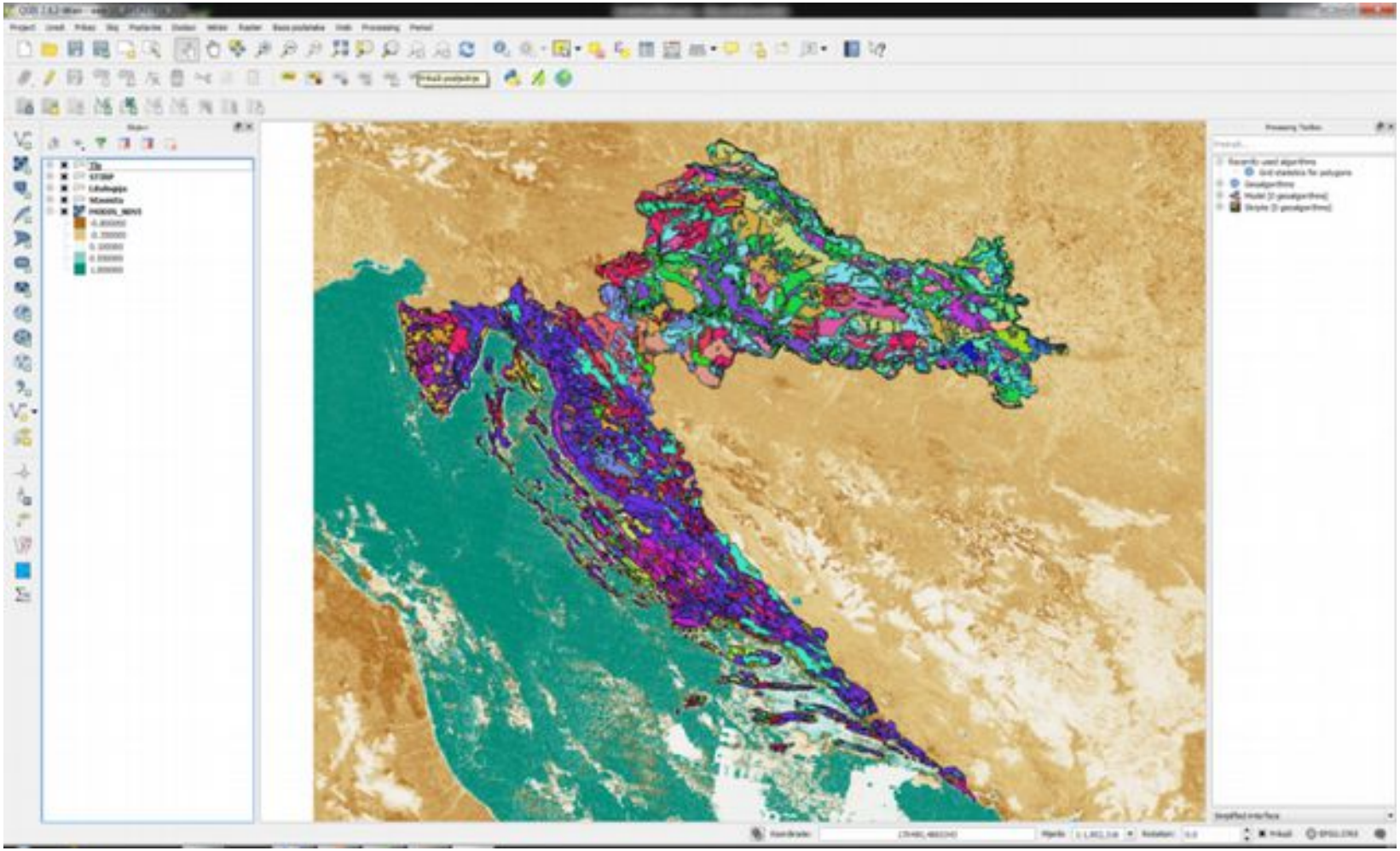
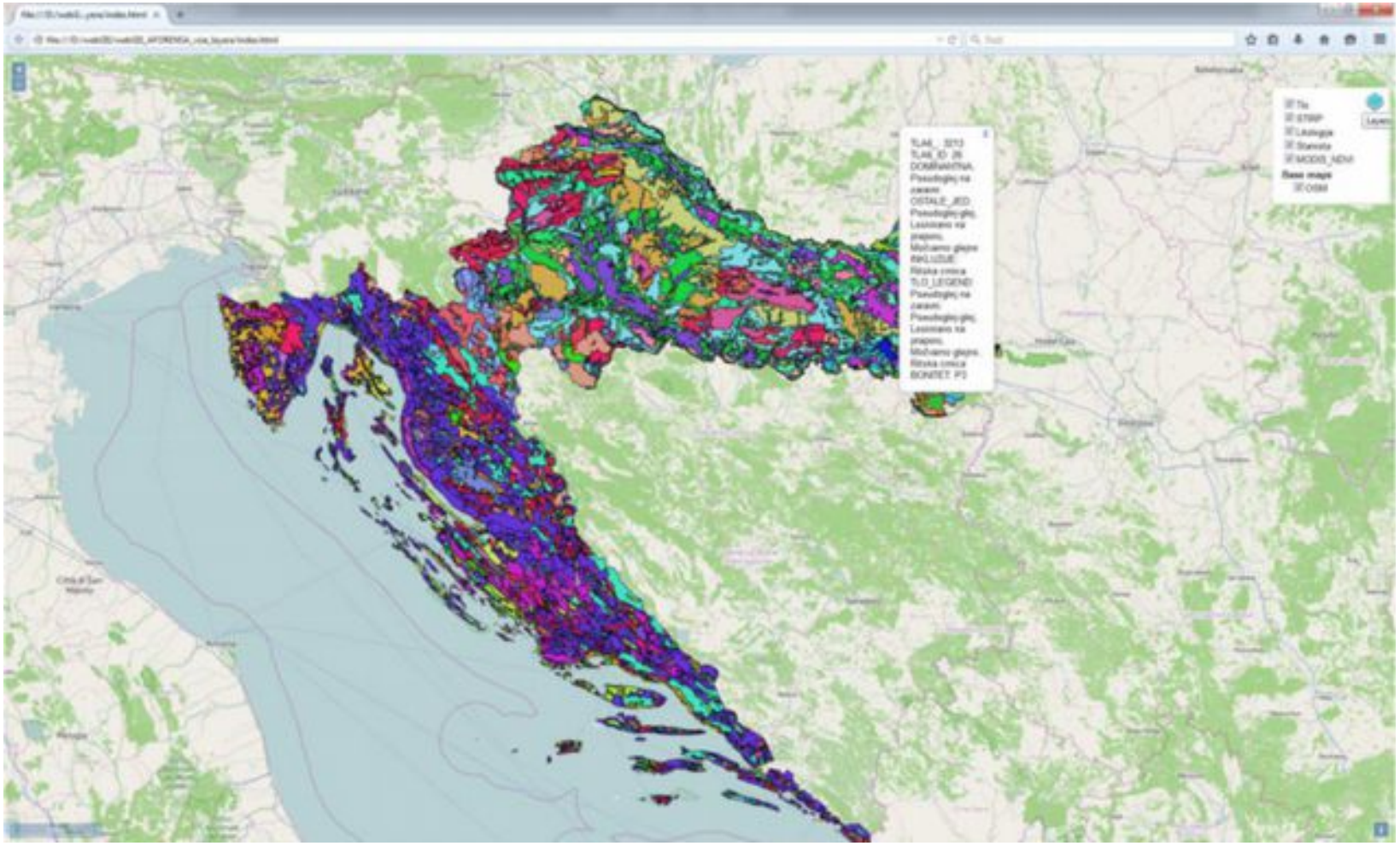
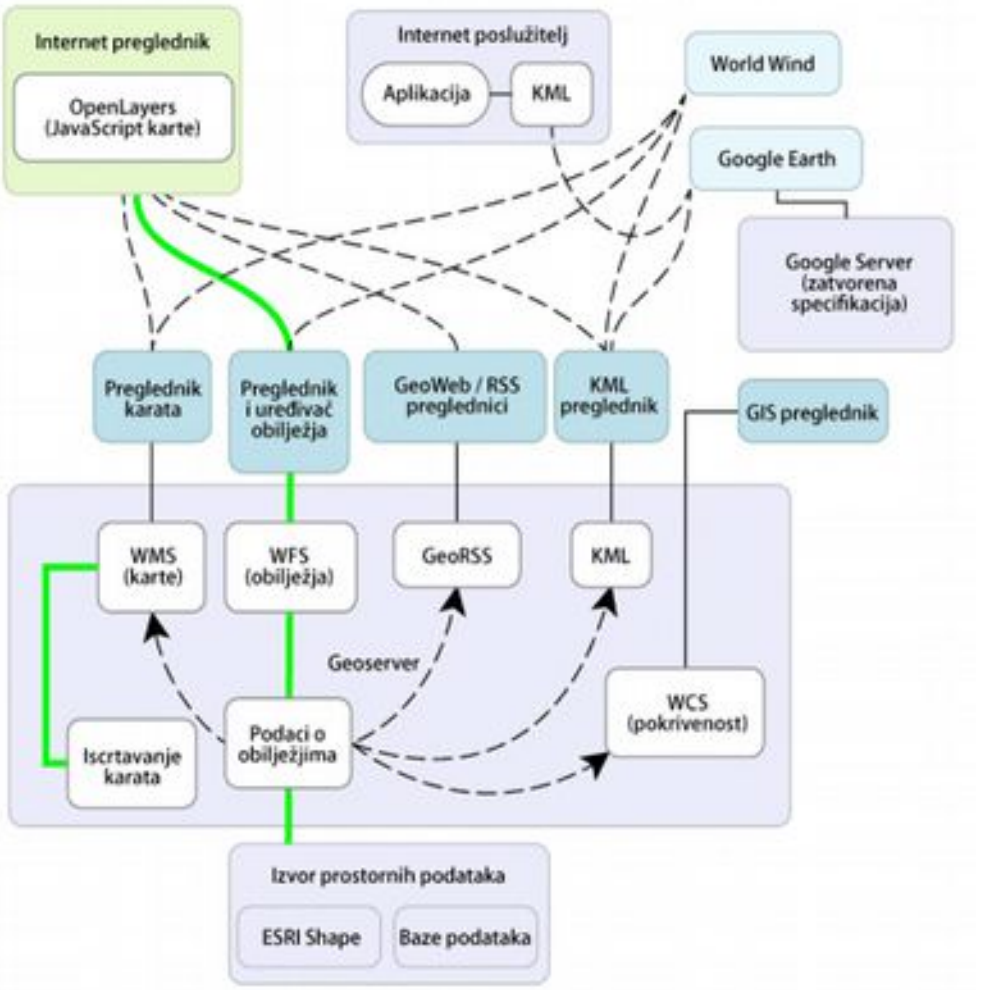


Korištenjen Quantum GIS aplikacije svi podaci su topološki očišćeni kao i svedeni u isti koordinatni sustav i projekciju. Potrebno je bilo svaki pojedini sloj obraditi kako bi se kasnije podaci mogli koristiti za izradu web aplikacije. Treba napomenuti da se podaci satilitskih snimaka još obrađuju i kako će se završavati njihova obrada oni će se unositi u sustav.

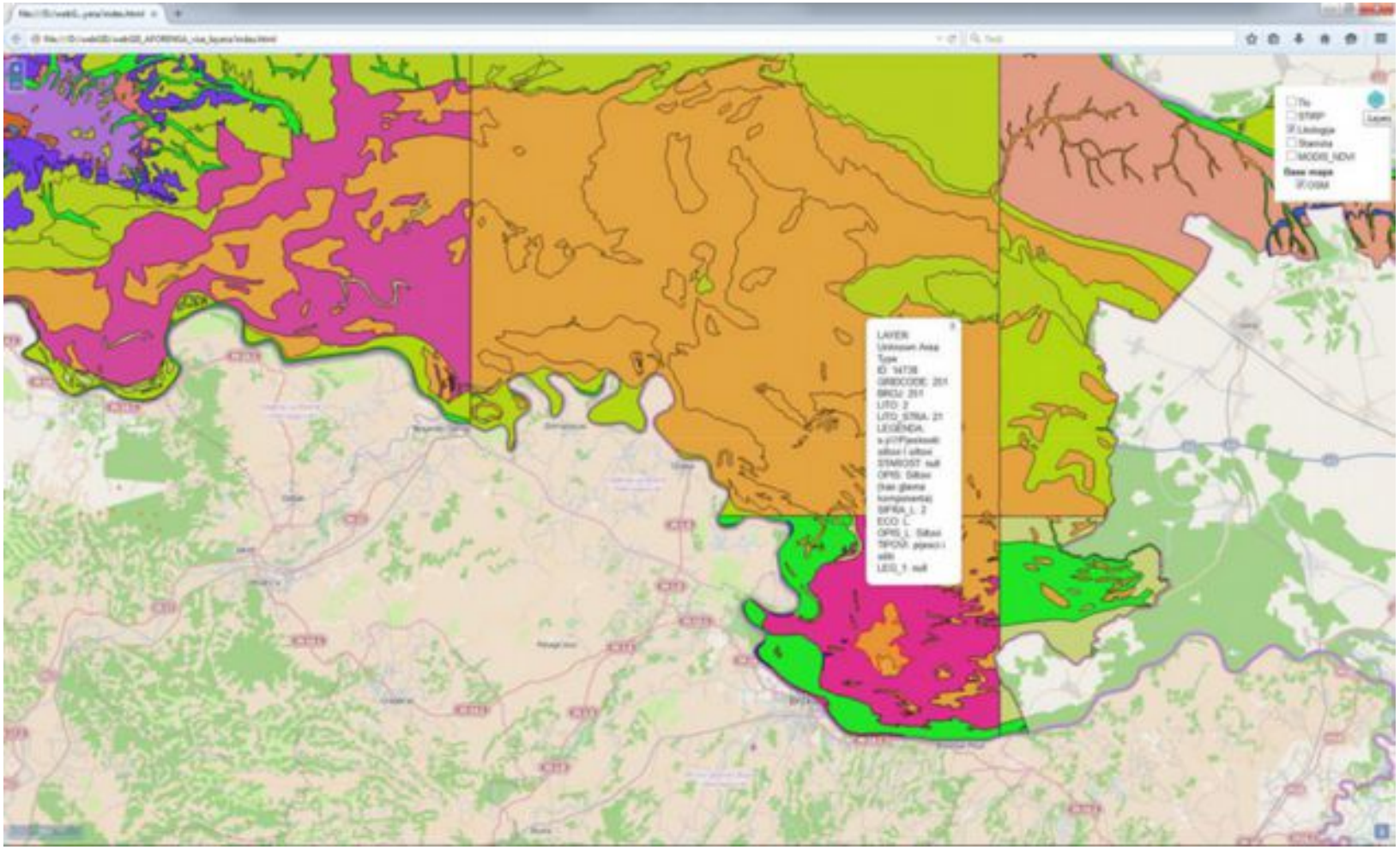


Prikaz AFORENSA WEB-GIS sustava s podacima o pedologiji, šumskim ekosustavima, MODIS podacima, korištenju zemljišta, litološkim podacima.

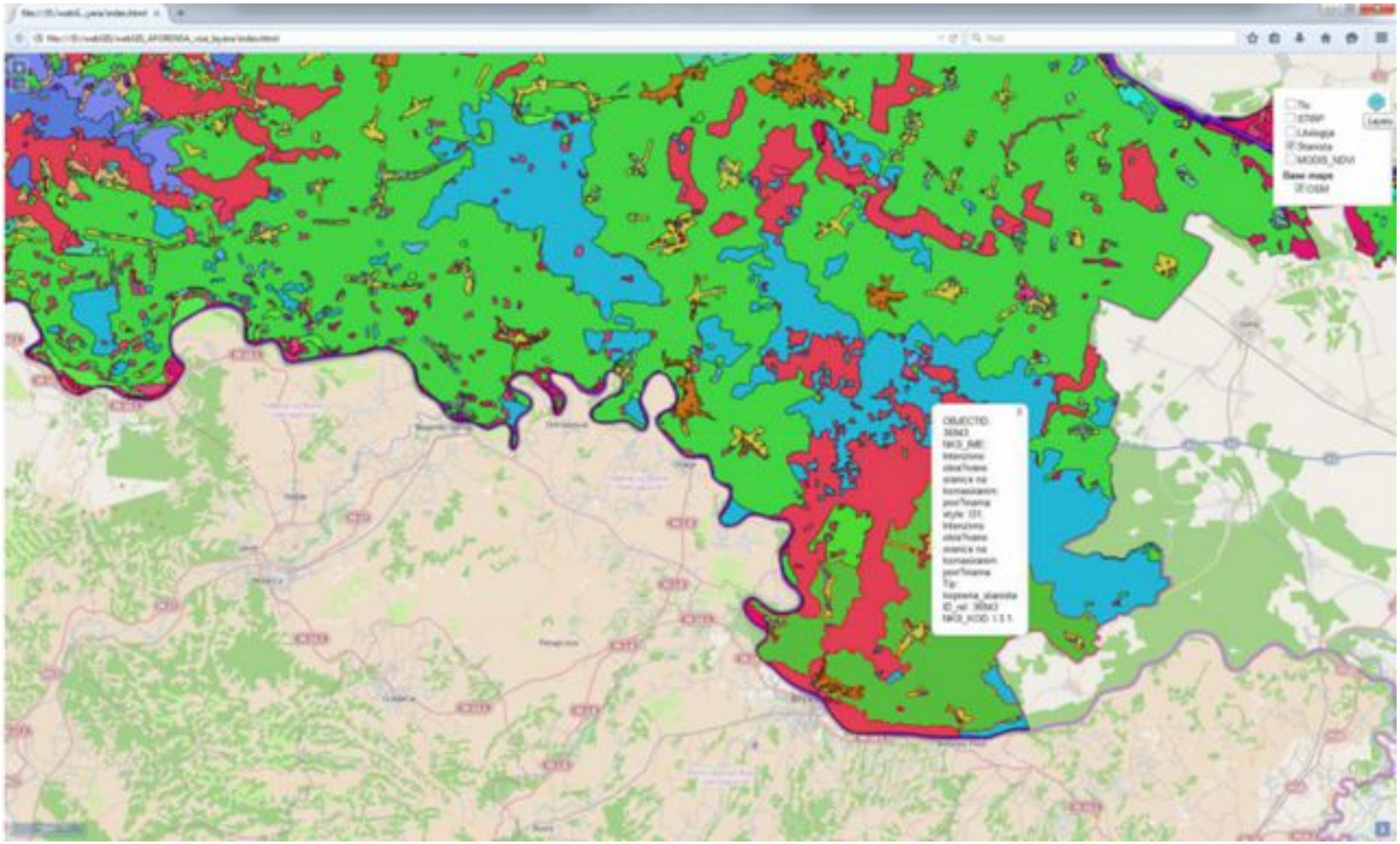


Većina standarda propisanih od strane OGC-a ovisi o grubo definiranom ustroju opisanom u skupu dokumenata zajedničkim imenom zvanih Abstract Specification (hrv. Opći tehnički opis). Ovi dokumenti opisuju osnovni podatkovni model za predstavljanje geografskih obilježja, te se na njima temelji niz specifikacija koje služe interoperabilnosti (omogućavanju međusobnog rada) različitih tehnologija koje se bave prostornim podacima i lociranjem. A koje su korištene u sustavu AFORENSA WEB-GIS.

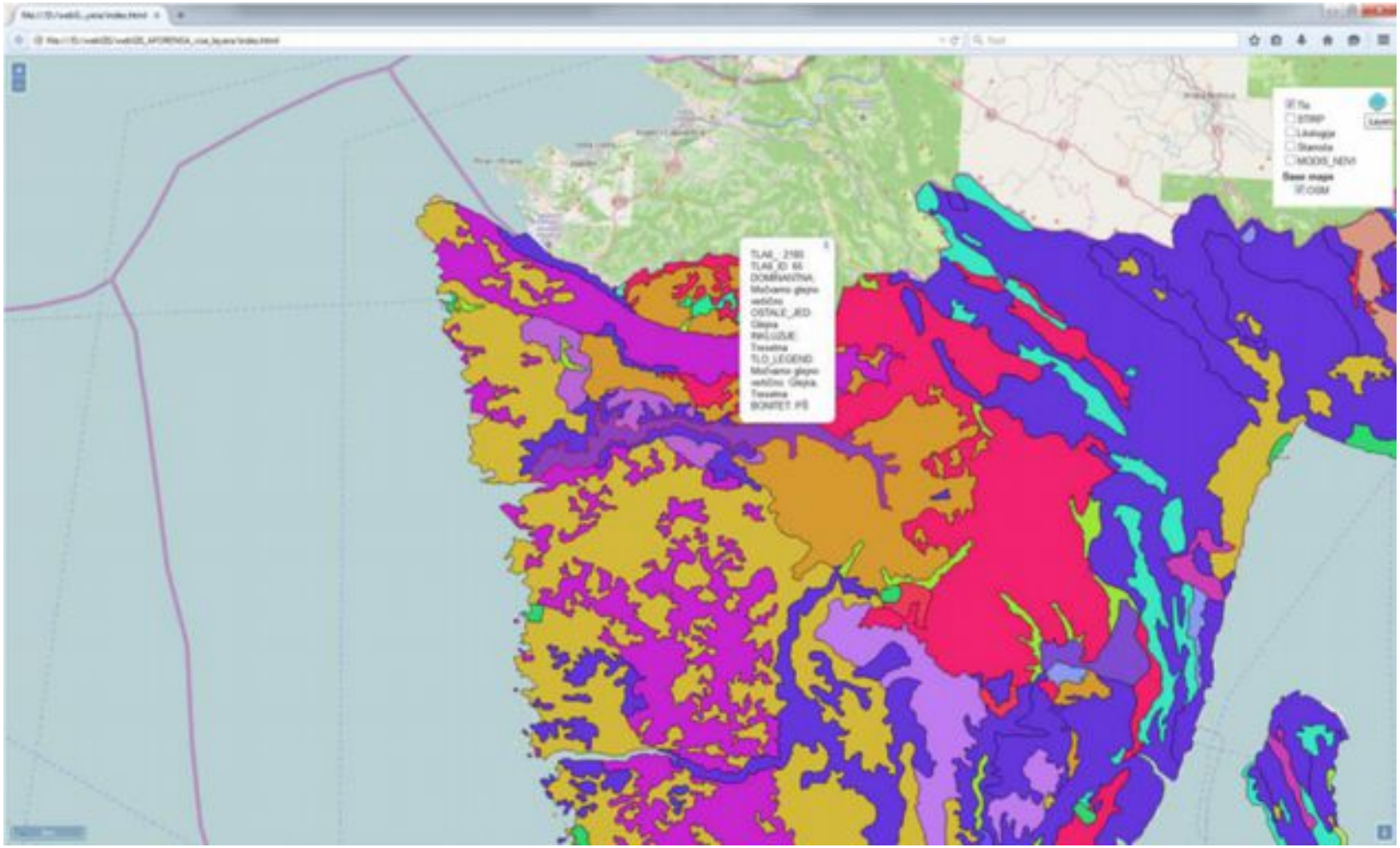
Neke od specifikacija propisanih od strane OGC-a su WMS, WMS-C, TMS i WFS protokoli, GML i KML opisni jezici, i sl. Međusobna povezanost i način korištenja ovih tehnologija može se vidjeti na dijagramu.



