

Daljinska istraživanja i GIS

Korišćenje satelitskih snimaka u promatranju života na Zemlji

DALJINSKA ISTRAŽIVANJA (engl. REMOTE SENSING) su vještina i znanje dobivanja informacija o nekom objektu, području (okolišu) ili pojavi kroz analizu podataka prikupljenih uređajem koji nije u kontaktu s objektom, područjem ili pojavom istraživanja.

GEOGRAFSKI INFORMACIJSKI SUSTAV (GIS, engl. GEOGRAPHIC INFORMATION SYSTEM) je klasa informacijskih sustava (info-tehnologije) za podršku unosu, obradi, analizi i prikazu prostornih informacija.

Prednosti ovih usko povezanih tehnologija

- vizualizacija podataka
- povezivanje geografskih i atributnih obilježja
- mogućnost interdisciplinarnog odlučivanja

Vizualizacija podataka je mogućnost da se velika količina atributnih podataka pohranjenih u računalu prikaže u jednostavnom, slikovitom i čovjeku bliskom obliku.

Geoinformacije ili georeferencirane (geoprostorne) informacije su informacije koje su neraskidivo vezane uz lokaciju na Zemljinoj površini, te iznad ili ispod nje. Riječ je o kompleksnim informacijama, jer je prostorna komponenta kompleksan atribut s posebnim osobinama. Geoinformacije su rijetko statične, pa treba uzeti u obzir i vremensku komponentu.

Kako razlikujemo običnu od geoprostorne informacije?

OBIČNA

što?

koliko?

PRIMJER: broj bušotina kod mjesta Otok

GEOPROSTORNA

gdje?

(x_1, y_1)

(x_2, y_2)

VINKOVCI ?
PRELOG ?

(x_3, y_3)

(x_4, y_4)

NUMERIČKA INFORMACIJA

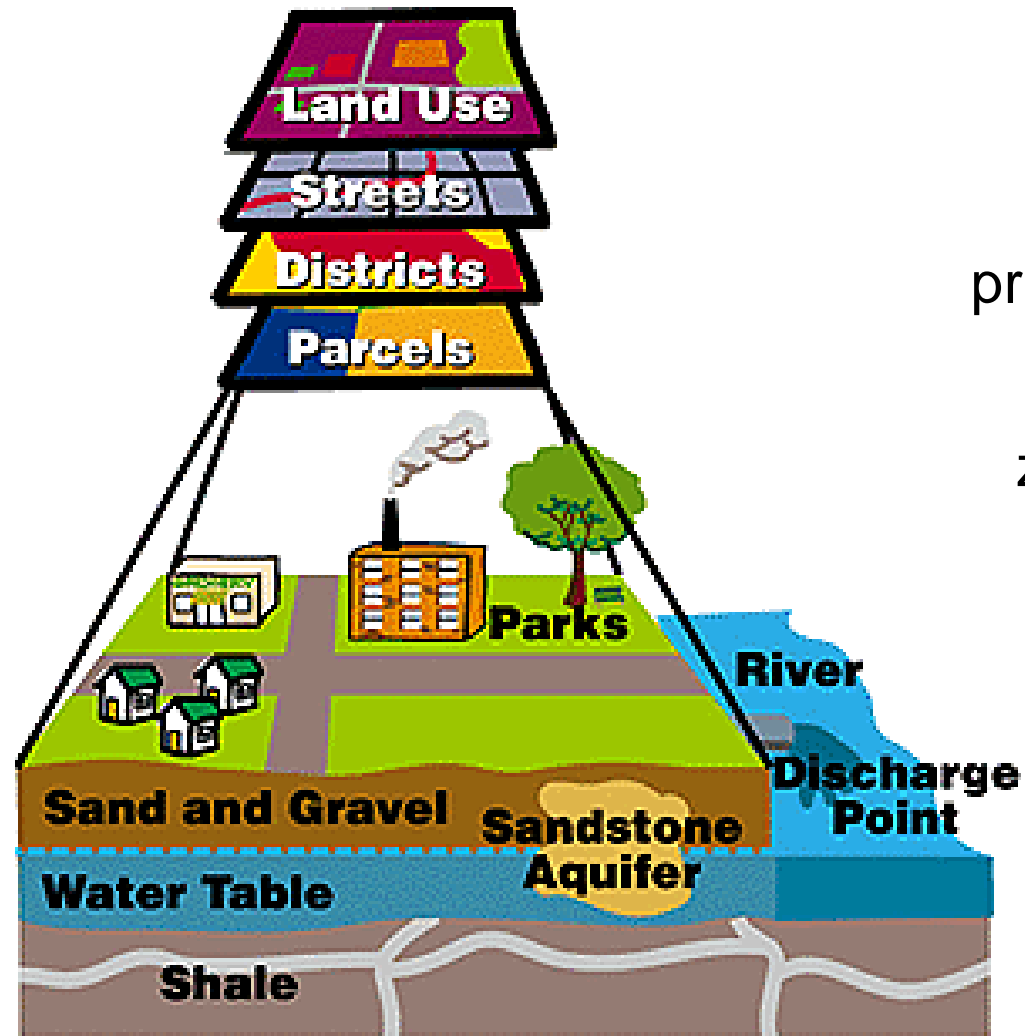
+

PROSTORNI ASPEKT

=

GEOPROSTORNA INFORMACIJA

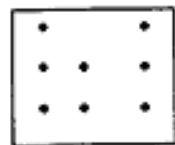
Tematsko modeliranje



preklapanje karata
(GIS slojeva)
za urbanističko
planiranje

Temeljni prostorni objekti

- Temeljni prostorni objekti u GIS-u koji služe za prikaz realnog svijeta u dvodimenzionalnom modeliranju su **točka**, **linija** i **poligon**.
- Putem temeljnih objekata i njihovom kombinacijom, prikazuju se stvarni objekti u GIS-u, a promatramo ih kao odgovarajuće tematske slojeve (točkaste, linijske i poligonalne).



Točke



Linije



Granice površina



Centroidi površina



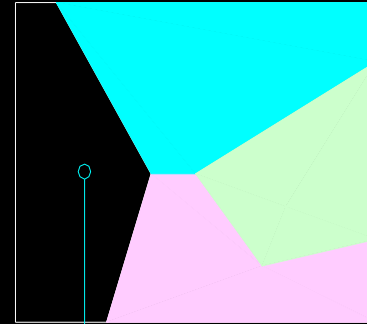
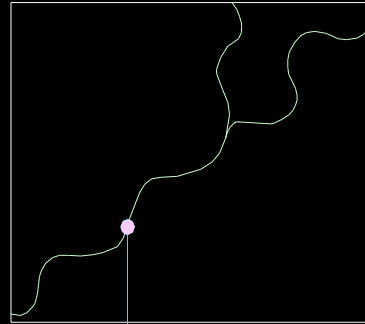
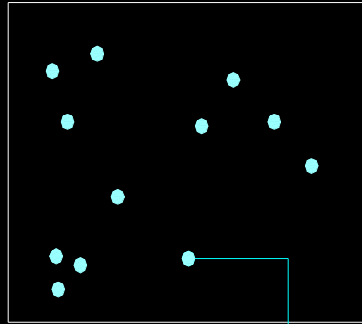
Tekst



