatori dello spazio pubblico centrale

Trame dei tessuti prevalentemente residenziali



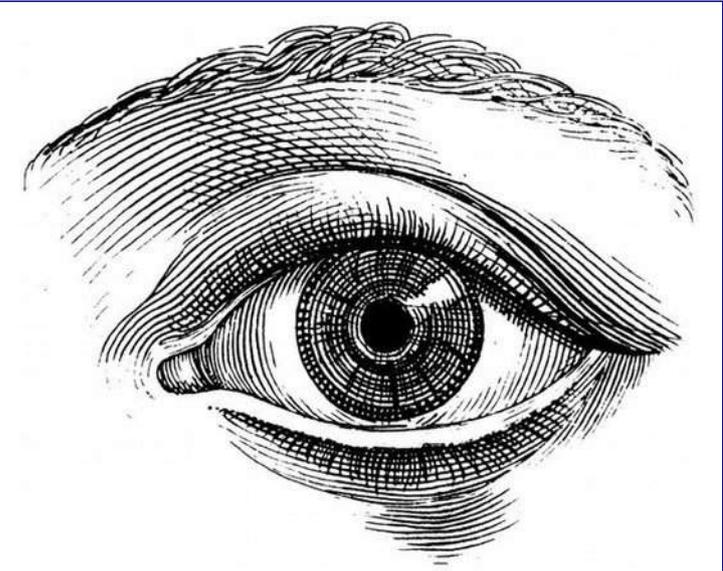
- Isolati chiusi e semichiusi
- Principali allineamenti degli edifici sul fronte stradale
- Edifici presenti al 1940
- Edilizia non aggregata
- Interventi unitari
- Edifici alti (6 - 9 piani)

Permanenze del tessuto agricolo tradizionale



- Permanenze delle aree verdi e agricole presenti nel "Catasto Generale Toscano", (catasto "leopoldino", 1820)
- Permanenze dei segni dell'organizzazione fondiaria presenti nel "Catasto Generale Toscano", (catasto "leopoldino") del 1820
- Permanenze dei fossi di scolo presenti nel "Catasto Generale Toscano", (catasto "leopoldino", 1820)
- Alberature con impianto relazionabile alle trame presenti nel "Catasto Generale Toscano", (catasto leopoldino, 1820)

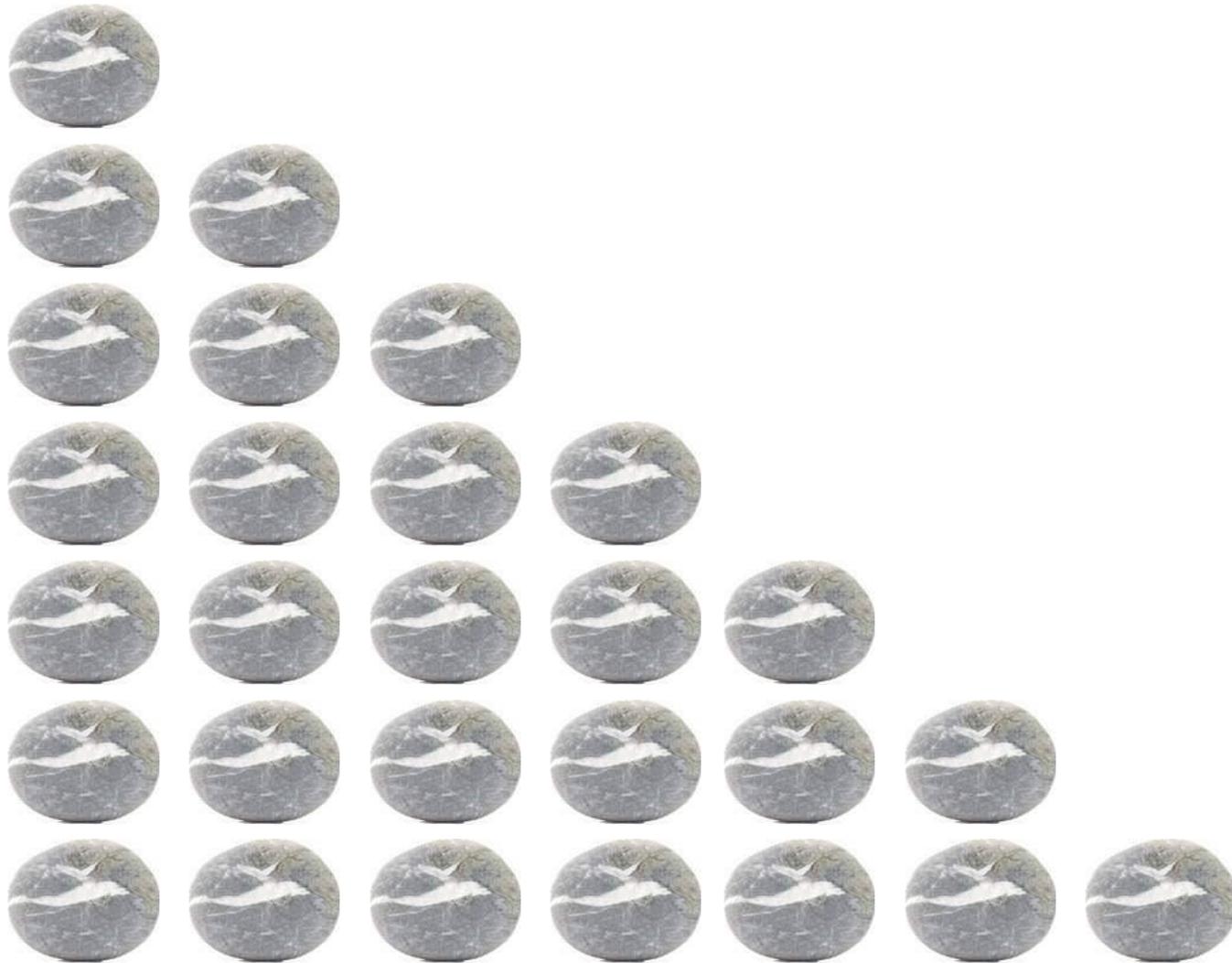
Visual computations

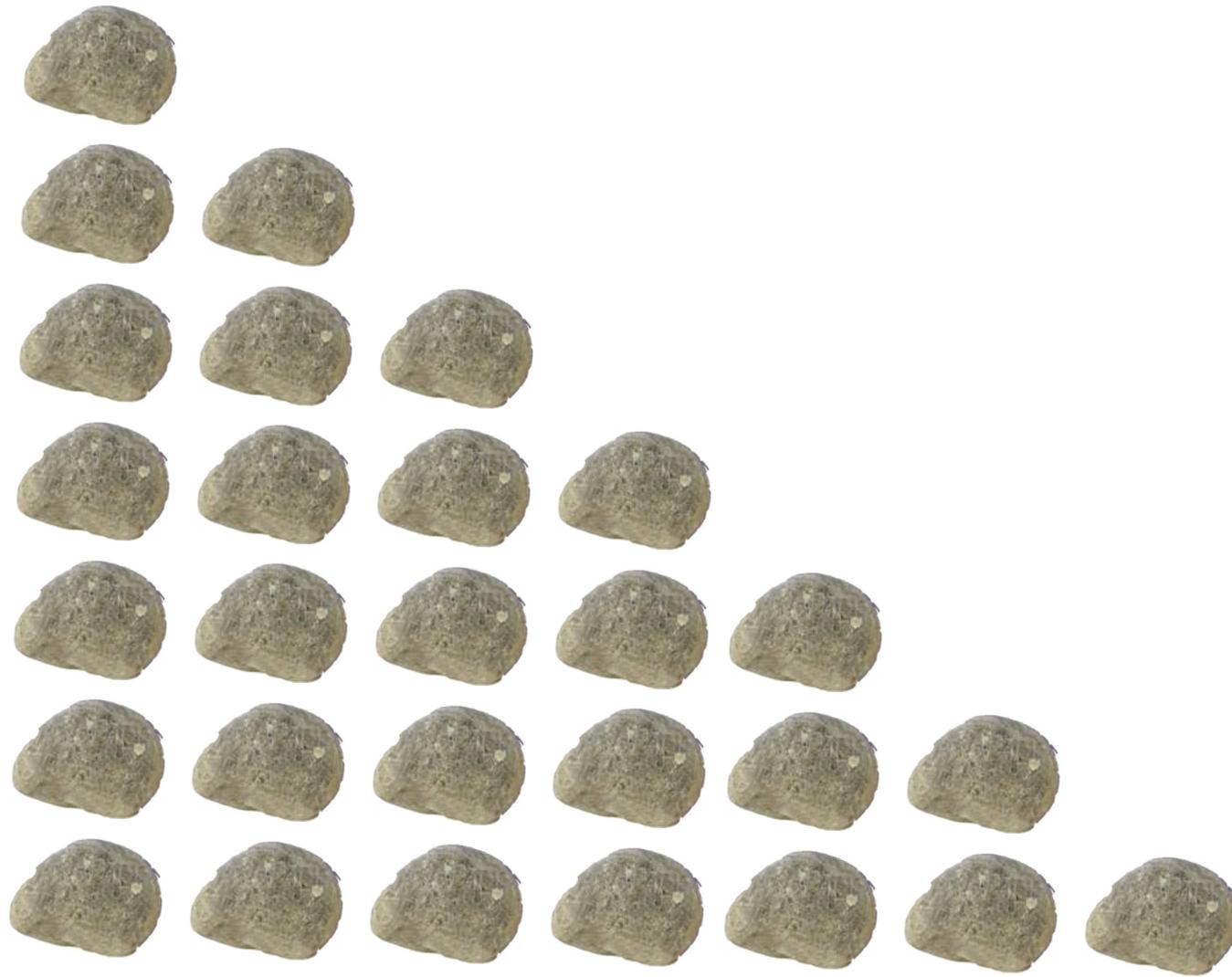


A simple sum

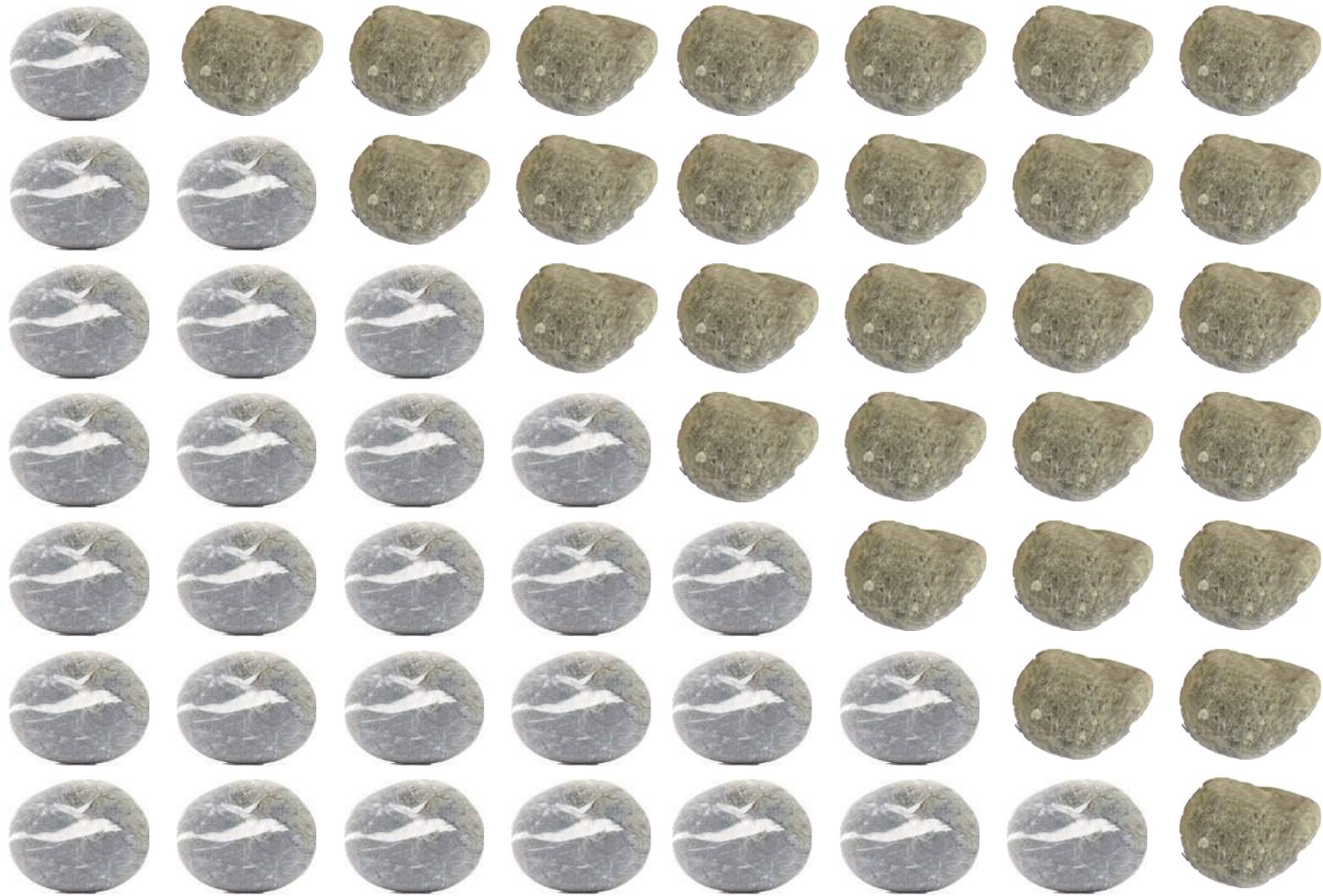
$$1 + 2 + 3 + 4 + 5 + \dots + 100$$

01:00

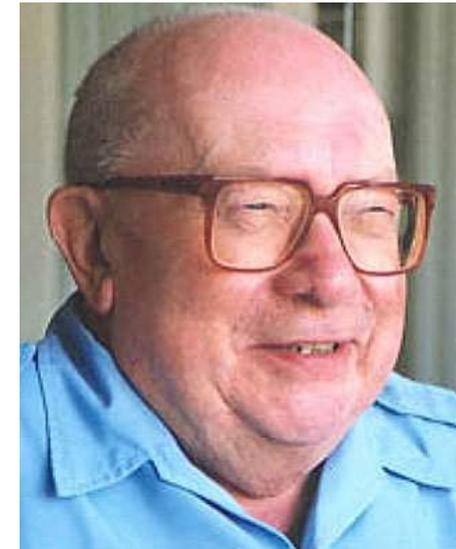
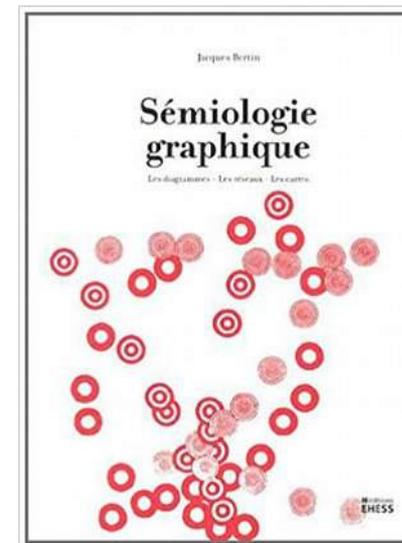








The operating graphic language "constitutes the spatial form of logical reasoning with multiple variables, while the mathematical analysis of data is a linear reasoning. The mathematical analysis has the advantage of rapidity and quantity, but is an automatism that we have to undergo (and this is liked by many). The graphical analysis has the advantage of the perception of a set of data in a continuous manner, of the understanding of the succeeding operations and of freedom, in every moment, of redistributes cards".



Bertin J. *Sémiologie graphique : les diagrammes, les réseaux, les cartes*, Paris 1967

Una semplice somma

$$1 + 2 + 3 + 4 + 5 + \dots + 100$$

5050

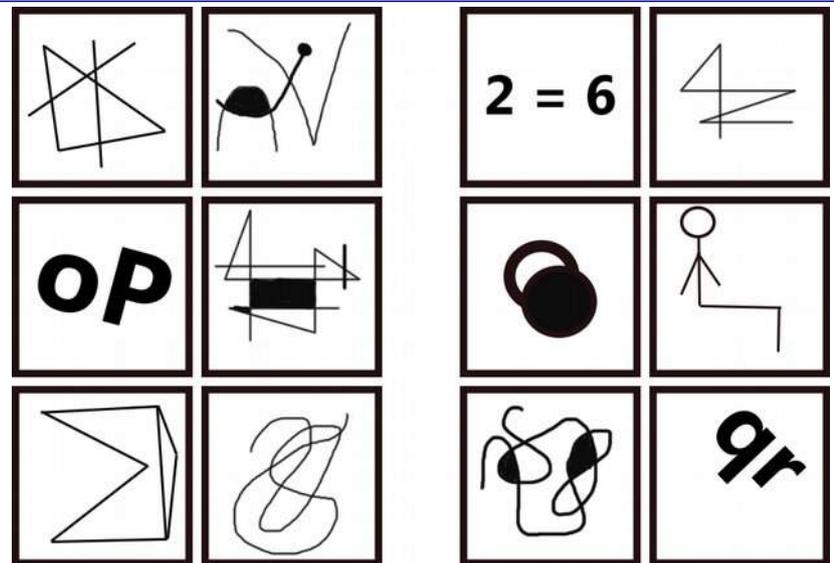
1	+	2	+	3	+	4	+	5	+	...	+	100
100	+	99	+	98	+	97	+	96	+	...	+	1
101		101		101		101		101		101		101

$$100 \times 101 = 10100$$

$$10100 / 2 = 5050$$

$$S_n = \frac{n(n+1)}{2}$$

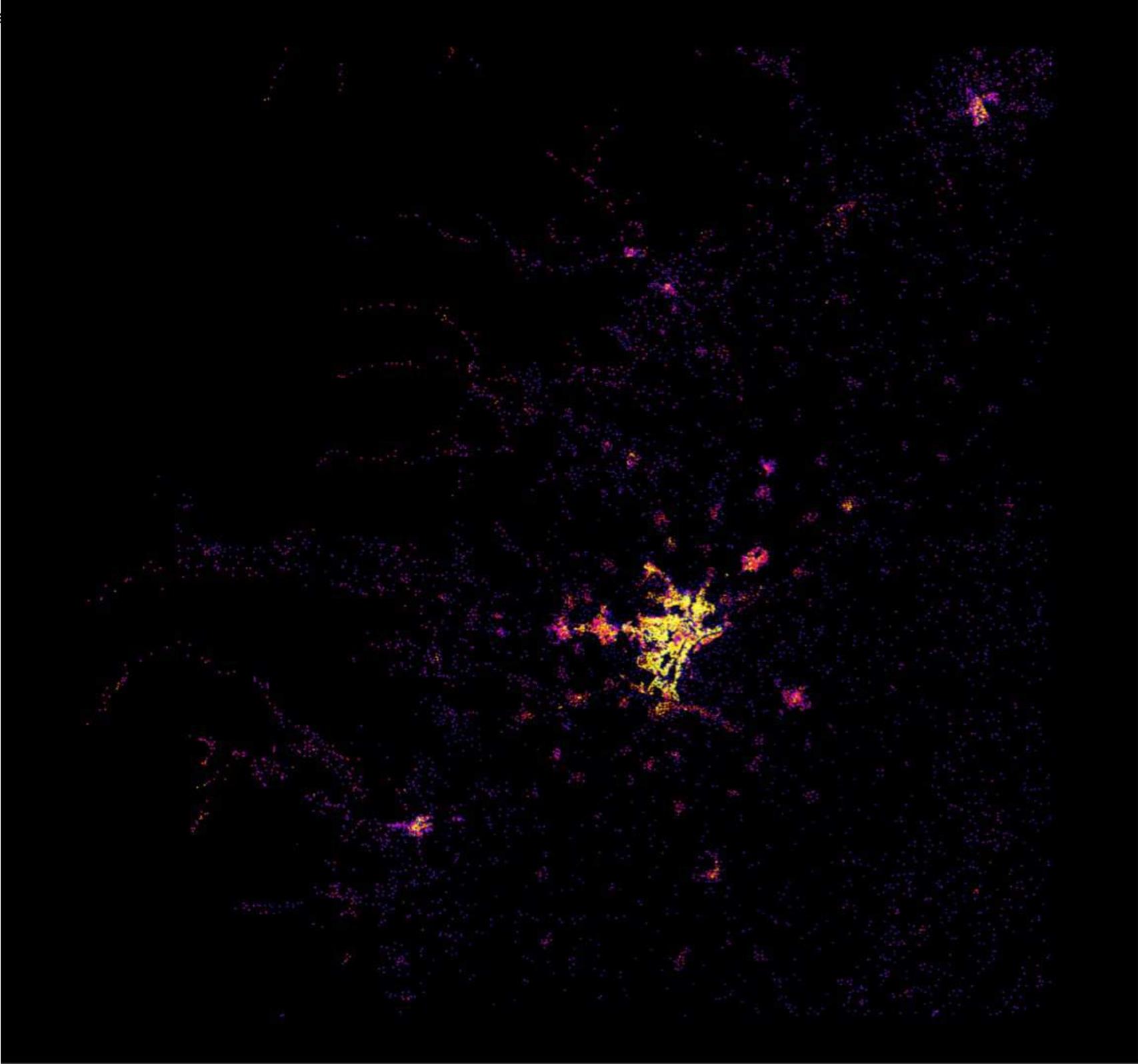
Spatial form of logical, multivariable, reasoning