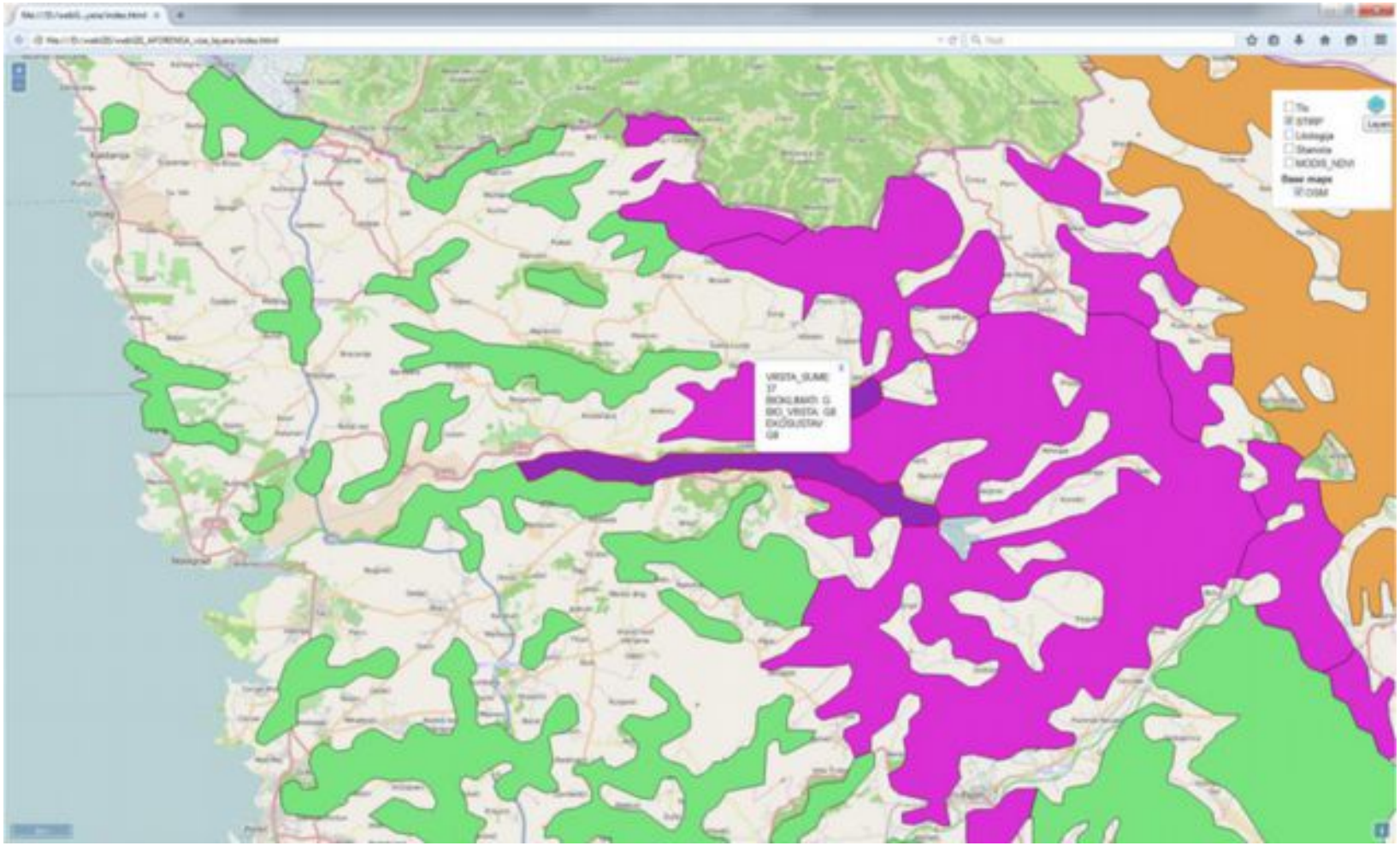
Prikaz iz AFORENSA WEB-GIS sustava litoloških podataka na području šume Spačva



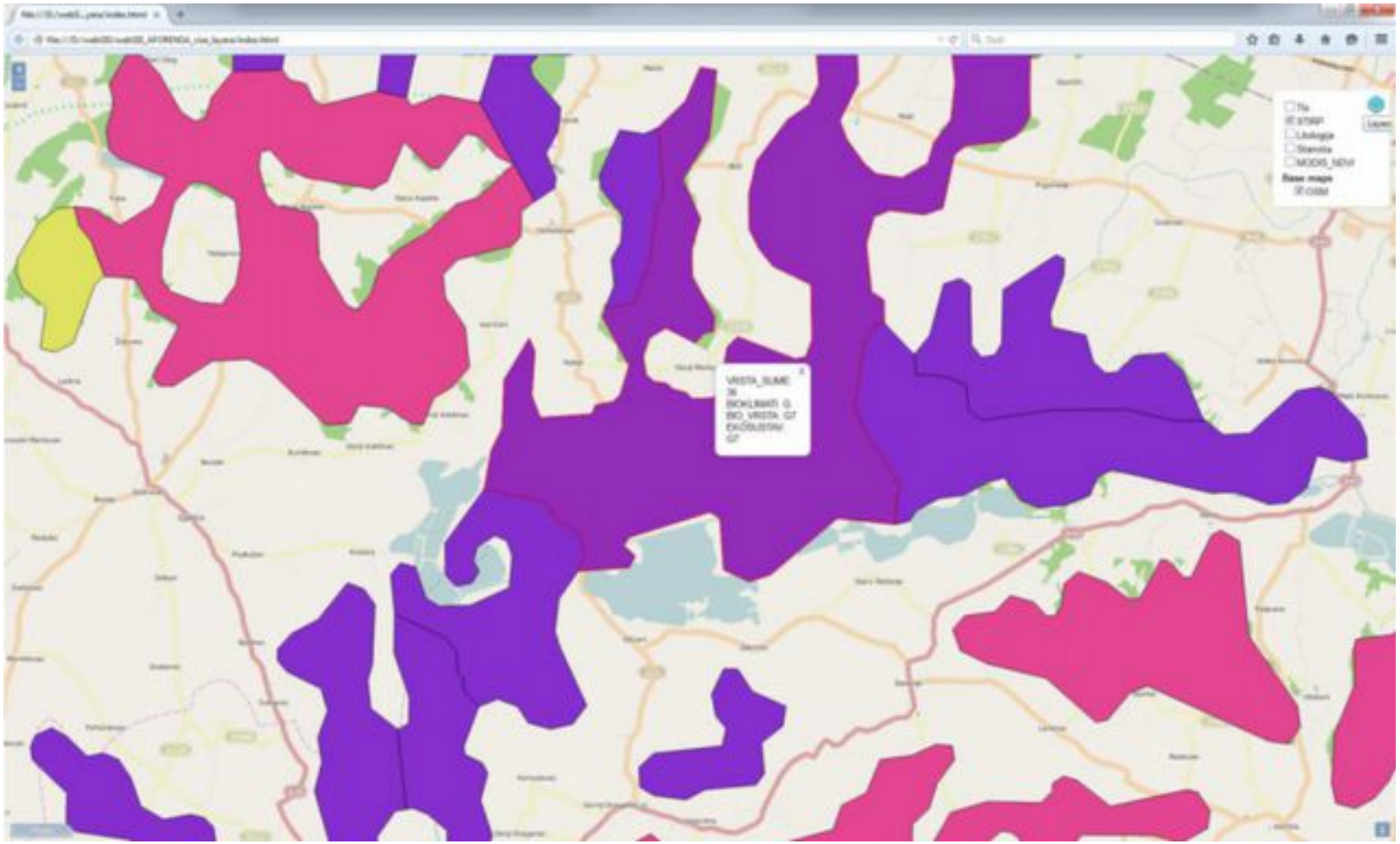
Prikaz iz AFORENSA WEB-GIS sustava korištenja zemljišta na području šume Spačva



Prikaz iz AFORENSA WEB-GIS sustava pedoloških podataka na području sliva rijeke Mirne

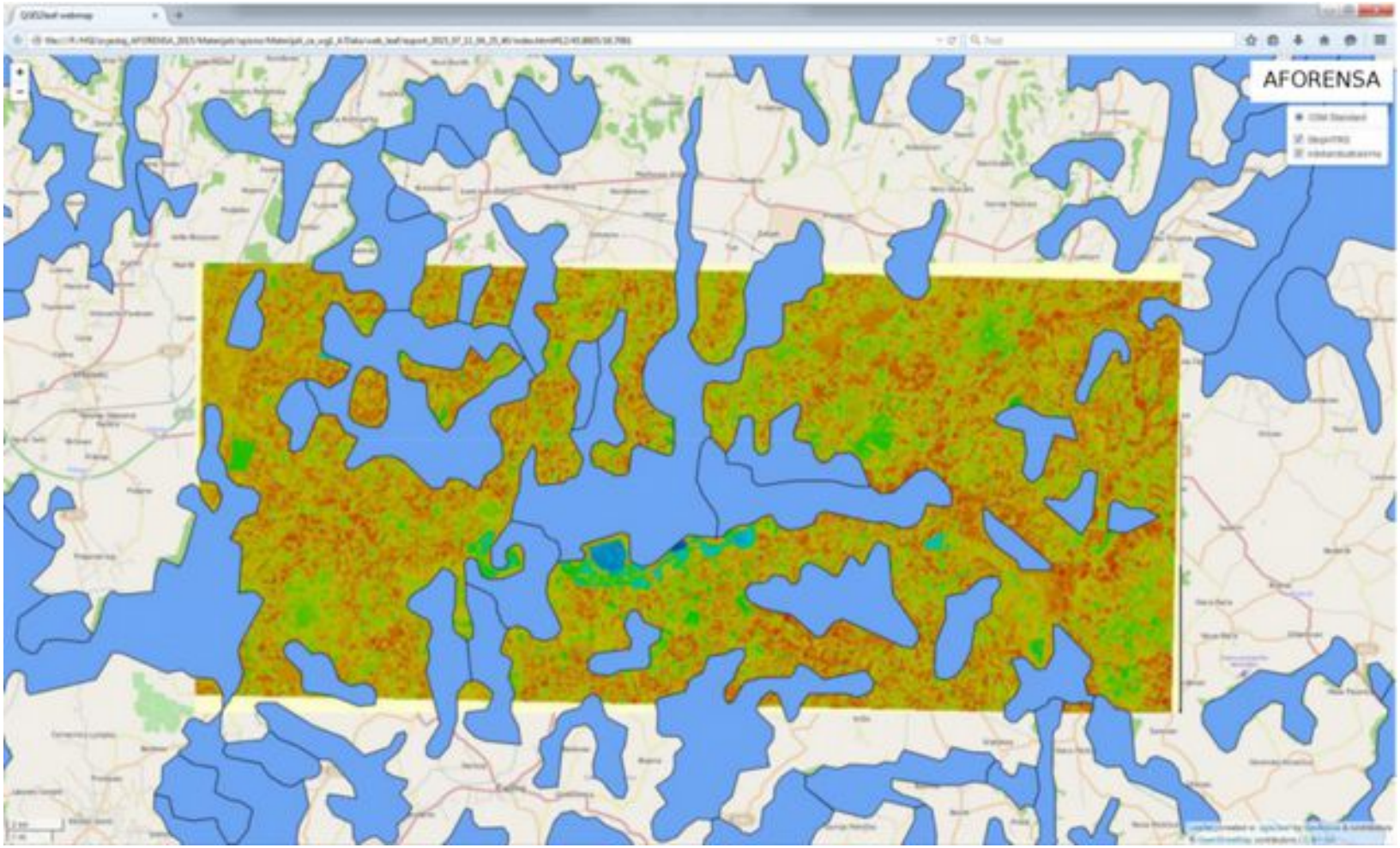


Prikaz iz AFORENSA WEB-GIS sustava bioklimata i ekosustava na području sliva rijeke Mirne

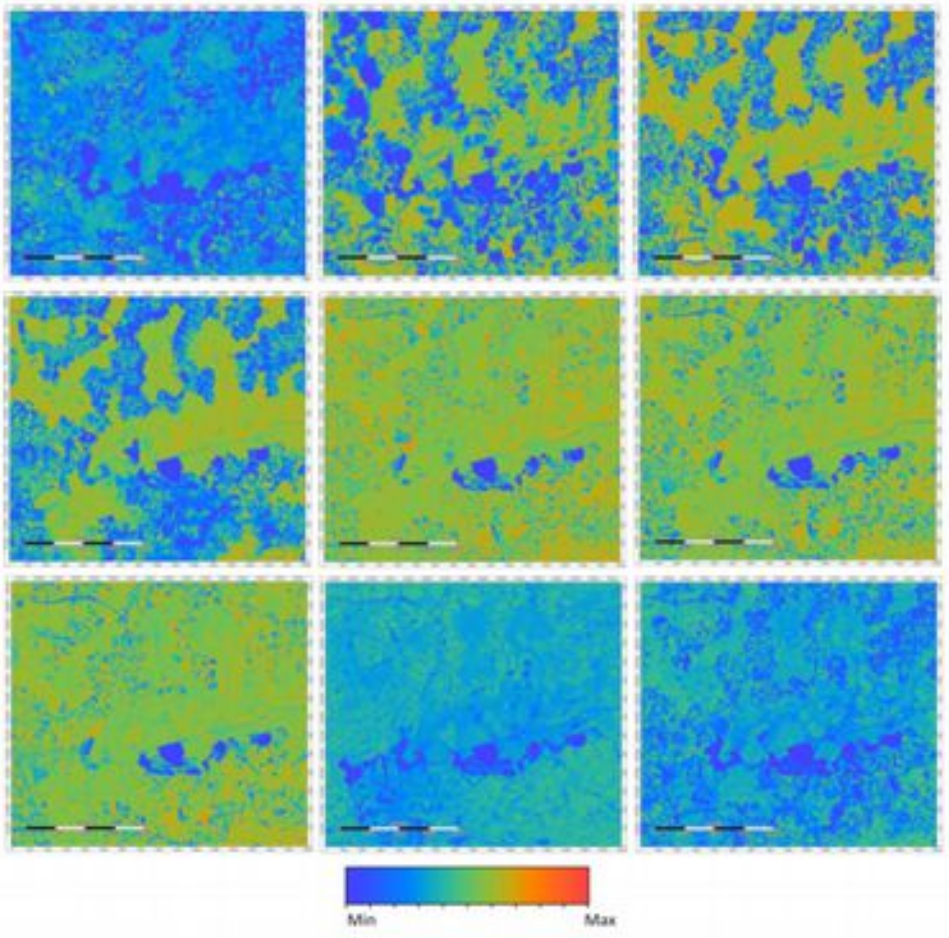


Prikaz iz AFORENSA WEB-GIS sustava bioklimata i ekosustava na području šuma Česme

Prikaz iz AFORENSA WEB-GIS sustava litoloških podataka na području šuma Česme

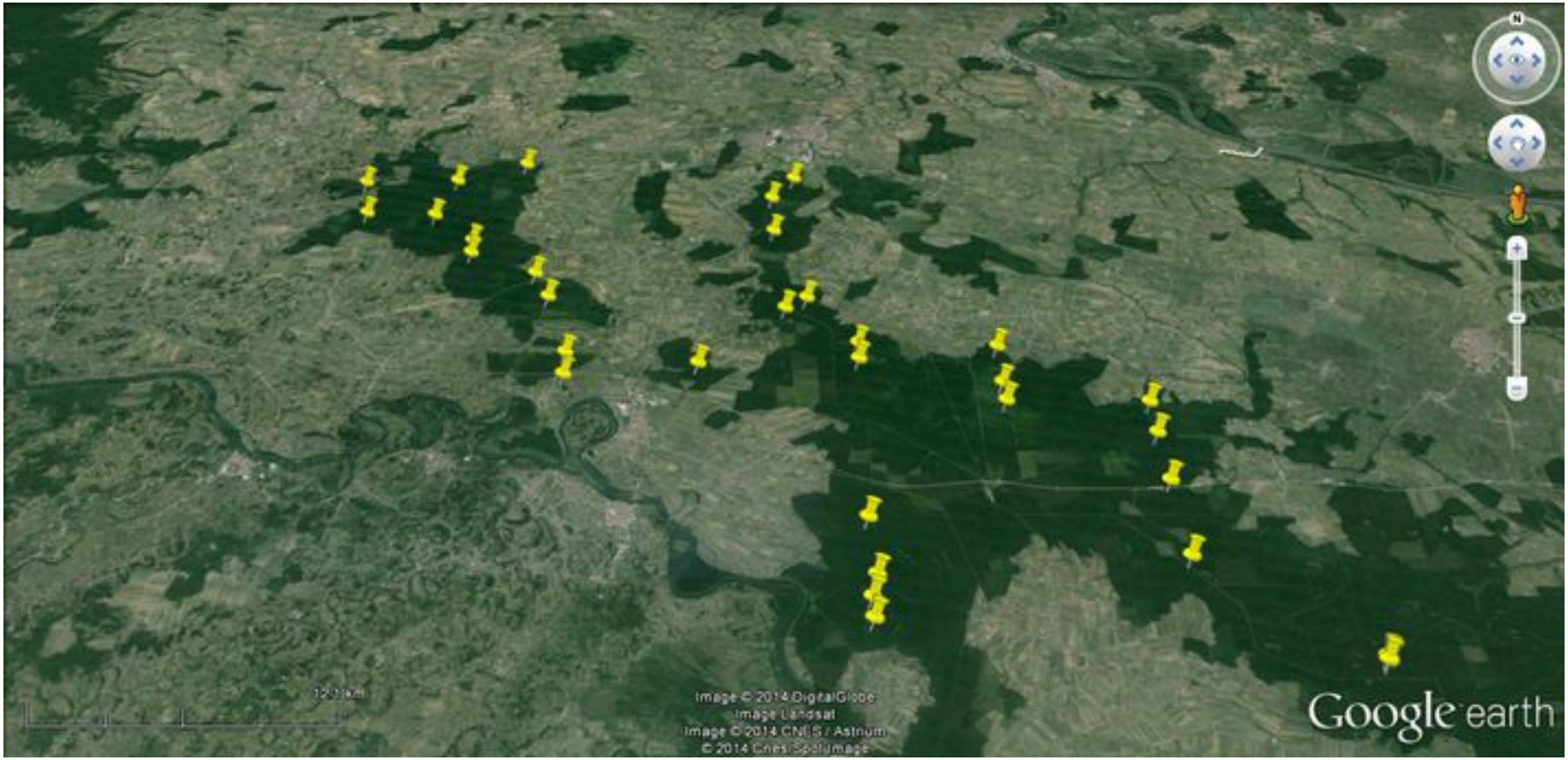


Prikaz iz AFORENSA WEB-GIS sustava bioklimata i ekosustava i NDVI indeksa izračunatog iz LandSAT snimaka na području šuma Česme



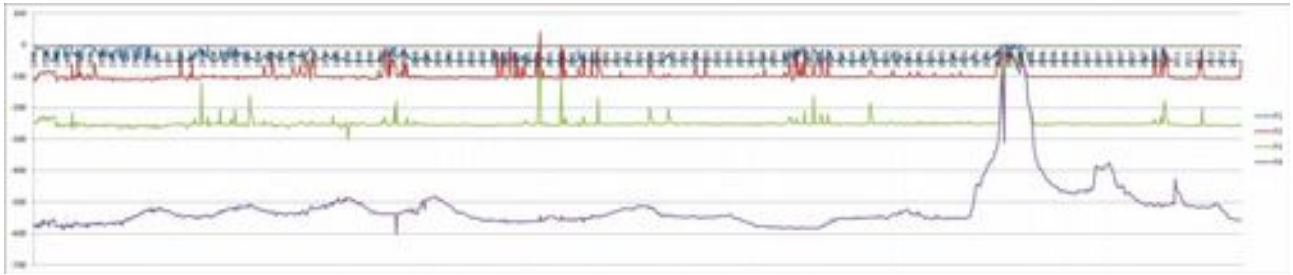
NDVI indeks za područje šume Česma izračunat iz LandSAT snimaka za 2014 godinu. Nakon što se tako obrade podaci unose se u sustav AFORENSA WEB-GIS

SPAČVA – analiza piezometarskih mjerenja (proračun godišnjeg trajanja saturacije na lokacijama)

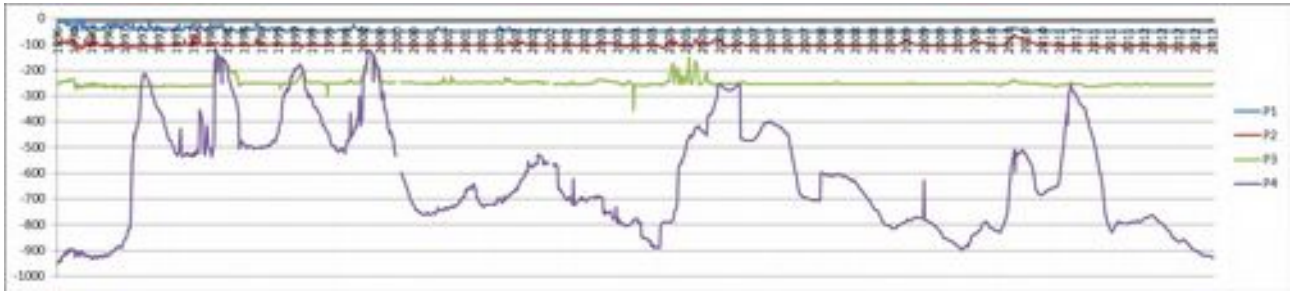


Slika 1. Lokacije piezometarskih postaja na širem području spačvanskog bazena

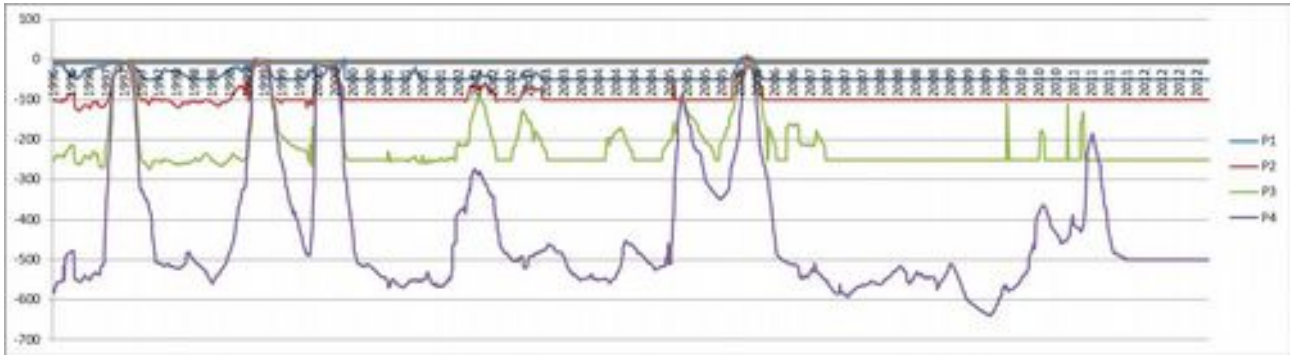
Prikaz hidrograma podzemnih voda na 9 izdvojenih piezometarskih postaja (1996.-2012. godine)