Nedefiniran tip

Temeljni prostorni objekti

Grafički prikaz podataka



Atributne tablice

Točke

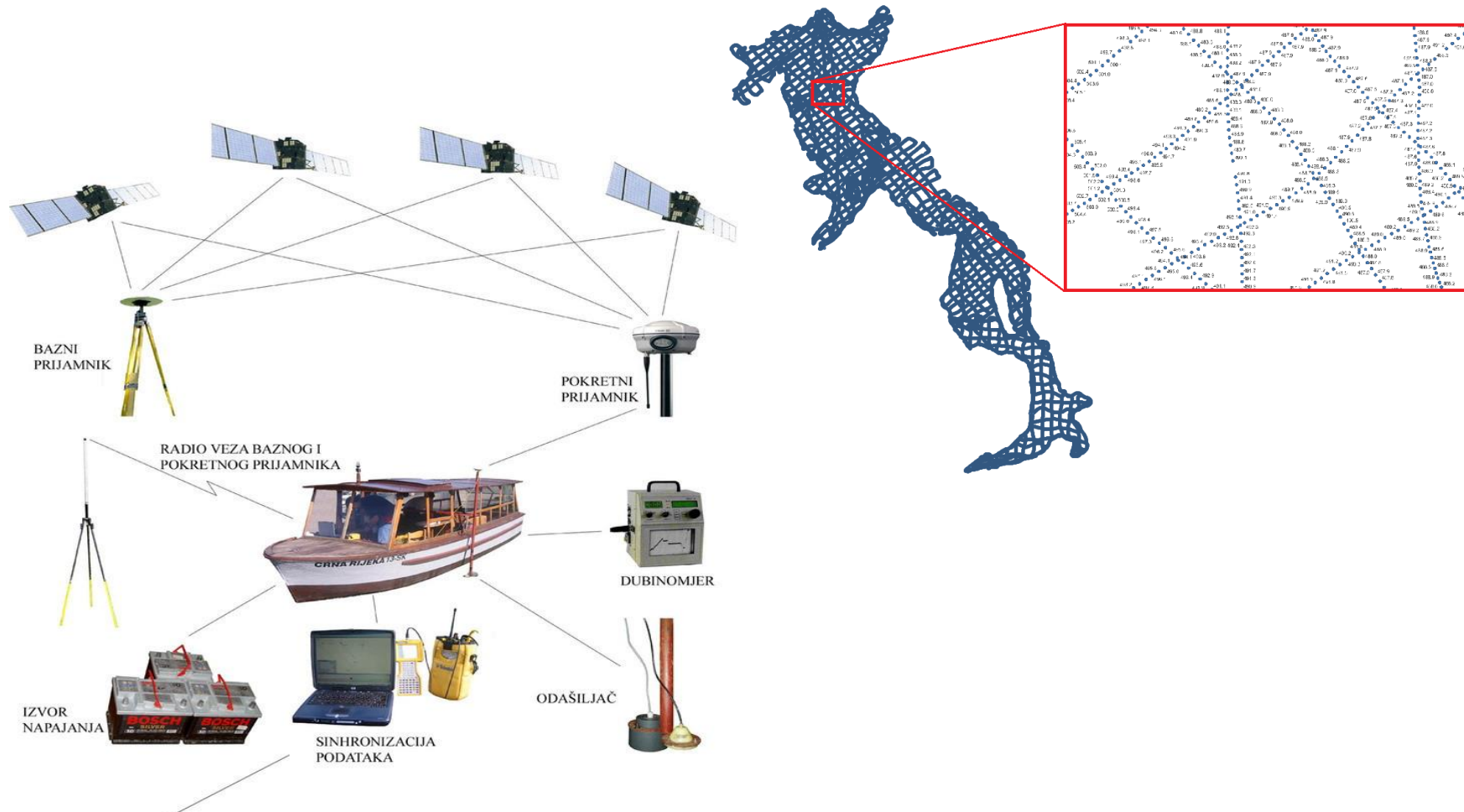
Linije

Poligoni

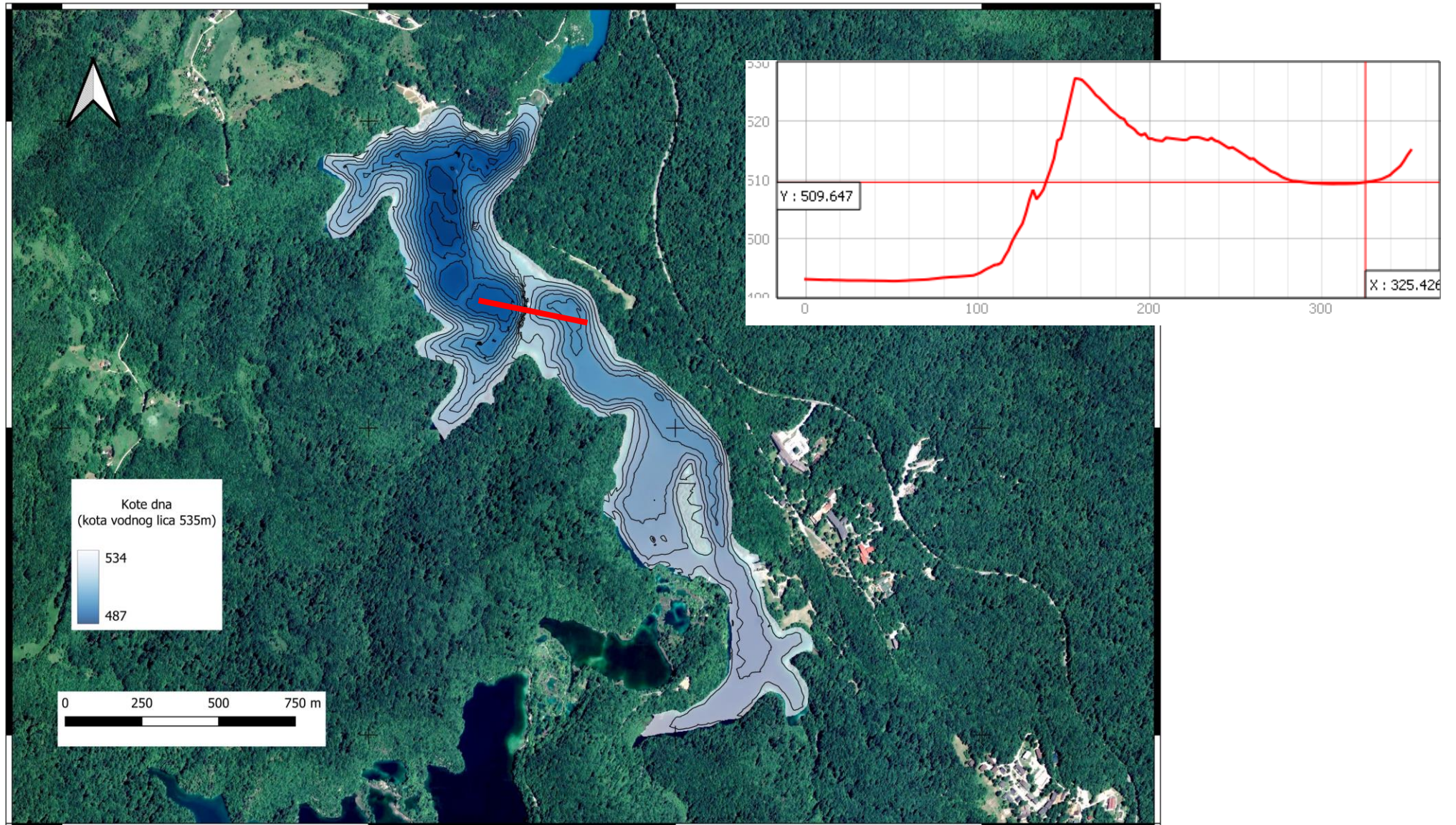
Temeljni prostorni objekti

- **Točka** može predstavljati hidrant, prometni znak, ZET postaju ali ovisno o mjerilu i sportski objekt, naselje itd.
- **Linije** mogu biti izolirane (npr. planinarske staze), stablastog oblika (npr. riječna mreža) i u obliku mreže (cestovna mreža),
- **Površine** (poligoni) mogu biti izolirane (jezera), susjedne (općine, županije) i ugniježdene površine (poligoni unutar poligona – izohipse)