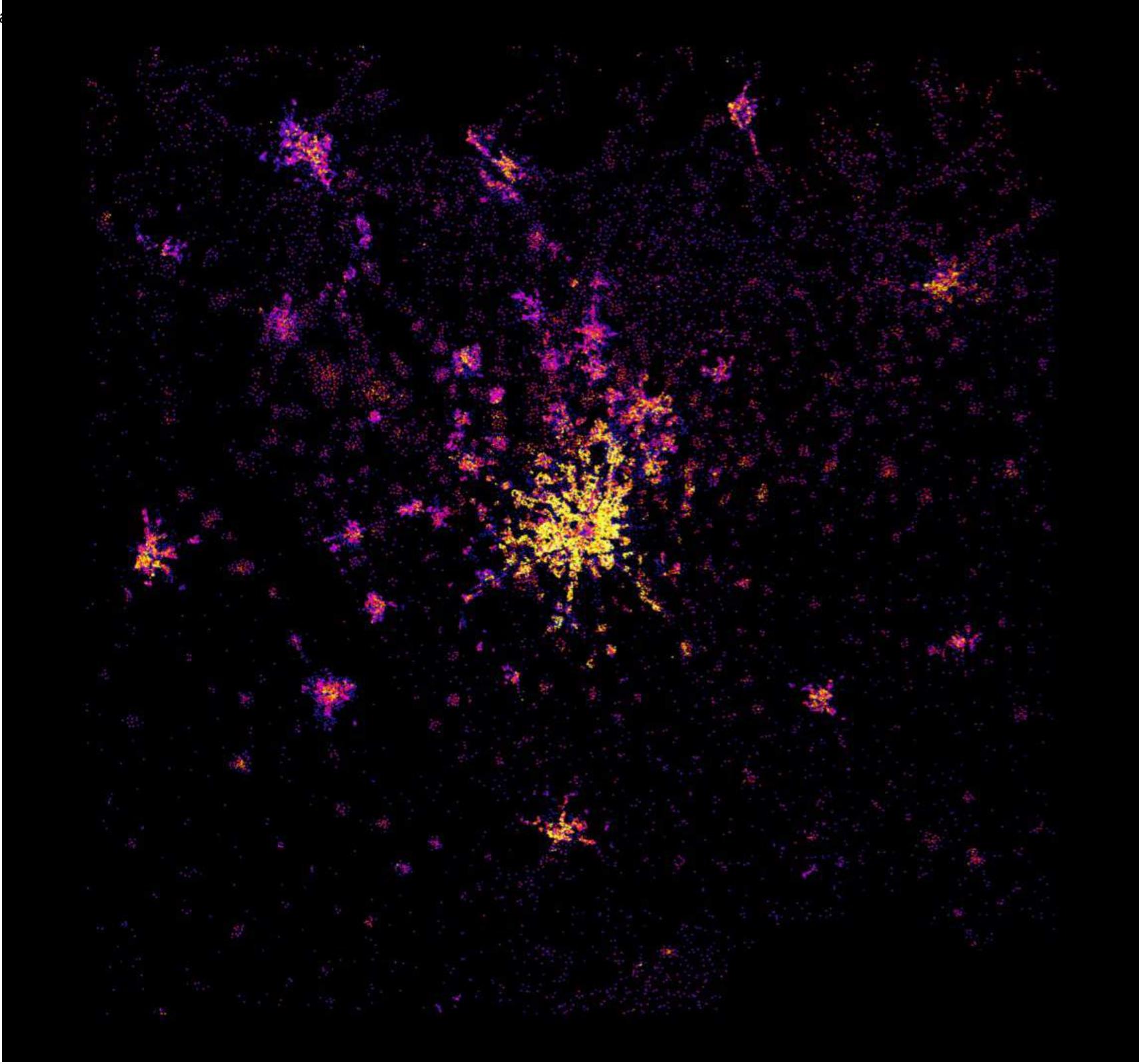


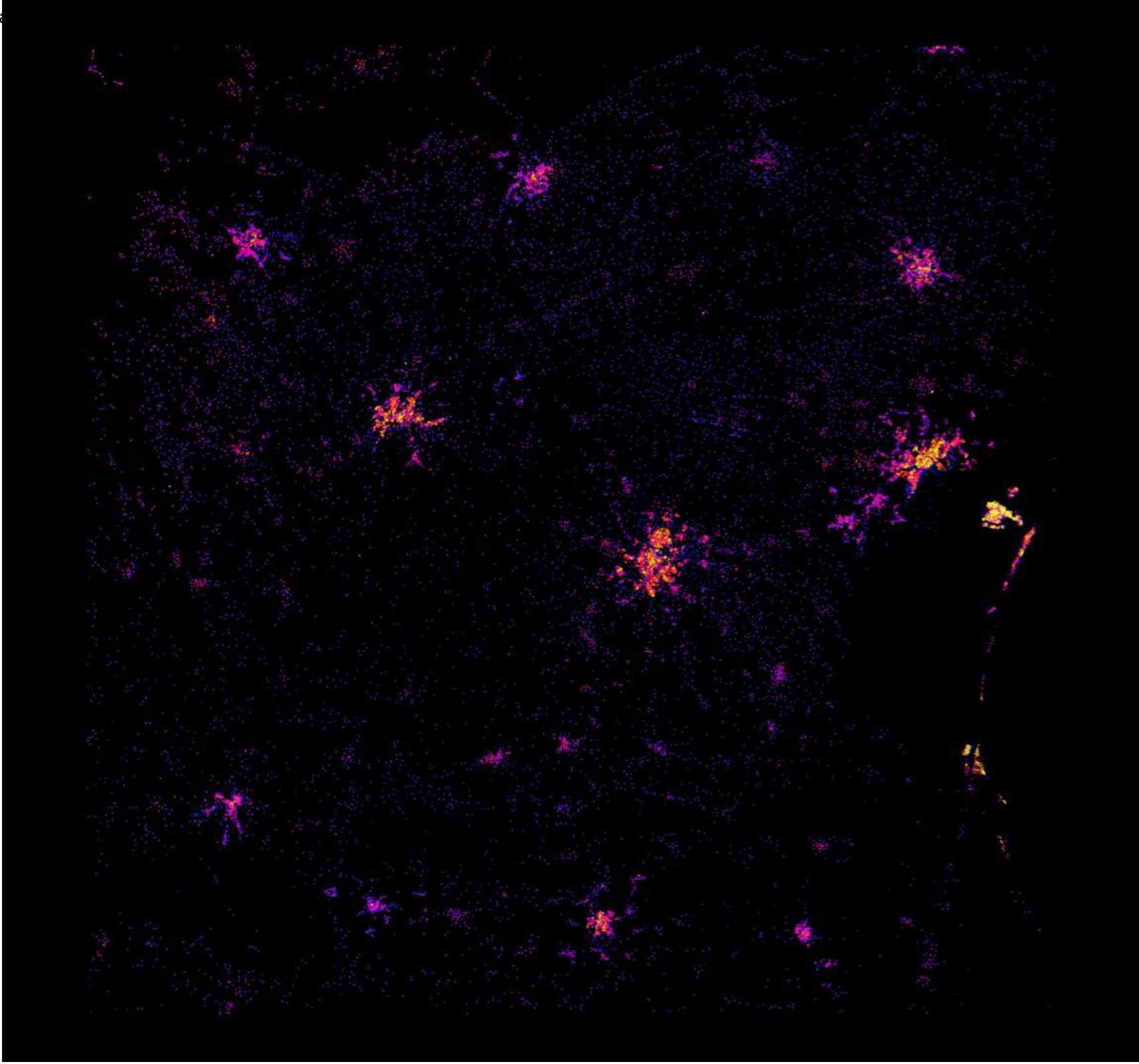
density of dwellings
source: ISTAT census for urban areas, 2001

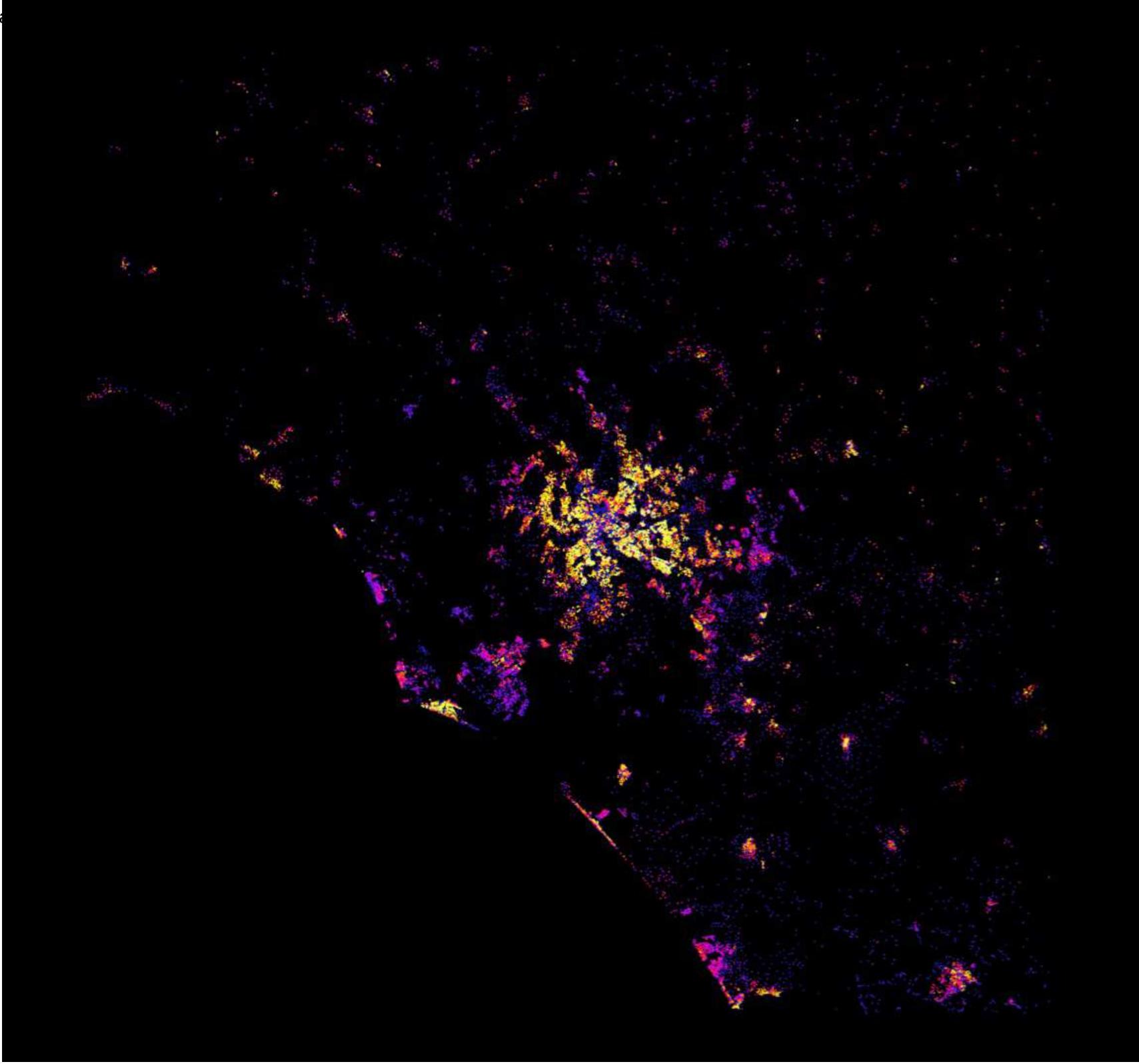
symbolization of the census areas centroids
9 classes, natural breaks method