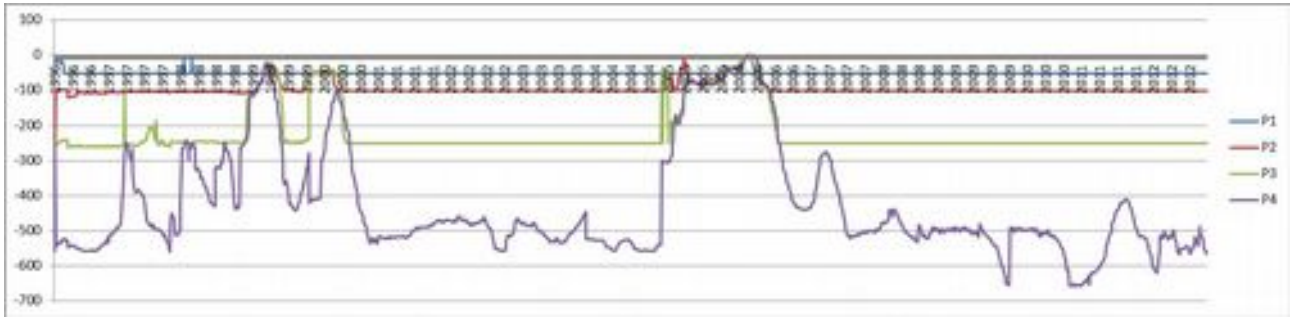
Piezometar 4.5c



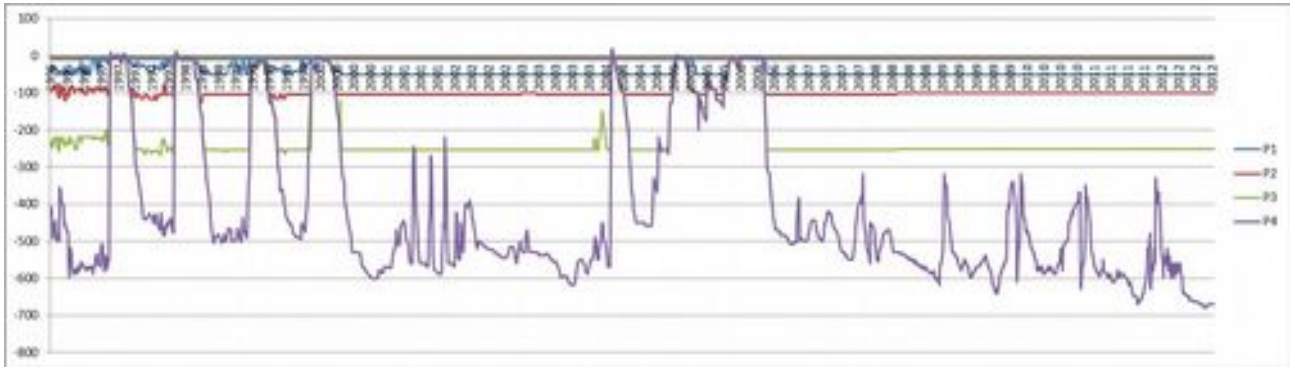
Piezometar 4.5c



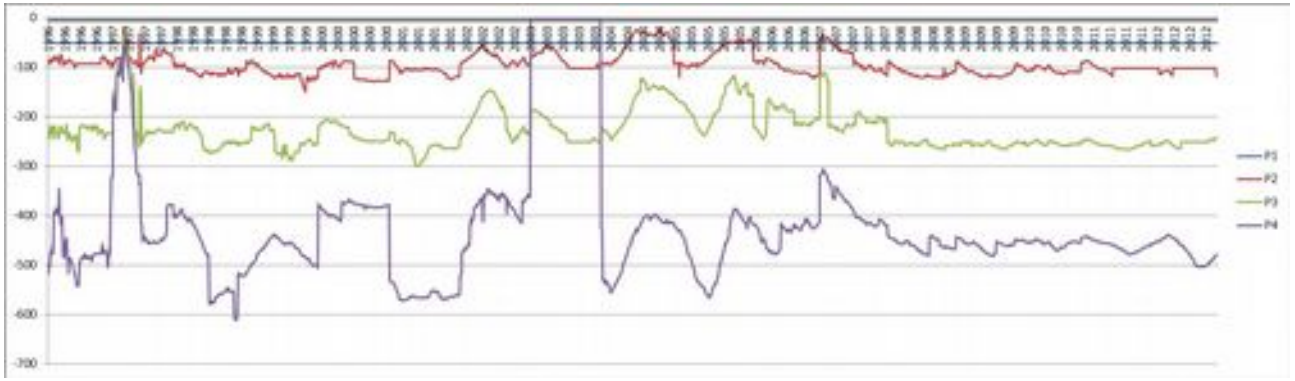
Piezometar 7c



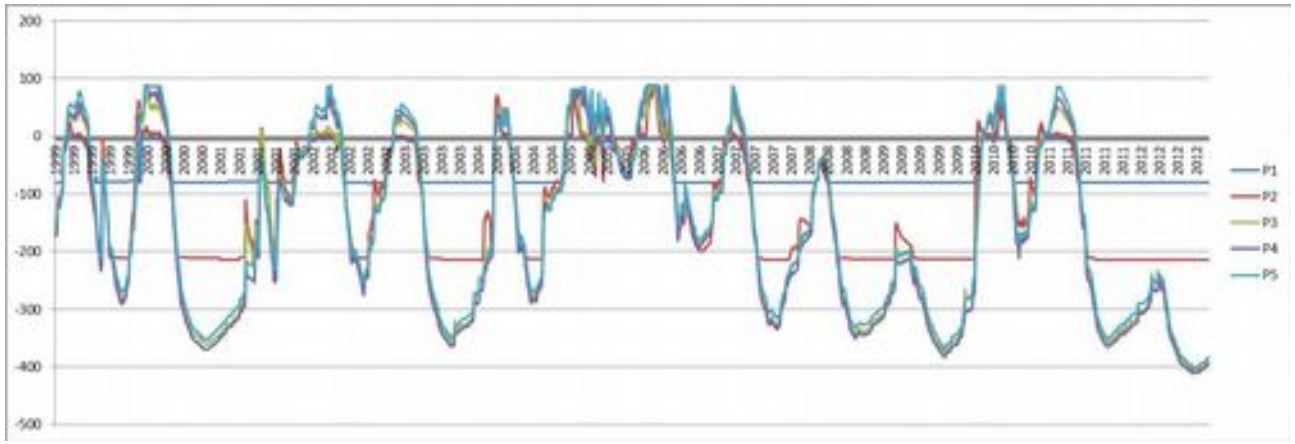
Piezometar 8c



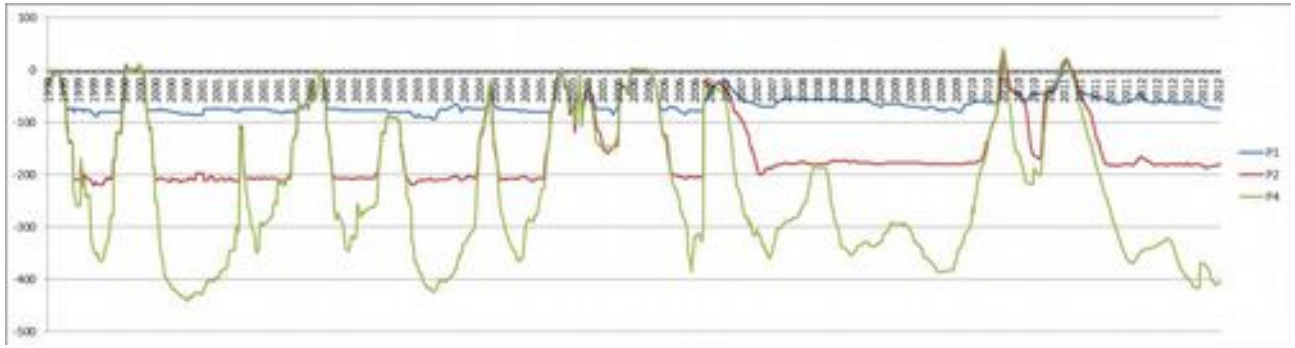
Piezometar 9b



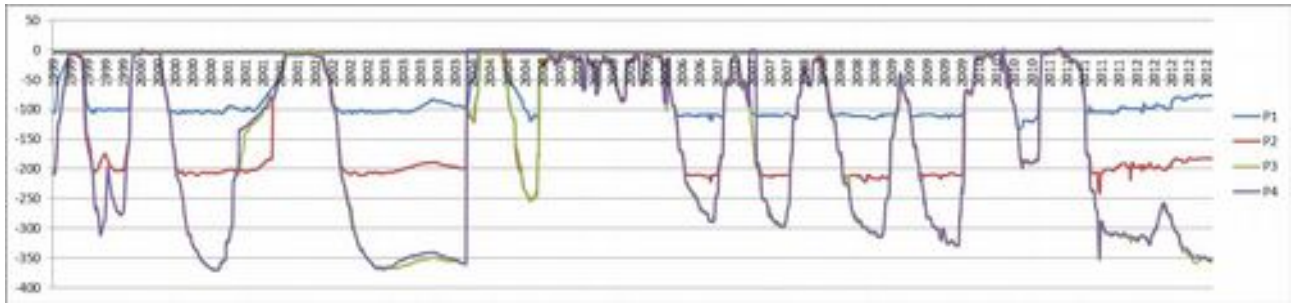
Piezometar 11a



Piezometar 01c

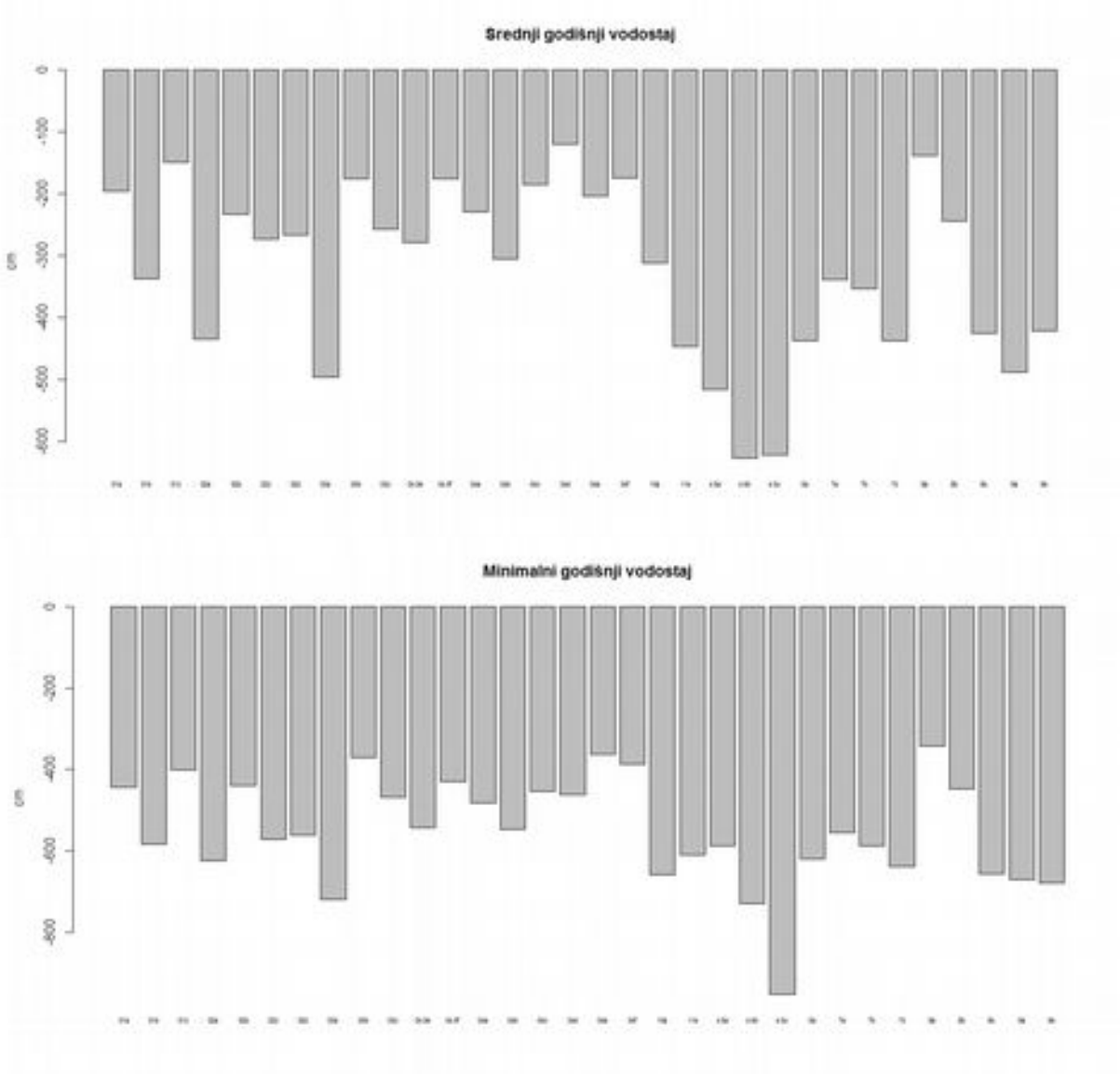


Piezometar 02b

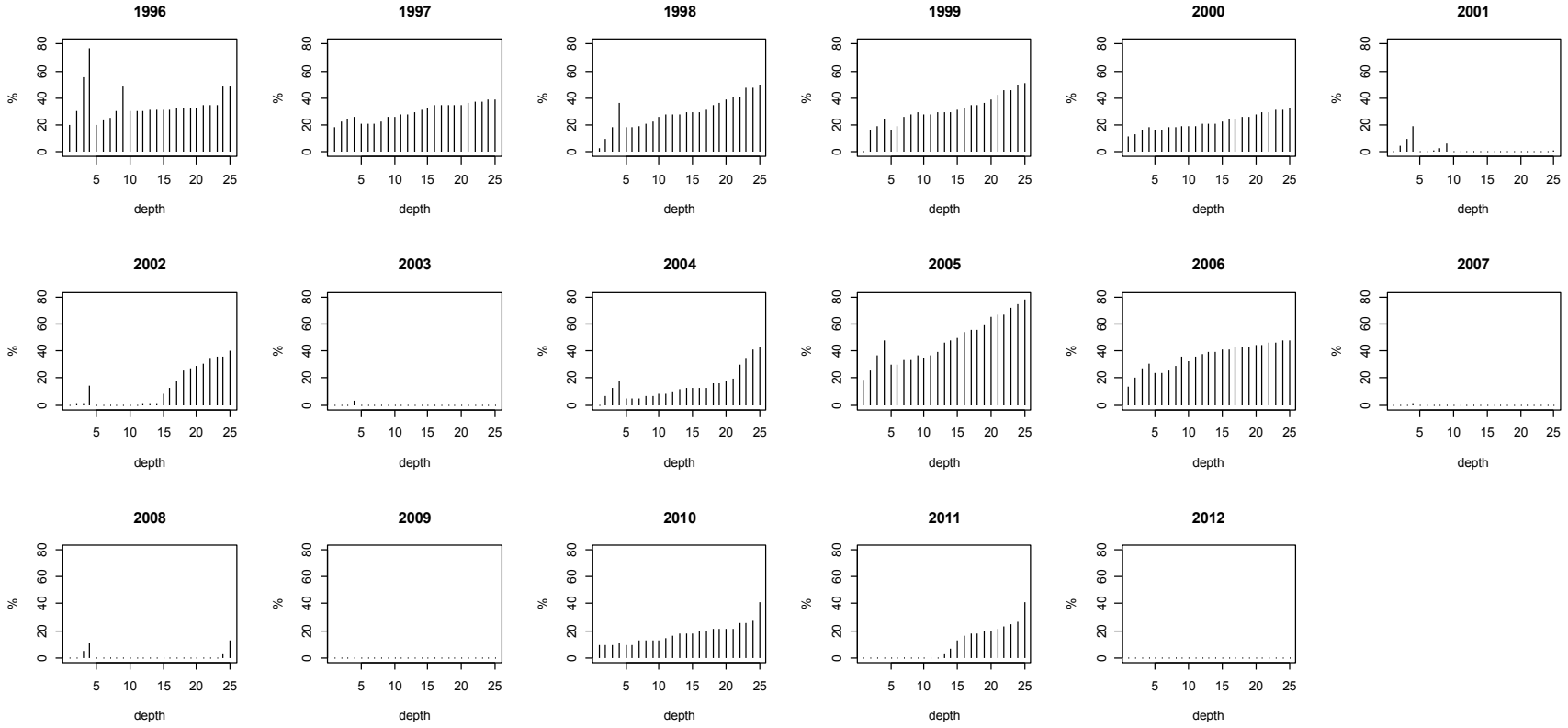


Piezometar 03b

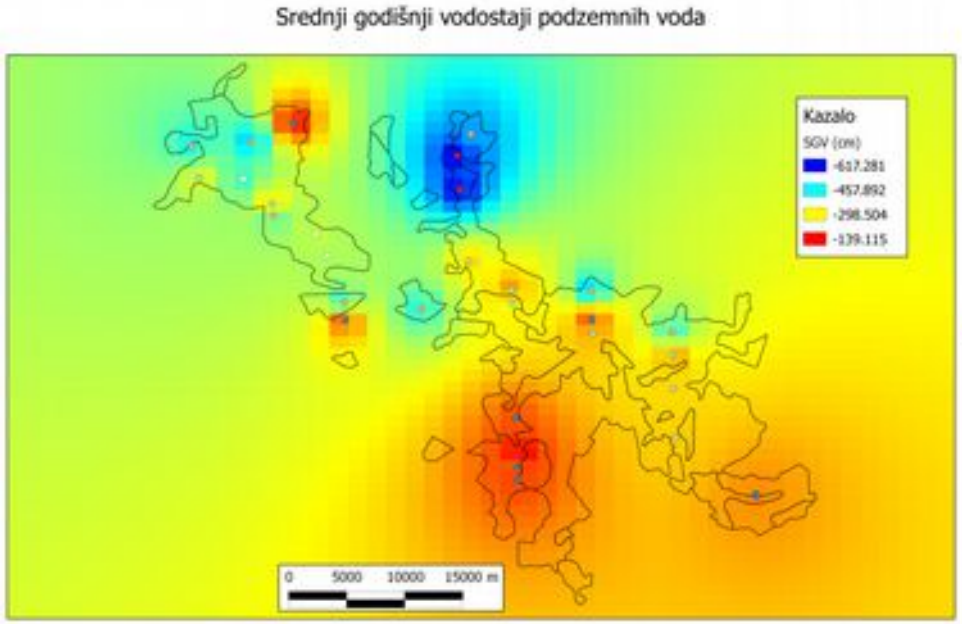
Nakon preliminarne obrade iz koje su dobiveni ujednačeni vodostaji podzemnih voda, provedena je daljnja obrada koja je uključivala izračun osnovnih statističkih pokazatelja kao što su to srednji godišnji vodostaj (SGV) u mjerenom razdoblju te srednji minimalni vodostaj u mjerenom razdoblju (SGMin).

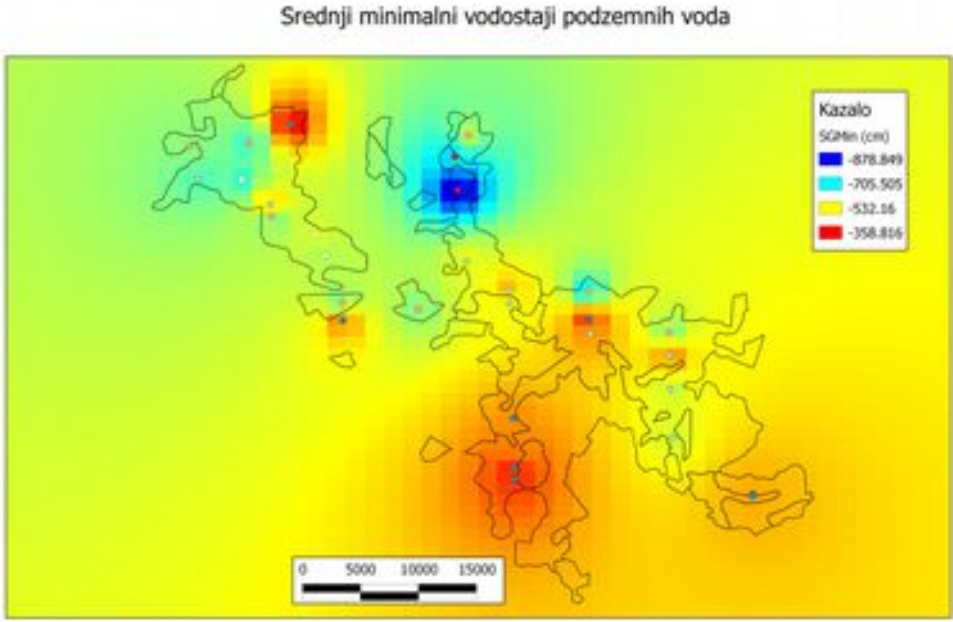


Prikaz trajanja saturacije tla vodom prema godinama i slojevima tla od 10 cm do dubine od 250 cm za piezometar 7a



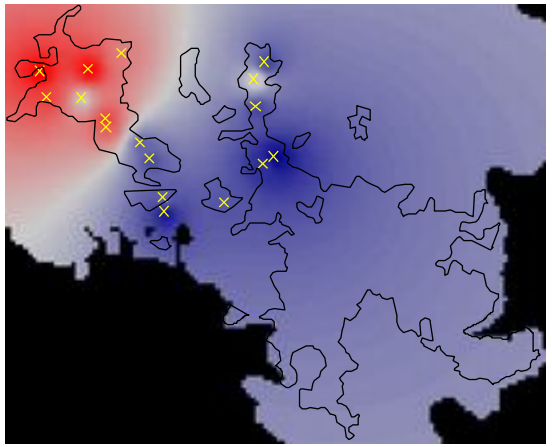
Prikaz interpoliranih srednjih vodostaja odnosno prikaz vodnog lica podzemnih voda te minimalnih vrijednosti za područje Spačvanskog bazena





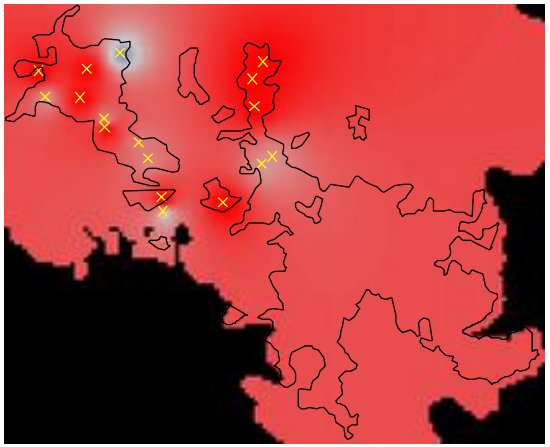
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 50 CM TLA

WRL 1996



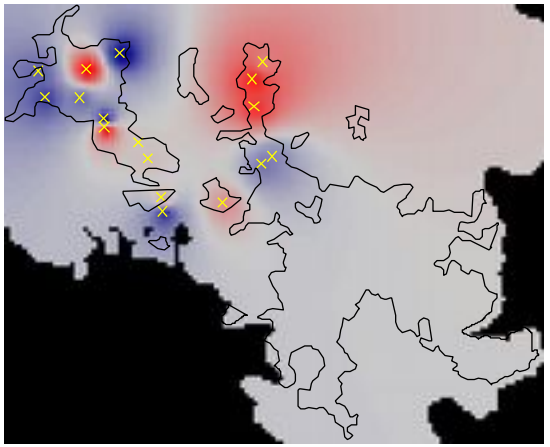
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 150 CM TLA