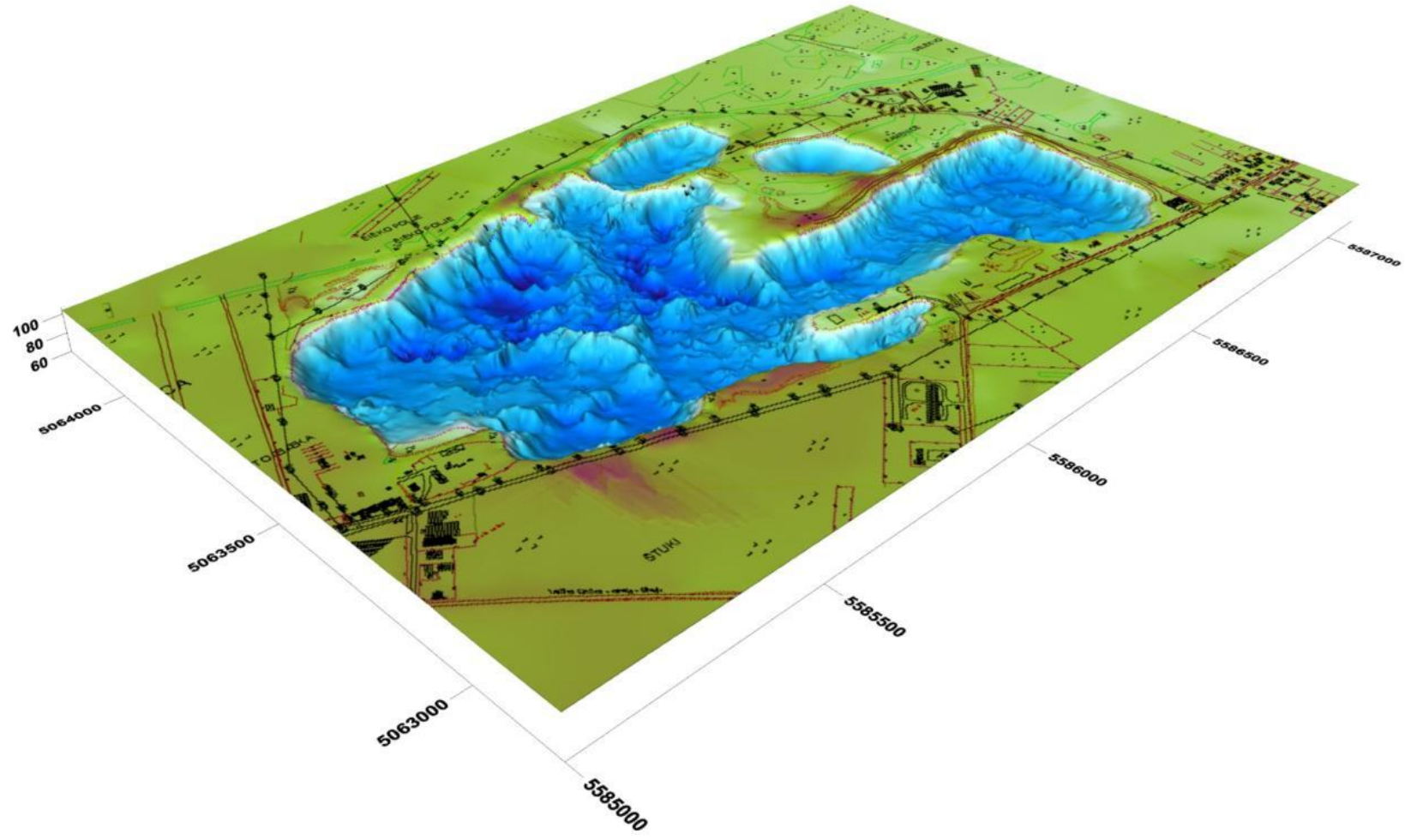
Hidrografska izmjera jezera Kozjak



Hidrografska izmjera jezera Kozjak



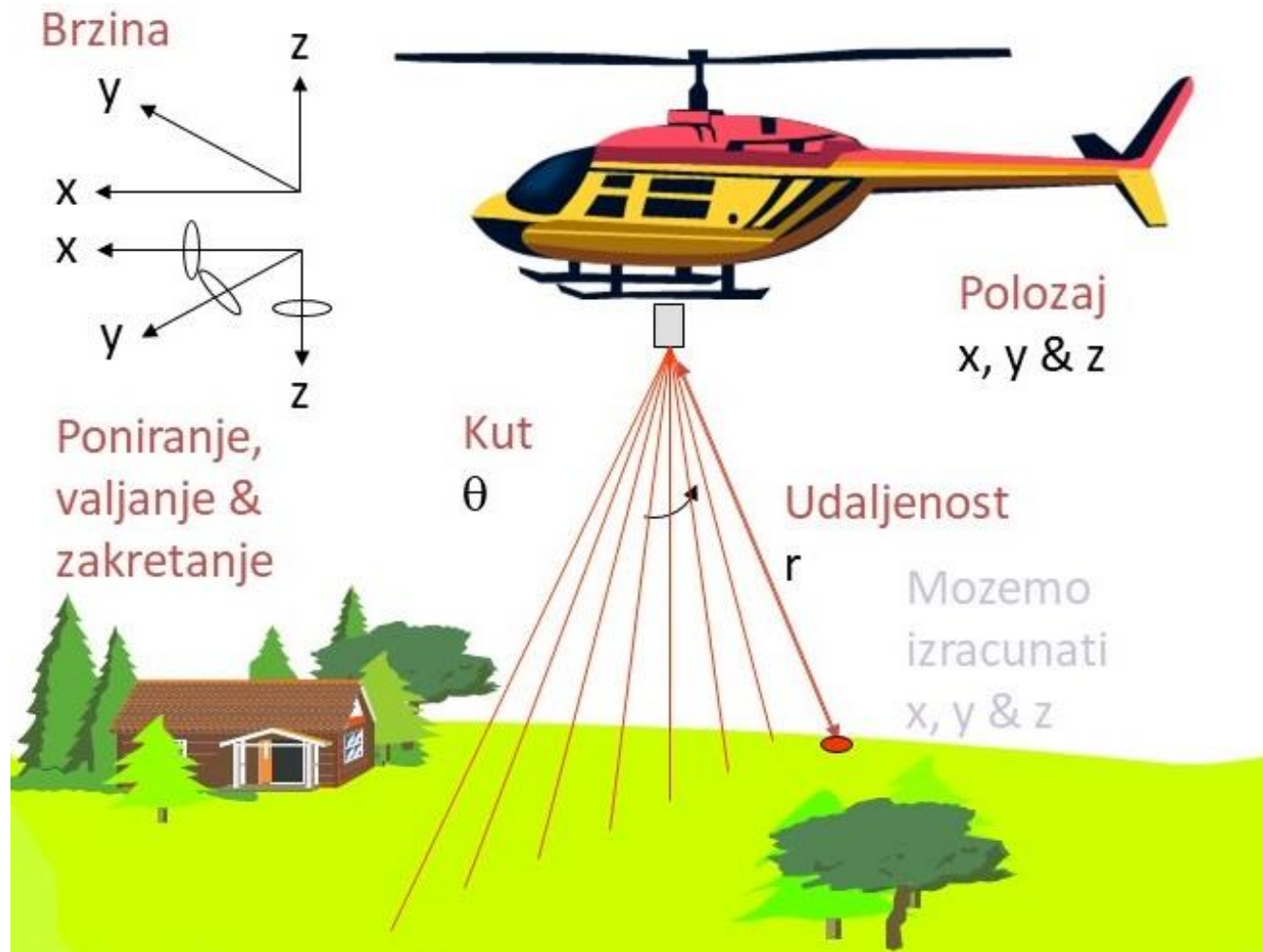
3D prikaz šljunčare Čiče