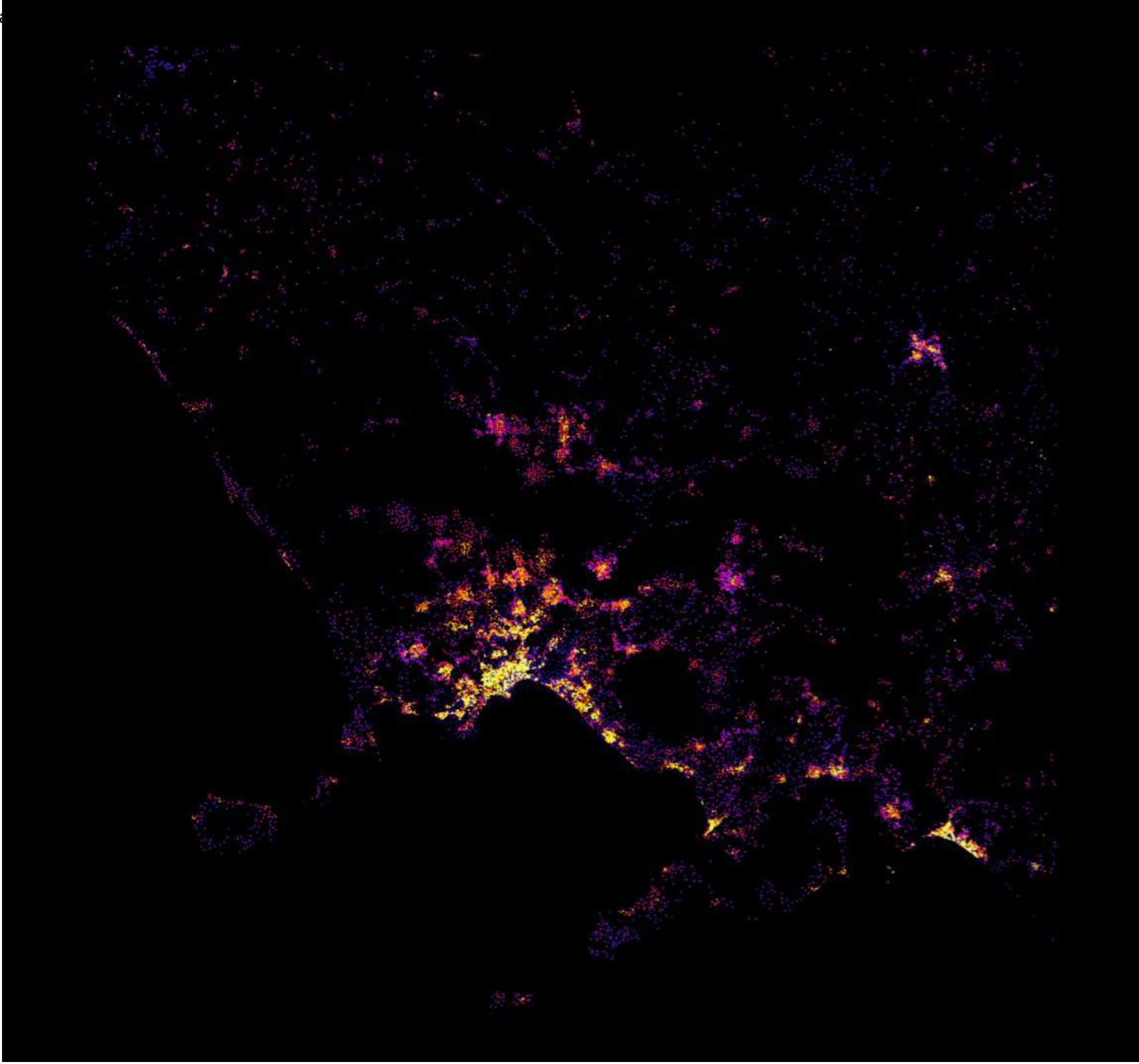


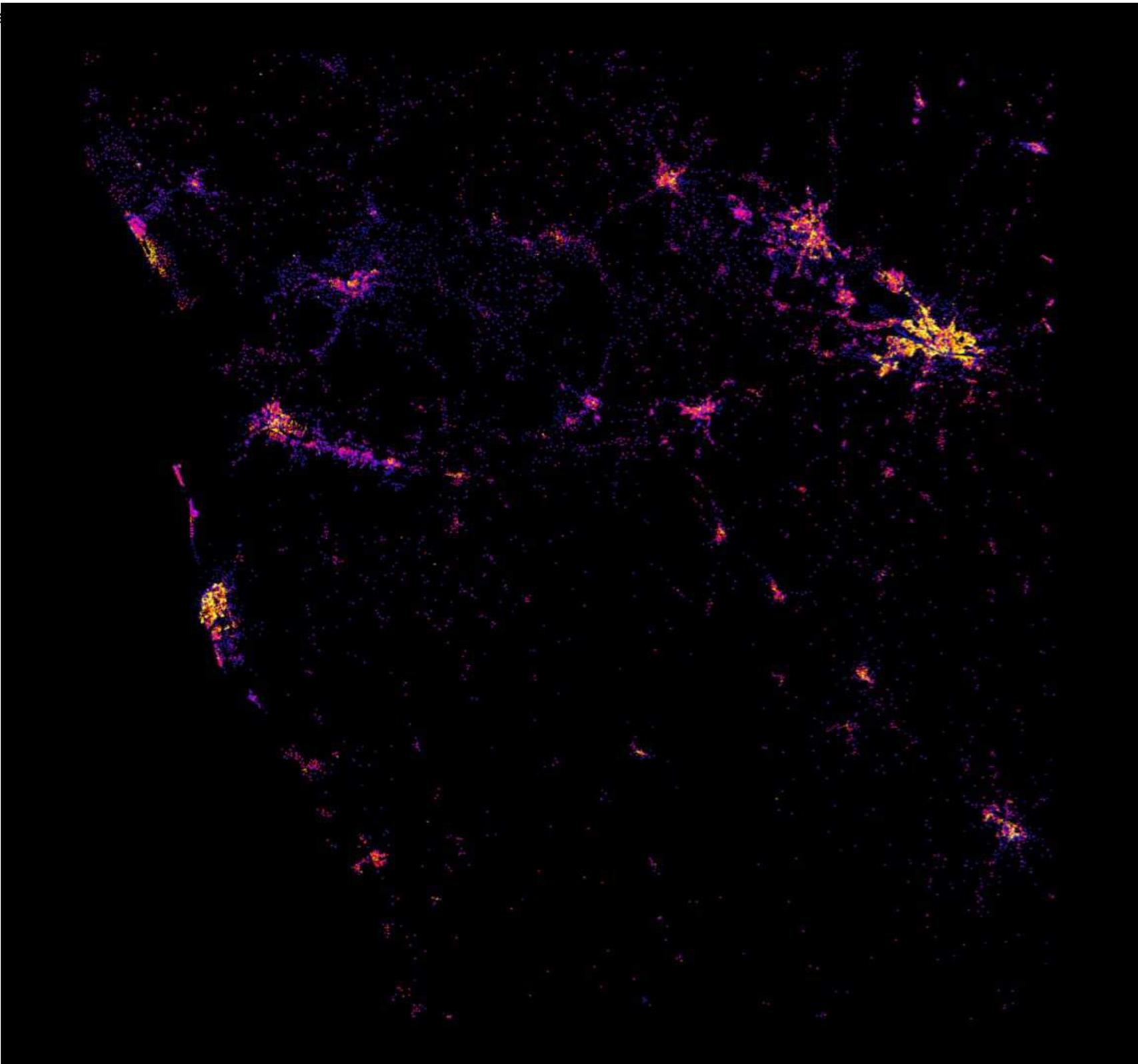












density of settlements
source: Regione Toscana – Informazione Geografica

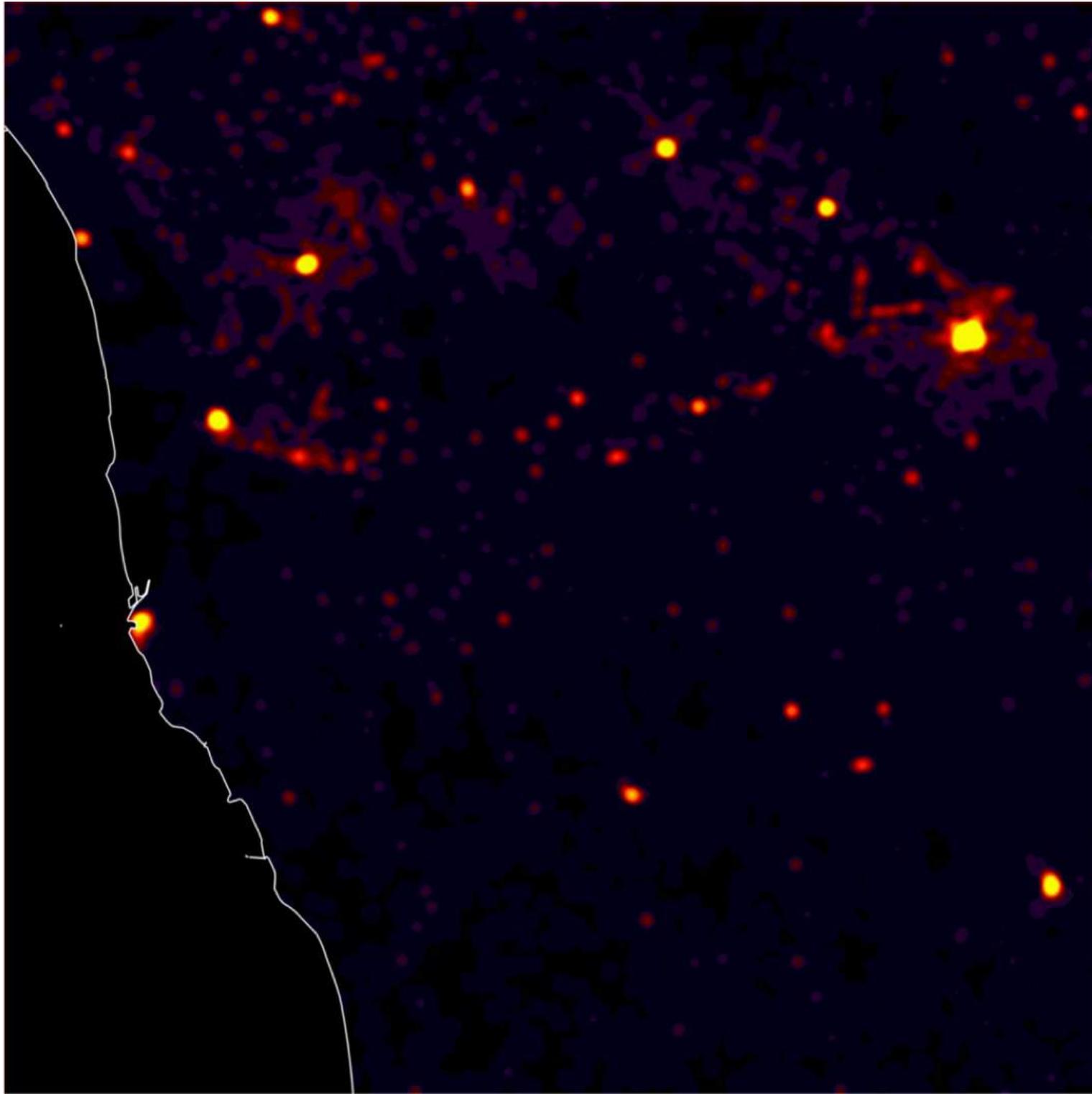
kernel density map

from low density

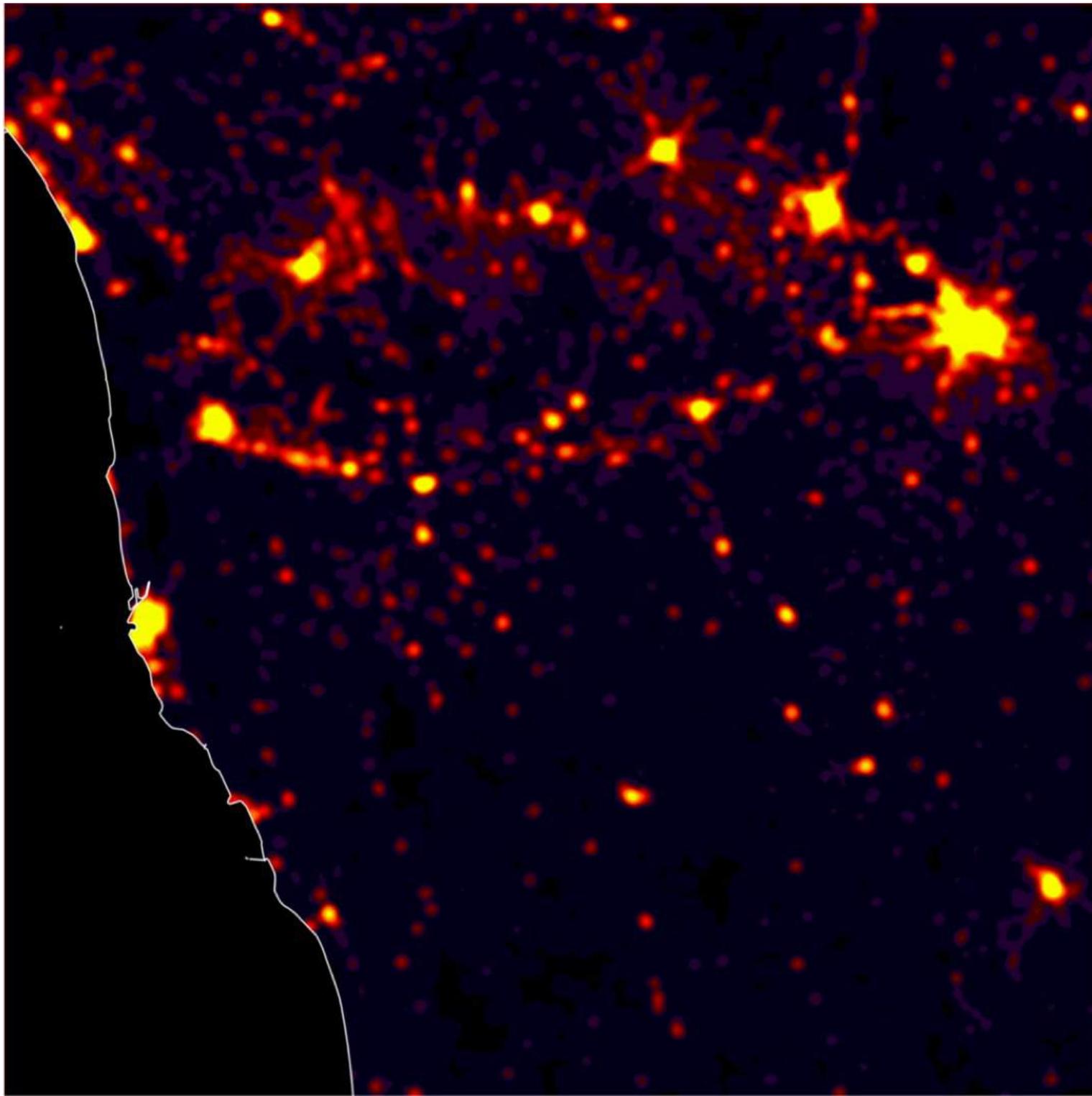


to high density

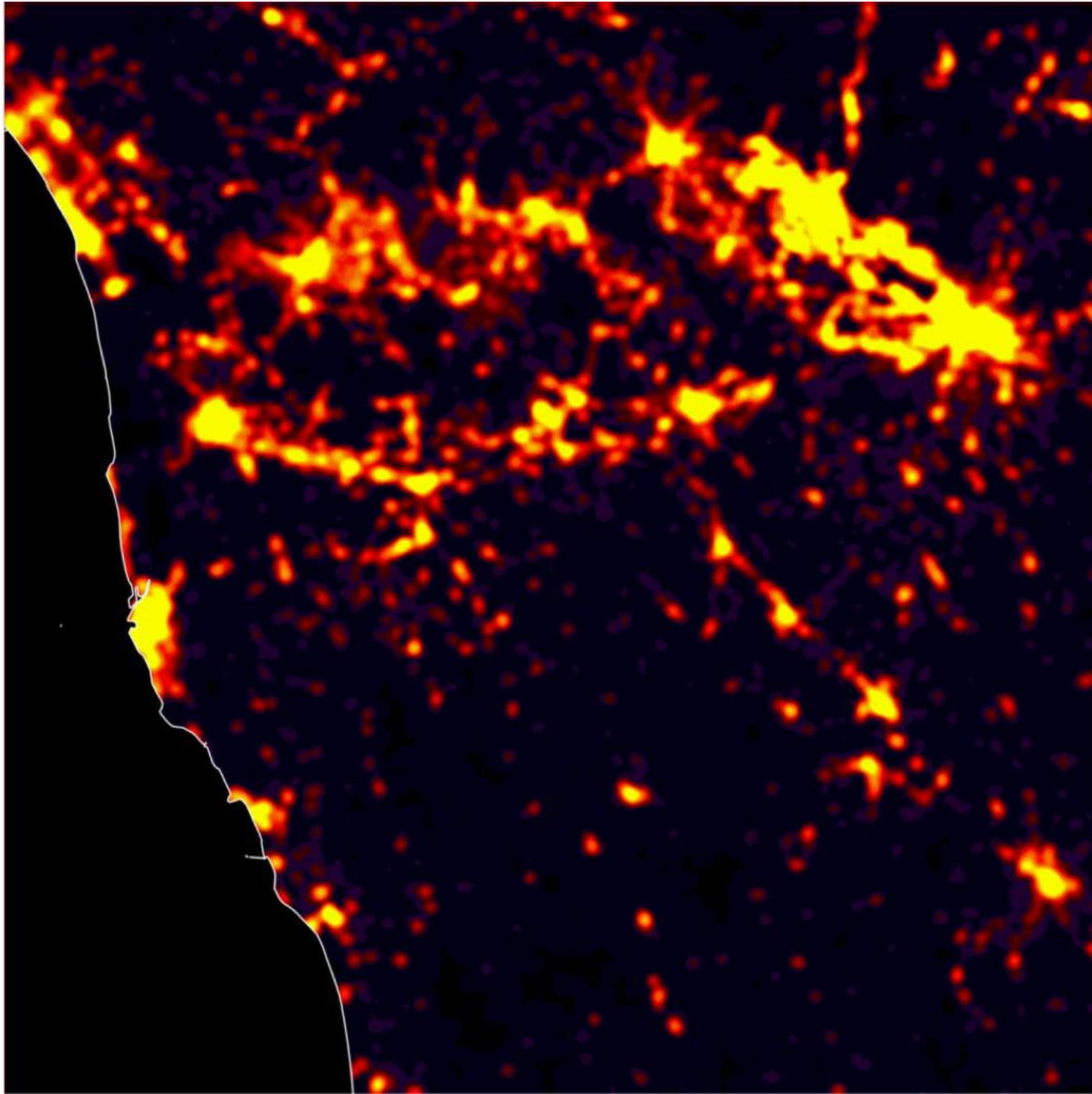
1850



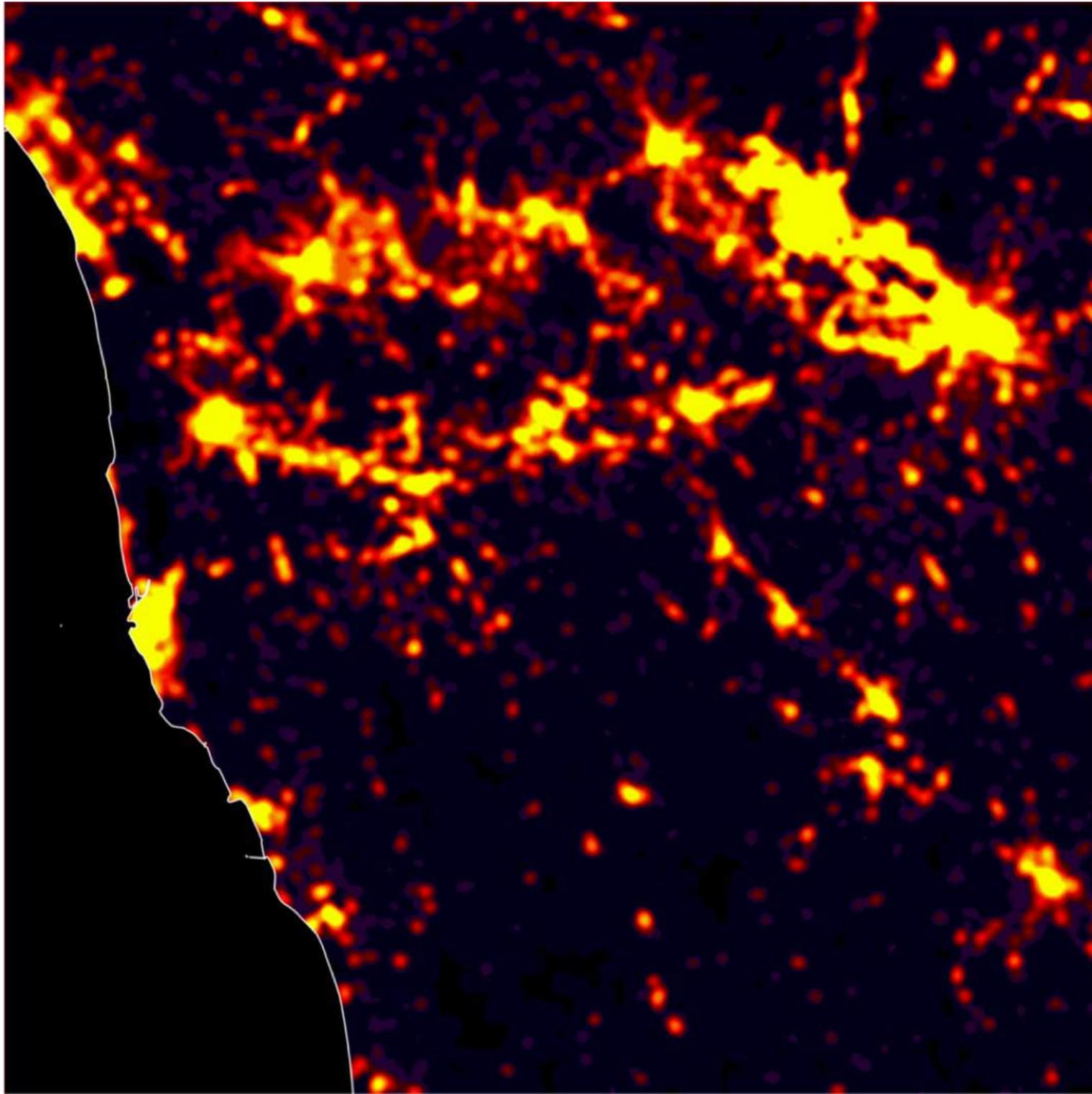
1954



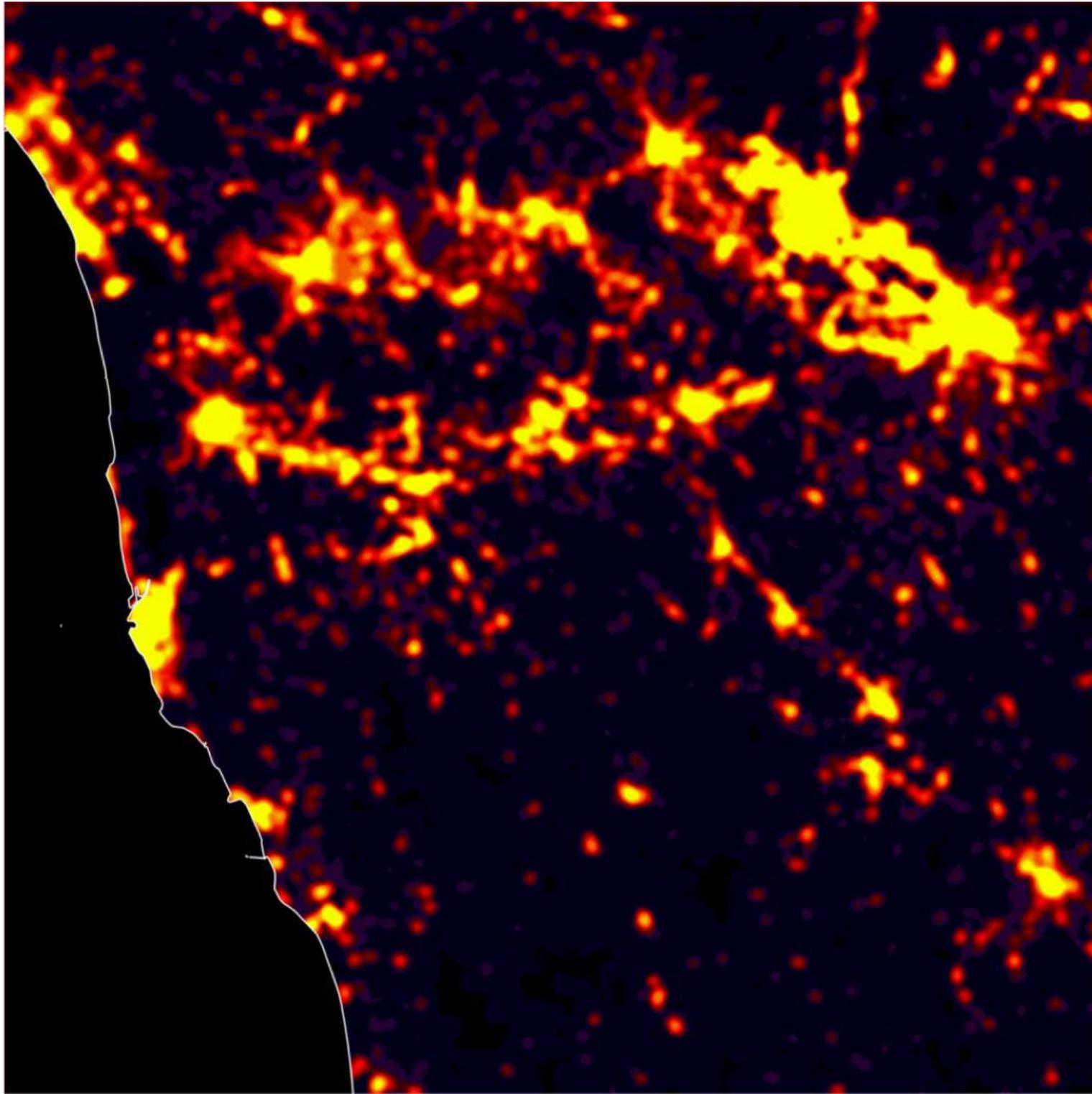
1978

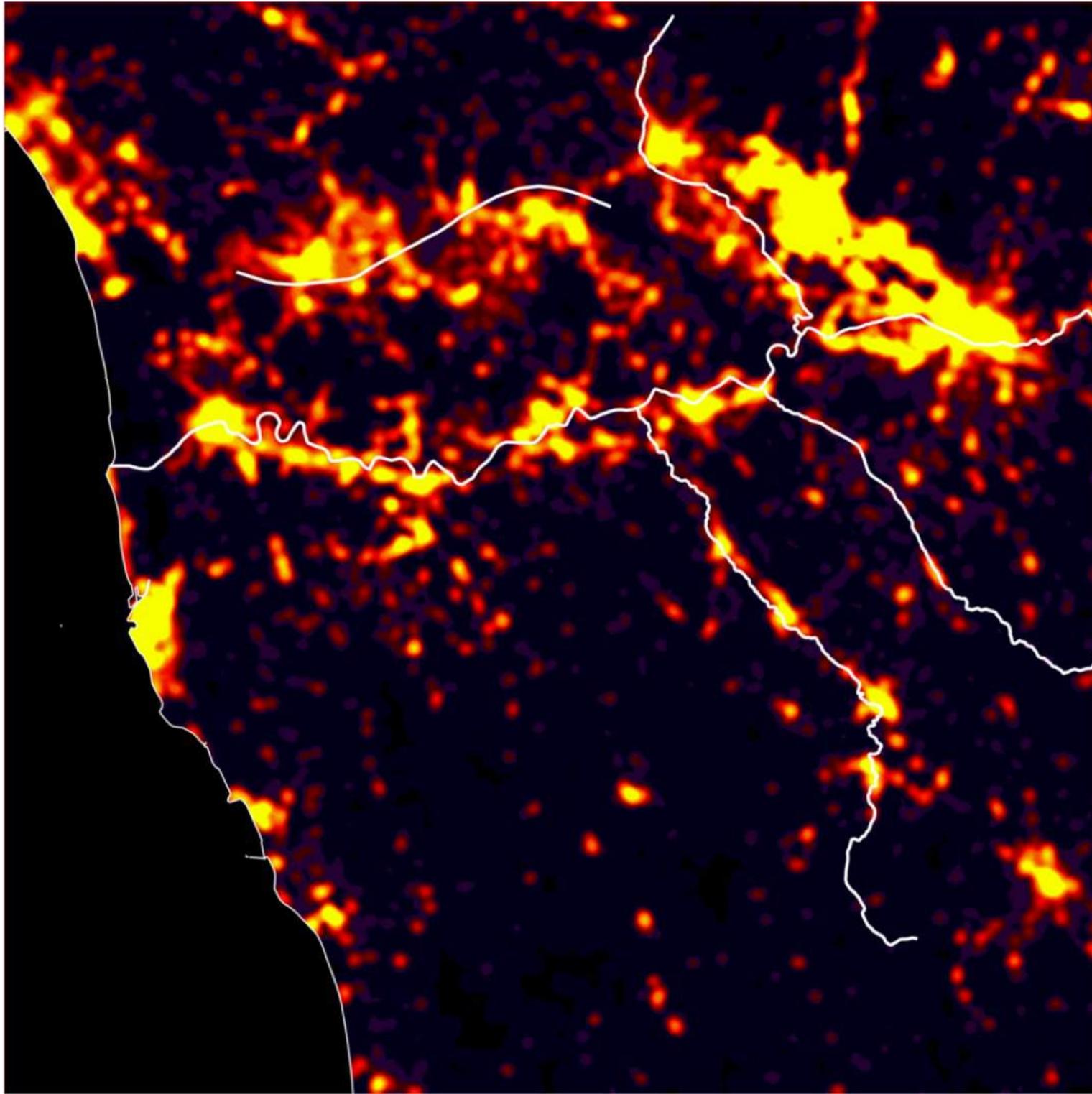


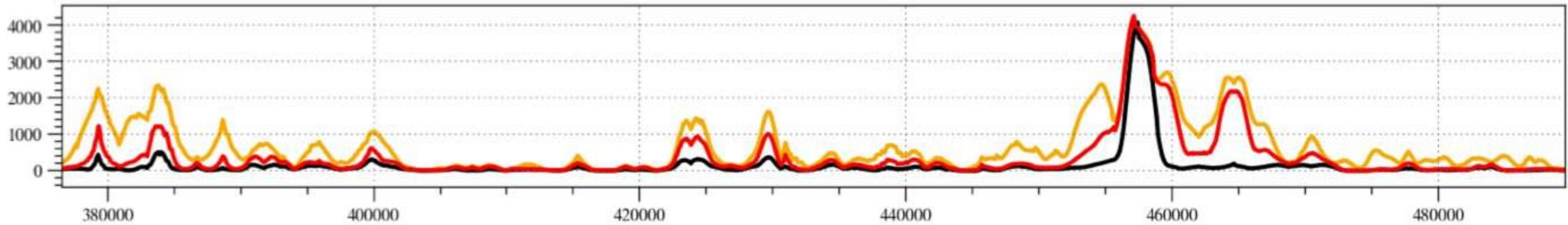
1996



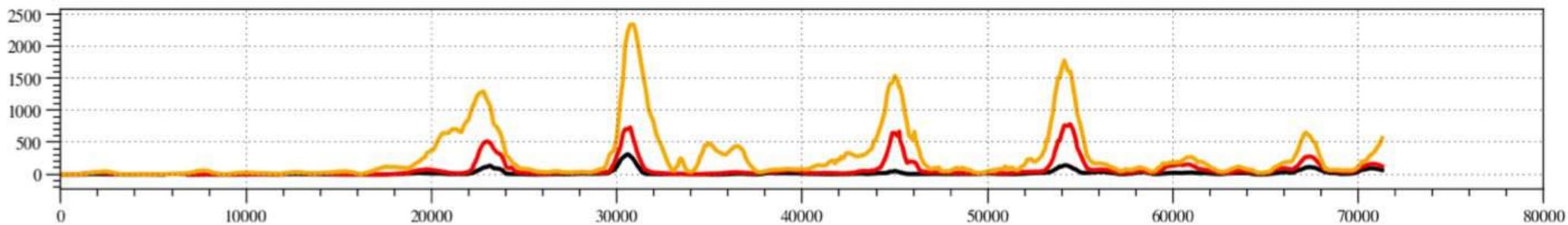
2012



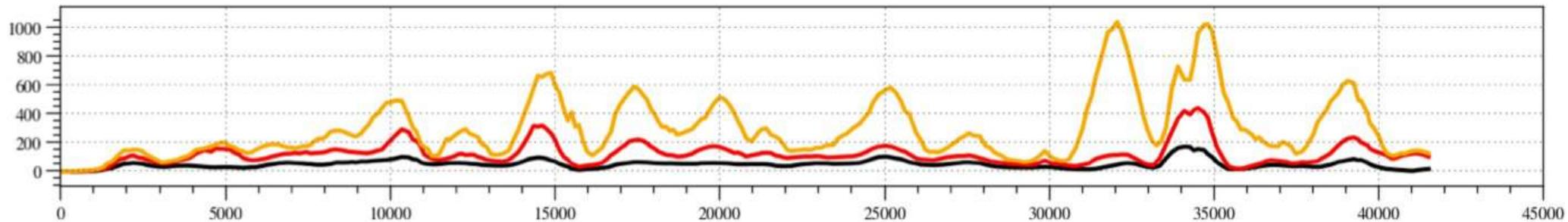




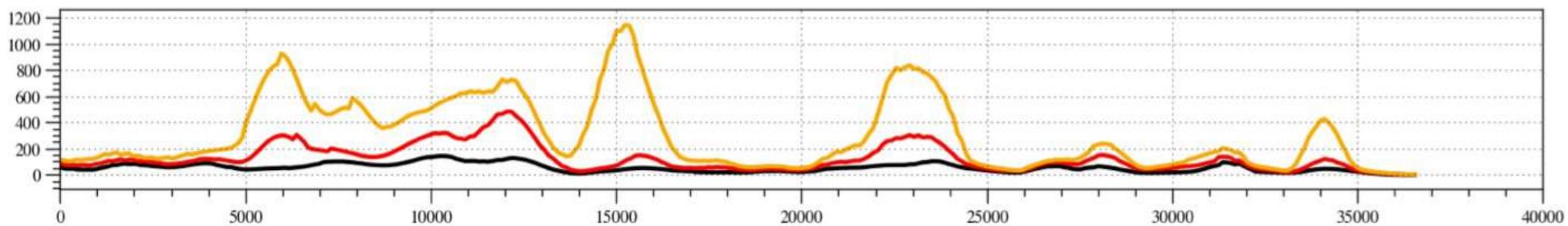
ARNO



ELSA



OMBRONE PISTOIESE



VAL DI NIEVOLE

What density (of buildings) means?