WRL 1996

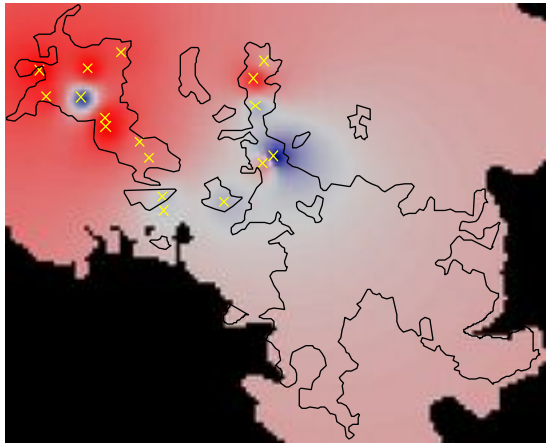


TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 250 CM TLA

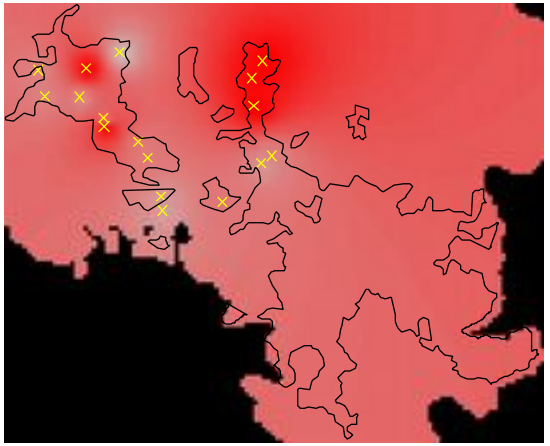
WRL 1996



WRL 1997



WRL 1997



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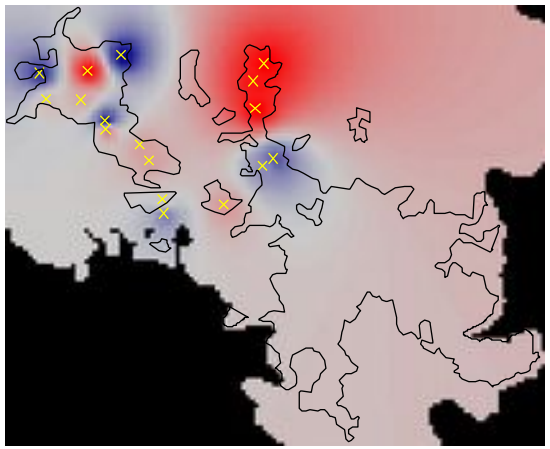
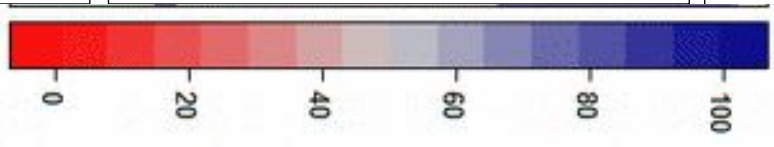
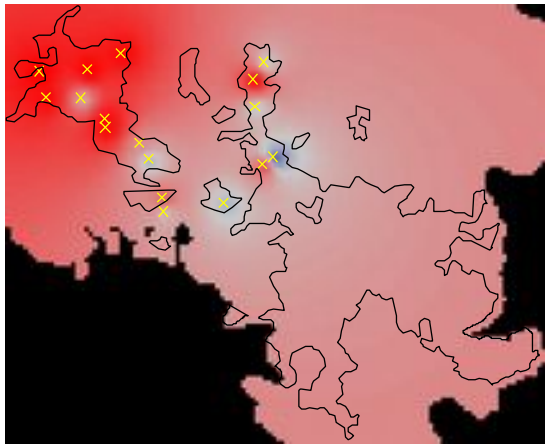




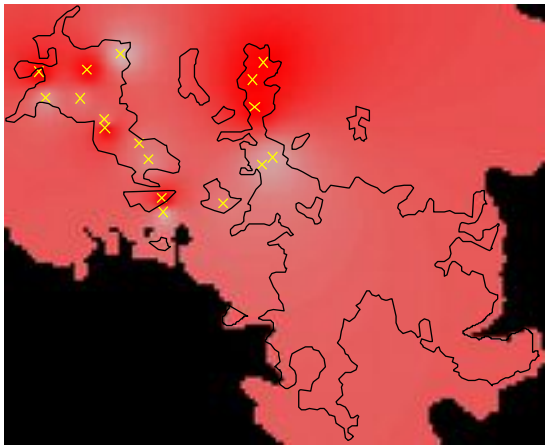
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 50 CM TLA

WRL 1998



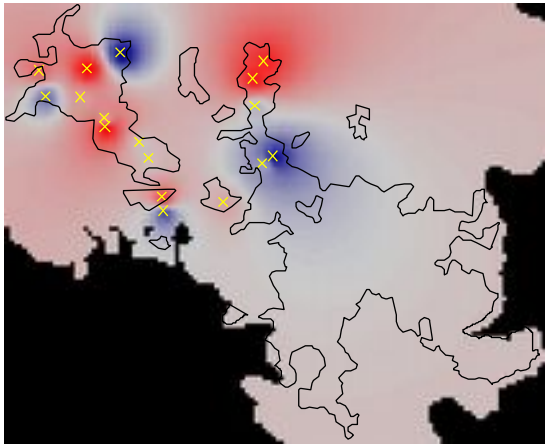
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 150 CM TLA

WRL 1998

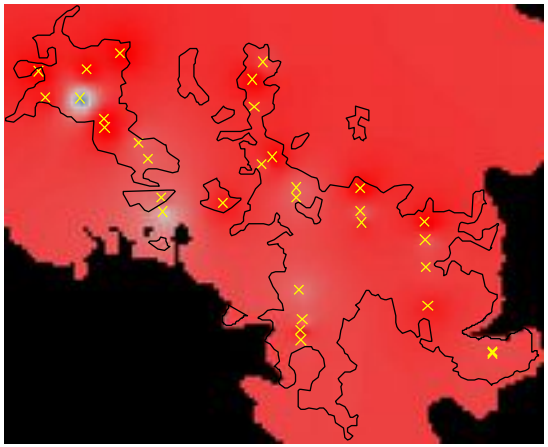


TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 250 CM TLA

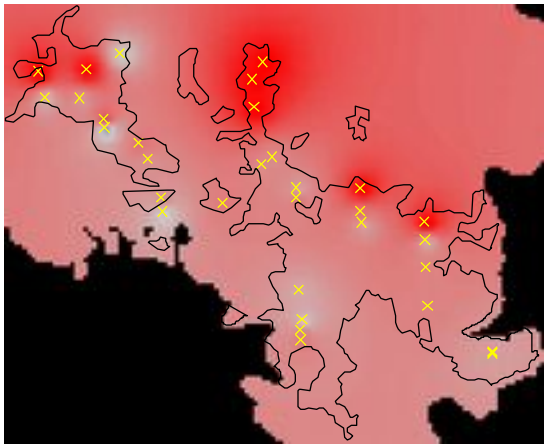
WRL 1998



WRL 1999



WRL 1999



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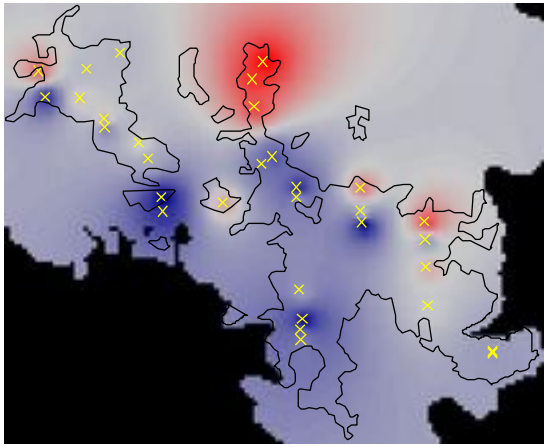
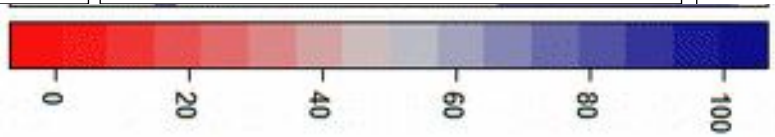
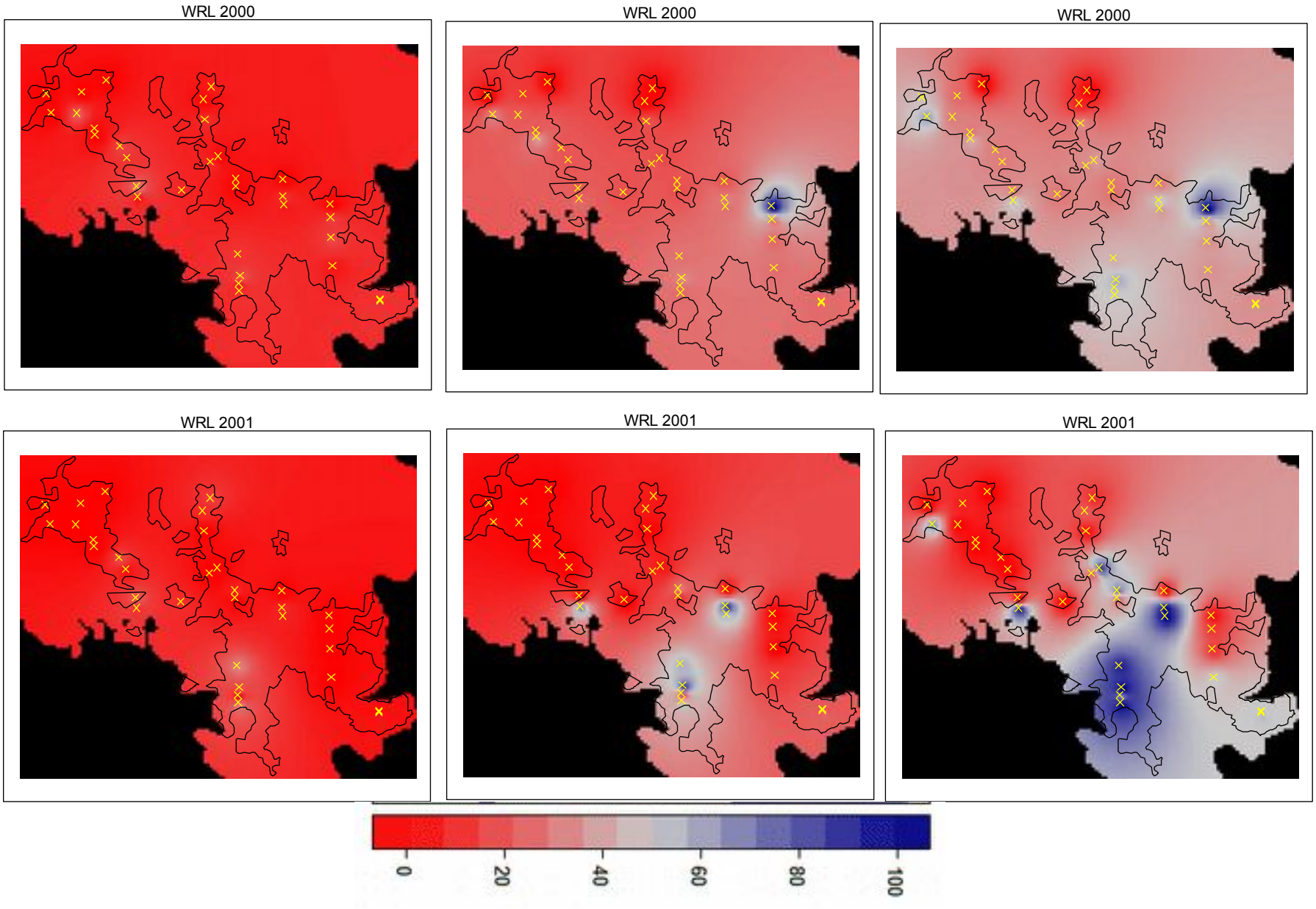




TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 50 CM TLA

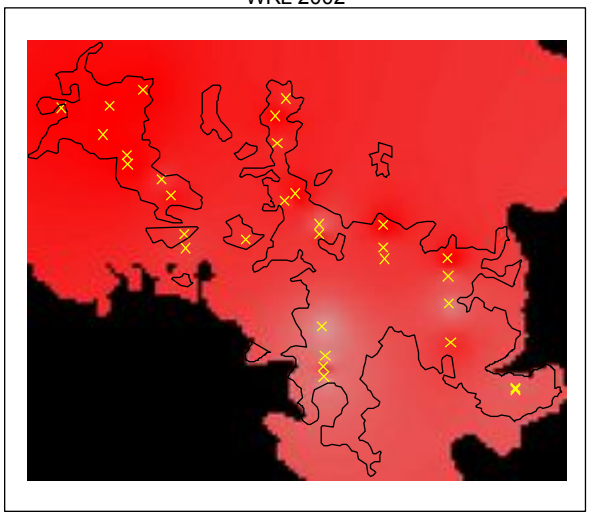
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 150 CM TLA

TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 250 CM TLA

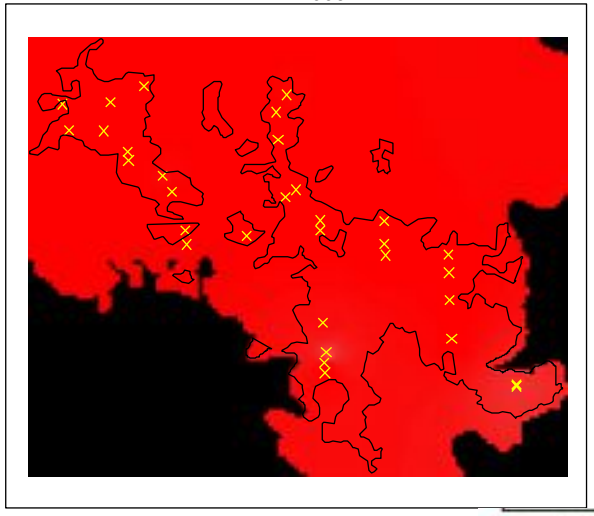


TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 50 CM TLA

WRL 2002

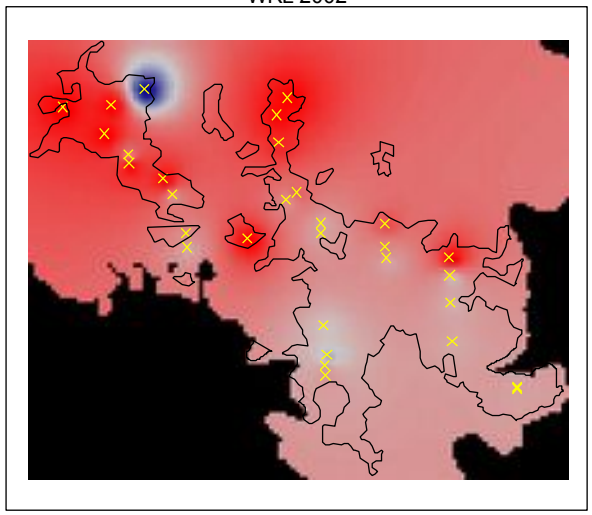


WRL 2003

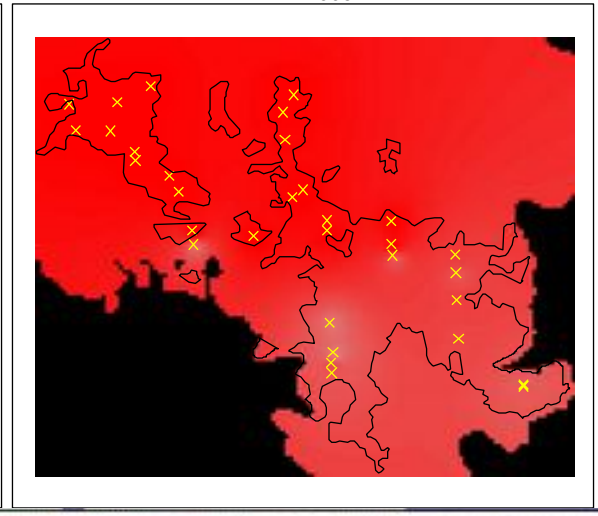


TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 150 CM TLA

WRL 2002

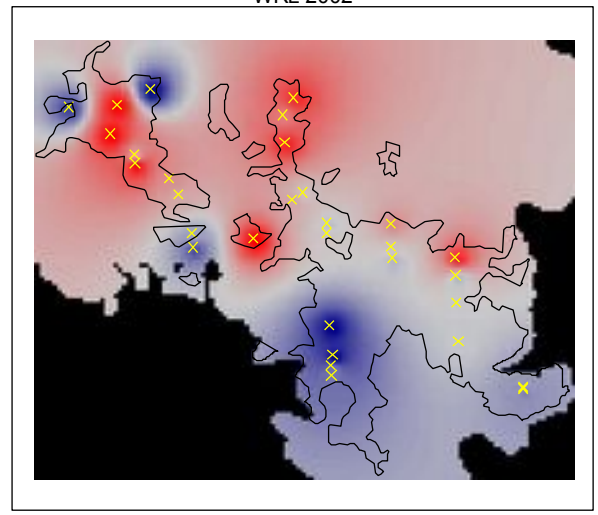


WRL 2003

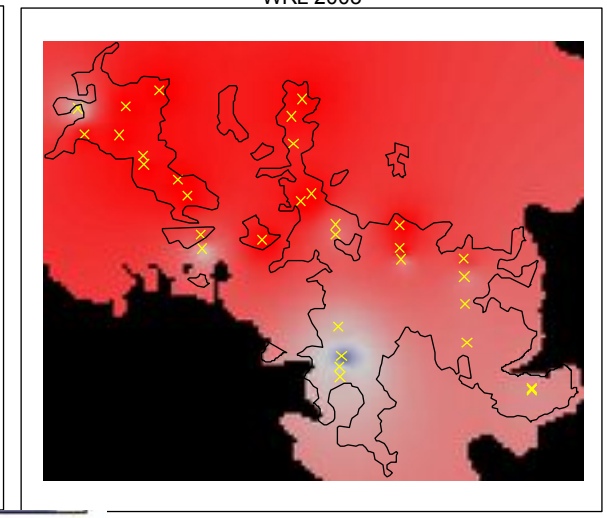


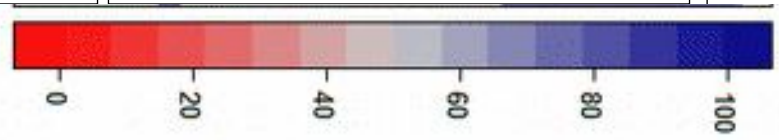
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 250 CM TLA

WRL 2002



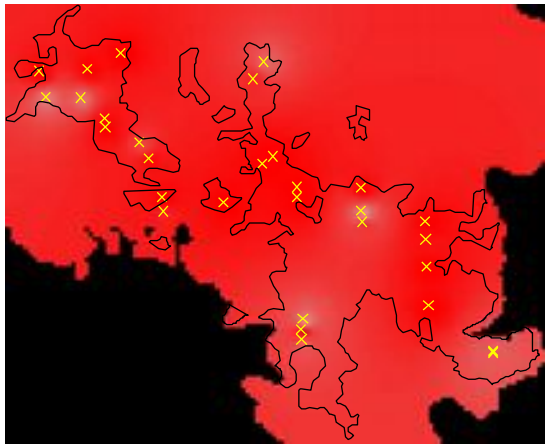
WRL 2003





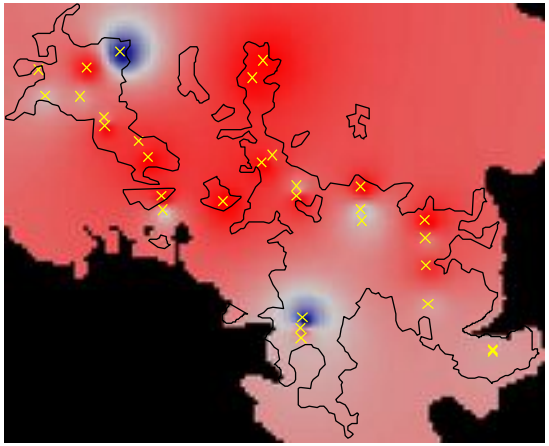
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 50 CM TLA

WRL 2004



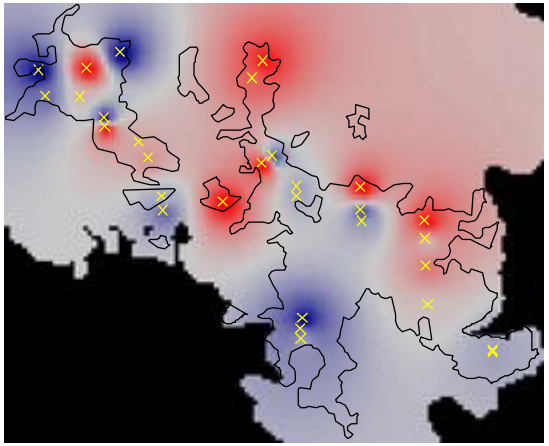
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 150 CM TLA

WRL 2004

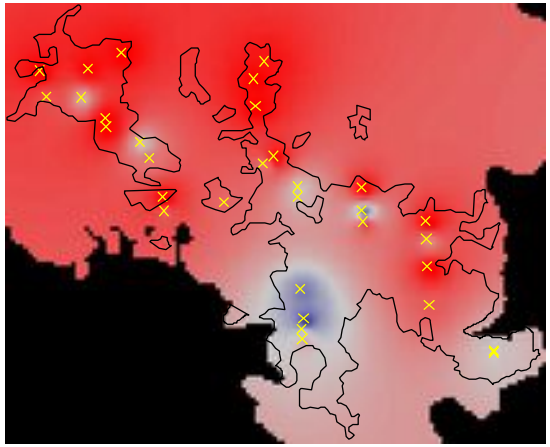


TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 250 CM TLA

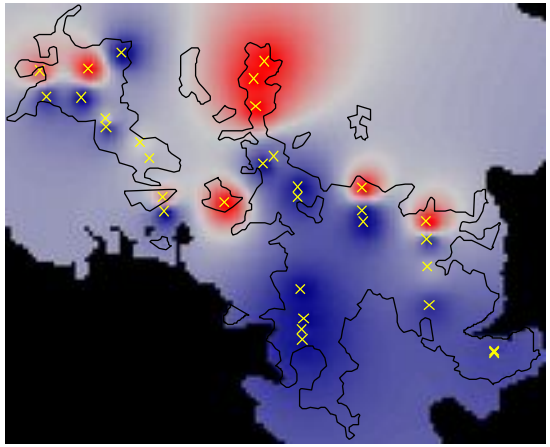
WRL 2004



WRL 2005



WRL 2005



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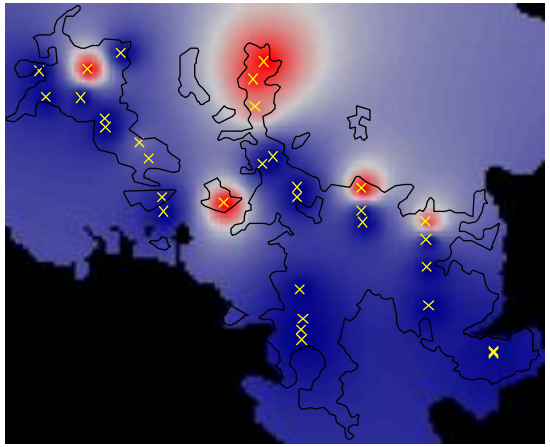
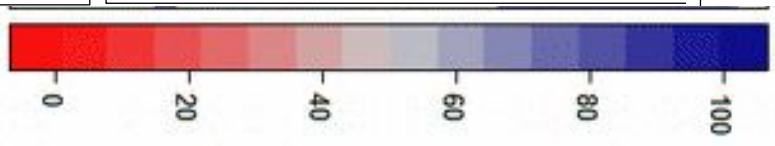


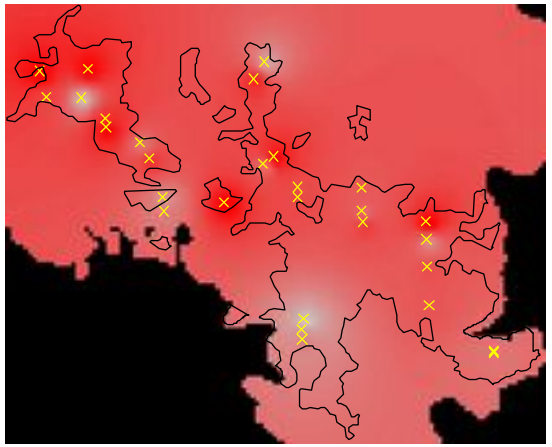


TRAJANJE SATURACIJE (WLR %) U SLOJU OD 50 CM TLA

TRAJANJE SATURACIJE (WLR %) U SLOJU OD 150 CM TLA

TRAJANJE SATURACIJE (WLR %) U SLOJU OD 250 CM TLA

WRL 2006



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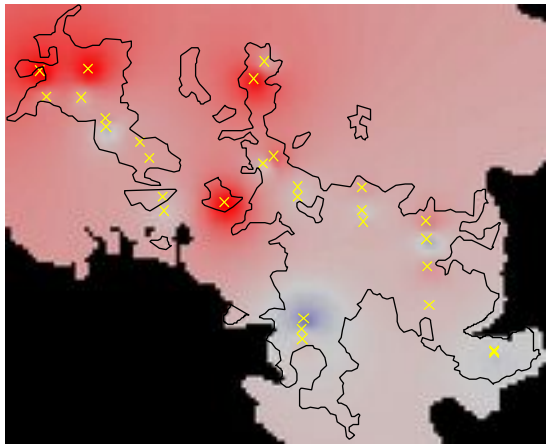