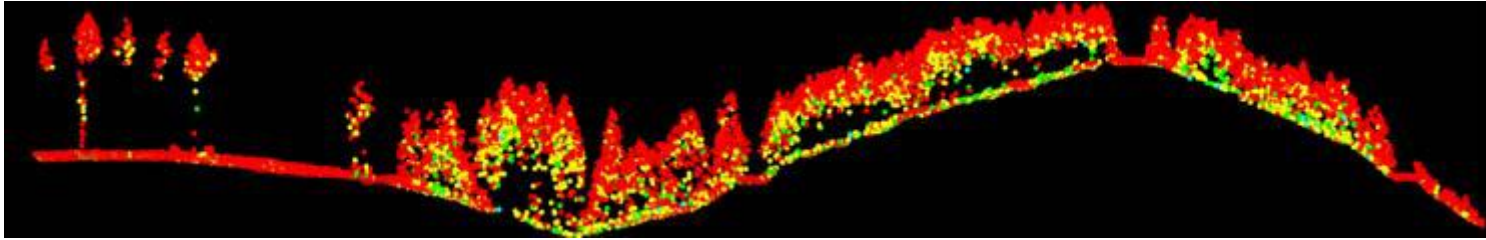


3D lasersko skeniranje

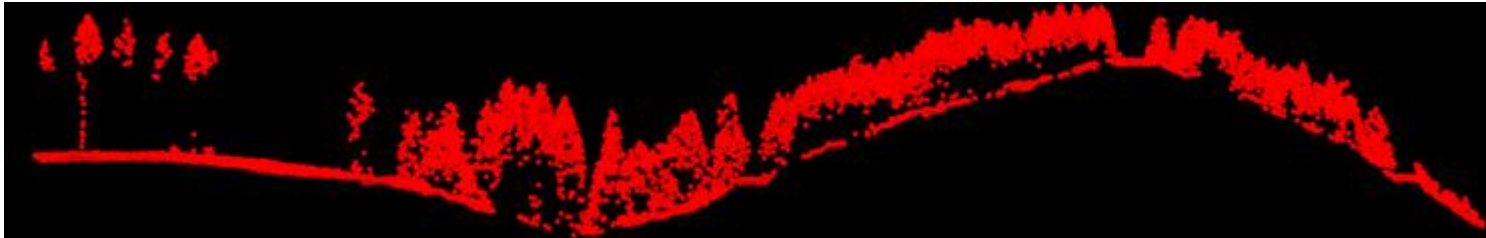


Lidar

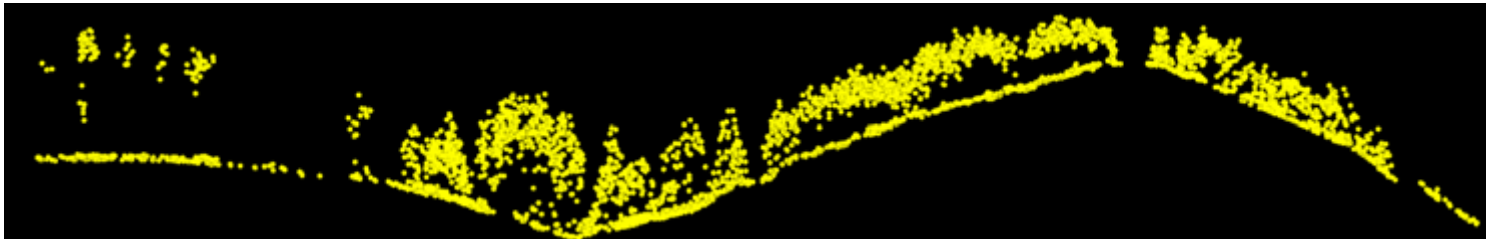




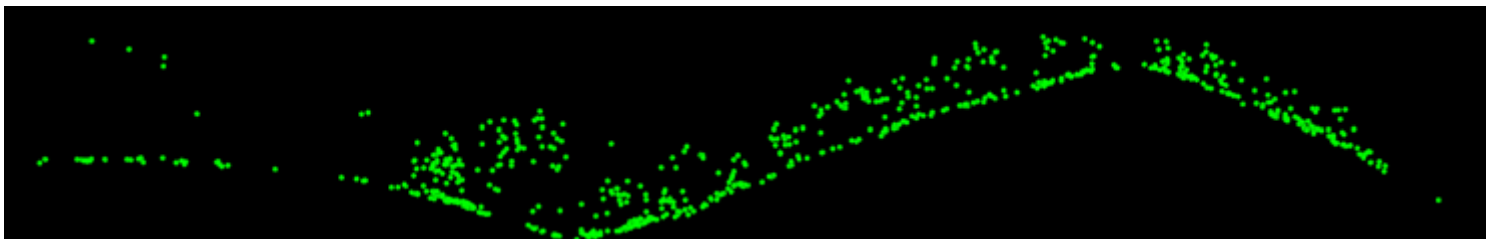
Povrat svih
kanala