What kind phenomenon we want to study?

Can we imagine a threshold to separate low and high?

And how?

density of settlements
source: Regione Toscana – Informazione Geografica

standard deviation map

> average and < average plus half
the value of the standard deviation



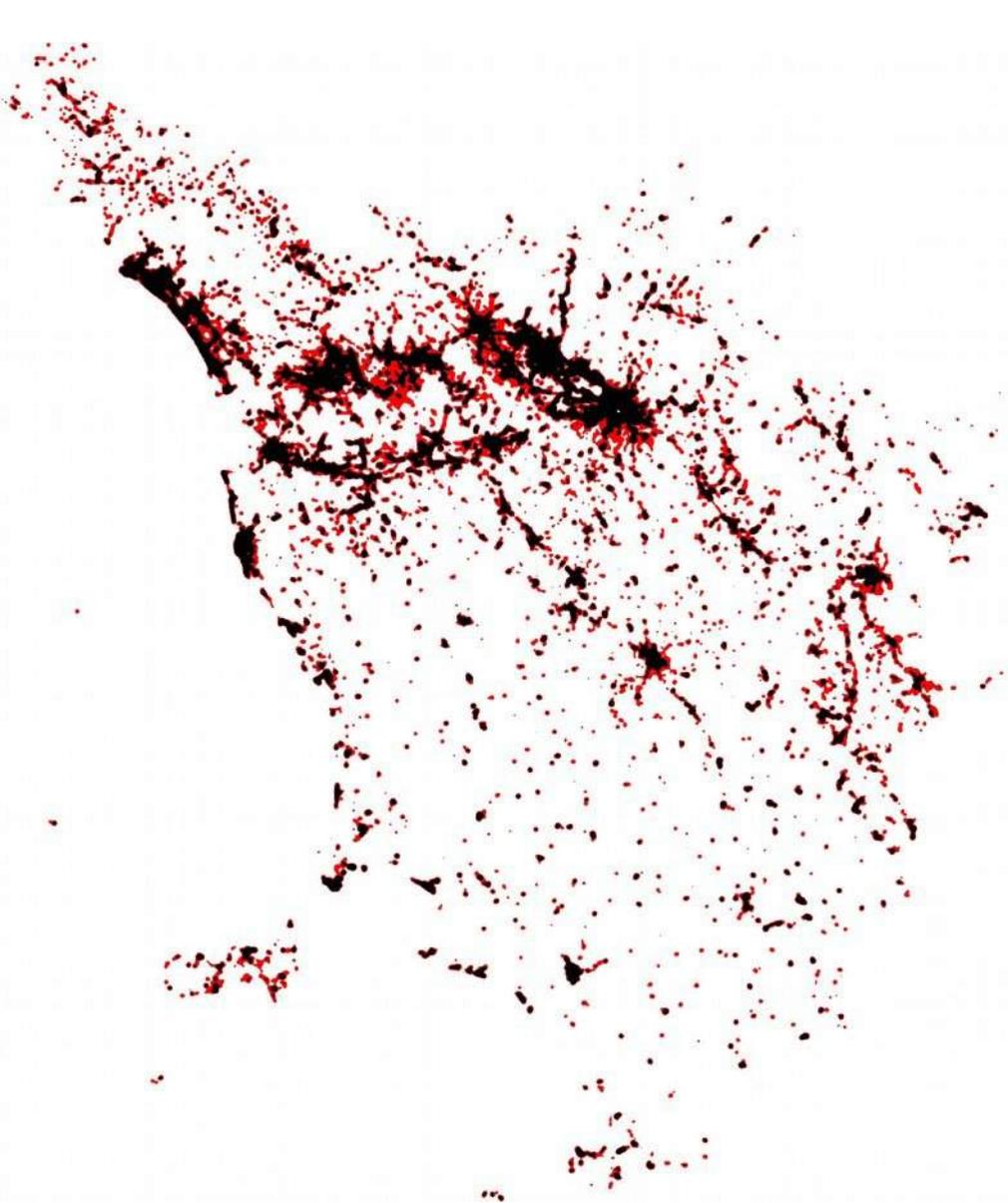
> average plus half the value of the
standard deviation



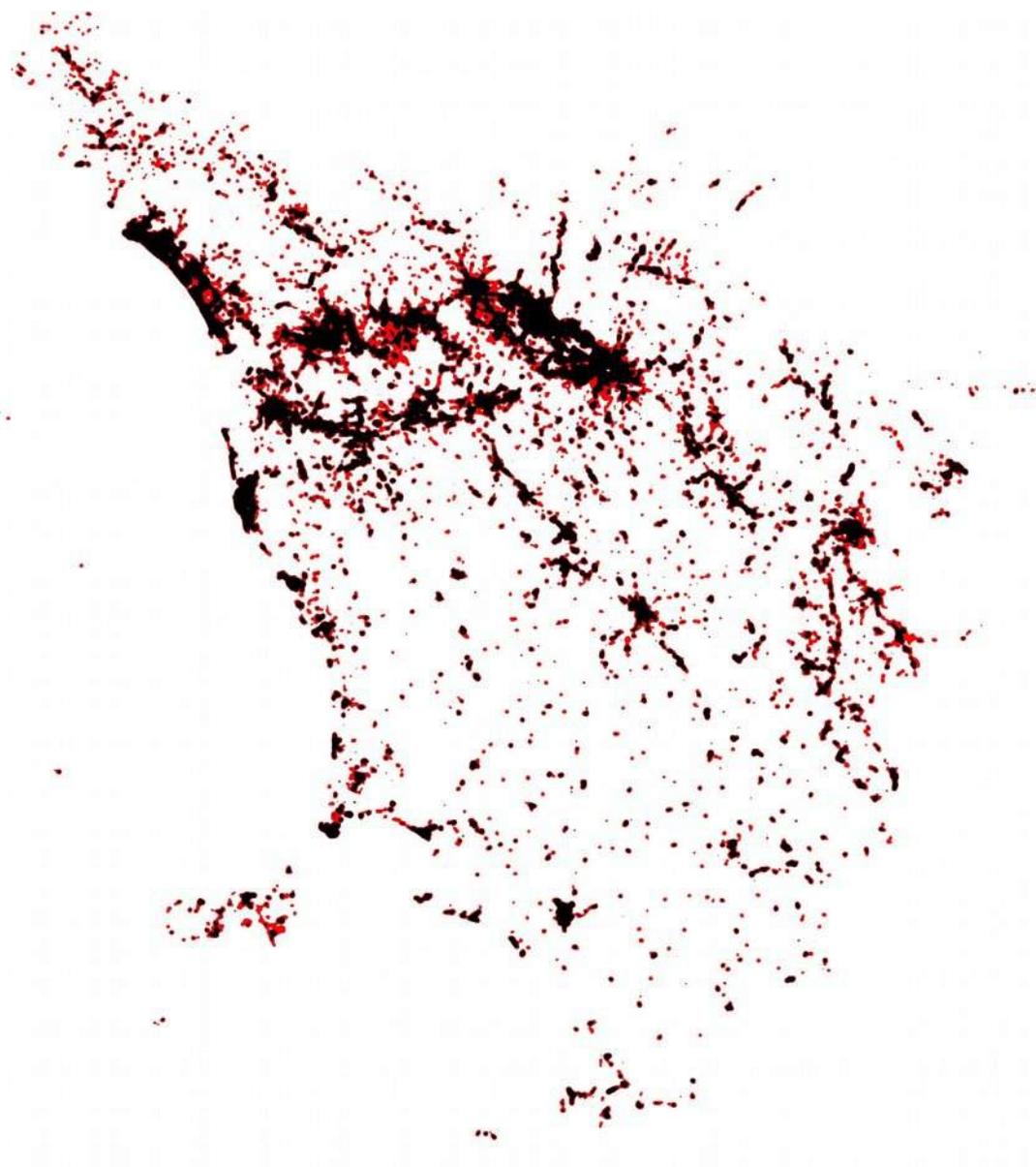
1850



1954



1978



2012

composite density index
source: ISTAT census 2011
ISPRA soil imperviousness

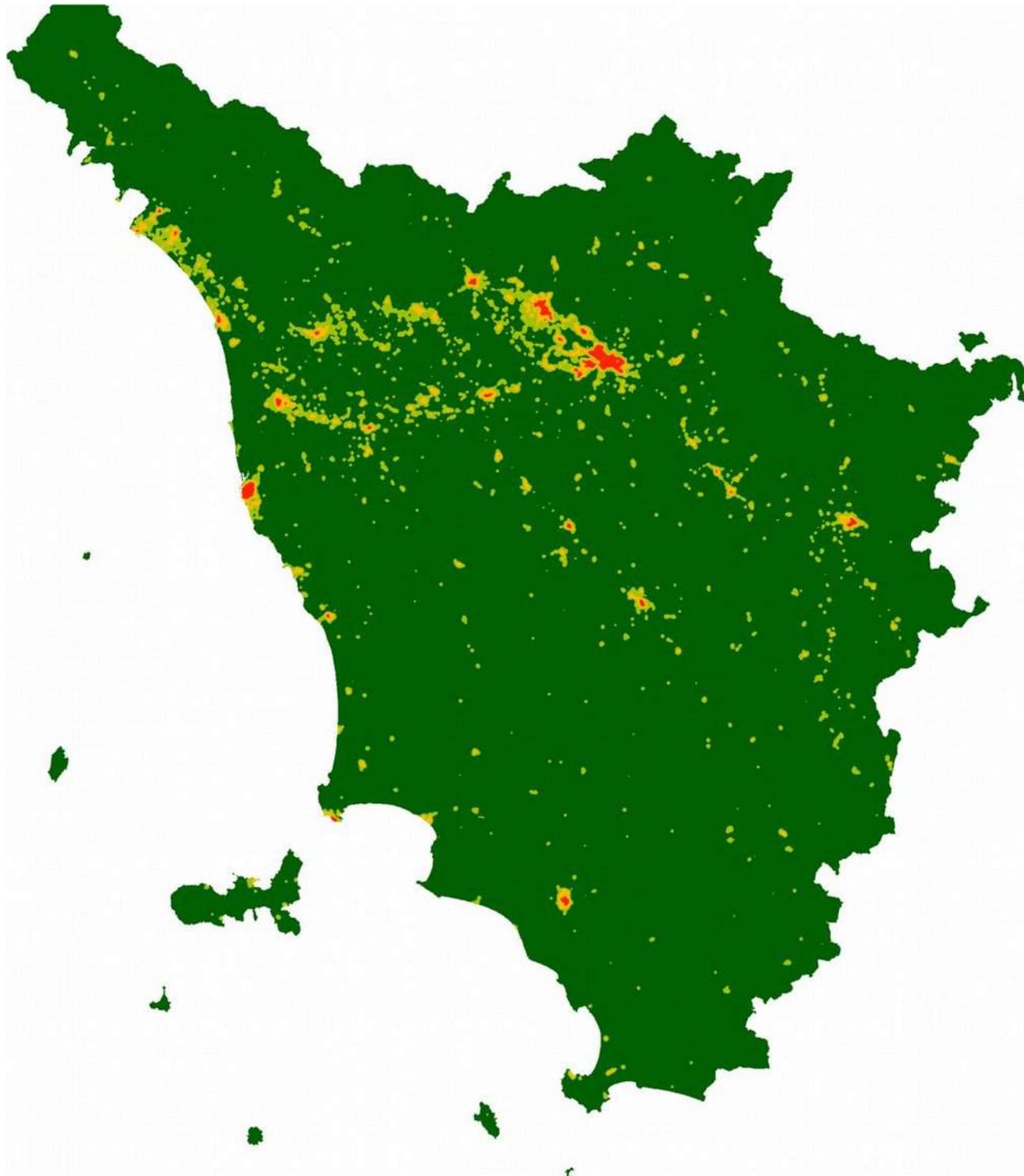
four color classes, natural bracks method



If we agree that urban is a place where we have the convergence of three kind of concentration: inhabitants, built objects and work, we can map this concentration of urbanity

The map is the result of the relationship of:

- density of population 2011 (kernel density)
- density of workers 2011 (kernel density)
- intensity of soil imperviousness (raster 20x20)



complex density index
source: ISTAT census 2011

mathematical relationship between raster, kernel density, maps

low correlation



high correlation

The city is an instrument "to gain accessibility" (M. Webber, 1963)

If we agree that urban is a place where a category of demand meet supply of urban functions, we can measure the convergence of the two

We have tested three categories of functions offered by the city:

- services for people
- services for factories
- cultural and loisir services

Servizi imprese



Addetti imprese manifatturiere



Addetti servizi alle imprese

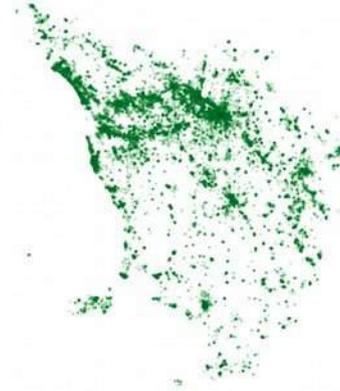


Distribuzione pesata dei servizi alle imprese

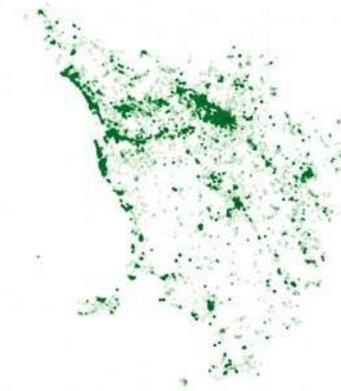
Servizi persona



Popolazione

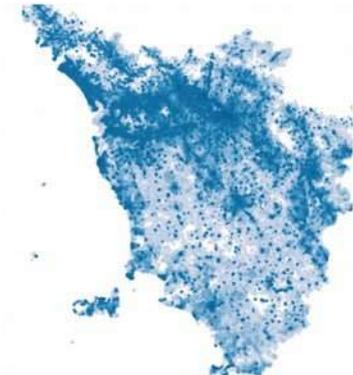


Addetti servizi alla persona

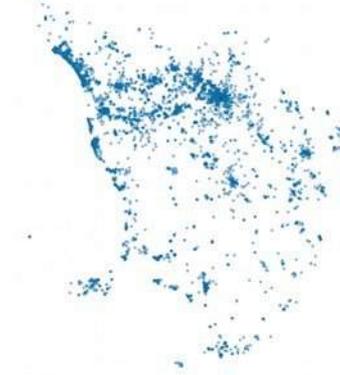


Distribuzione pesata dei servizi alla persona

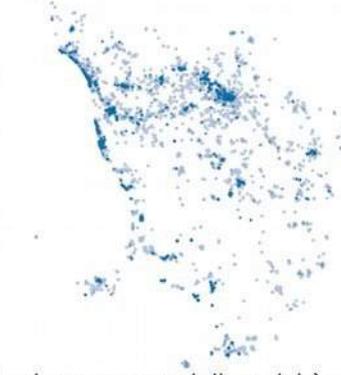
Cultura e loisir



Popolazione attiva



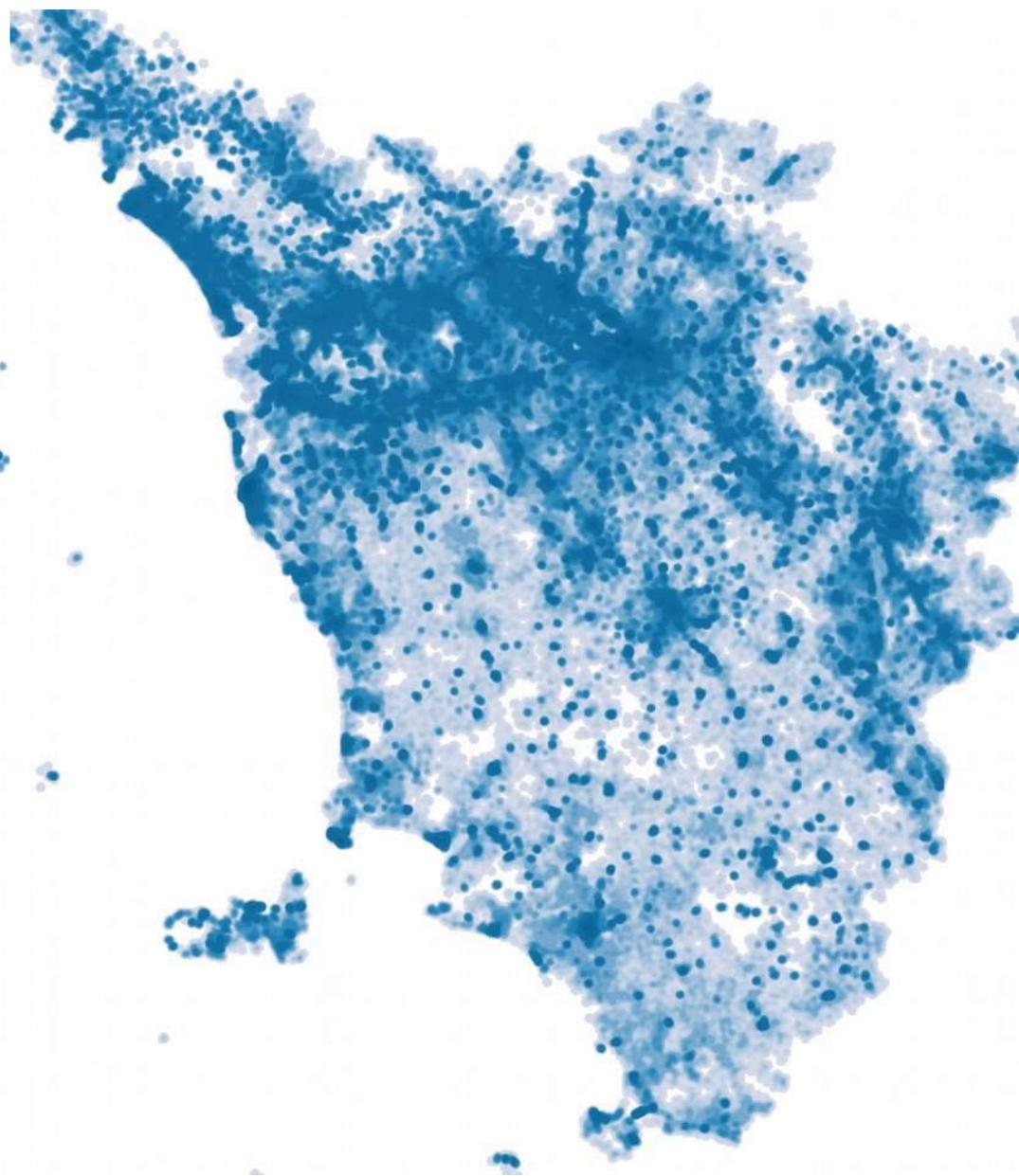
Addetti attività culturali e loisir



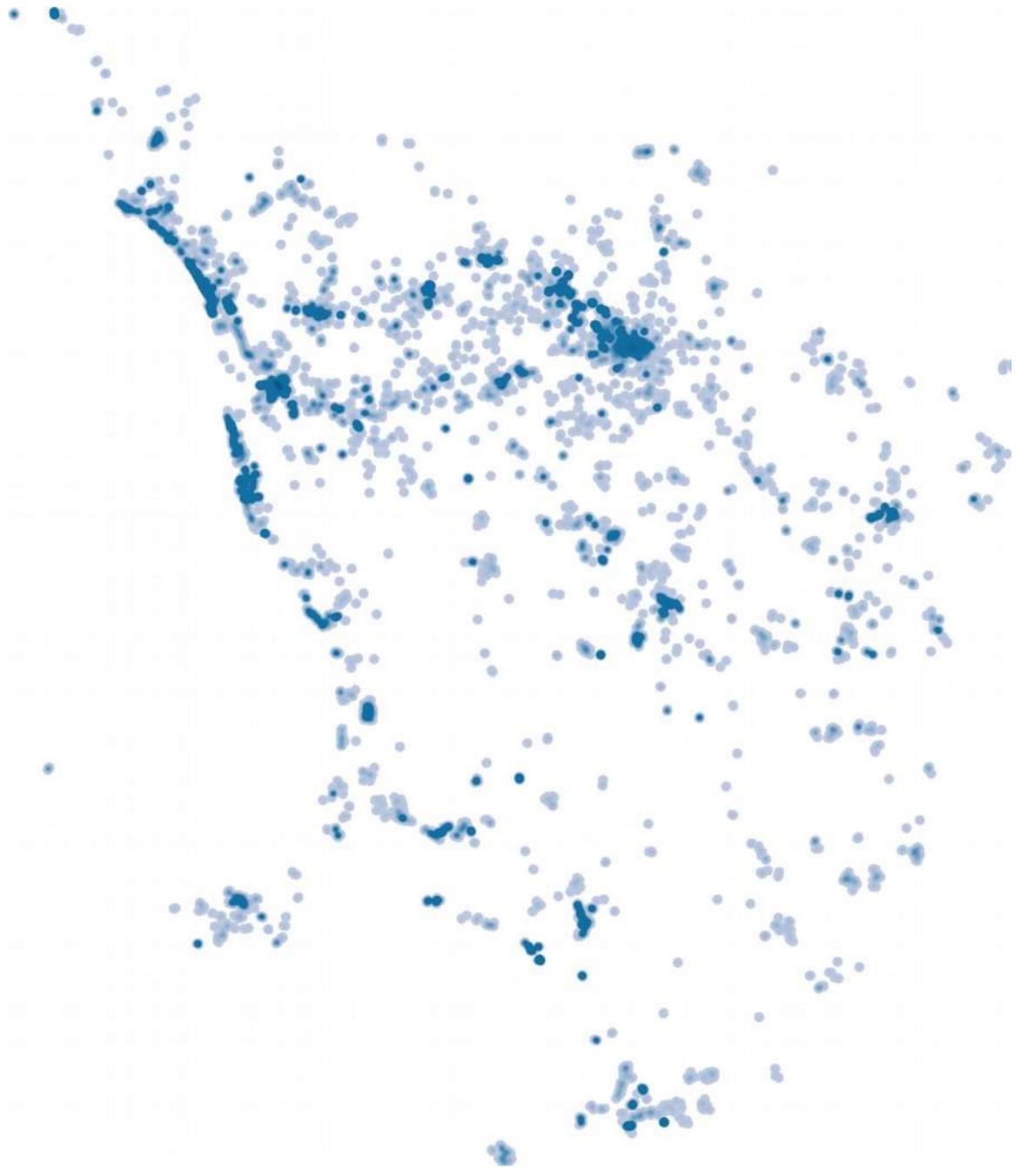
Distribuzione pesata delle attività culturali e di loisir