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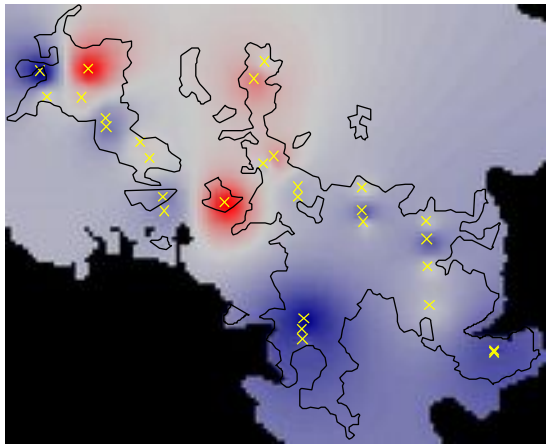

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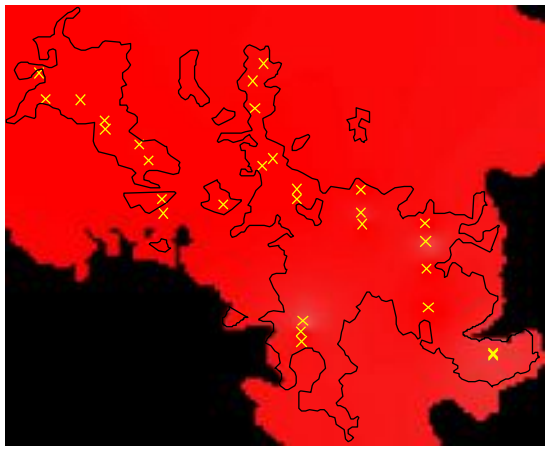

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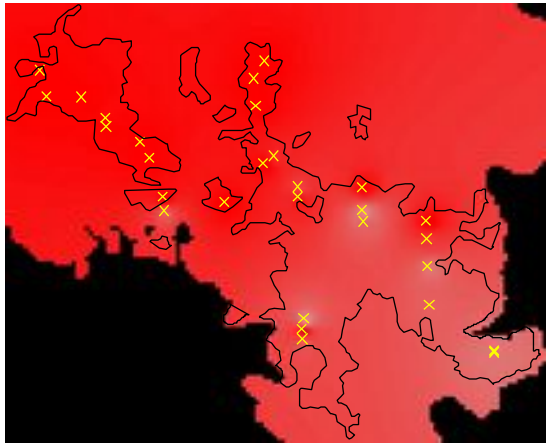

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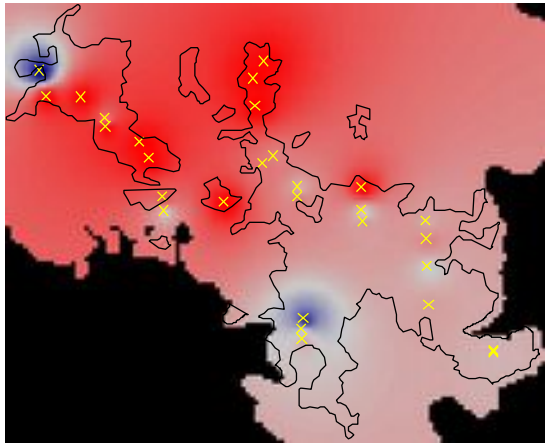
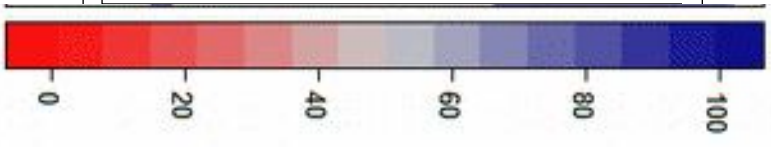


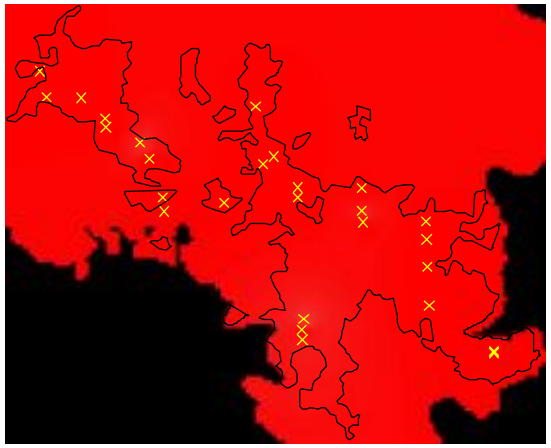


TRAJANJE SATURACIJE (WLR %) U SLOJU OD 50 CM TLA

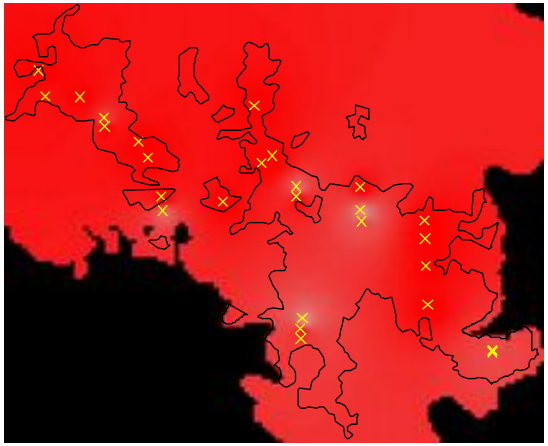
TRAJANJE SATURACIJE (WLR %) U SLOJU OD 150 CM TLA

TRAJANJE SATURACIJE (WLR %) U SLOJU OD 250 CM TLA

WRL 2008



WRL 2008



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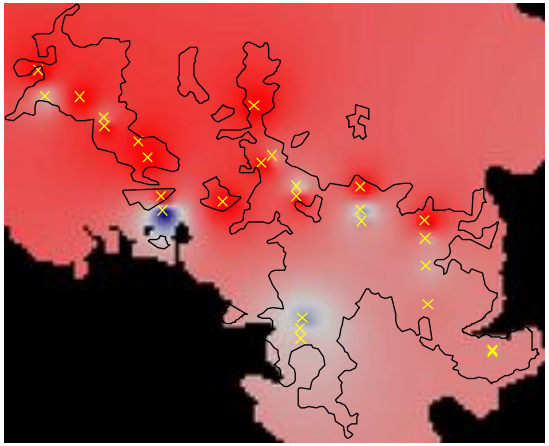
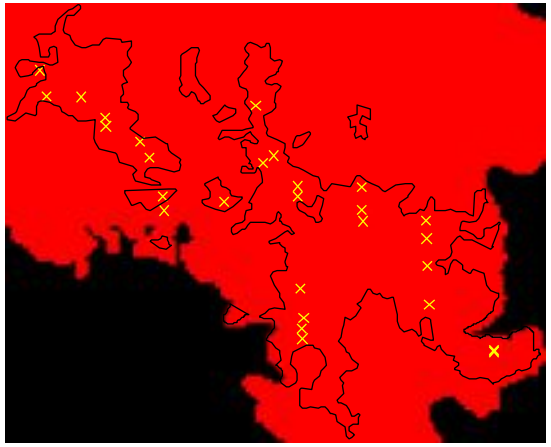


WRL 2009



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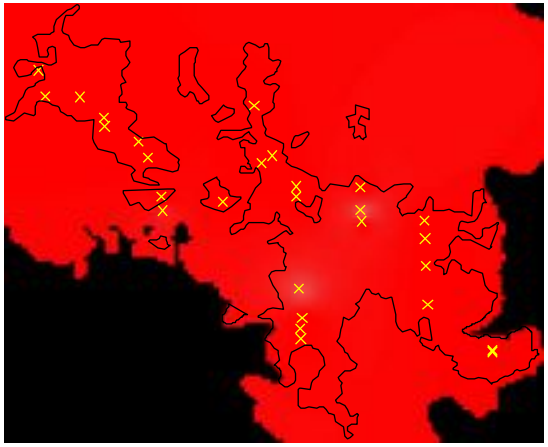

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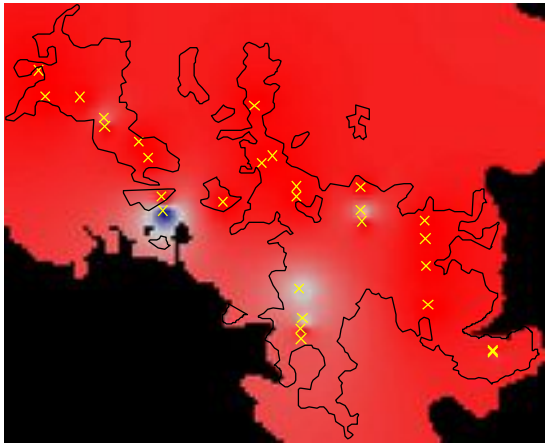
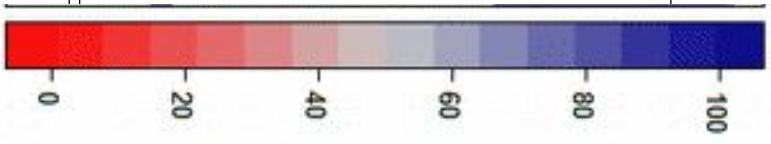
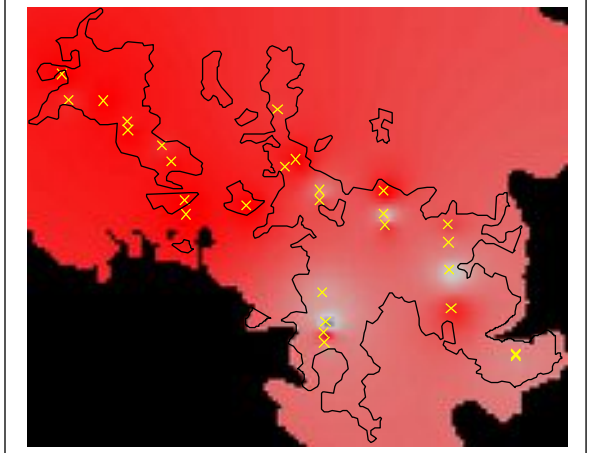




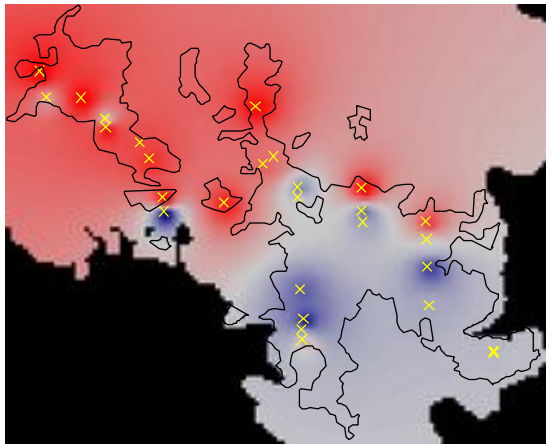
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 50 CM TLA

WRL 2010



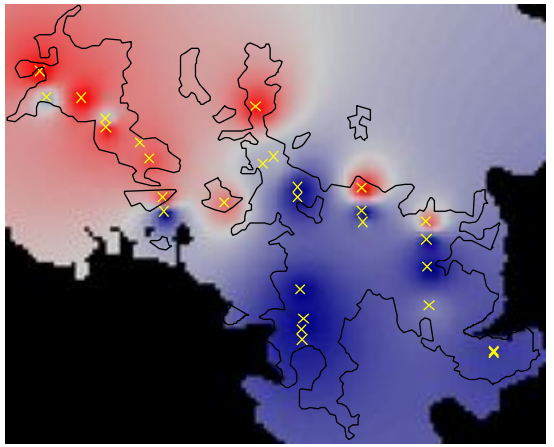
TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 150 CM TLA

WRL 2010

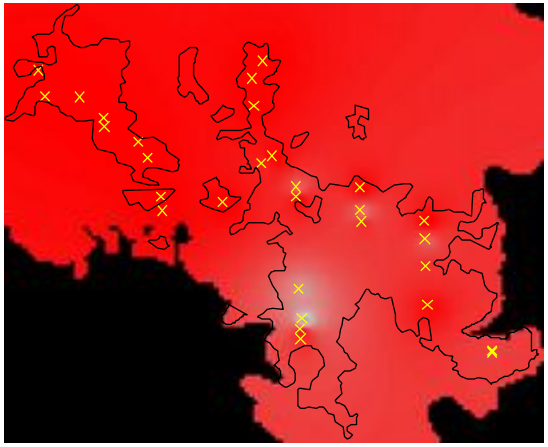


TRAJANJE SATURACIJE (WLR %)
U SLOJU OD 250 CM TLA

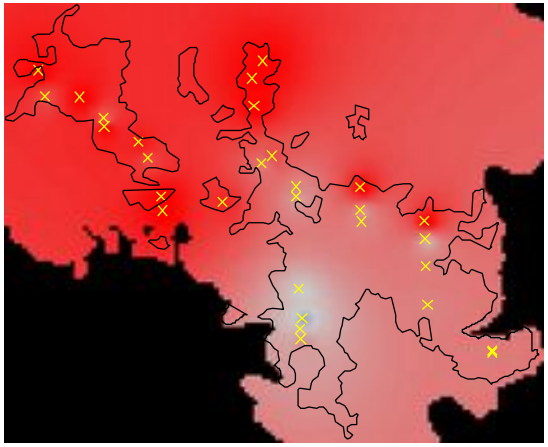
WRL 2010



WRL 2011



WRL 2011



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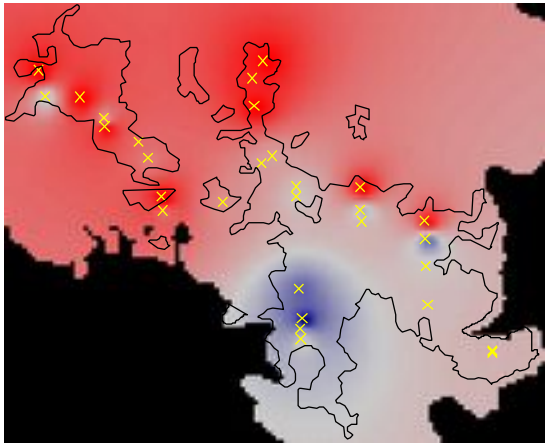
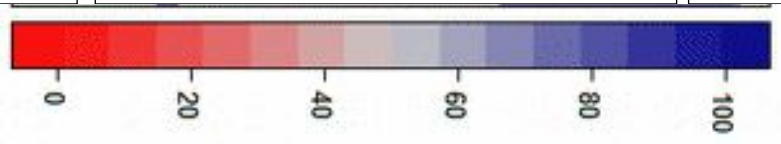
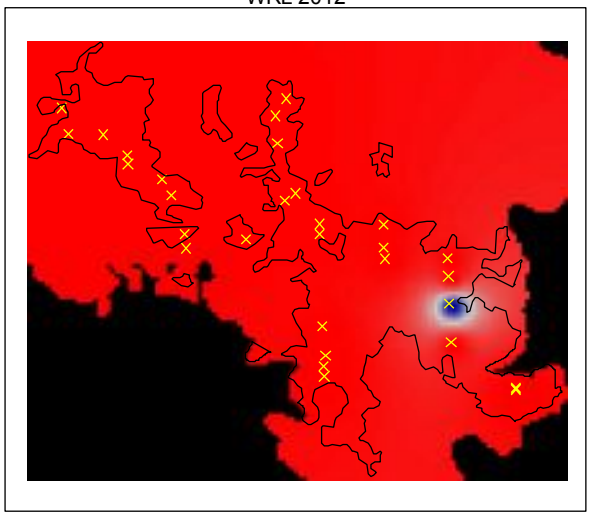




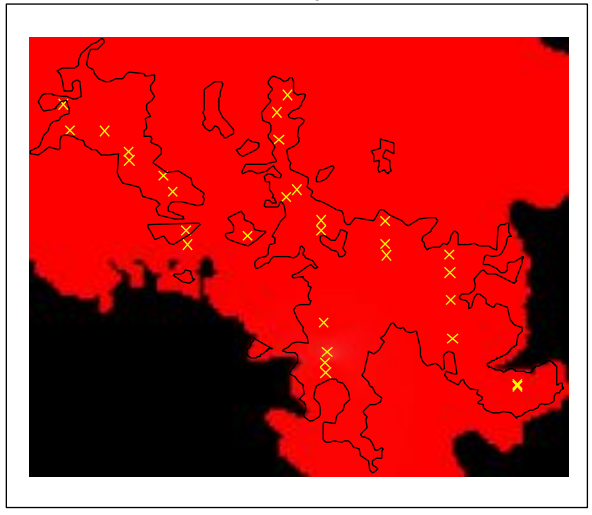
TRAJANJE SATURACIJE (WLR %) U SLOJU OD 50 CM TLA

WRL 2012



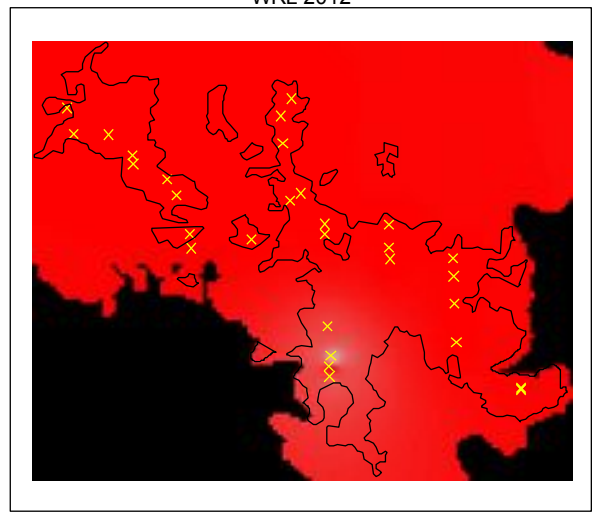
TRAJANJE SATURACIJE (WLR %) U SLOJU OD 150 CM TLA

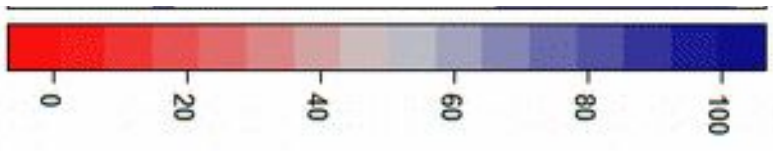
WRL 2012



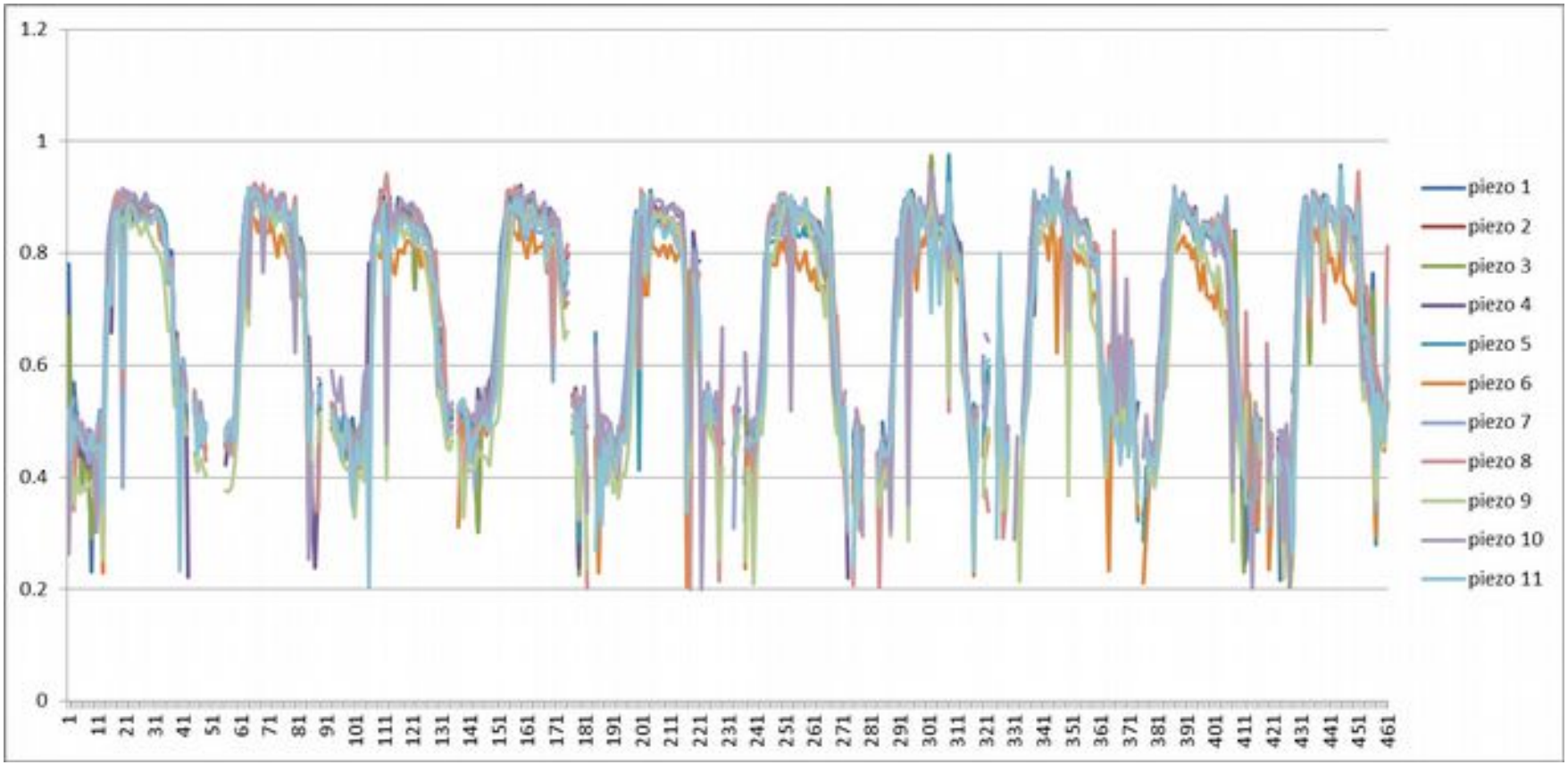
TRAJANJE SATURACIJE (WLR %) U SLOJU OD 250 CM TLA

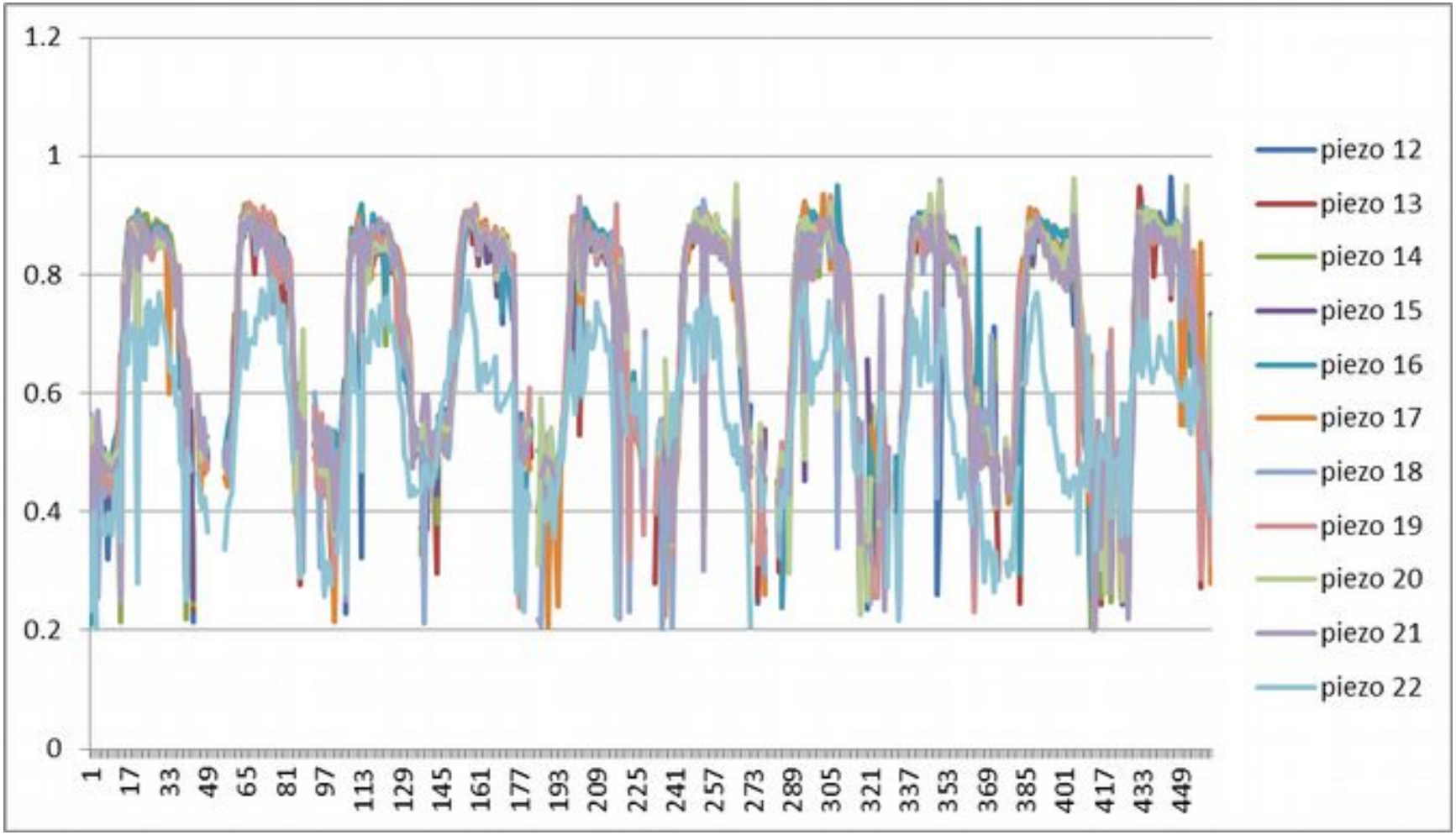
WRL 2012





Prikaz proračunatih 8 dnevnih vrijednosti NDVI iz MODIS uređaja na piezometarskim lokalitetima