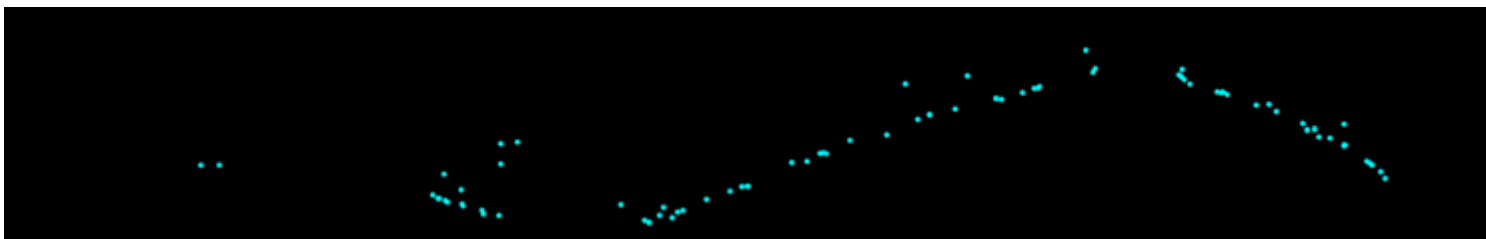
Povrat
1. kanala



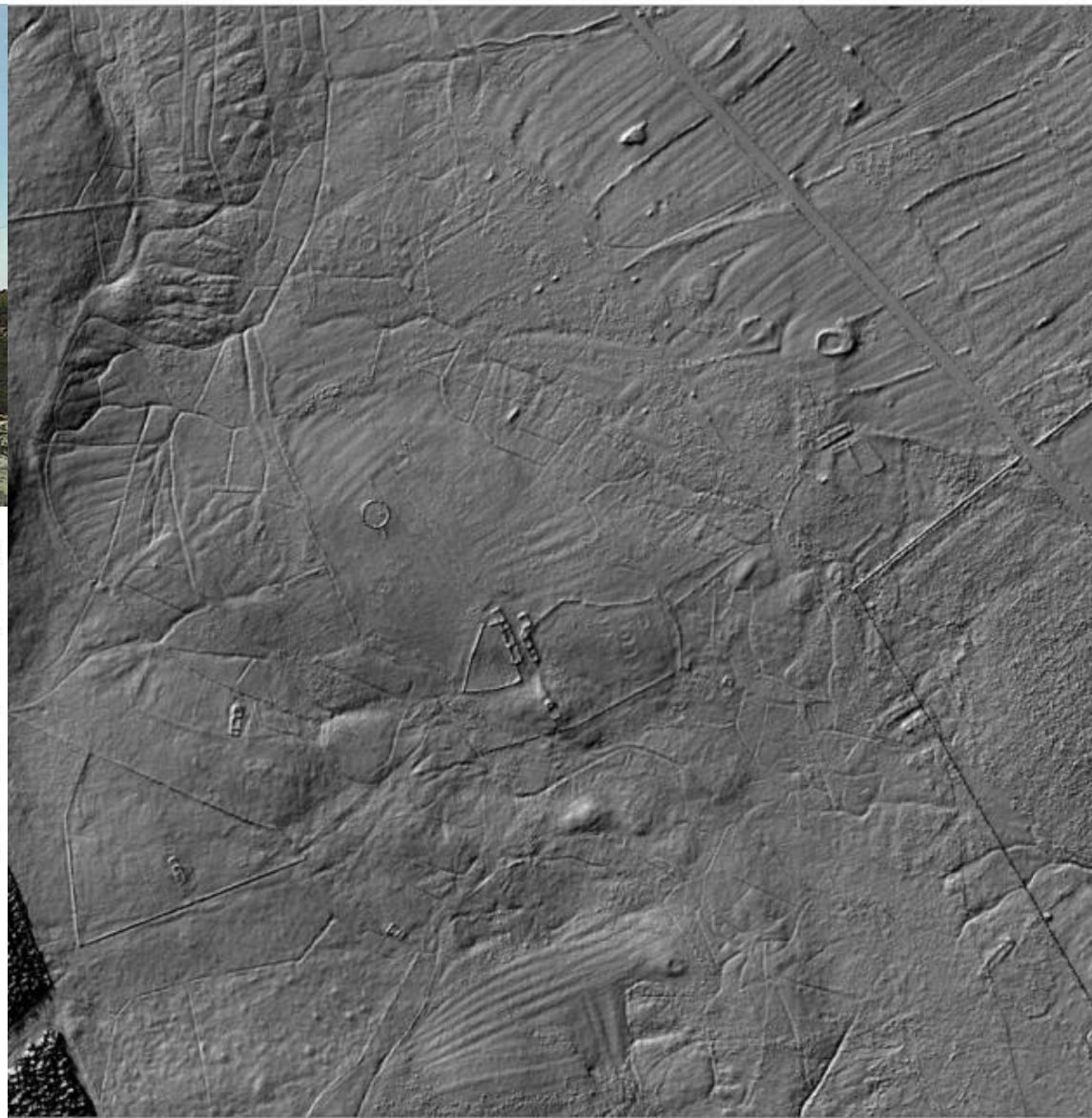
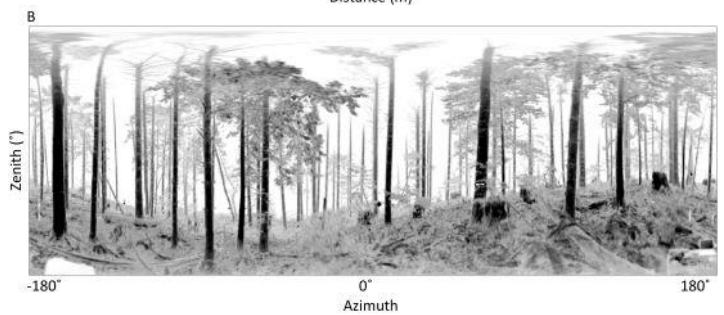
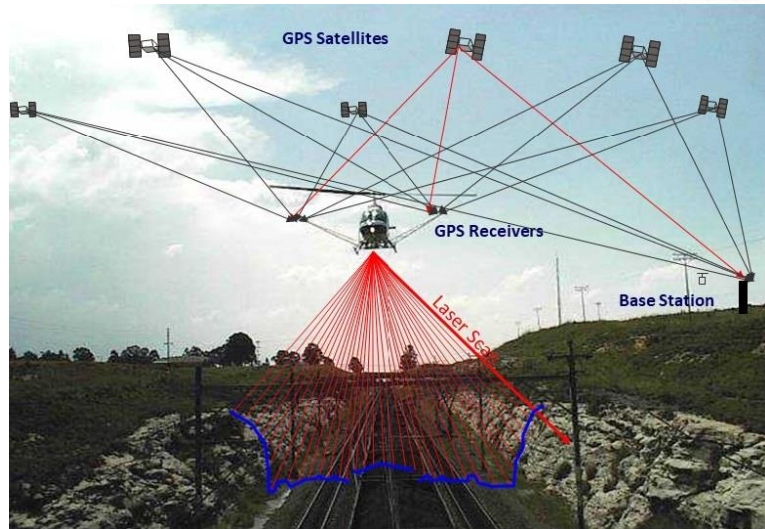
Povrat
2. kanala