Workers in loisir and cultural activities



Population between 20 and 75 years



Sustainable maps



streams and levees
source: Ministero dell'Ambiente
EU Environment Agency

extension and landforms of the unbuilt areas

impossible to build



possible to build

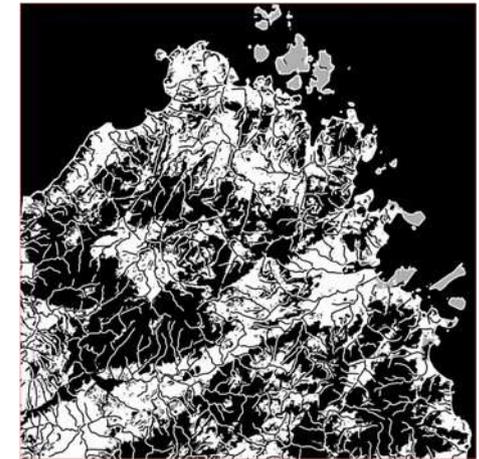
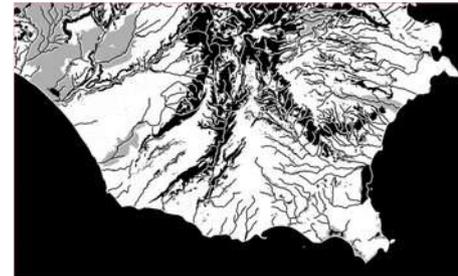
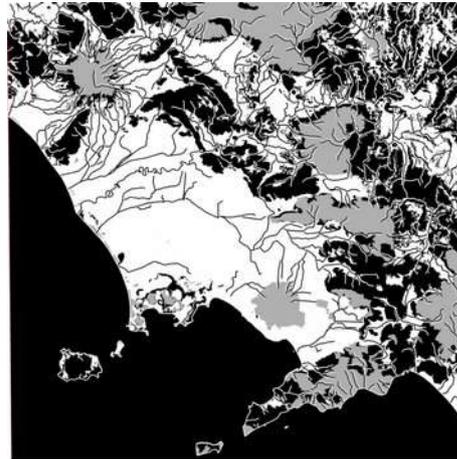
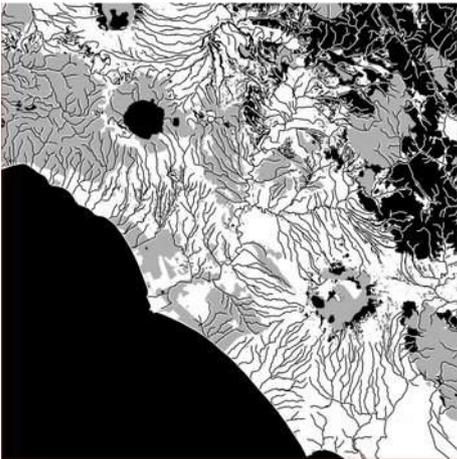
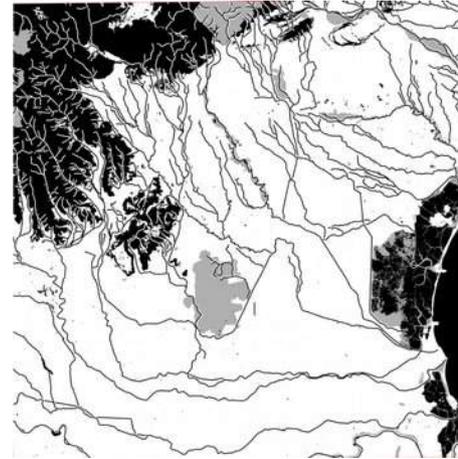
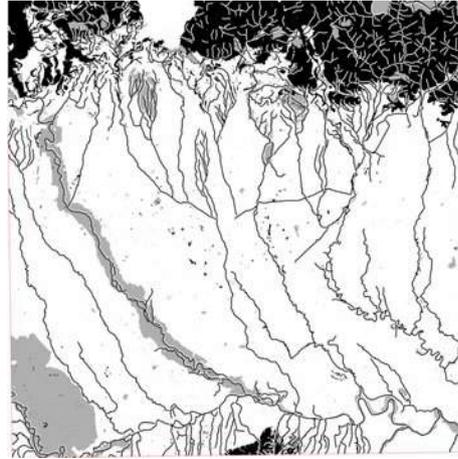
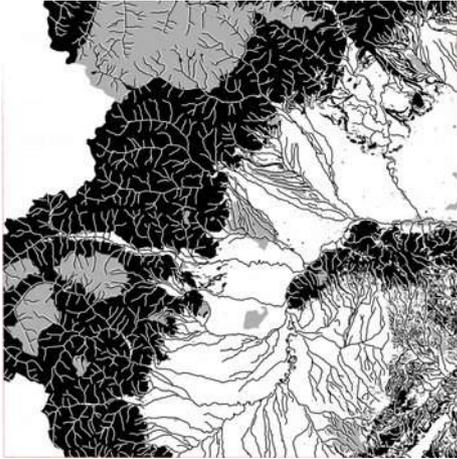
From the space of every tile we subtract:

- slope with a declivity $>10\%$ (*)
- internal water bodies (**)
- swamps and humid areas (**)
- EU-Site of Community Importance (***)
- EU- Special Protection Area (***)
- Ramsar Convention Areas (***)

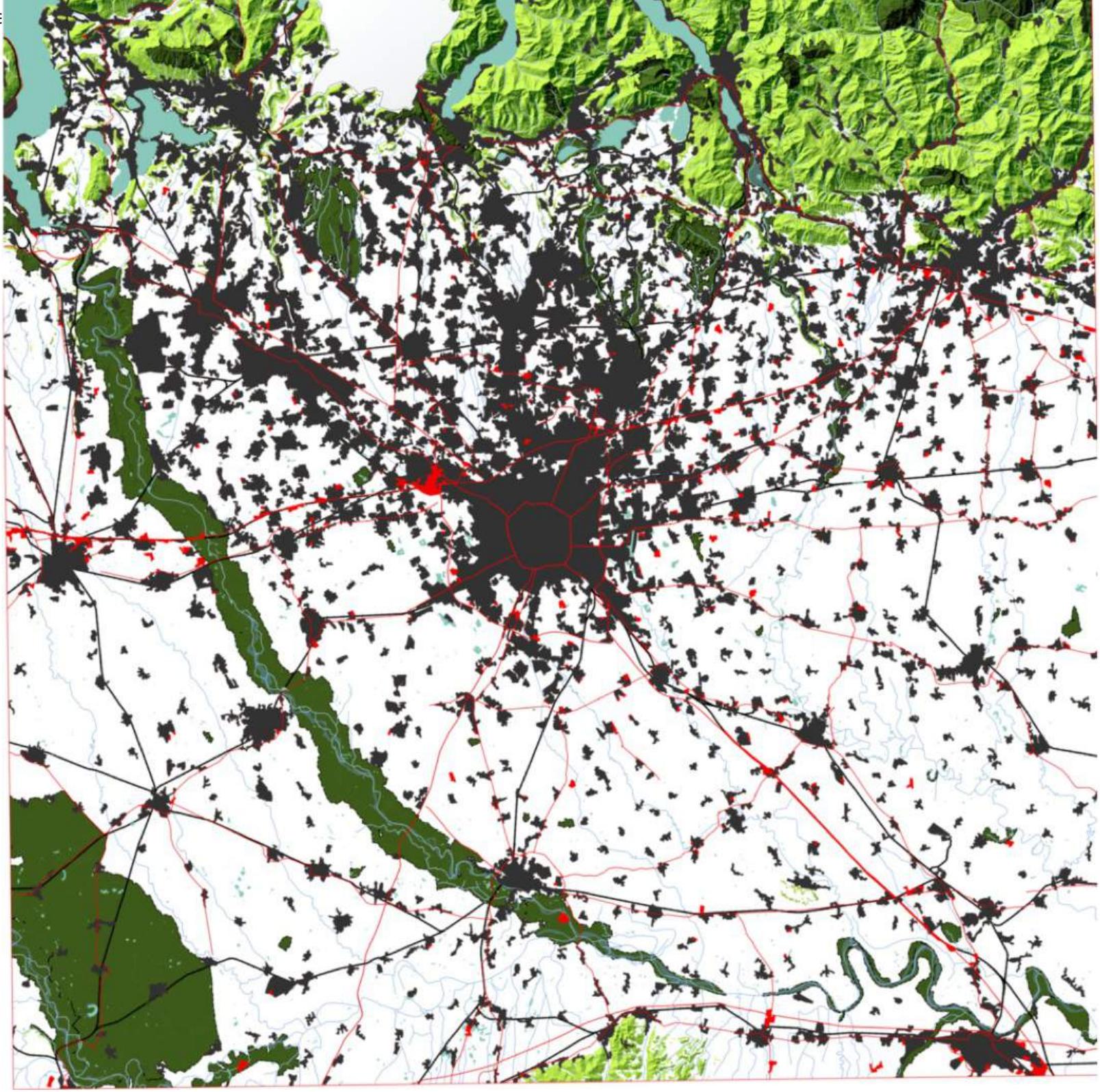
(*) dtm 20m Ministero Ambiente

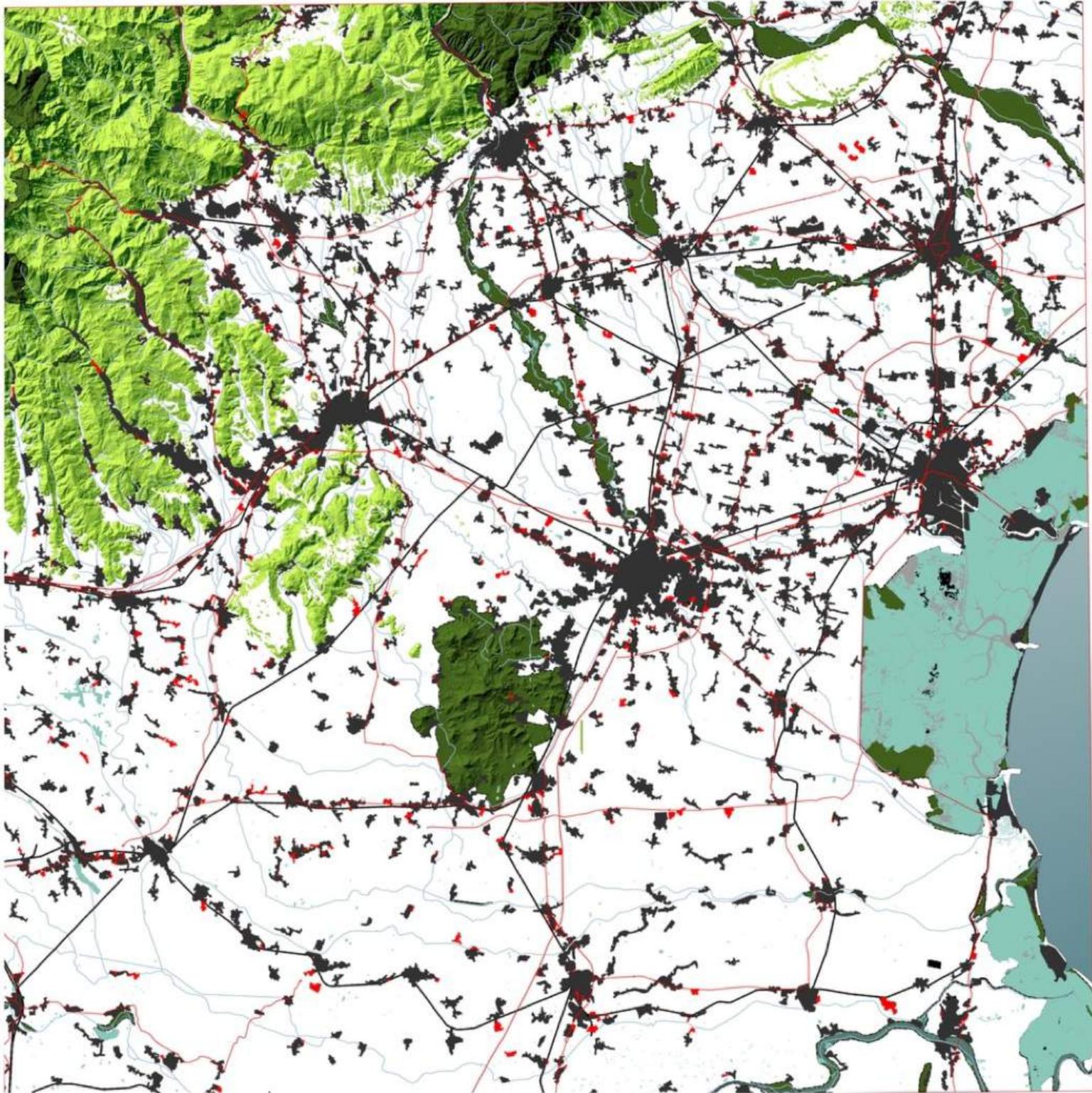
(**) CLC 2006

(***) Sistema Aree Protette, Ministero Ambiente



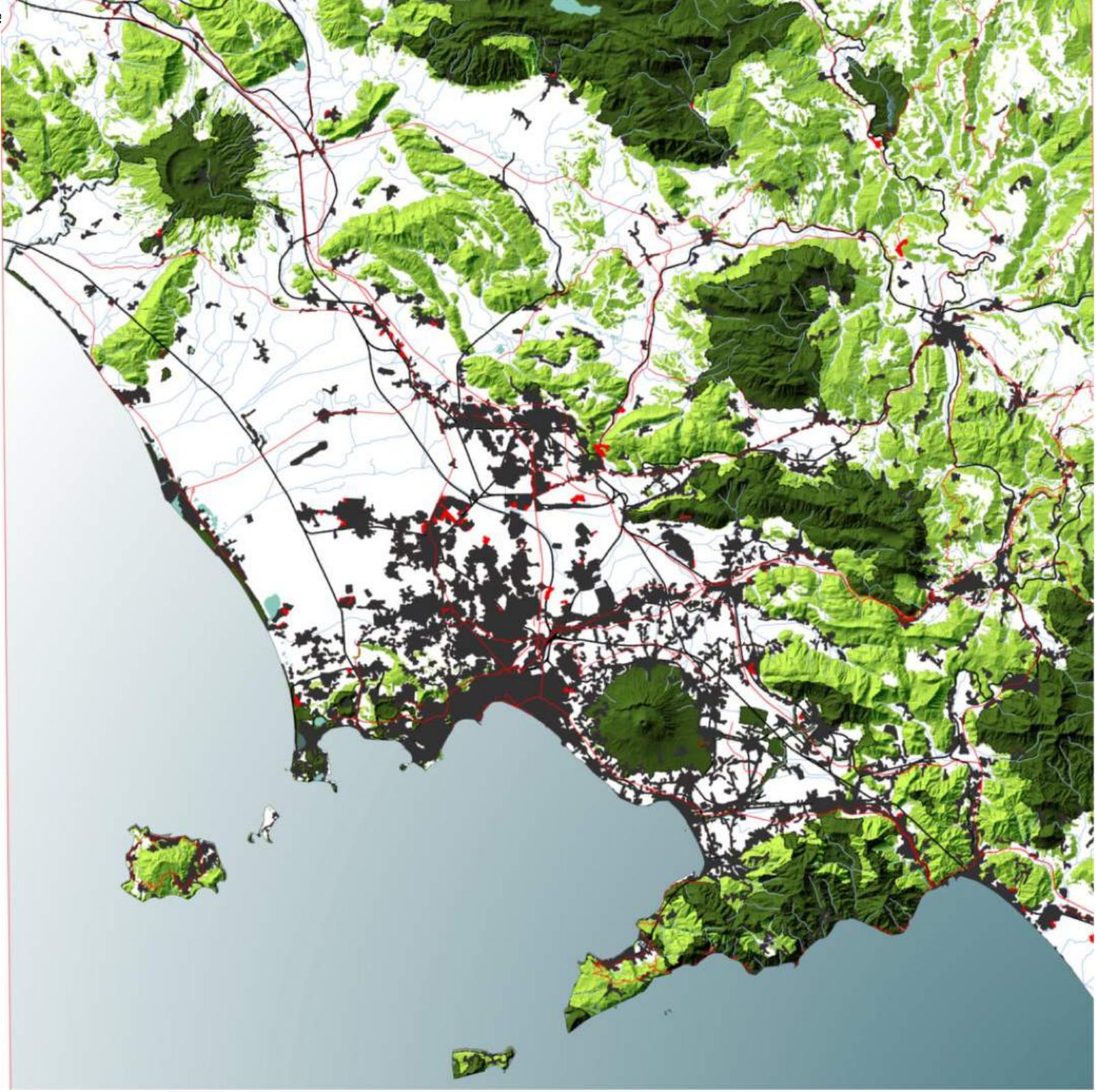




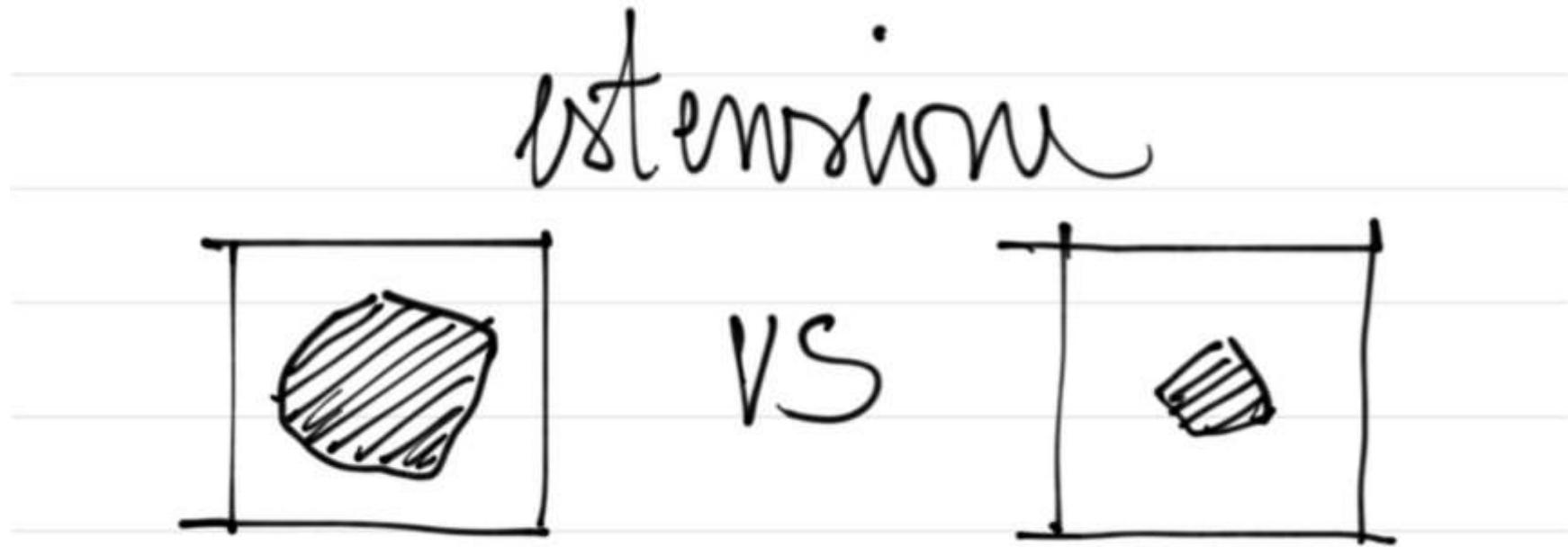






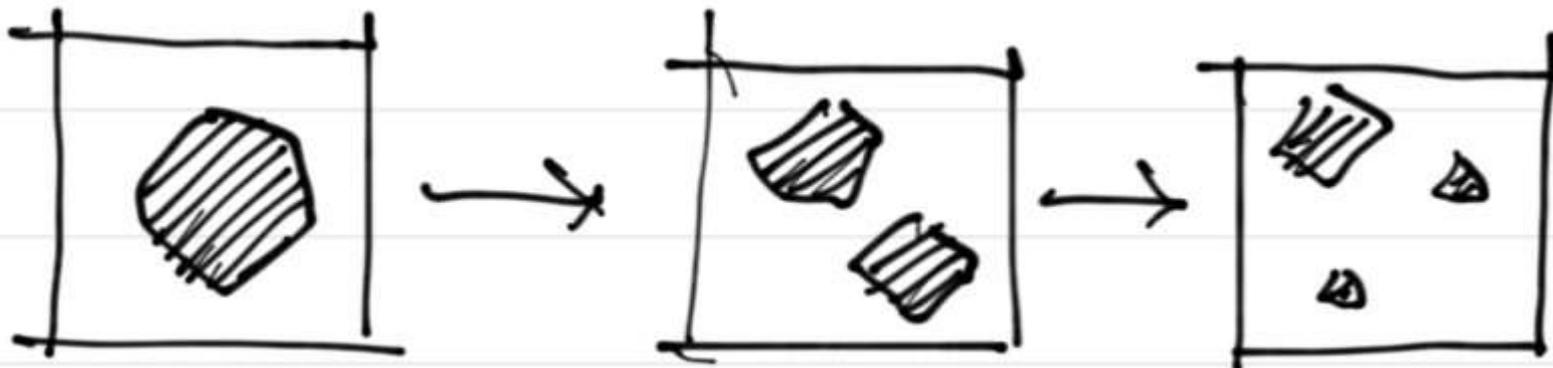


index: extension



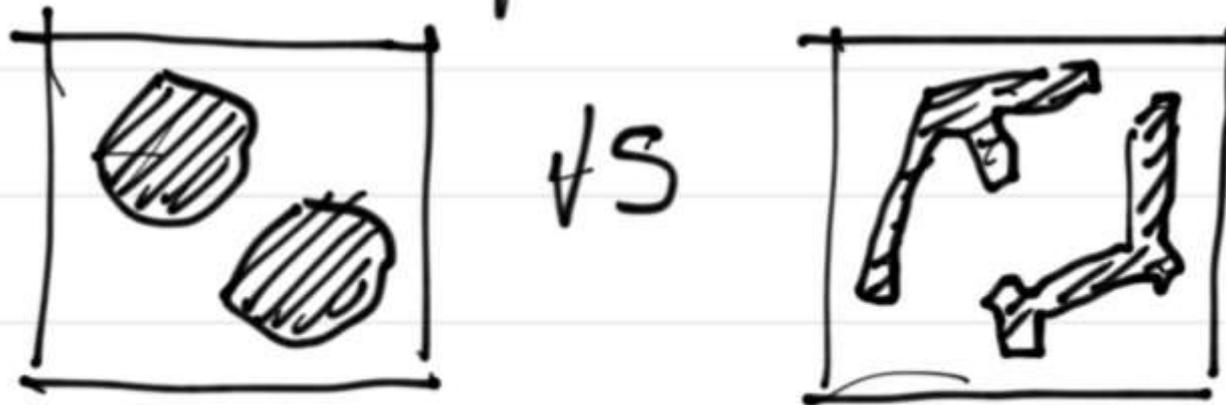
unbuilt surface/total surface (net of the sea, France and Switzerland)*100