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1
0.8
0.6
0.4
0.2
0
1
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33
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65
81
97
113
129
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161
177
193
209
225
241
257
273
289
305
321
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369
385
401
417
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piezo 13
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piezo 18
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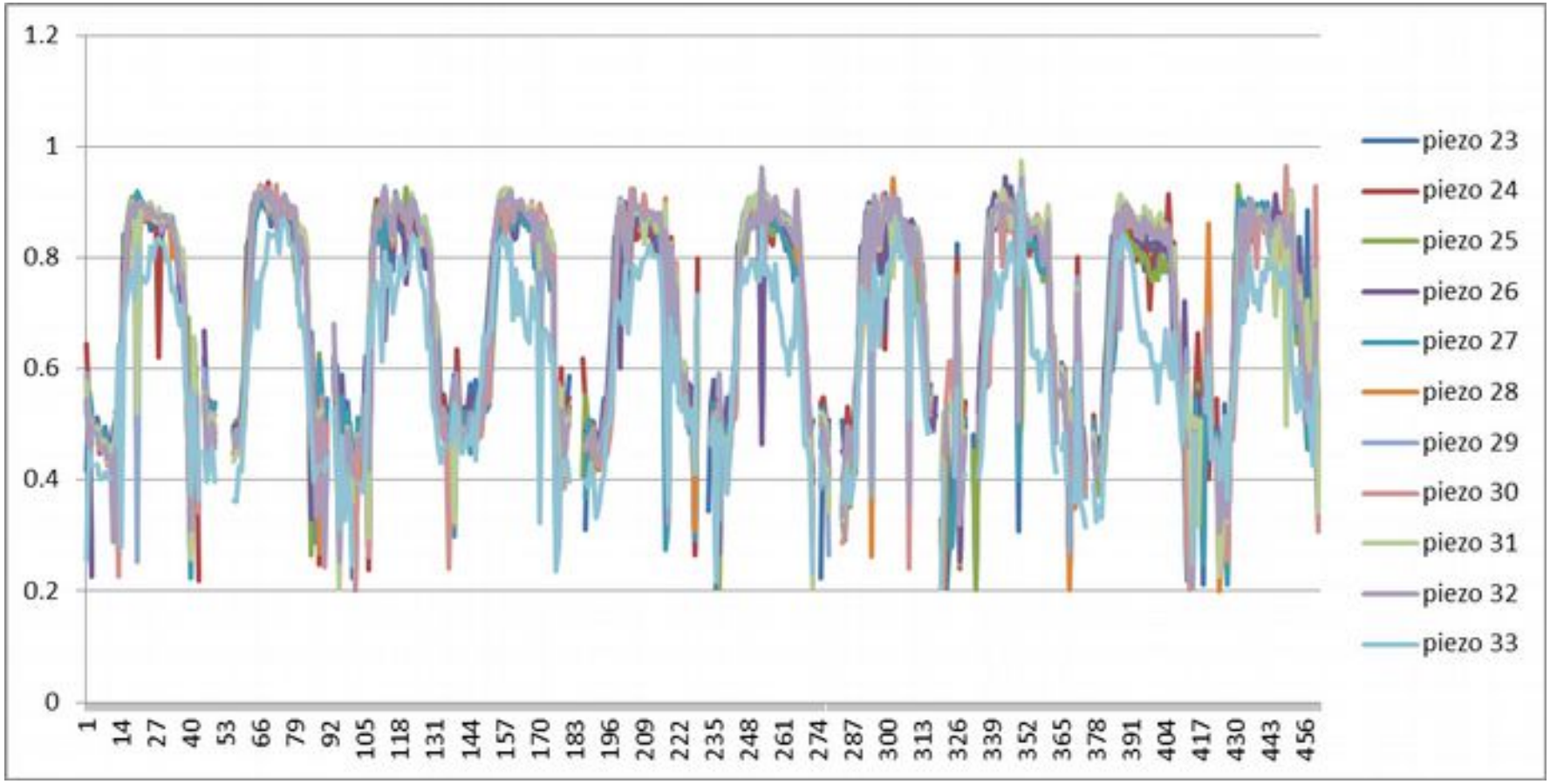
1.2
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piezo 29
piezo 30
piezo 31
piezo 32
piezo 33

ČESMA – Obrada vegetacijskih indeksa iz Landsat multispektralnih snimki

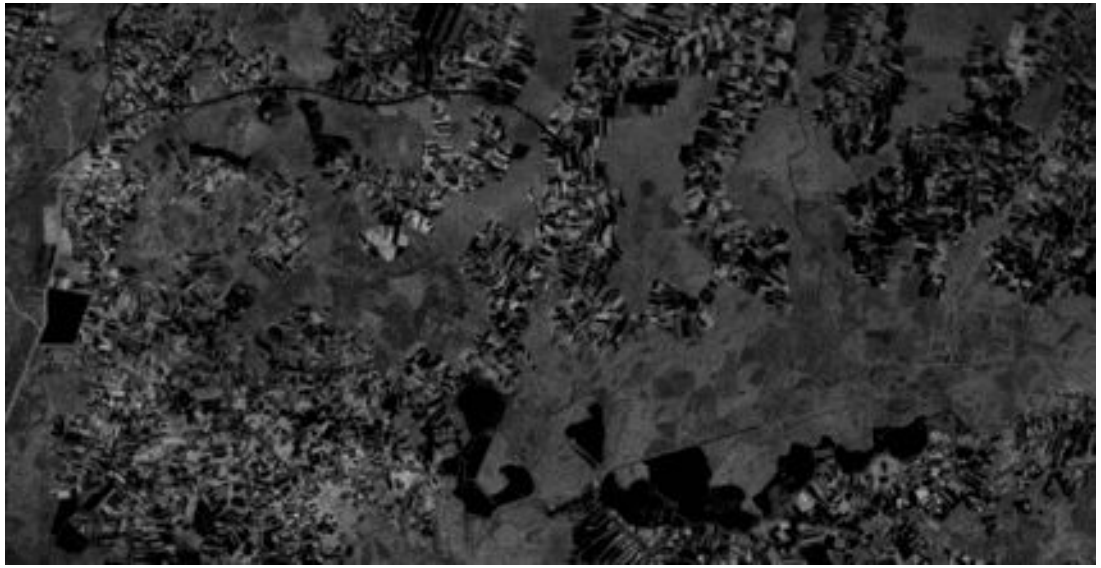
Obrađeni vegetacijski indeksi:

- Simple ratio (SR)
- Modified simple ratio (MSR)
- Normalized difference vegetation index (NDVI)
- Normalized difference water index (NDWI)
- Modified soil adjusted vegetation indeks (MSAVI)

Simple ratio (SR)

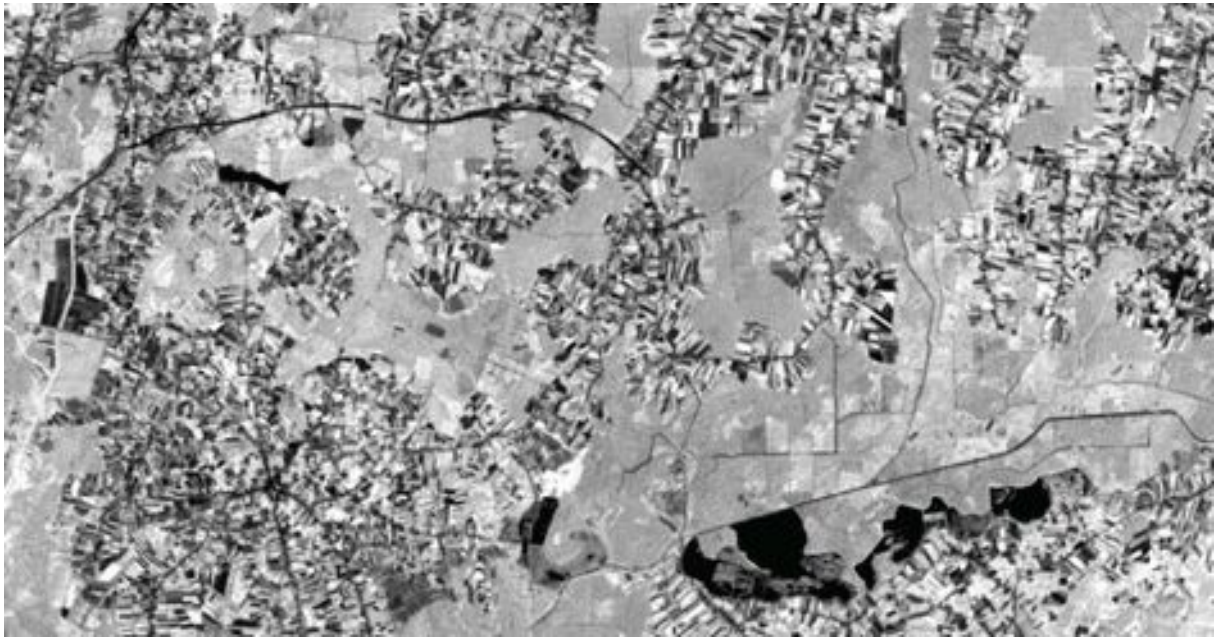
- Omjer blizu infracrvenog i crvenog kanala
- $SR = \frac{NIR}{Red}$
- Vrijednosti od 0 do 30
- Zelena vegetacija između 2 i 8
- Veći rezultat = veći postotak zdrave vegetacije
- Osjetljiv – puno vegetacije na snimci
- Smanjenje ostetljivosti smanjenjem vegetacije na snimci

Simple ratio



3. Mjesec 2014.

7. Mjesec 2014.



Modified simple ratio

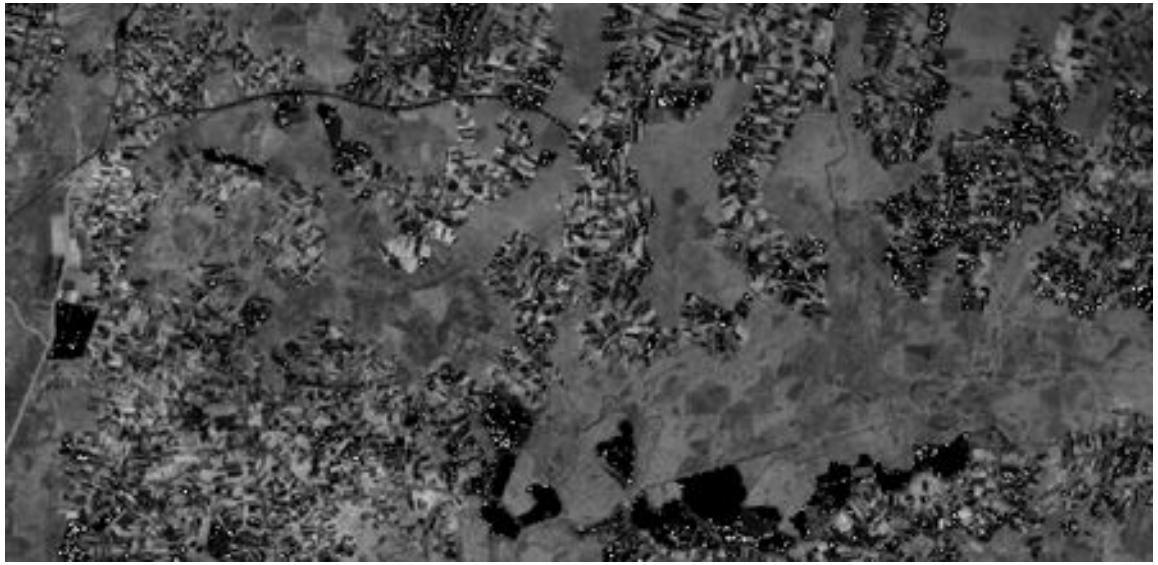
- Nastao kao poboljšanje Simple ratio indeksa
- Poboljšana osjetljivost na biofizičke parametre vegetacije

Nastao kao poboljšanje Simple ratio indeksa

$$MSR = \frac{\left(\frac{NIR}{Red}\right)-1}{\sqrt{\left(\frac{NIR}{Red}\right)+1}} = \frac{SR-1}{\sqrt{SR+1}}$$

Poboljšana osjetljivost na biofizičke parametre vegetacije

Modified simple ratio



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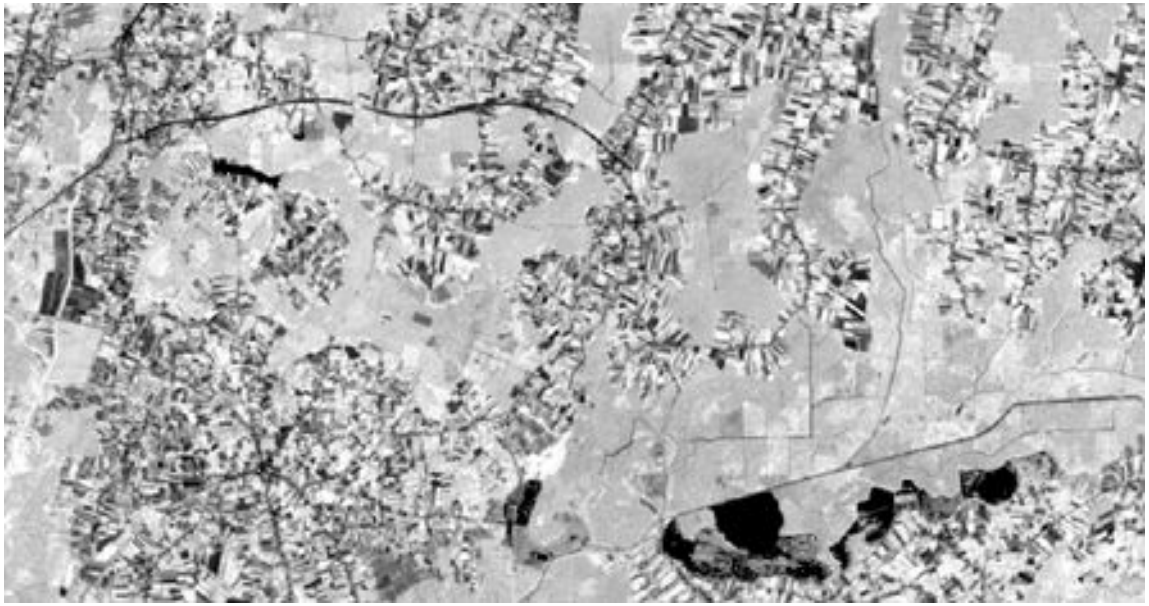
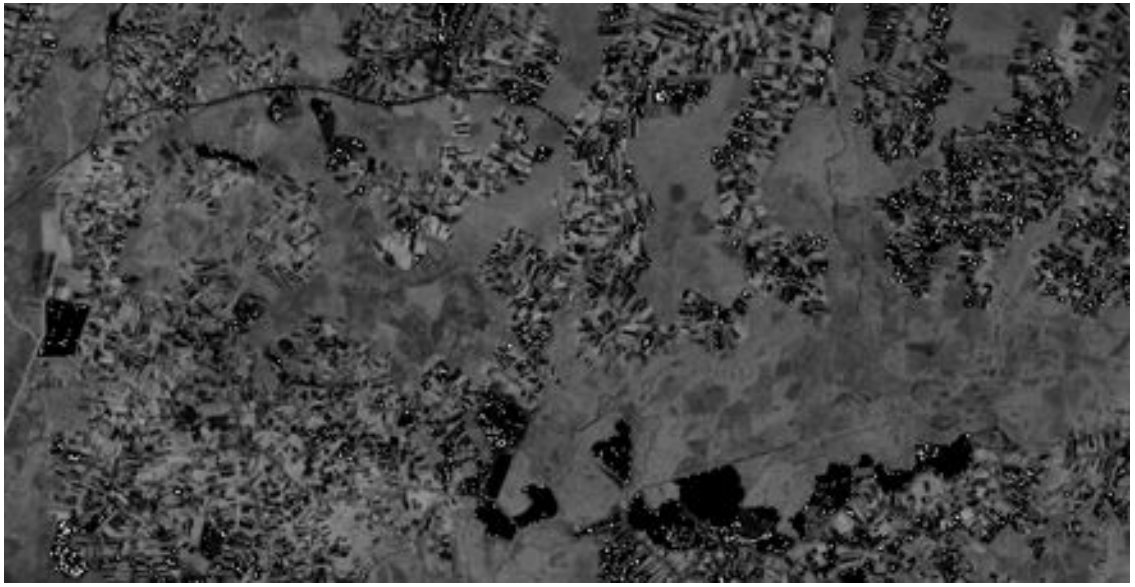


Normalized difference vegetation index (NDVI)

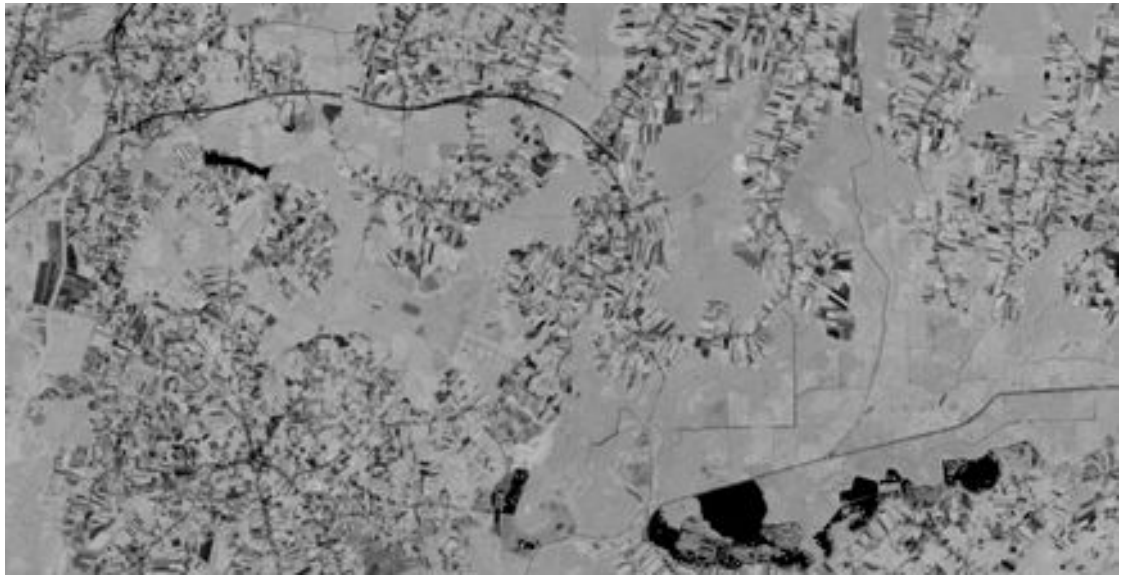
- Najčešće korišteni vegetacijski indeks
- Predstavlja normaliziranu razliku između crvenog i NIR kanala
- $NDVI = \frac{(NIR - Red)}{(NIR + Red)}$
- Fotosintetska aktivnost biljke, područje pokrivenosti biljkama, vlaga zemlje i biljaka
- Vrijednosti od -1 do 1 (0 do 1)
- Ne eliminira atmosferske efekte

NDVI



3. Mjesec 2014.

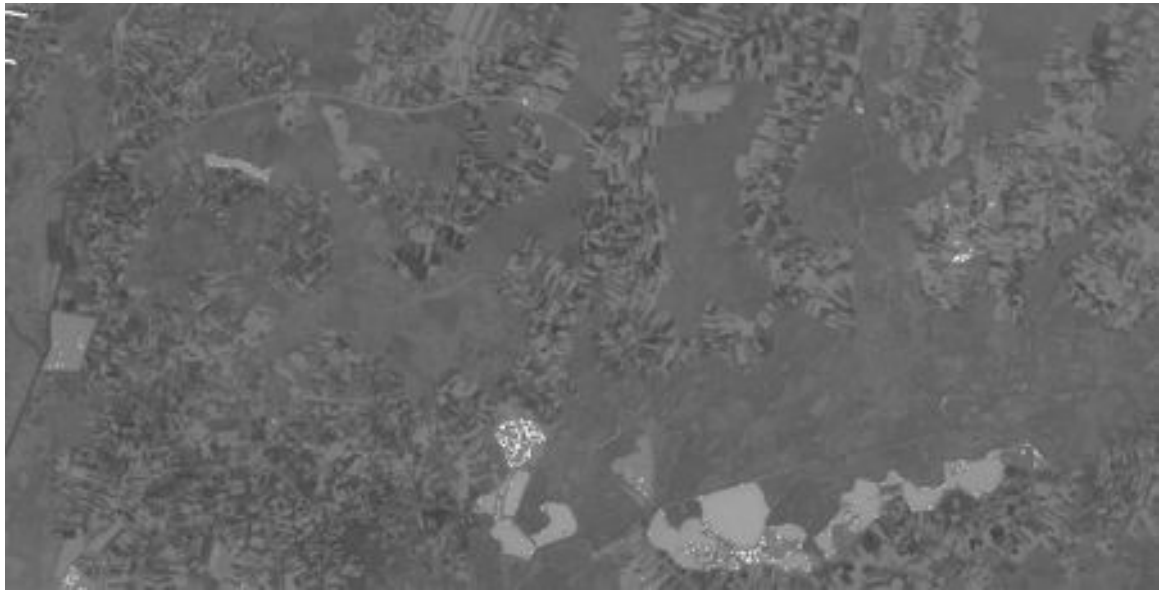
7. Mjesec 2014.