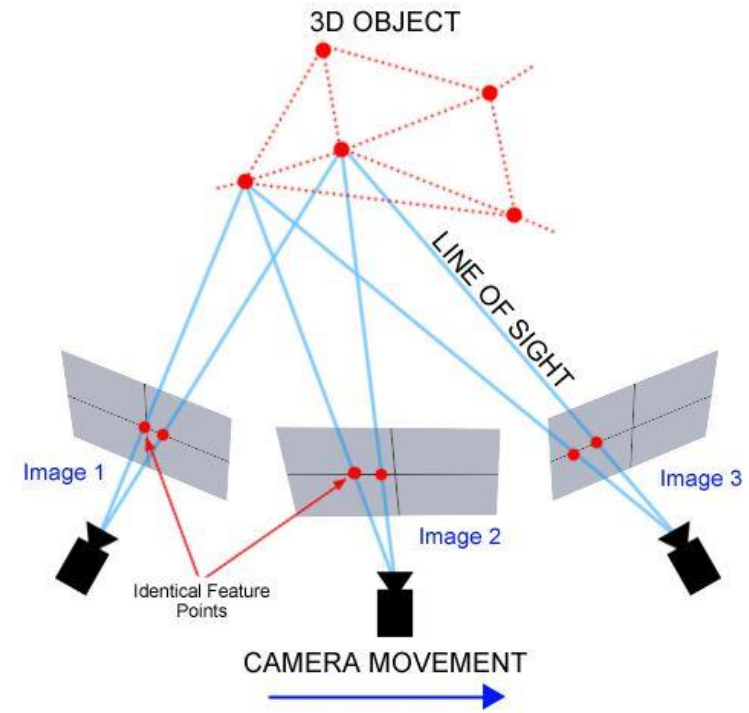
Povrat
3. kanala



Povrat
4. kanala



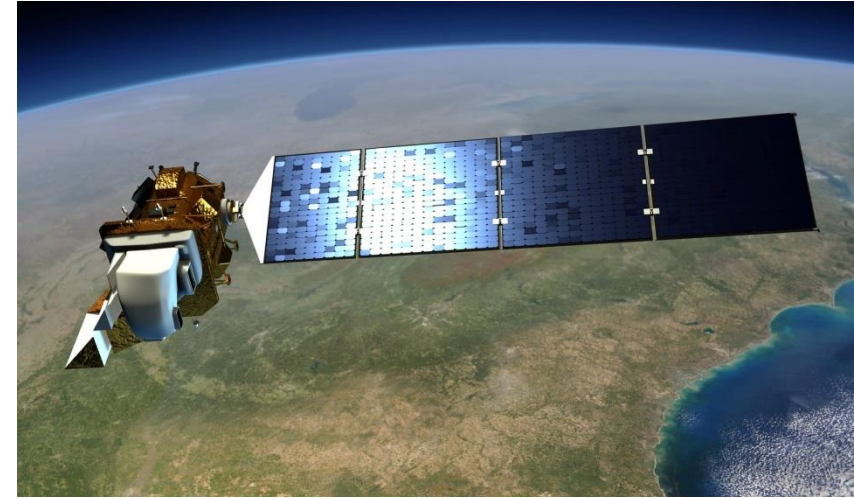
Fotogrametrija



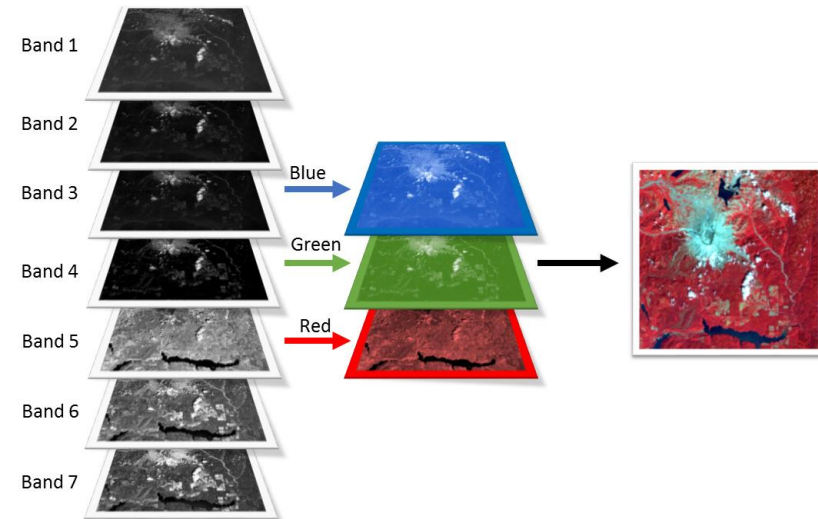
Landsat 8

Prostorna rezolucija
 30m kanali 1 do 7 i 9
 15m pankromatska
 100m termalni kanali