(more) planarity



dimension of the biggest patch/total area of the patches/number of the patches

Complementi



Area Weighted Mean Shape Index (AWMSI)

$$AWMSI = \sum_{i=1}^n \left[\left(\frac{p_i}{2\sqrt{\pi \cdot a_i}} \right) \left(\frac{a_i}{\sum_{i=1}^n a_i} \right) \right]$$



Extension:

how much free land (streams) in comparison with the total area
(percentage)





concentration/polarity:

Streams: preponderance of a single big patch and fragmentation of the small patches (normalized 0÷100)





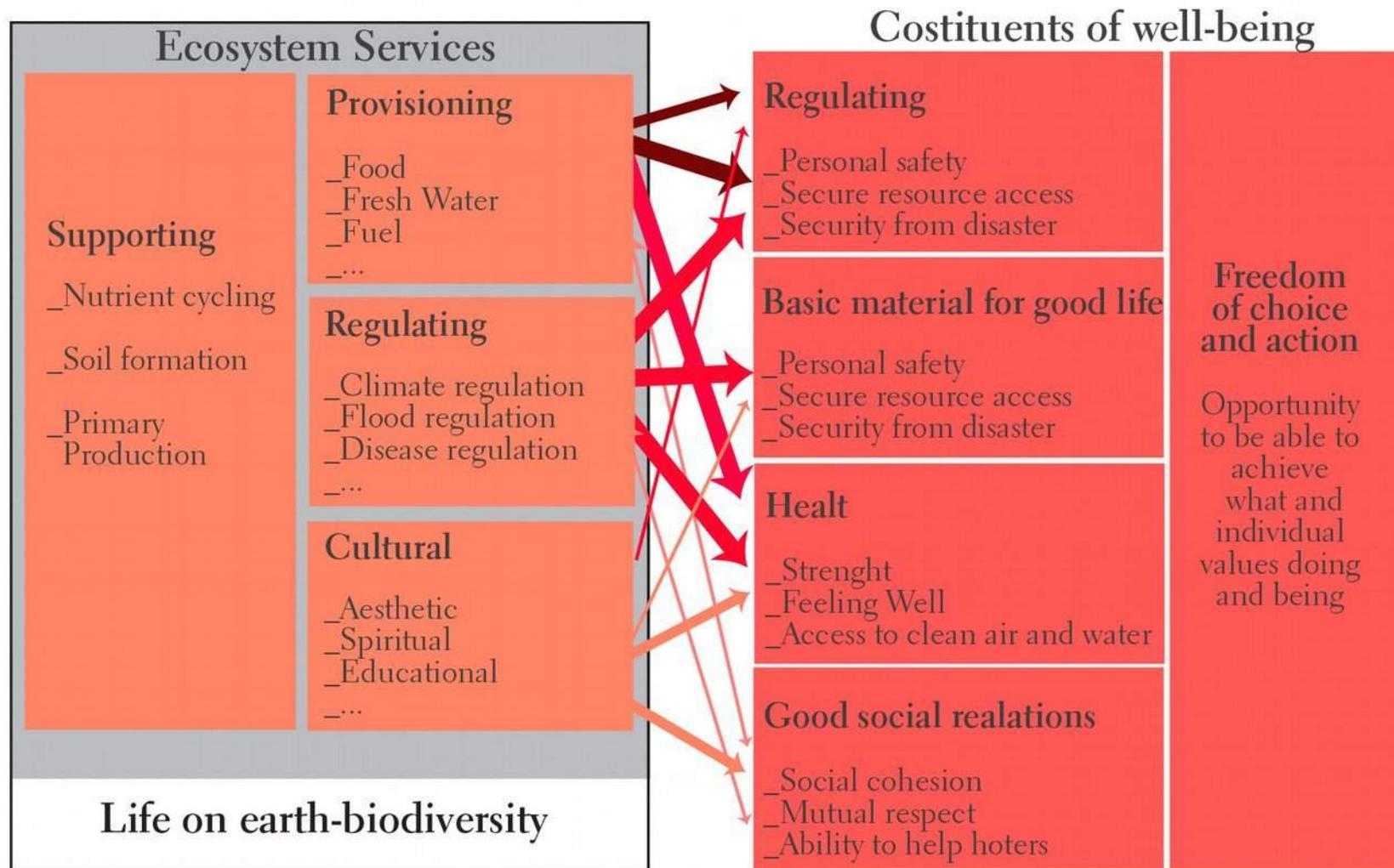
morphological complexity:

Streams: perimeter/area ratio, weighted on patch dimension
(normalized $0 \div 100$)



ecosystem services
source: Ministero dell'Ambiente
Regione Toscana – Informazione Geografica

services provided by unbuilt areas



Arrow's color
Potential for mediation by socioeconomic factors

Arrow's widht
Intensity of linkages between E.S. and human well-being

Low
 Medium
 High

Weak
 Medium
 Strong



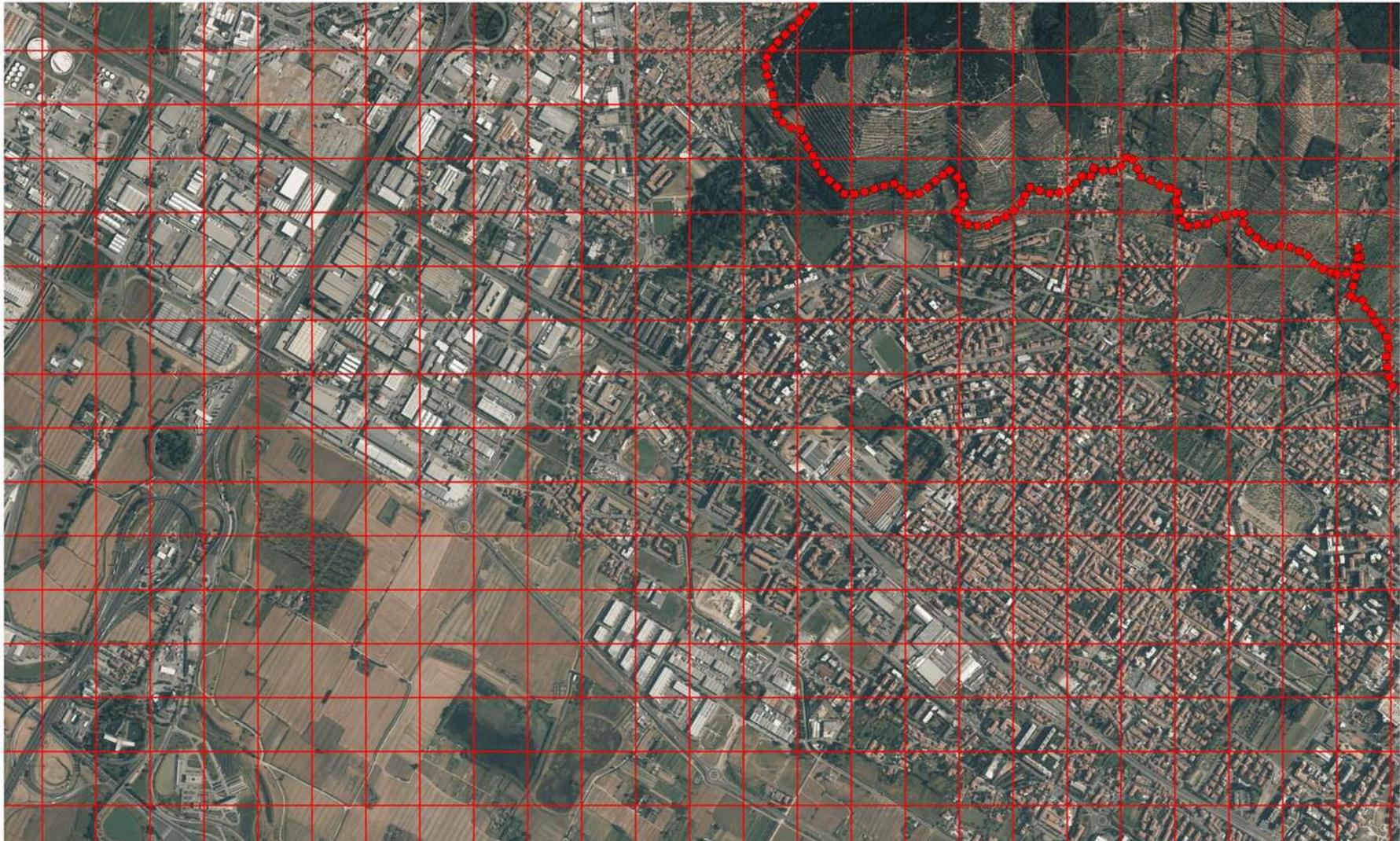
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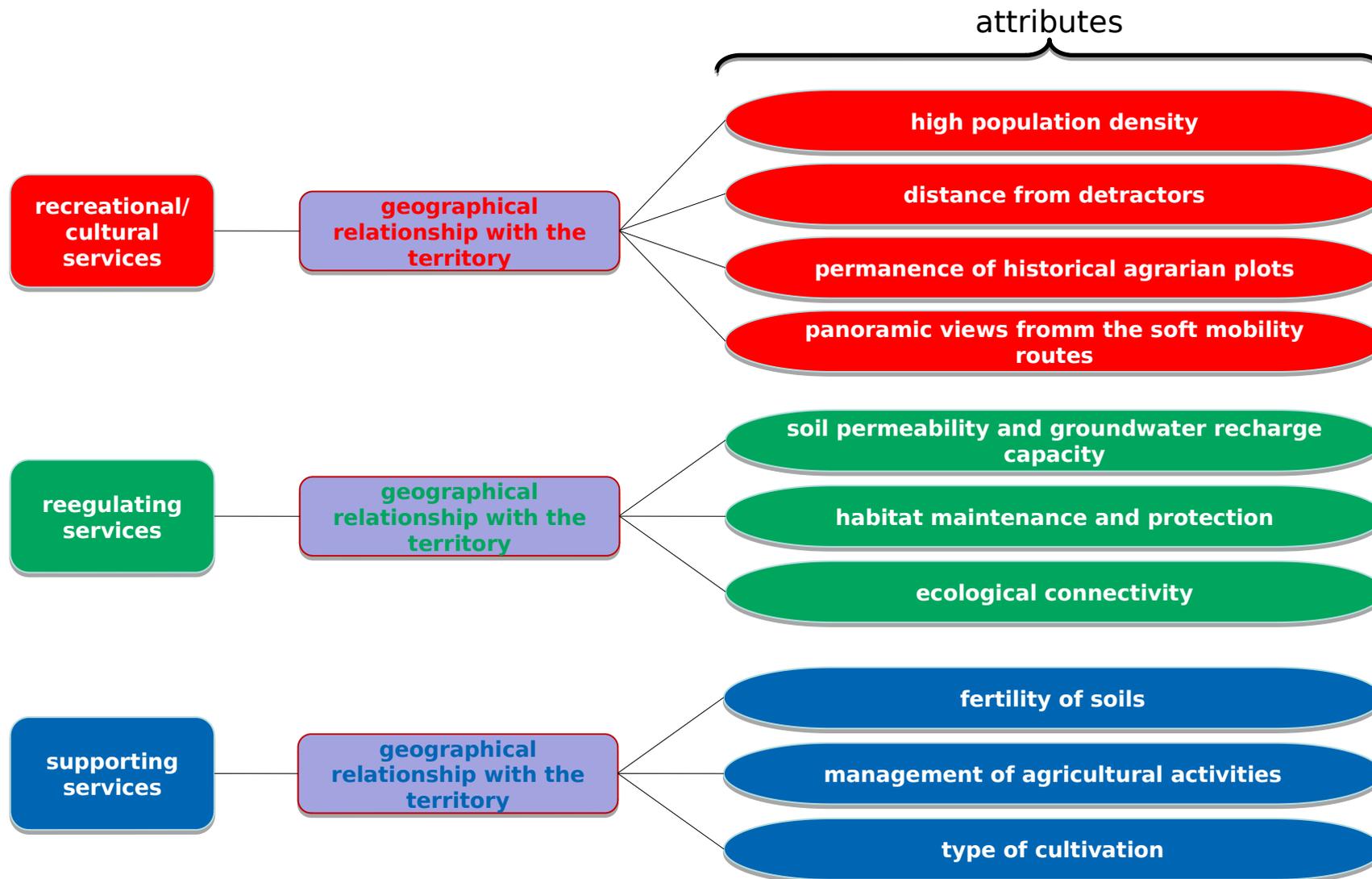
©FC2016/2016 © Consorzio TeA

Over the area we posed a grid, testing three different dimension (180x180; 60x60; 30x30)



For each cell have been calculated the constructed surface and the percentage of non-built space





the ecosystem service evaluation is based on a spatial multi-criteria analysis. The weight of the different attributes has been defined with the methodology of Analytic Hierarchy Process di Saaty (AHP).

An example of AHP

matrice delle priorità (CONFRONTO A COPPIE)

	Aeroporto	Autostrada	Strade di grande comunicazione	Ferrovia	Impianti tecnologici di smaltimento	Zone industriali	Discarica	CRITERIO FITTIZIO	Punteggi	Peso tranquillità
Aeroporto		1,0	1,0	1,0	1,0	1,0	1,0	1,0	7,0	0,250
Autostrada	0,0		1,0	1,0	1,0	1,0	1,0	1,0	6,0	0,214
Strade di grande comunicazione	0,0	0,0		1,0	1,0	1,0	1,0	1,0	5,0	0,179
Ferrovia	0,0	0,0	0,0		0,5	1,0	1,0	1,0	3,5	0,125
Impianti tecnologici di smaltimento	0,0	0,0	0,0	0,5		0,5	1,0	1,0	3,0	0,107
Zone industriali	0,0	0,0	0,0	0,0	0,5		1,0	1,0	2,5	0,089
Discarica	0,0	0,0	0,0	0,0	0,0	0,0		1,0	1,0	0,036
	0,0	0,0	0,0	0,0	0,0	0,0	0,0		0,0	0,000
Totale									28,0	1,000

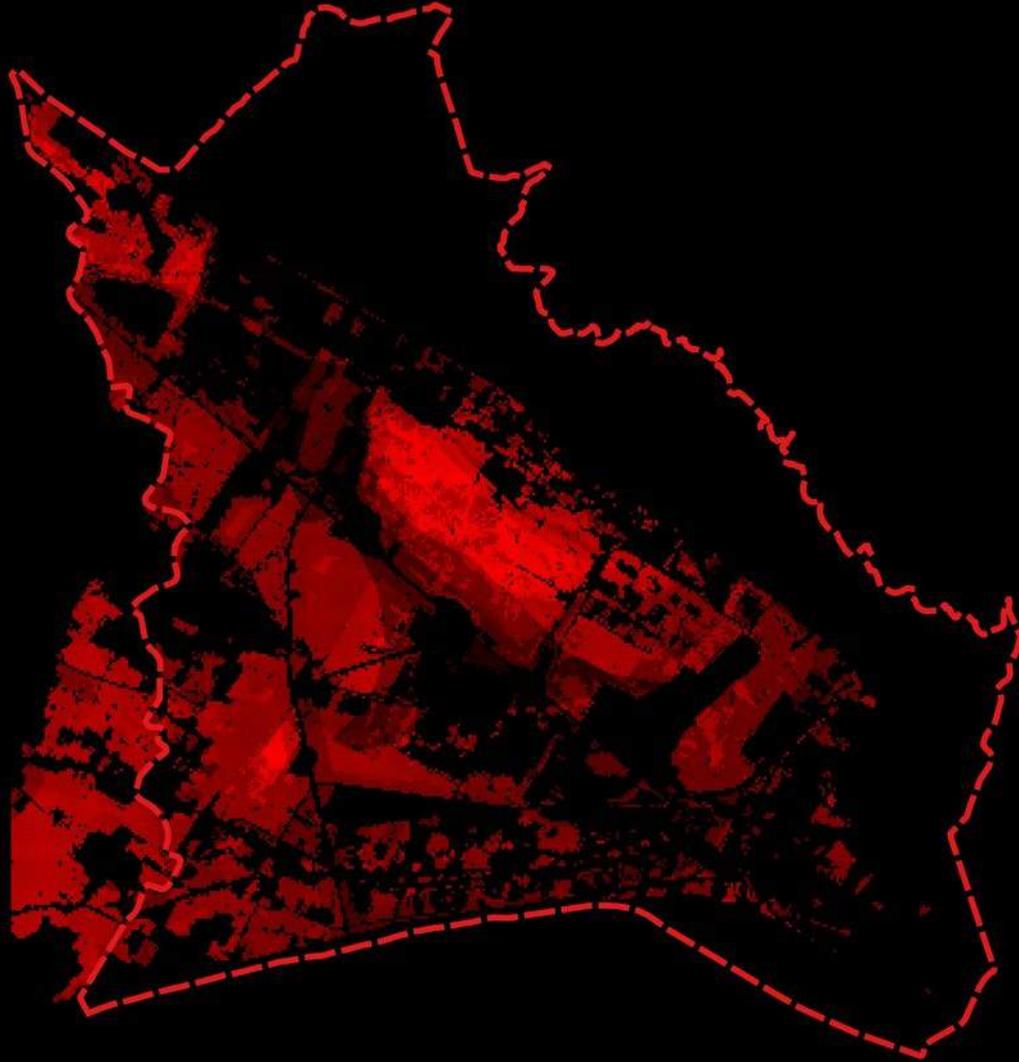
recreational/cultural services – maps of detractors and influence areas



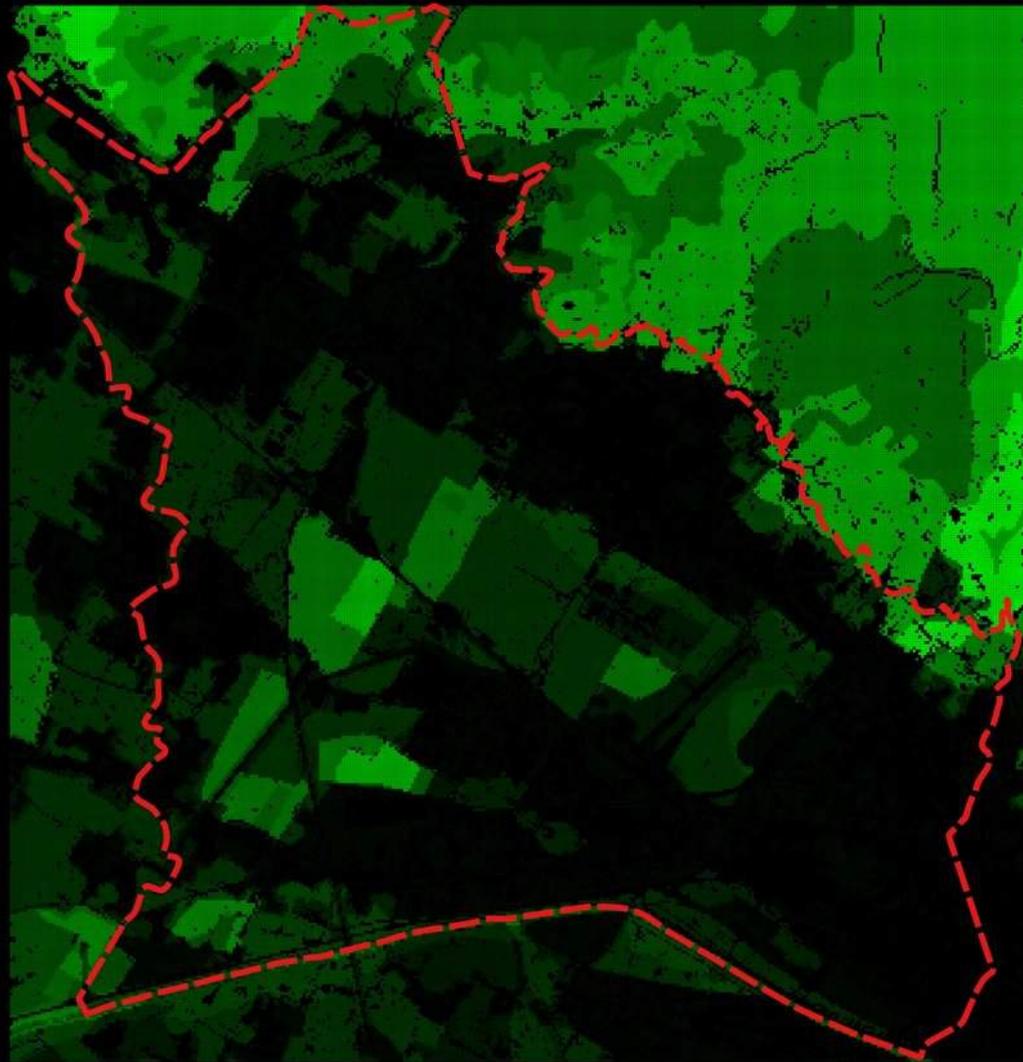
each cell has been crossed with the territorial distribution of the attributes