Normalized difference water index (NDWI)

- Procjena udjela vode u listu
- Koristi NIR i zeleni kanal
- $NDWI = \frac{Green - NIR}{Green + NIR}$
- Refleksija ovisi o količini vode u listu
- Može se koristiti za praćenje suše

NDWI



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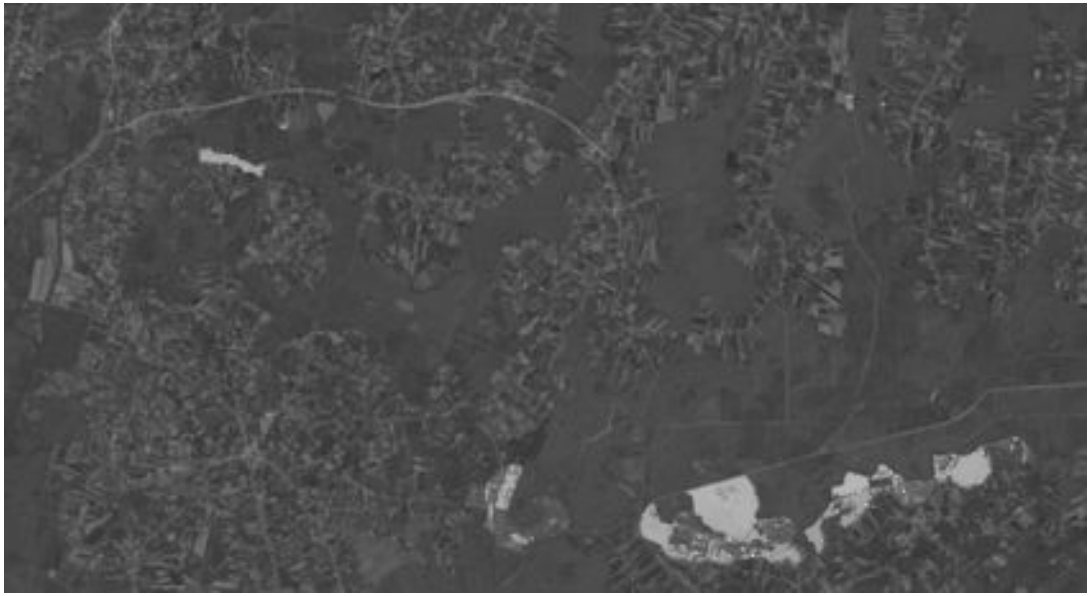
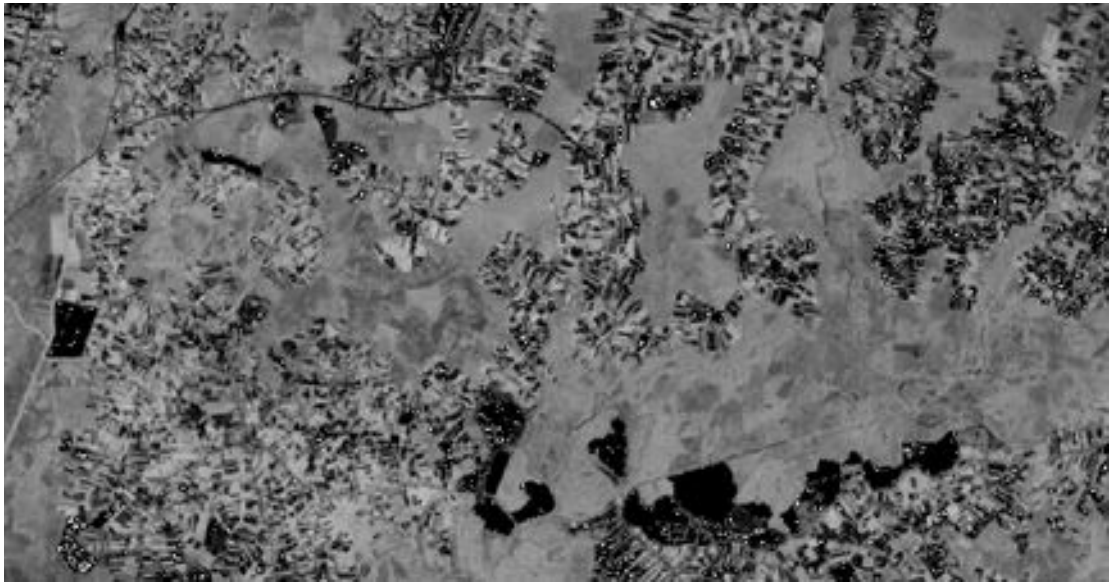


Modified soil adjusted vegetation indeks (MSAVI)

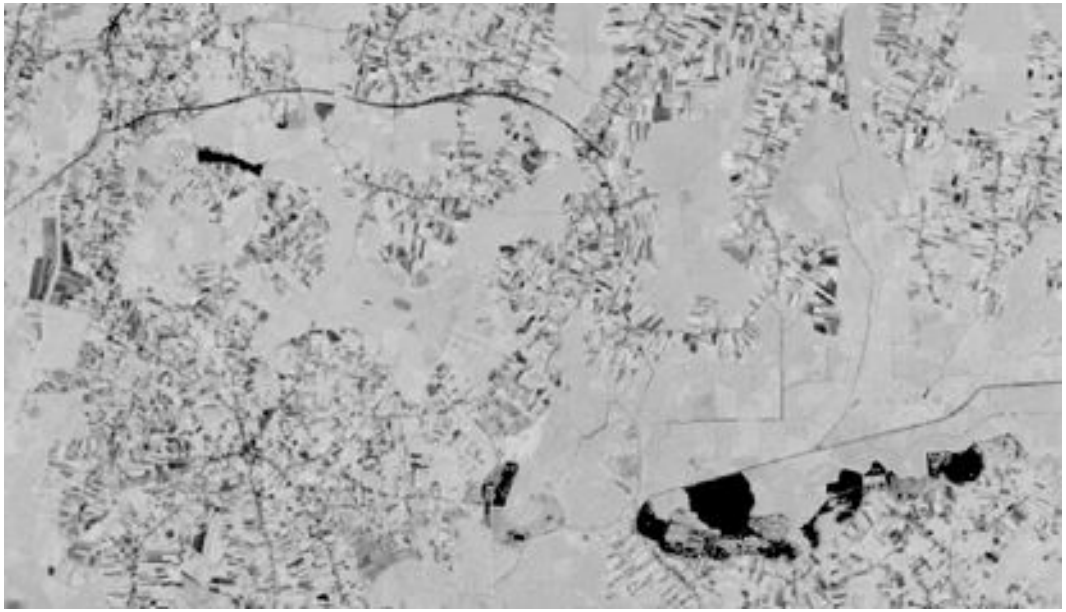
- Poboljšanje NDVI-a na područjima s golim tlom
- Predstavlja zelenilo vegetacije
- Vrijednosti -1 do 1
- Kartiranje zemljinog pokrova, procjena biomase

MSAVI



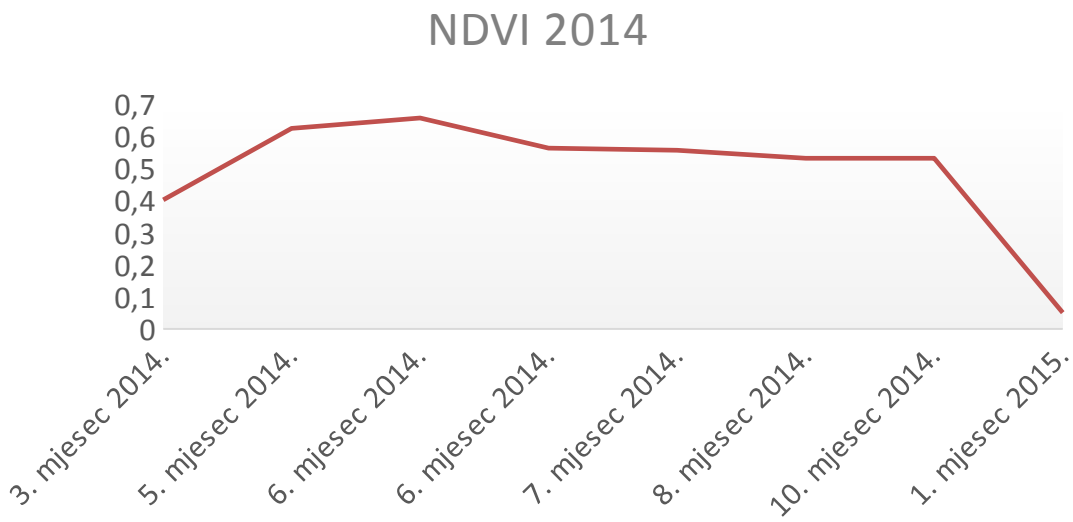
3. Mjesec 2014.

7. Mjesec 2014.



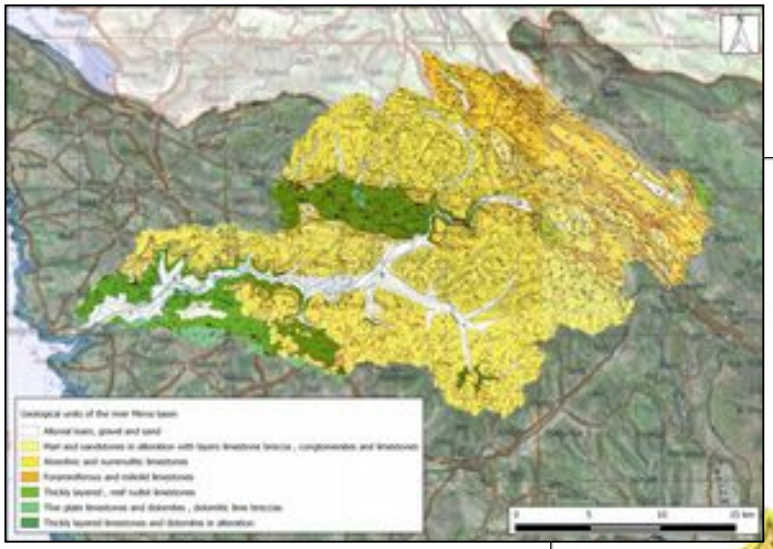
Vremenski niz

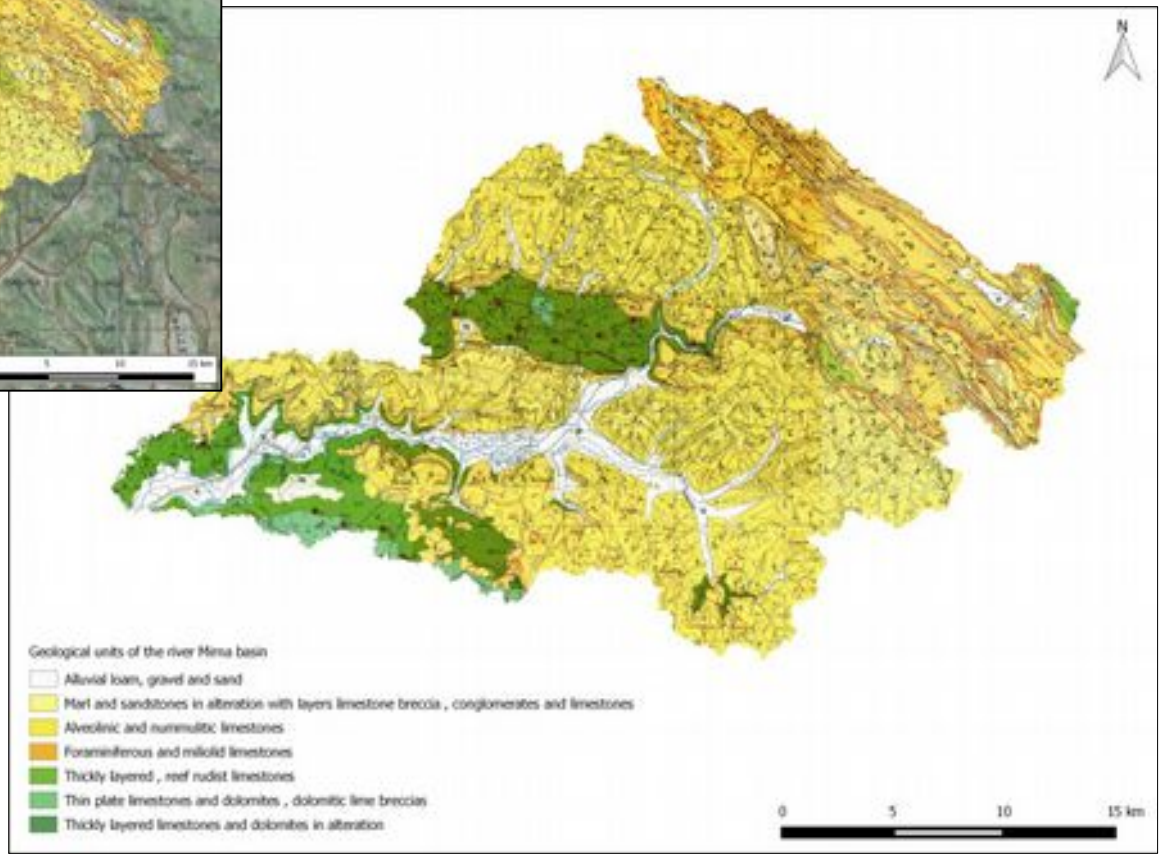
- 1 godina
- Snimke - oblaci



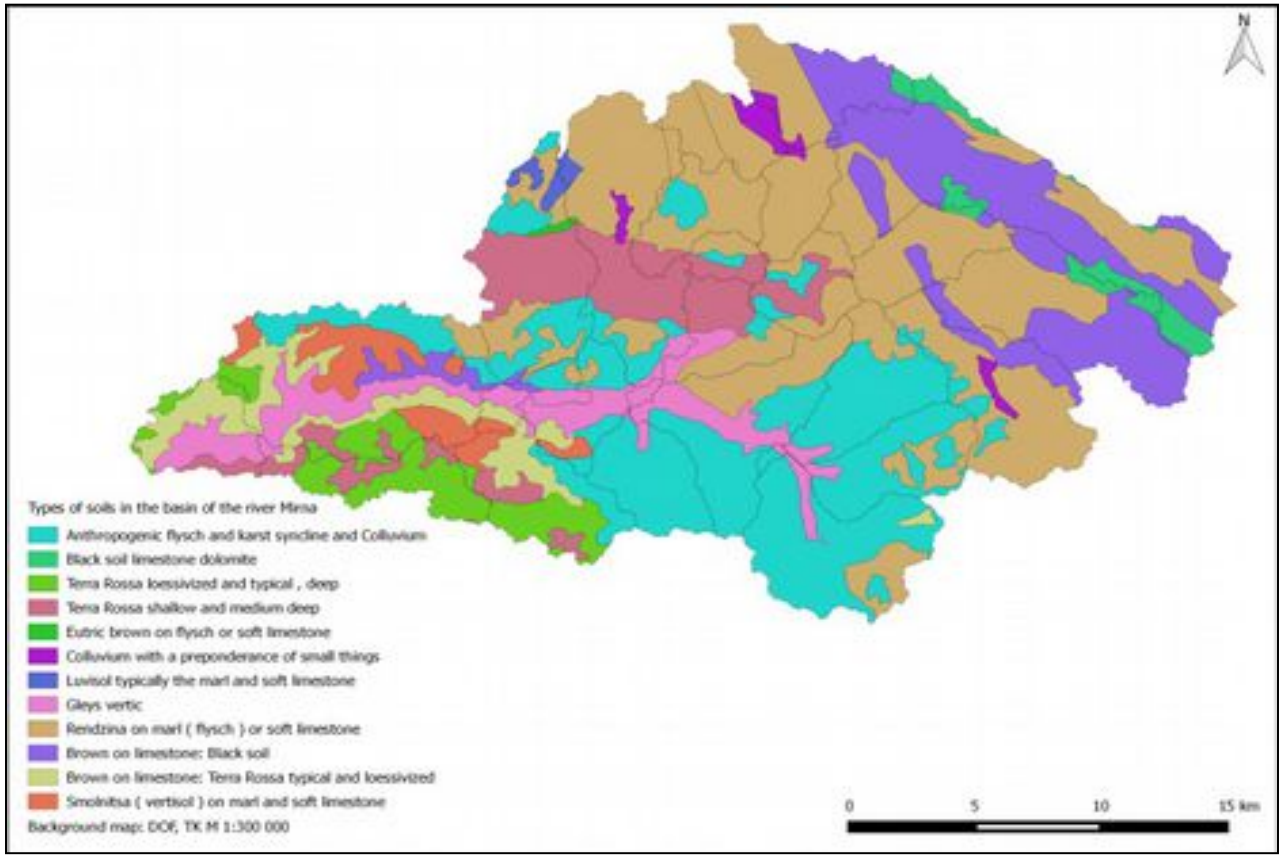
SLIV MIRNE – razgraničenje slivnog područja i izrada prostorne baze podataka

Geologija

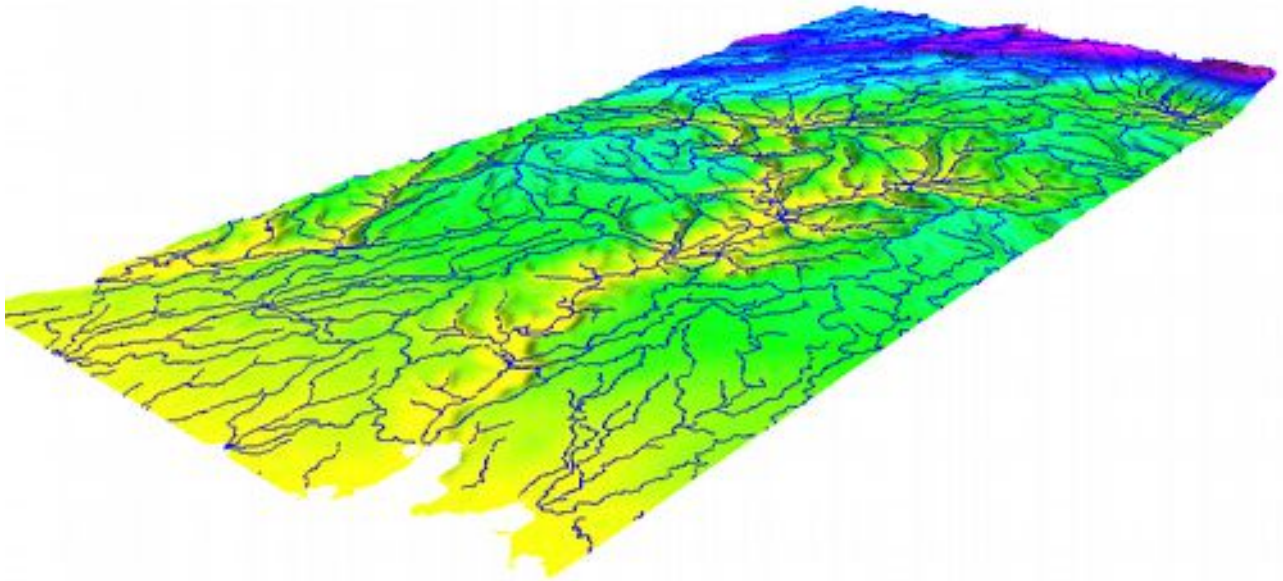




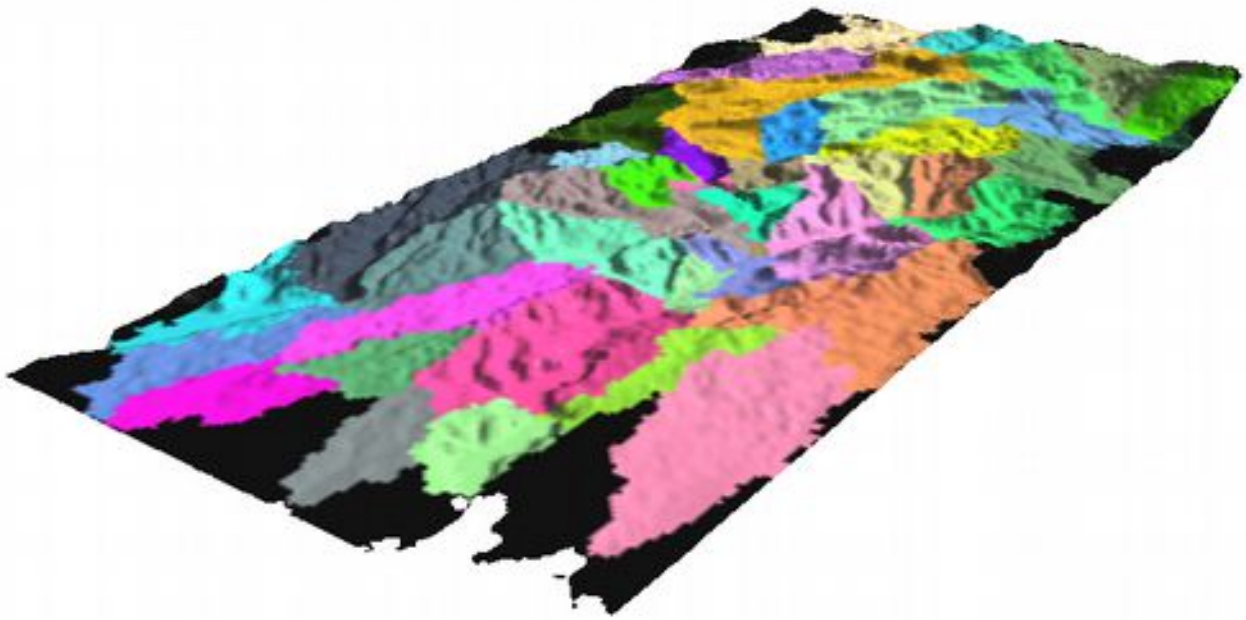
Pedologija


N
Types of soils in the basin of the river Mesa
Anthropogenic flysch and karst syncline and Colluvium
Black soil limestone dolomite
Terra Rossa loessivized and typical , deep
Terra Rossa shallow and medium deep
Eutric brown on flysch or soft limestone
Colluvium with a preponderance of small things
Luvisol typically the marl and soft limestone
Gleys vertic
Rendzina on marl (flysch) or soft limestone
Brown on limestone: Black soil
Brown on limestone: Terra Rossa typical and loessivized
Smolnitsa (vertisol) on marl and soft limestone
Background map: DOF, TK M 1:300 000
0
5
10
15 km

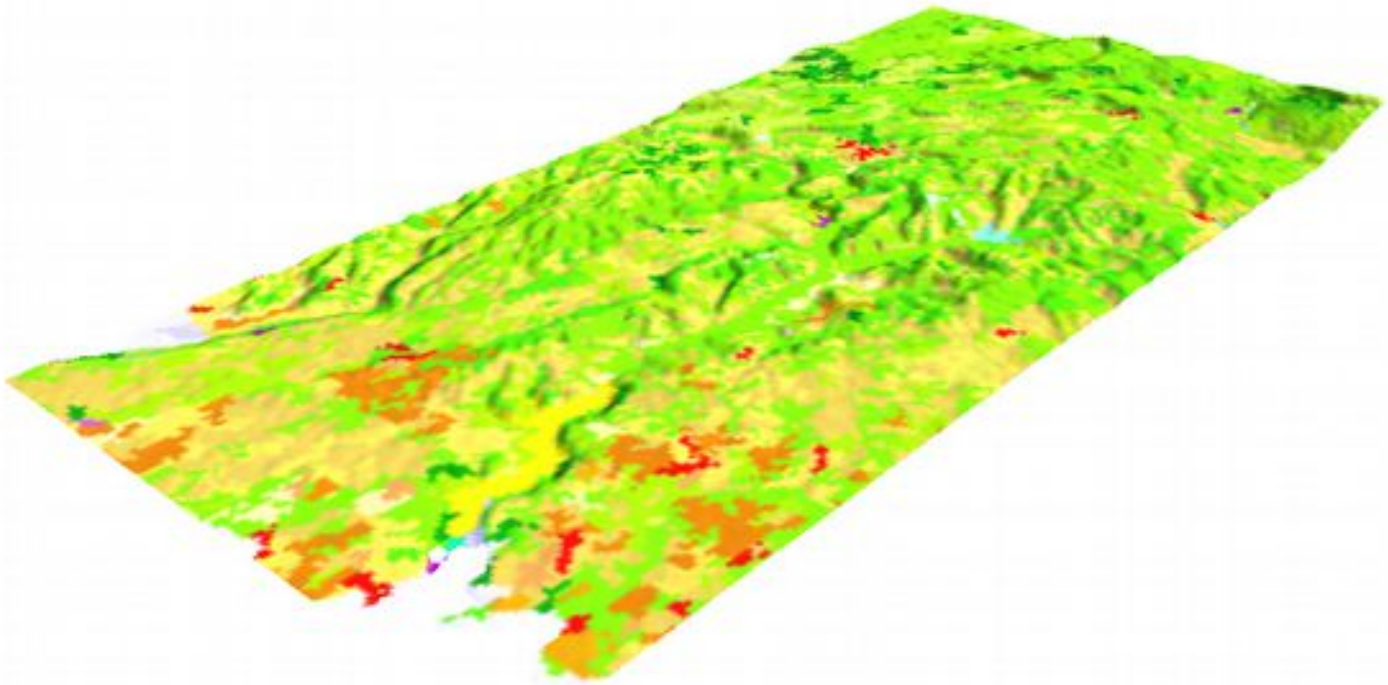
Prikaz izdvojenih sintetskih vodotoka (u NVIZ GRASS alatu)