Vremenska rezolucija
 16 dana

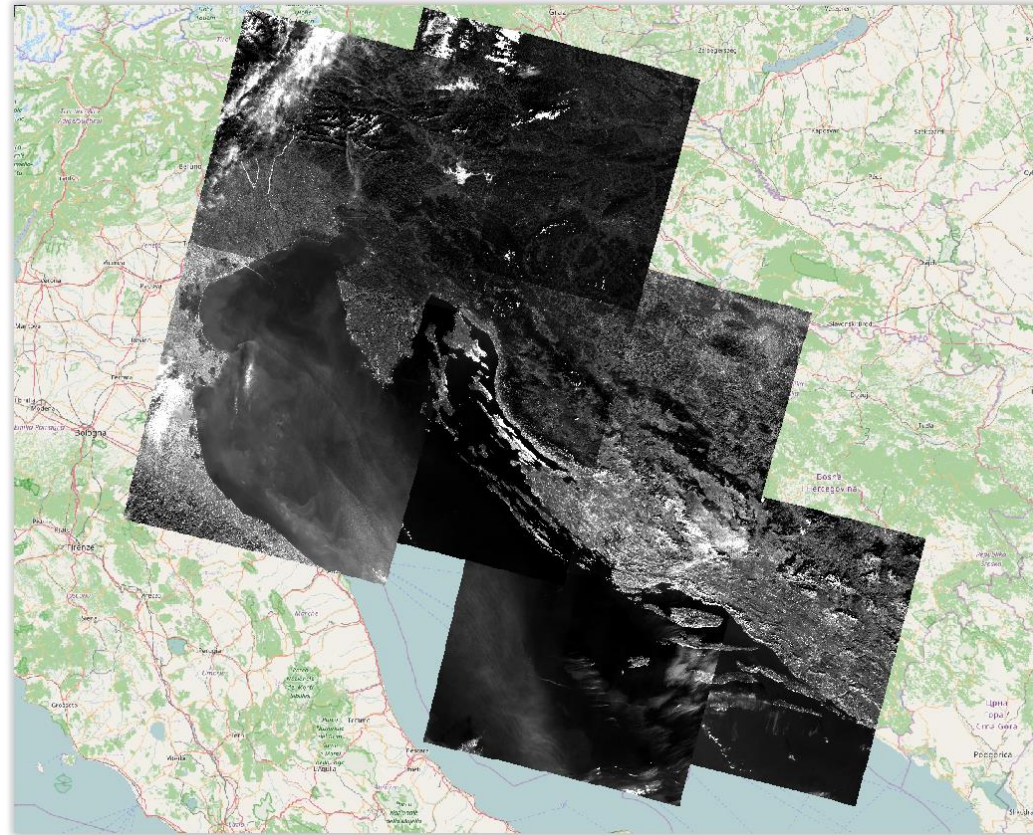


Senzor	Kanal [broj]	Valna duljina [μm]	Prostorna rezolucija [m]	Opis
OLI	1	0,43 – 0,45	30	Vidljivi
	2	0,45 – 0,51	30	Plavi
	3	0,53 – 0,59	30	Zeleni
	4	0,64 – 0,67	30	Crveni
	5	0,85 – 0,88	30	NIR
	6	1,57 – 1,65	30	SWIR
	7	2,11 – 2,29	30	SWIR
	8	0,50 – 0,68	15	Pankromatski
	9	1,36 – 1,38	30	Cirrus
TIRS	10	10,60 – 11,19	100	LWIR
	11	11,50 – 12,51	100	LWIR

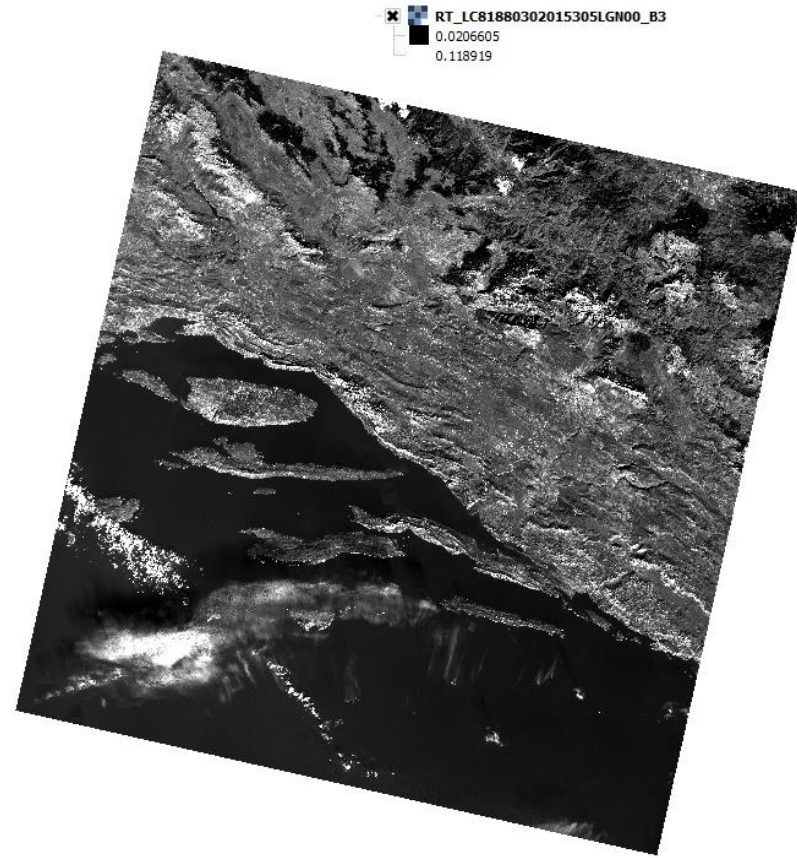
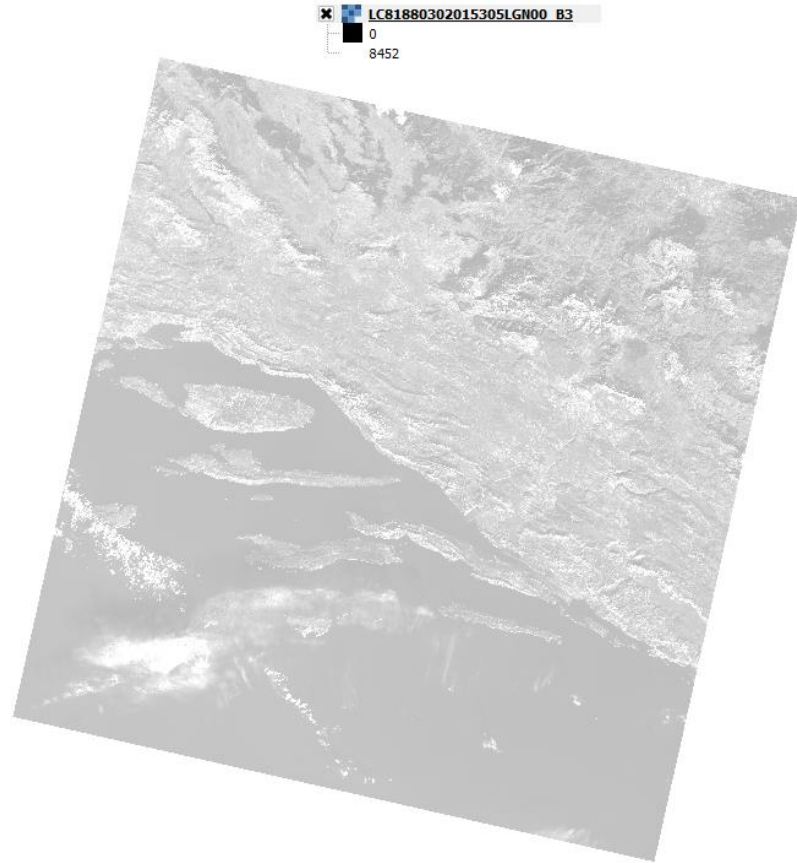


Landsat 8 područje Jadrana

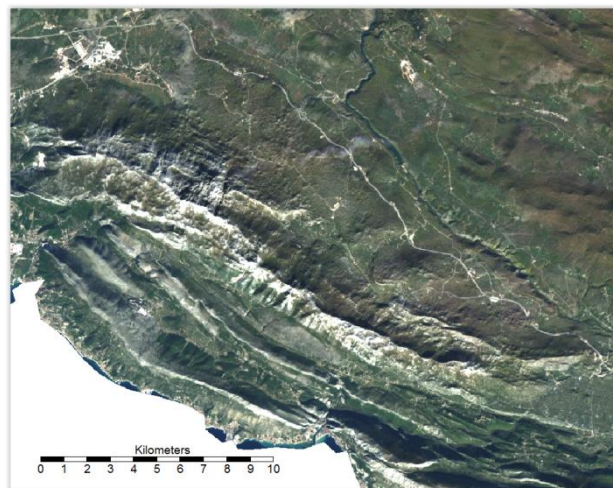
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LC81890292015312LGN00
LC81910282015310LGN00
LC81910292015310LGN00
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LC81900292015255LGN00
LC81900282016242LGN00