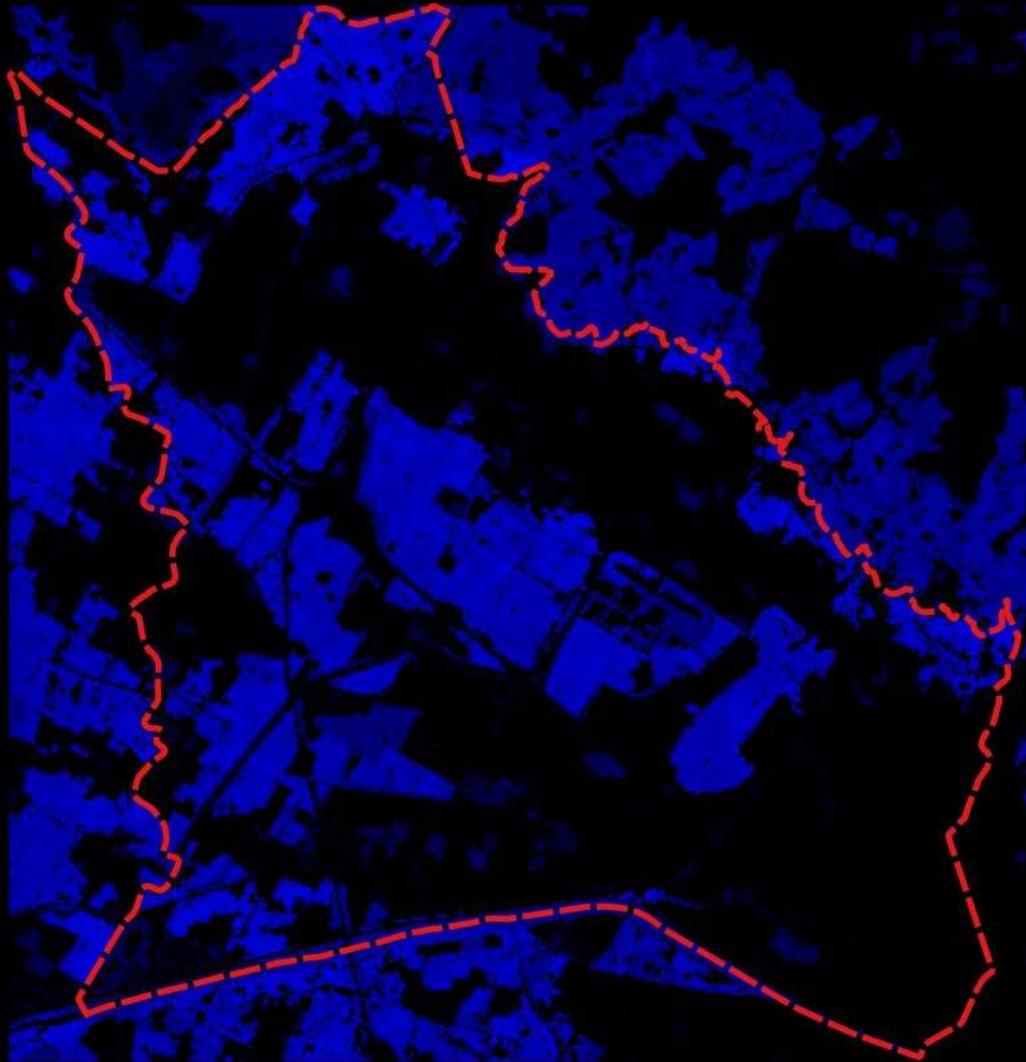
recreational/cultural services - red



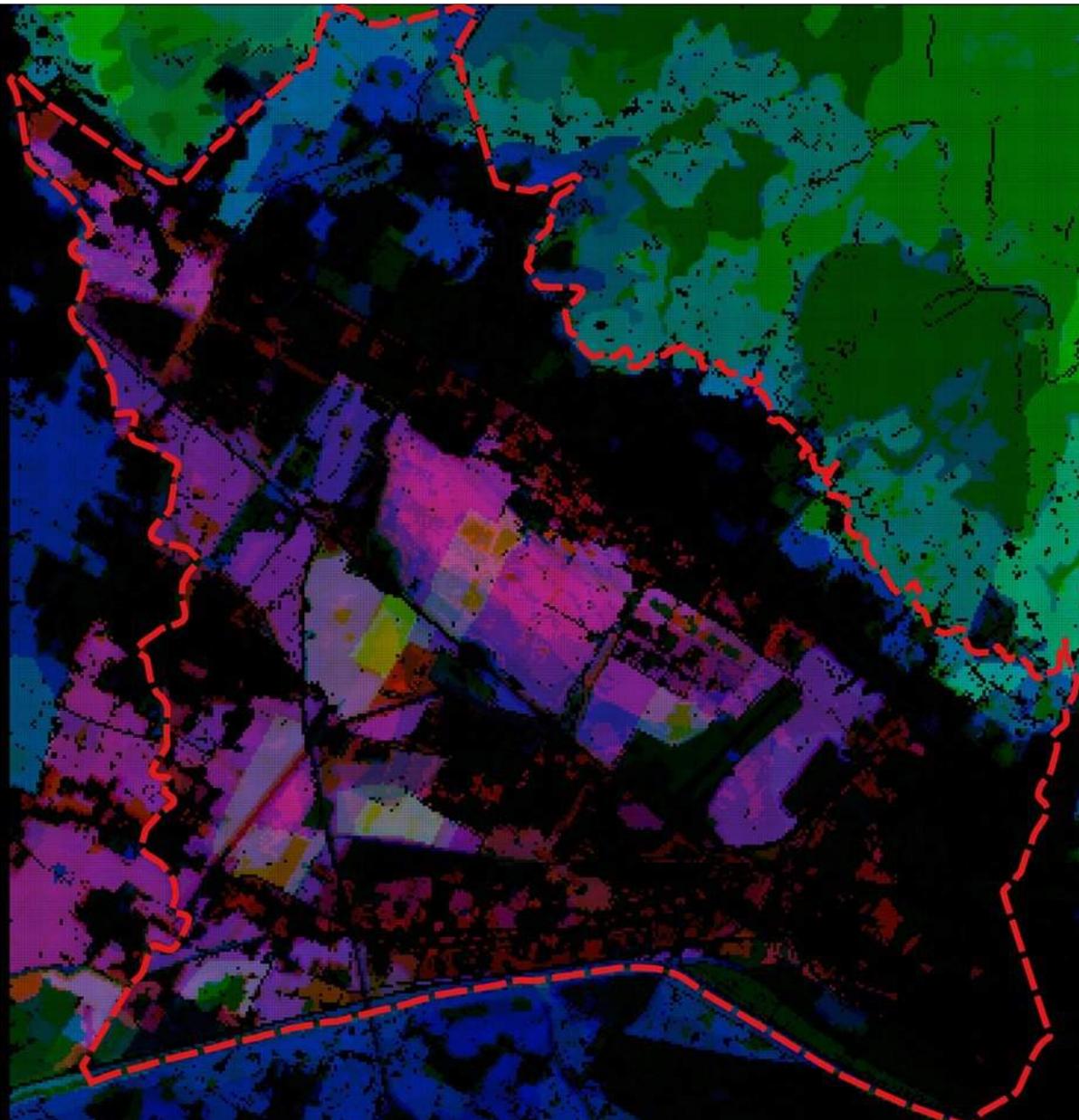
regulating services - green

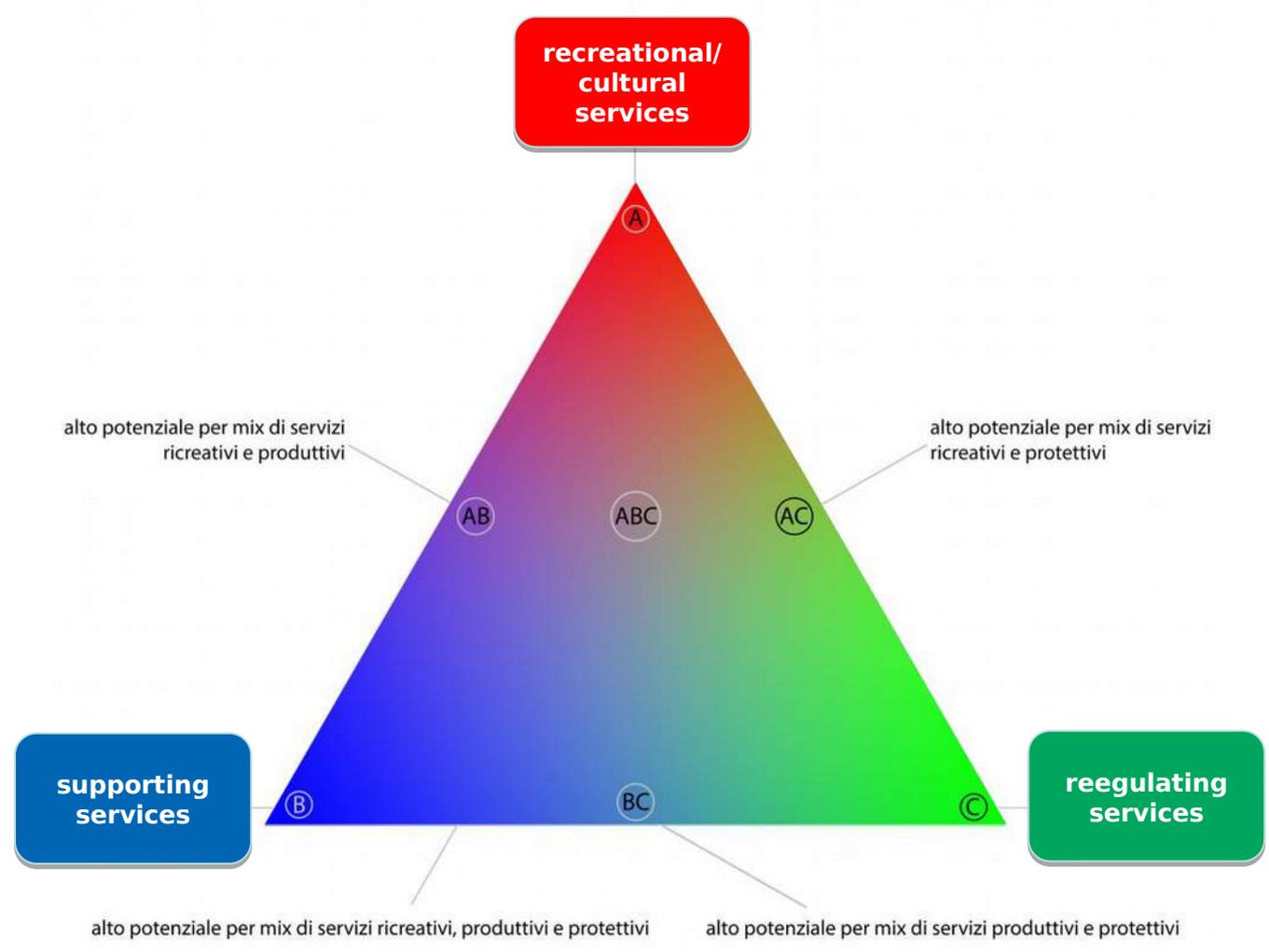


supporting services - blue



The three services

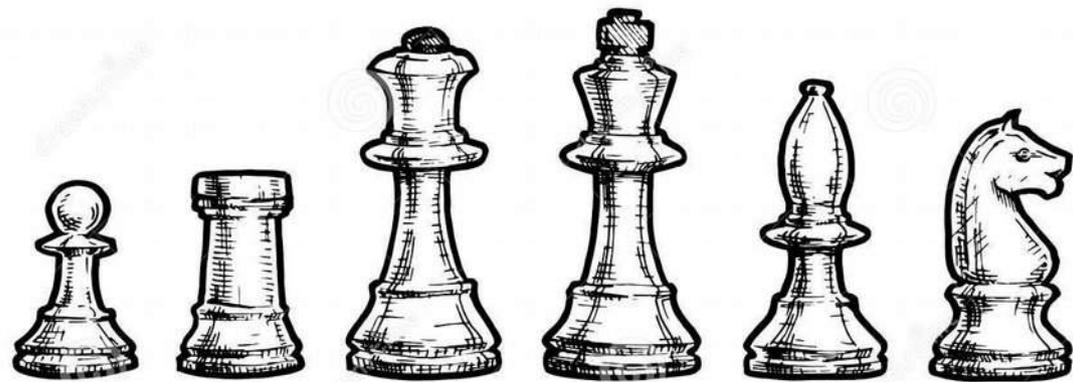


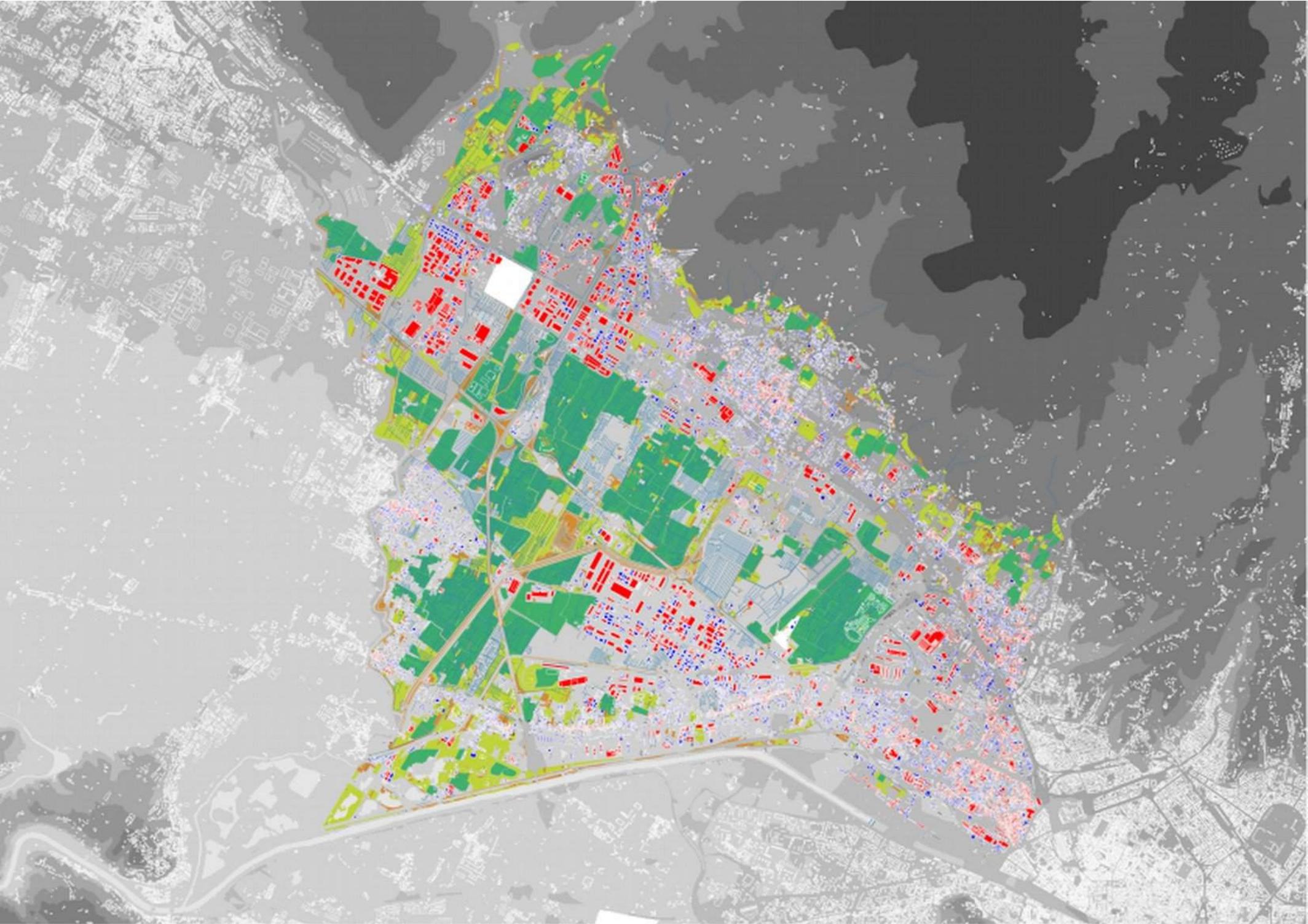


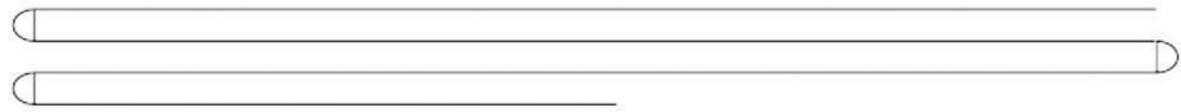
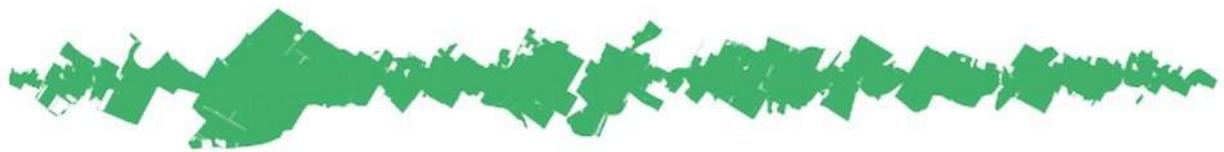


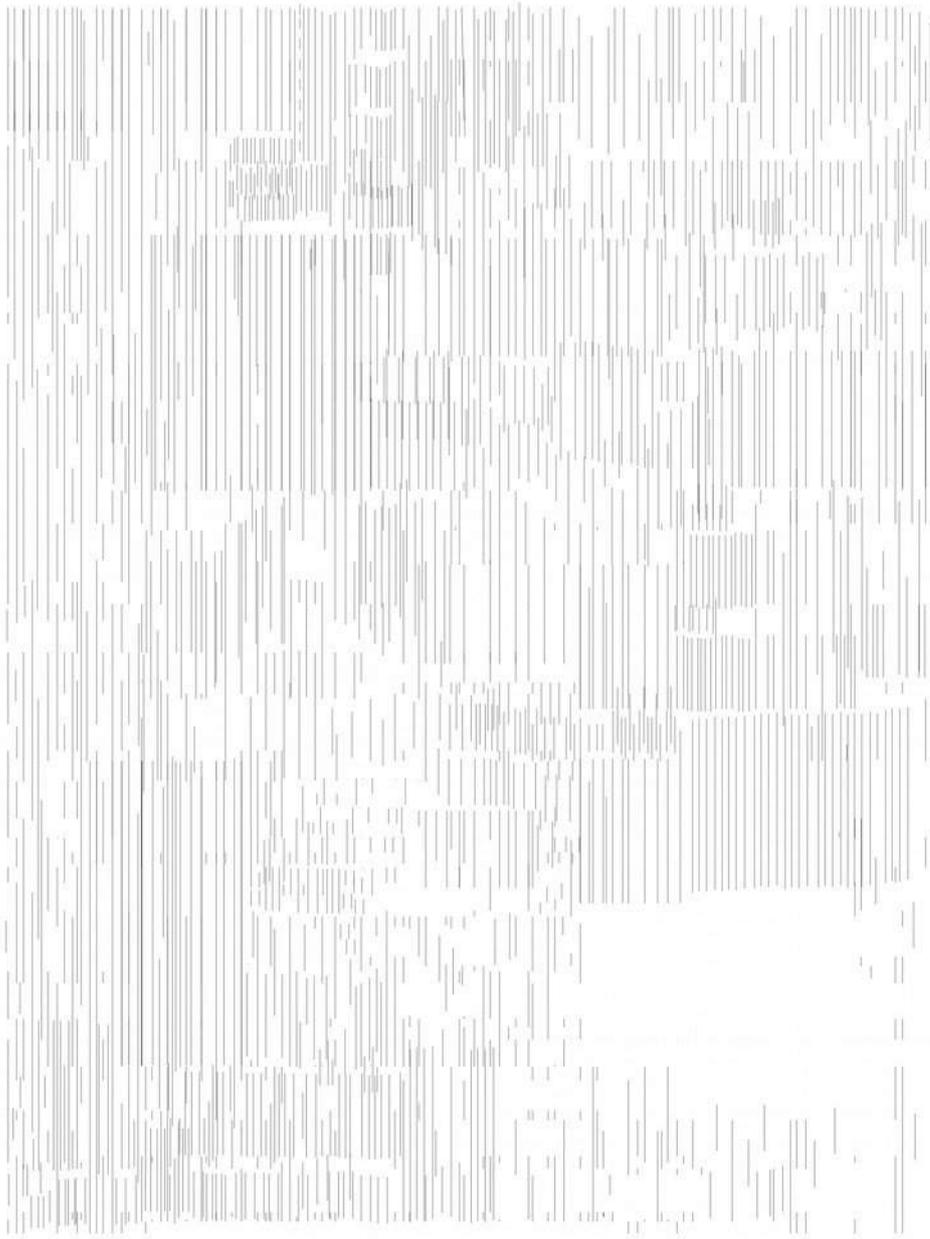
Meaningful games

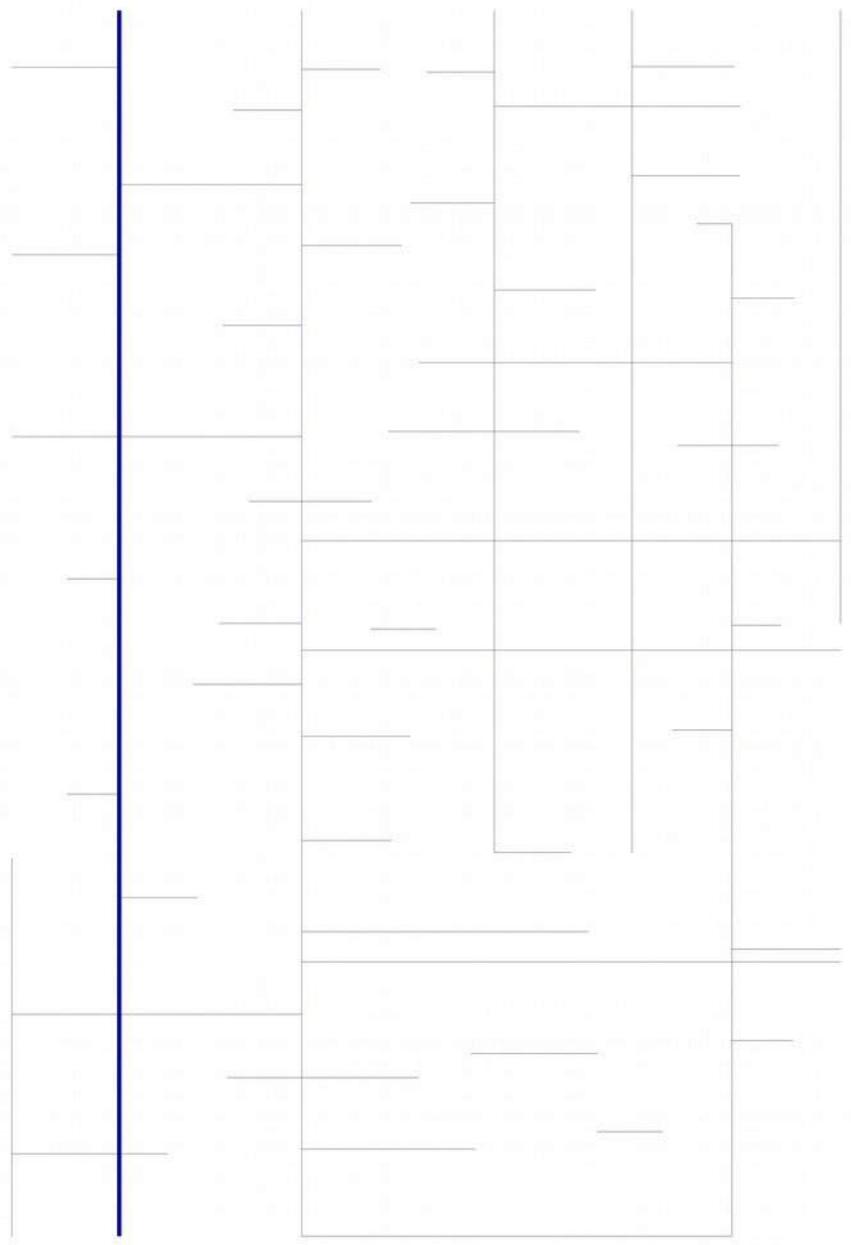
Just an example before to thank you for the attention