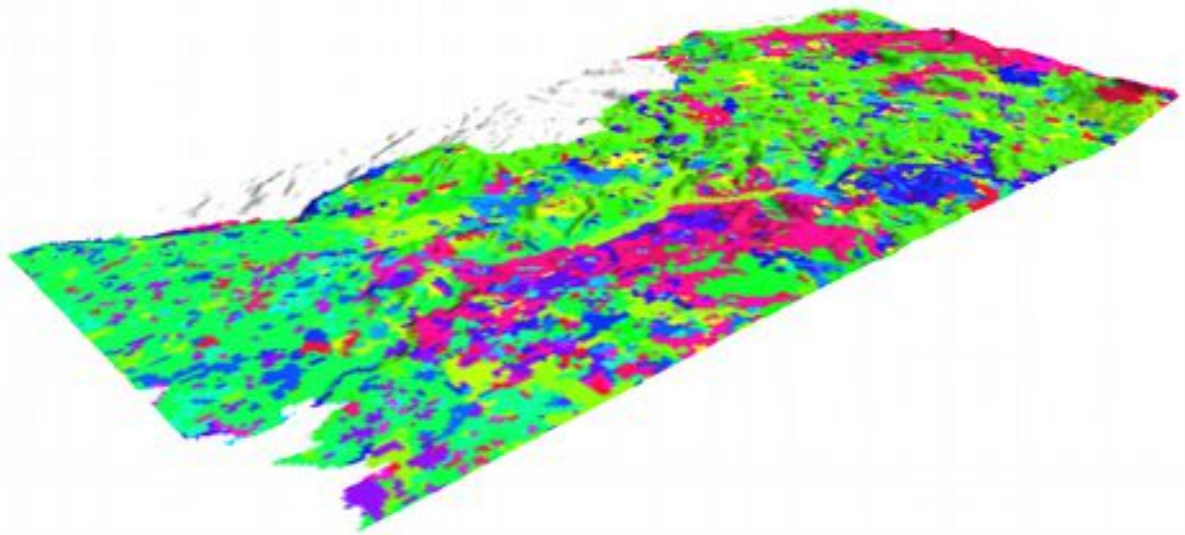
Prikaz izdvojenih podslivova (NVIZ)



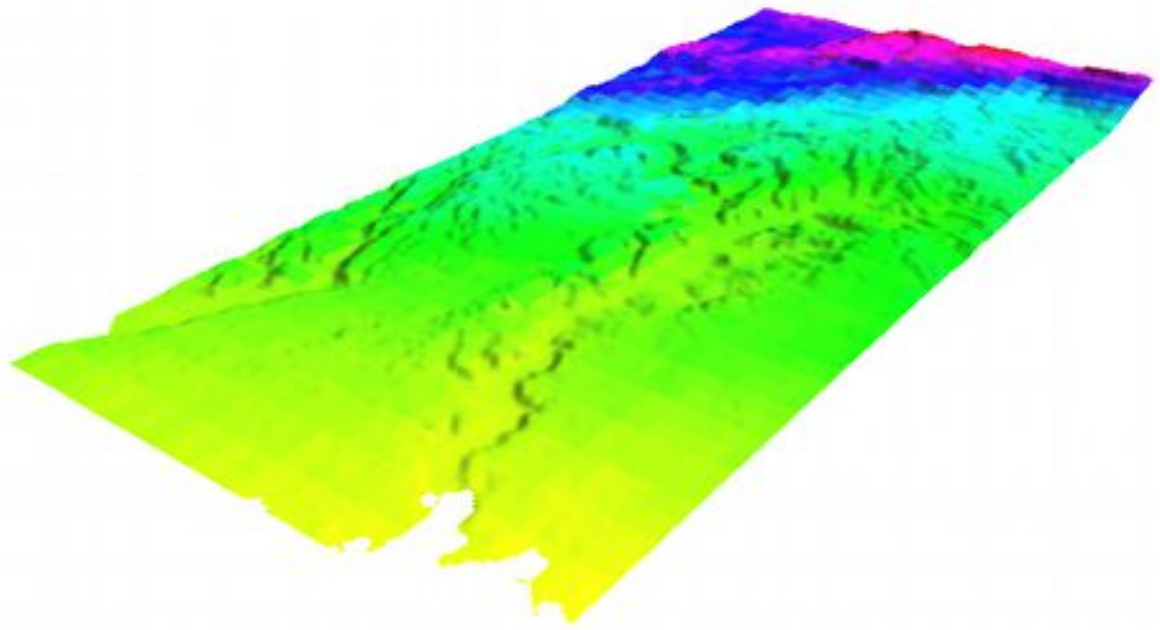
Prikaz Corine CLC kategorija (NVIZ)



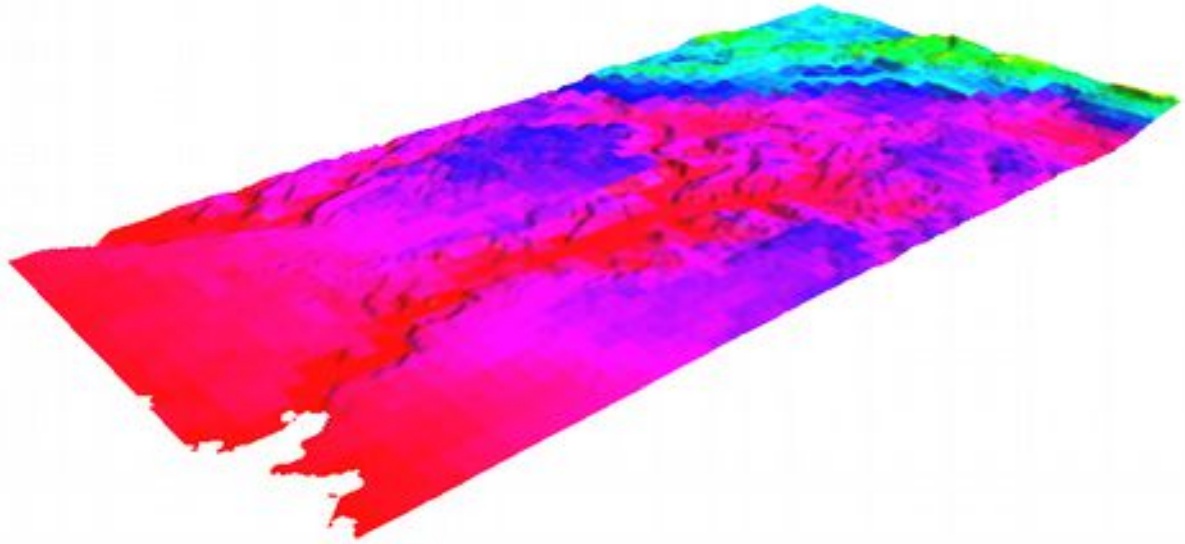
Prikaz razdiobe stanišnih tipova (NVIZ)



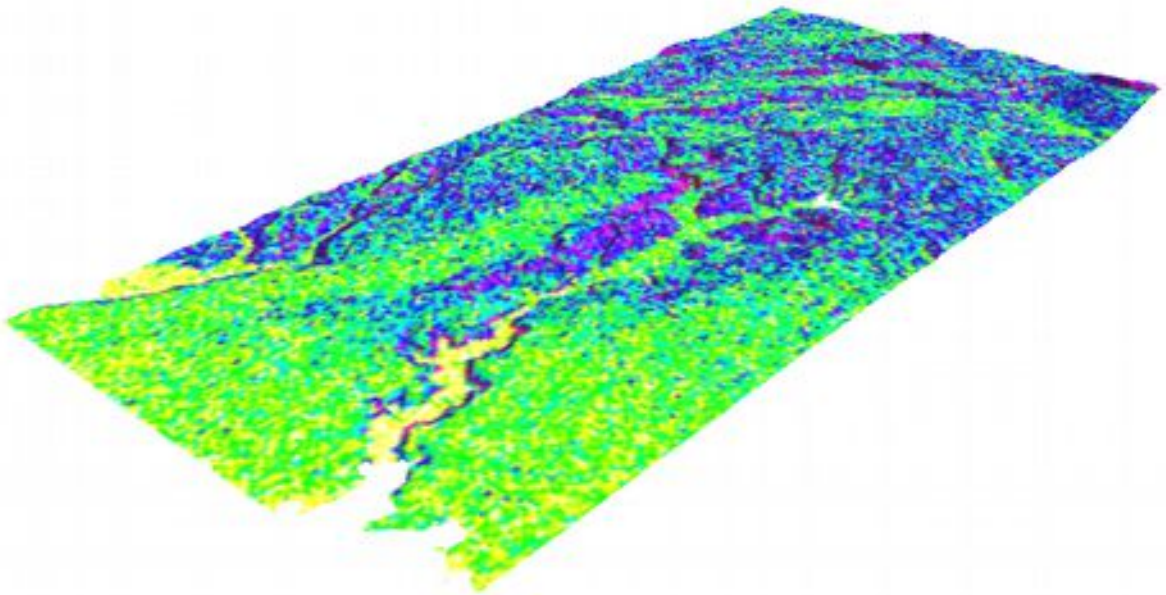
Prikaz distribucije srednjih godišnjih oborina (NVIZ)



Prikaz distribucije srednjih godišnjih temperatura (NVIZ)

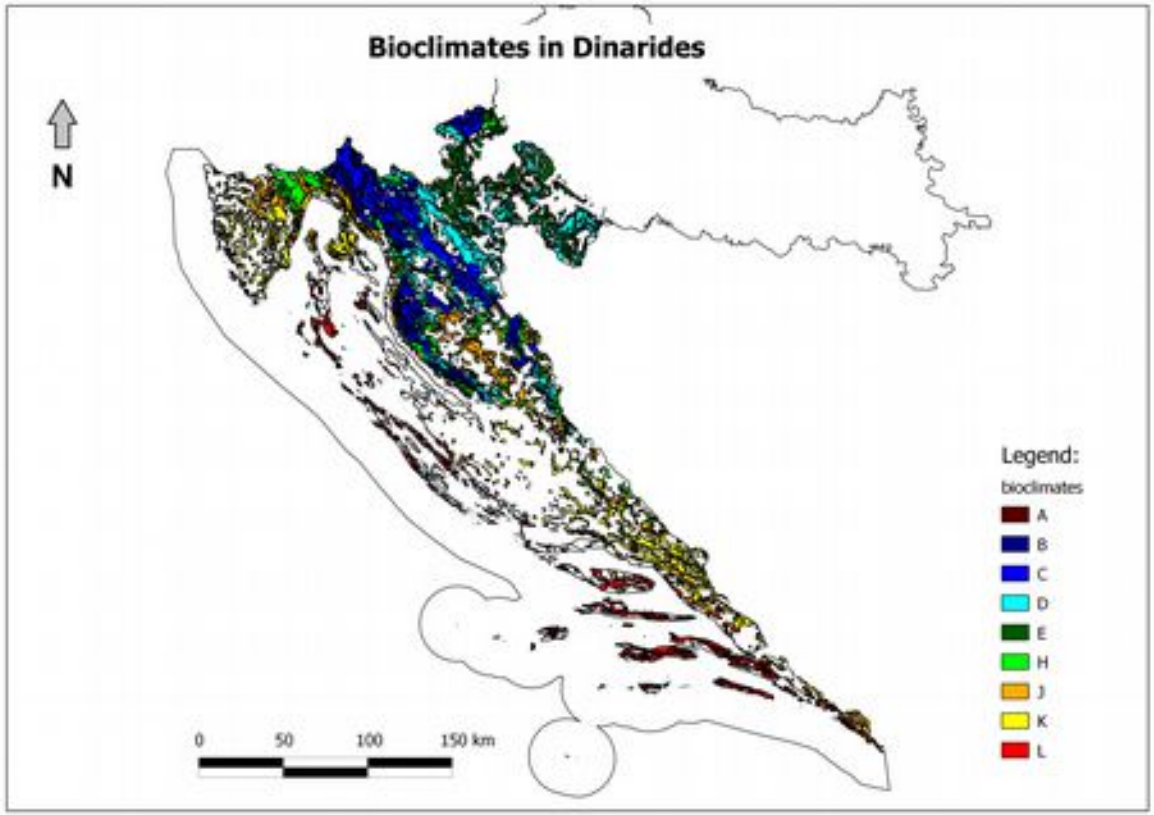


Prikaz distribucije nagiba terena (NVIZ)

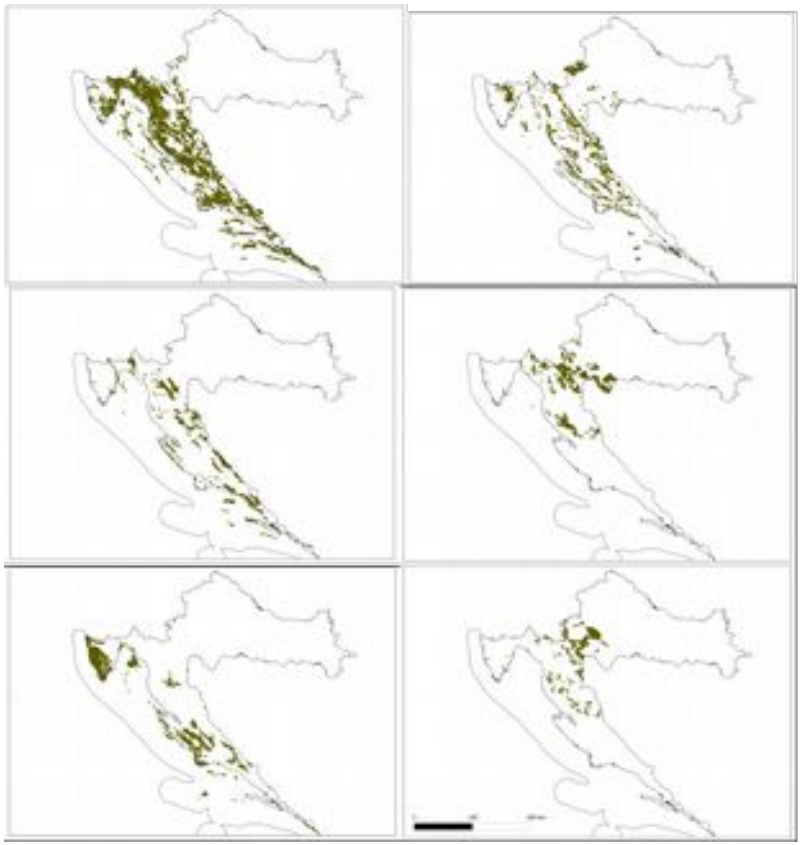


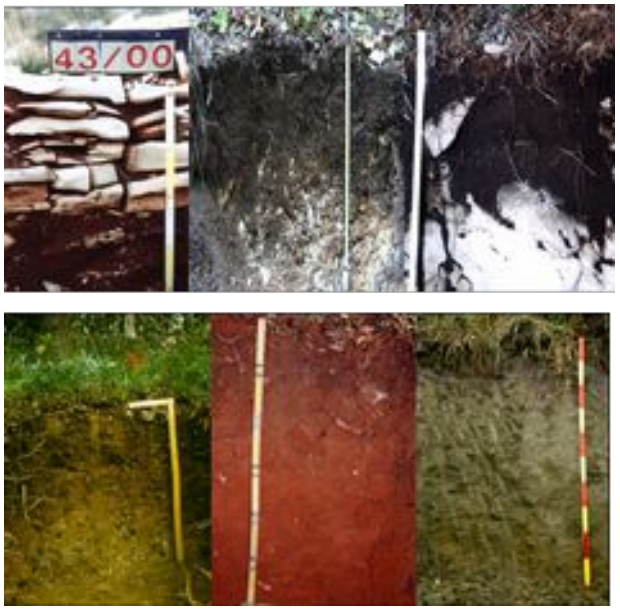
Dinaridi - Analiza varijabilnosti klime, tala i ekosustava

Razdioba bioklimatskih područja na području Dinarida

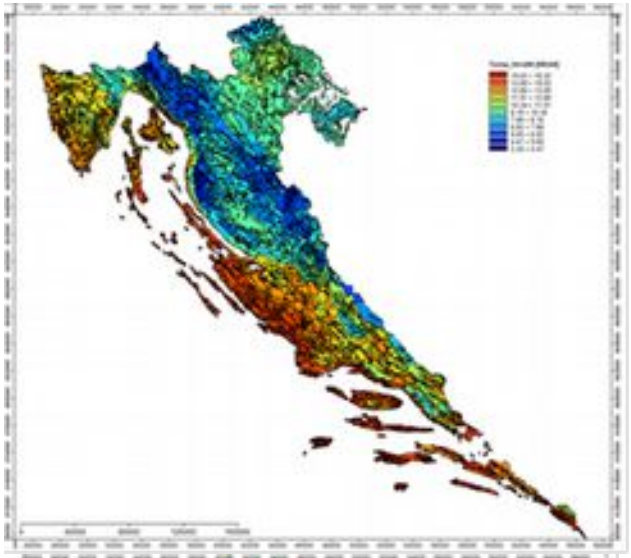


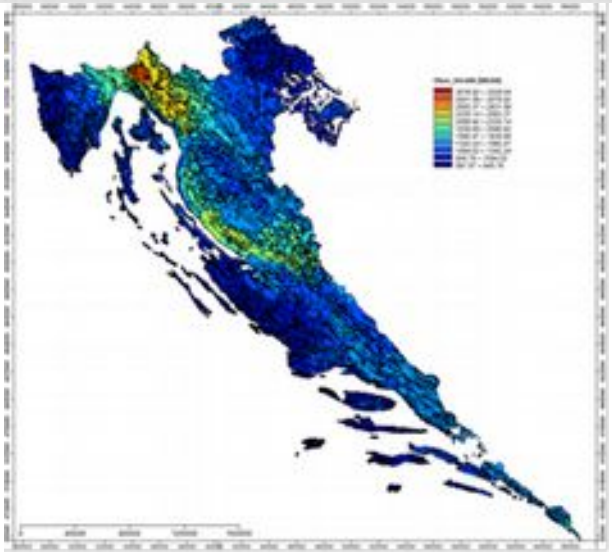
Razdioba dominantnih tipova tala na području Dinarida

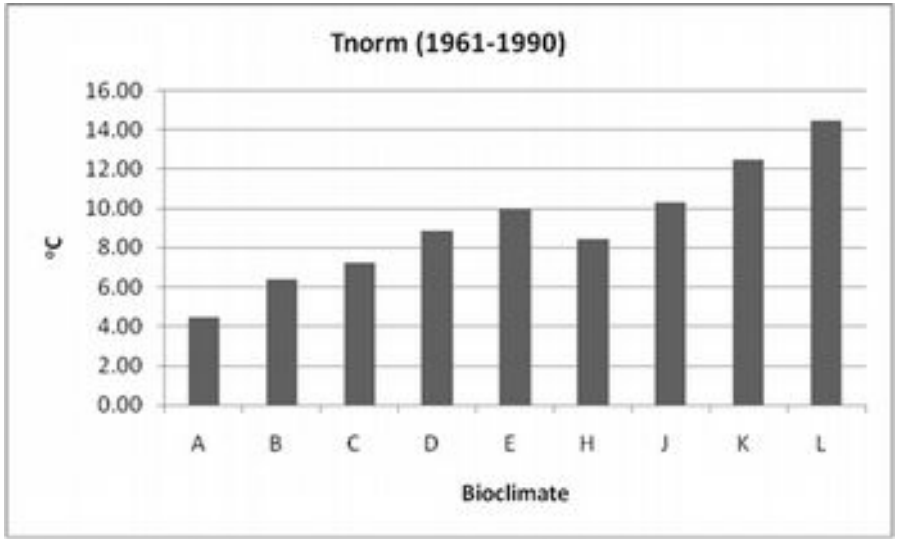


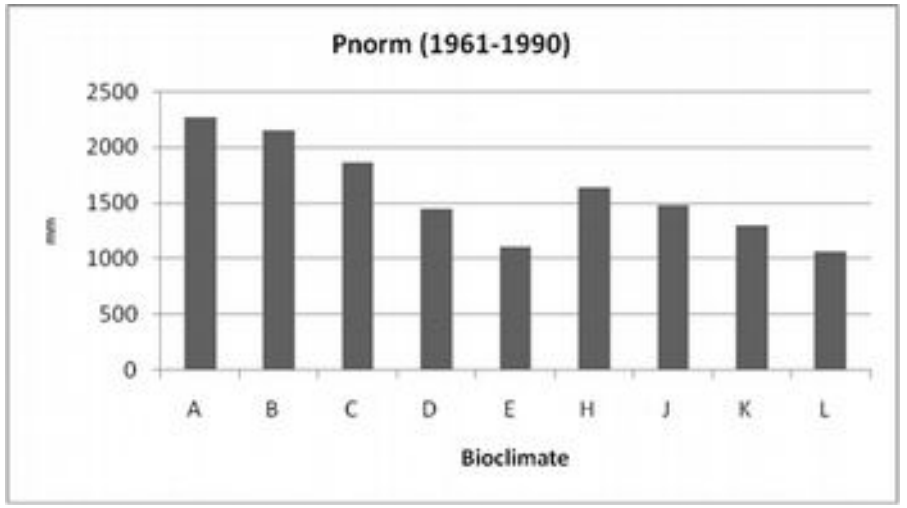


Razdioba srednjih godišnjih temperatura i ukupnih godišnjih oborina prema bioklimatima









U tisku – Poglavlje u knjizi „Održivi razvoj planinskih područja Jugo-istočne Europe” u izdanju Springer te Bugarske akademije znanosti

Climate variability, soil and forest ecosystem di-versity of Dinaric Mountains

Ivan Pilaš1, Jasna Medak1, Boris Vrbek1, I. Medved2, Ksenija Cindrić3, Marijana Gajić Čapka3, Melita Perčec Tadić3, Mirta Patarčić3, Čedo Branković3, Ivan Güttler3

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Abstract: The Dinaric mountains in Croatia presents one of the hot-spots of European biodiversity possessing very large number of species, hosting most en-demics. Dinaric mountains in Croatia strongly affect climate of the Adriatic region making a distinct boundary between the maritime and a continental climate. In this work, an overview of climatic conditions of Dinaric area was provided including observed climatic changes of temperatures and precipitation in the last century. Existing soil types were assessed and described, in particular with respect to soil forming processes. Role of climate as a dominant factor of soil formation was evaluated in relation to the other factors such as lithology and topography. Also, occurrence of specific broad range of forest associations in Dinarides was presented. We examined correspondence between forest vegetation, soil and climatic properties in Dinaric area. As a final, future, very possible scenarios of regional climatic development were presented as a serious hazard to sustainability of natural forest resources. We determine the variety of soil types, ranging from soils that are characteristic for Mediterranean (on limestone) such as Terra rossa with intensive red colour, calcomelanosols and calcicambisols in high carst, to soils characteristic for continental climate (on flint or silica) such as dystric cambisols and luvisols. Forest vegetation of Dinaric mountains comprises of 54 diverse forest ecosystem types, encompassing specific combinations of soil and phytocoenoses. Existing ecosystems forms nine broader groups i.e. bioclimates that are typical for Dinarides.

Keywords: Dinaric Mountains, soil types, forest types, bioclimates, observed and predicted climate change

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