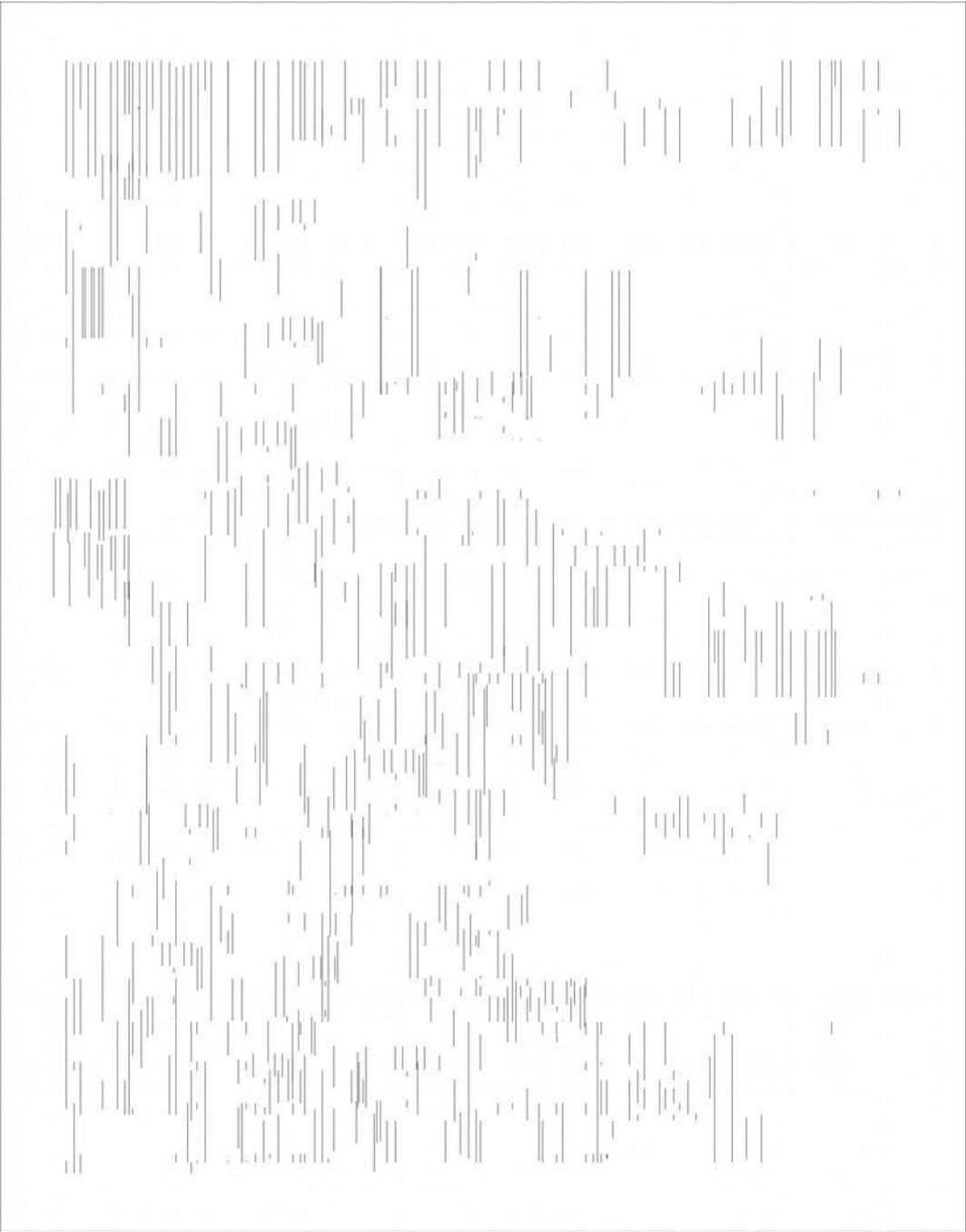


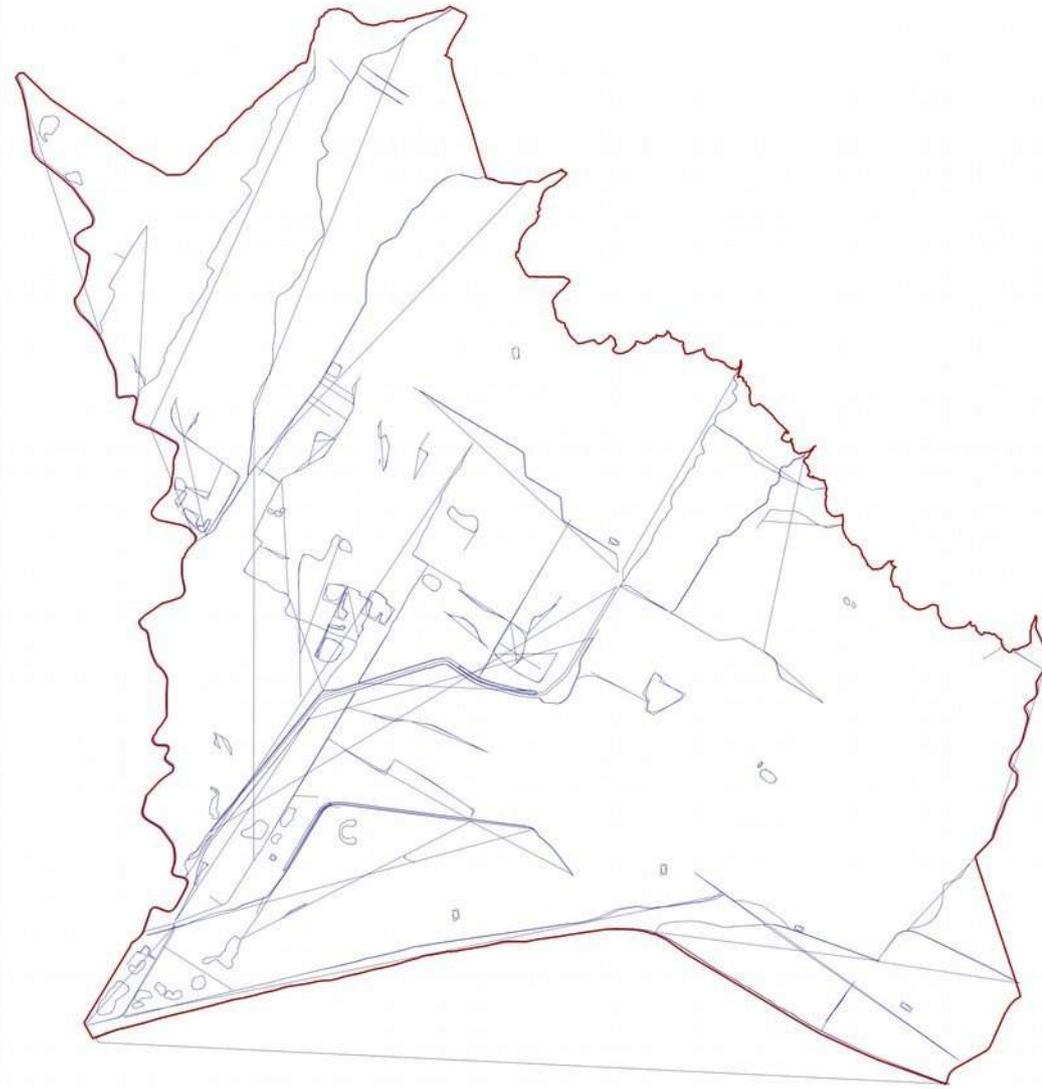
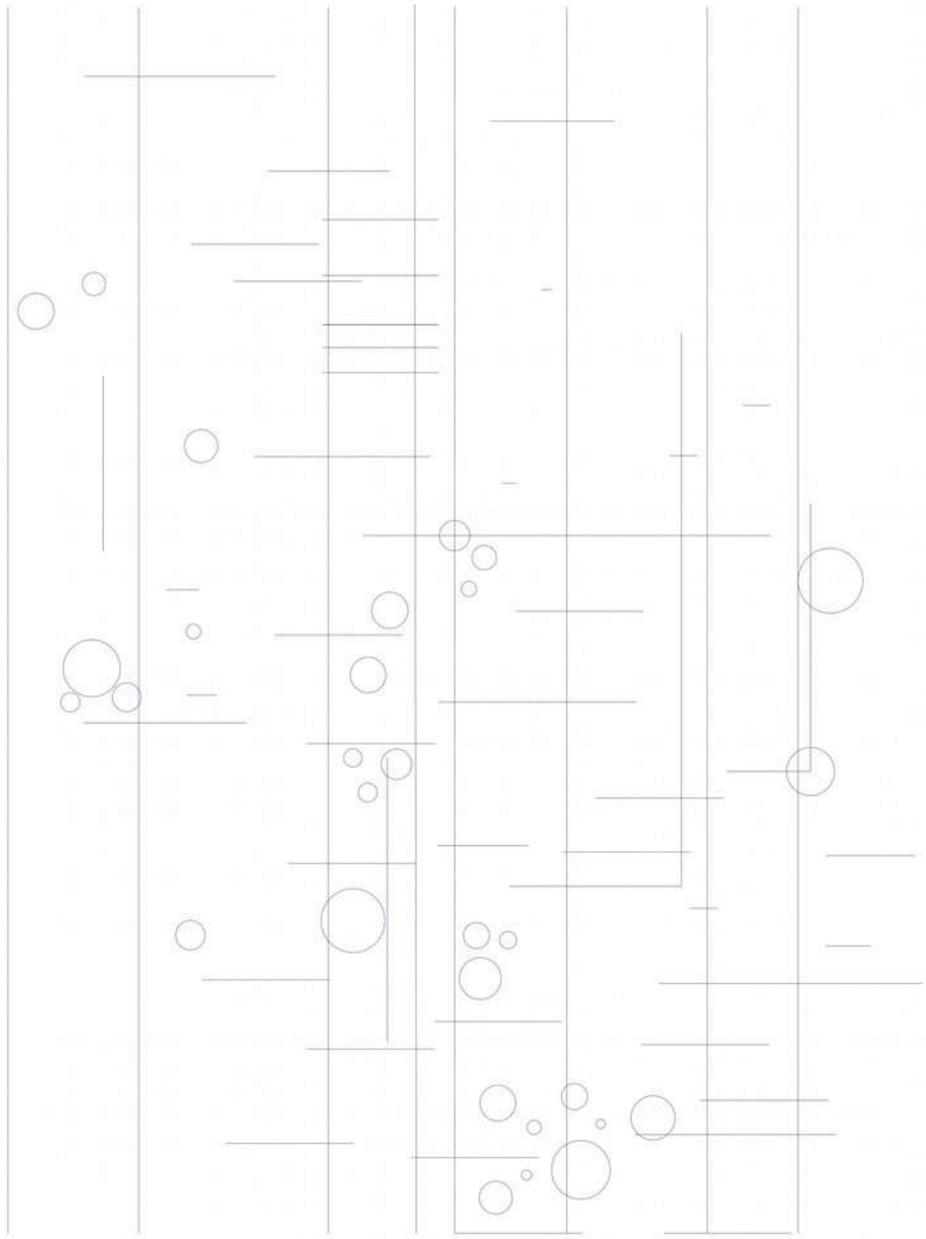


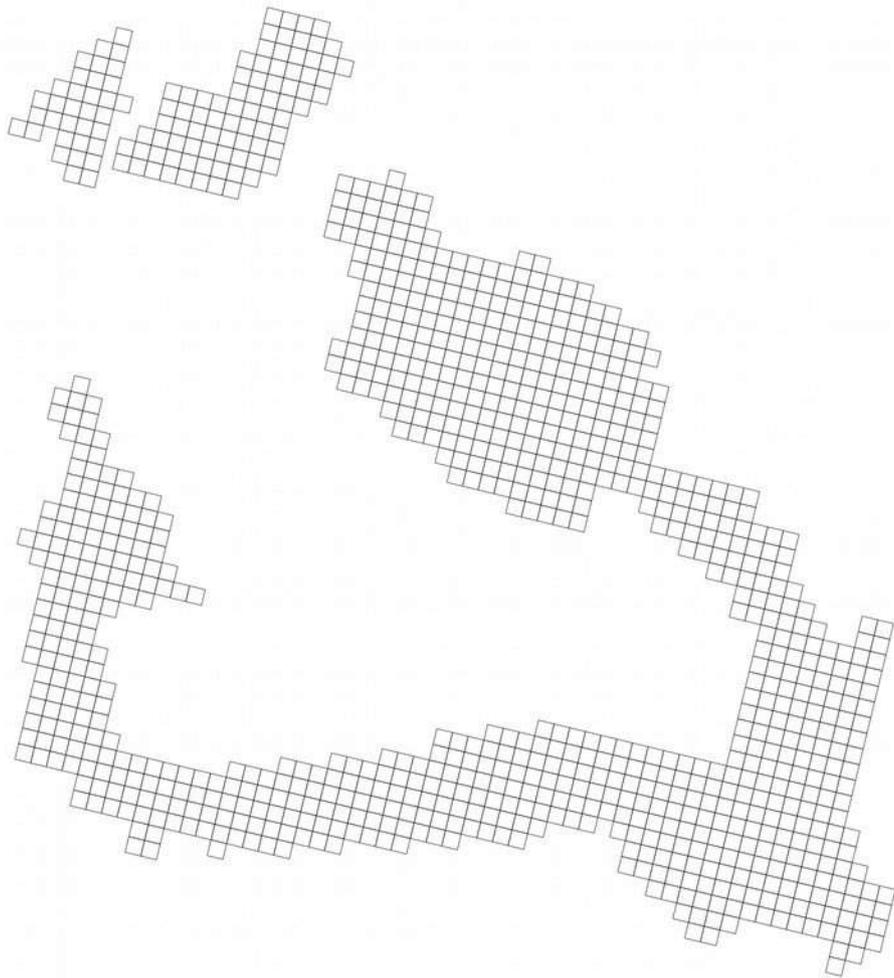


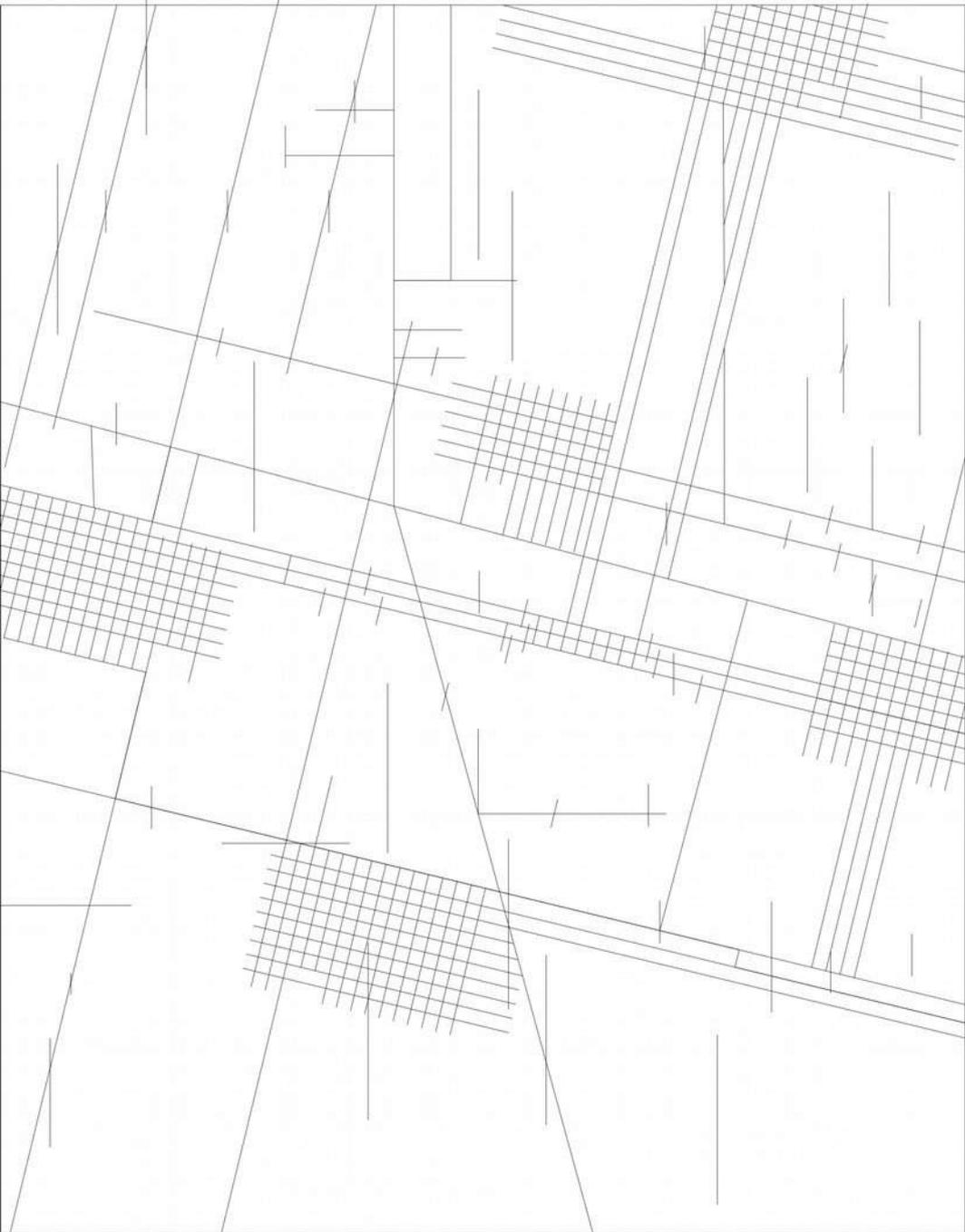


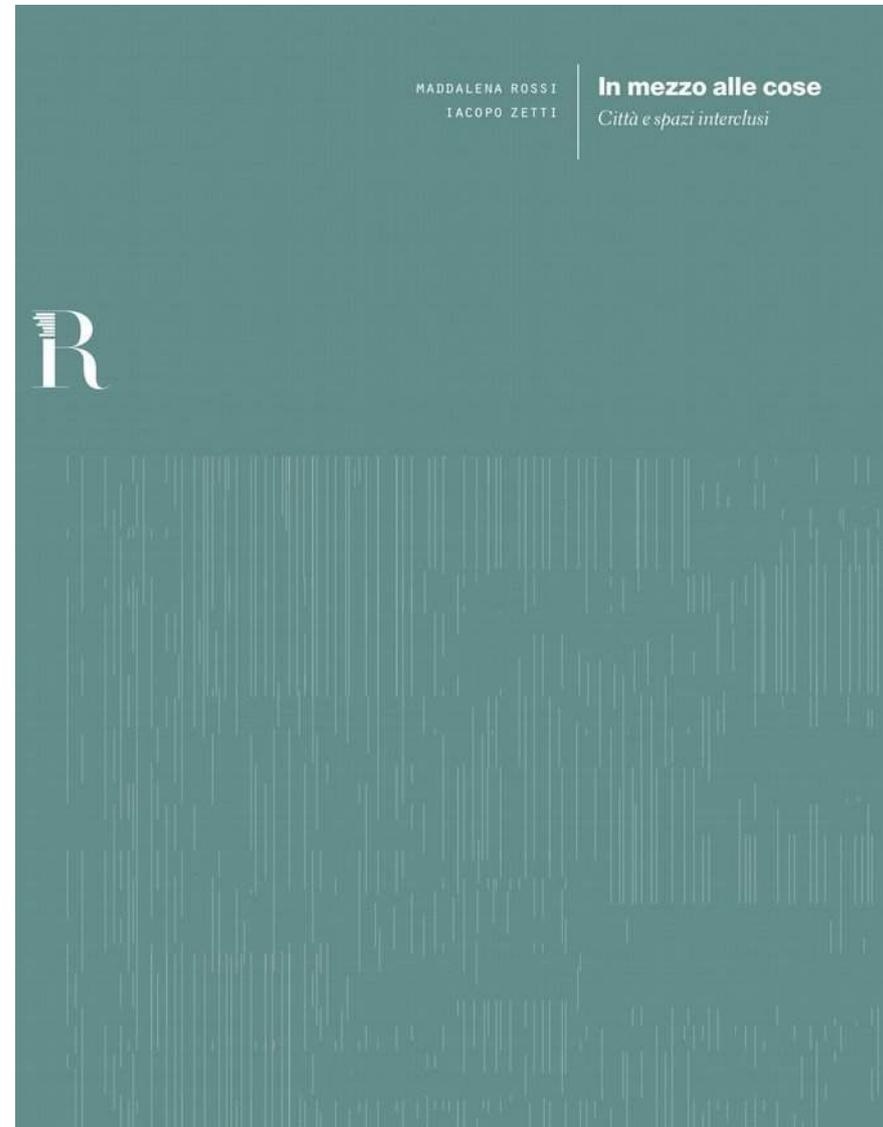












<https://didapress.it/in-mezzo-alle-cose>

<http://www.controgeografie.net>

The eye of the beholder

Maps and the shaping of a perception of the world through images