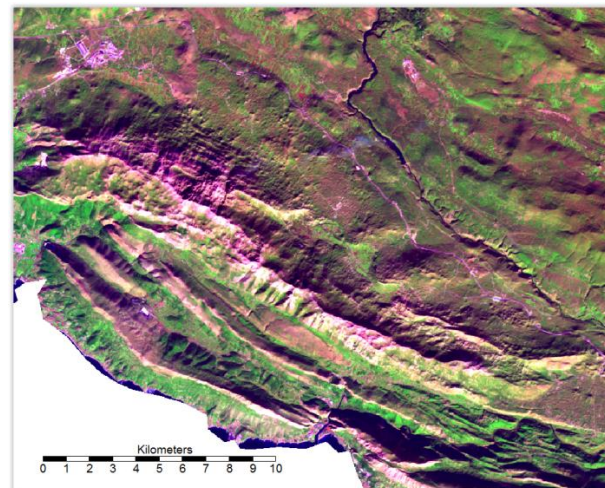
Atmosferska korekcija



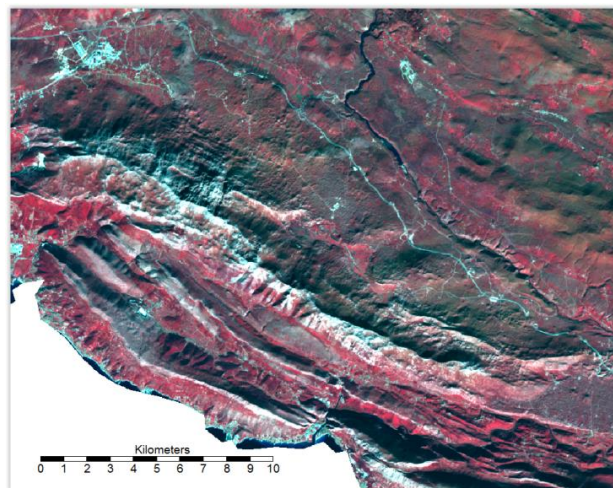
Visualizacija višekanalnih snimaka



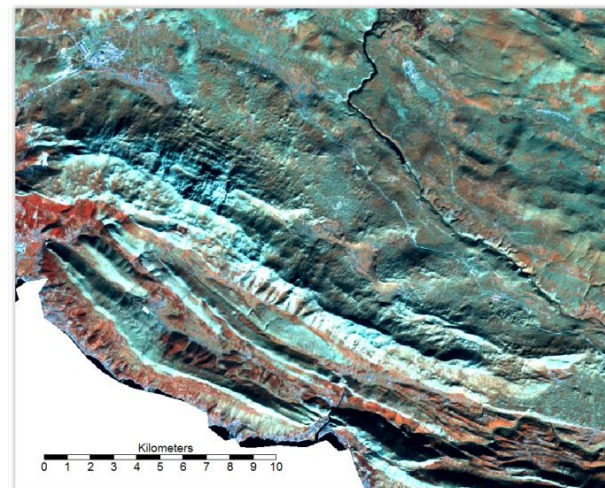
4-3-2



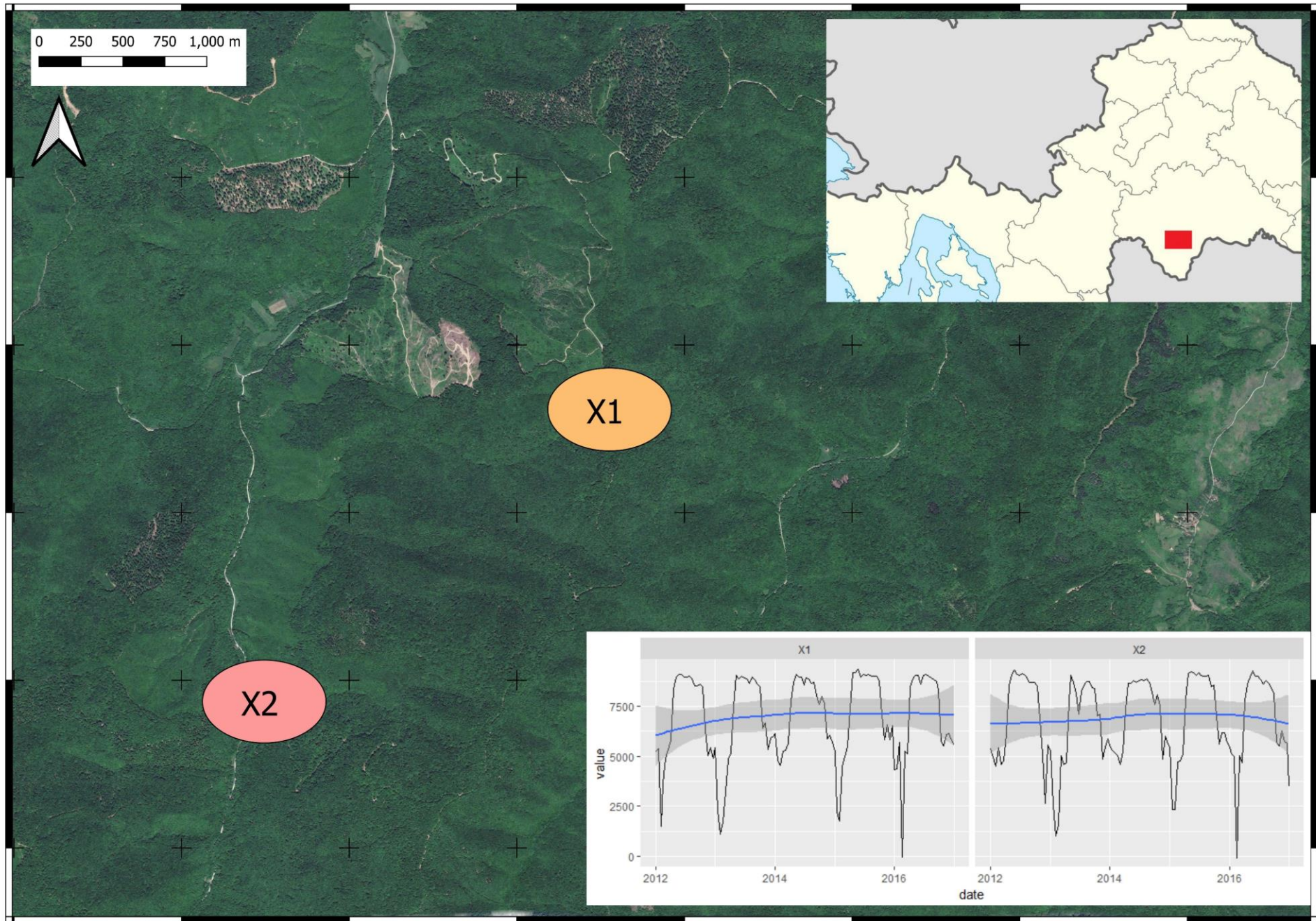
7-5-2



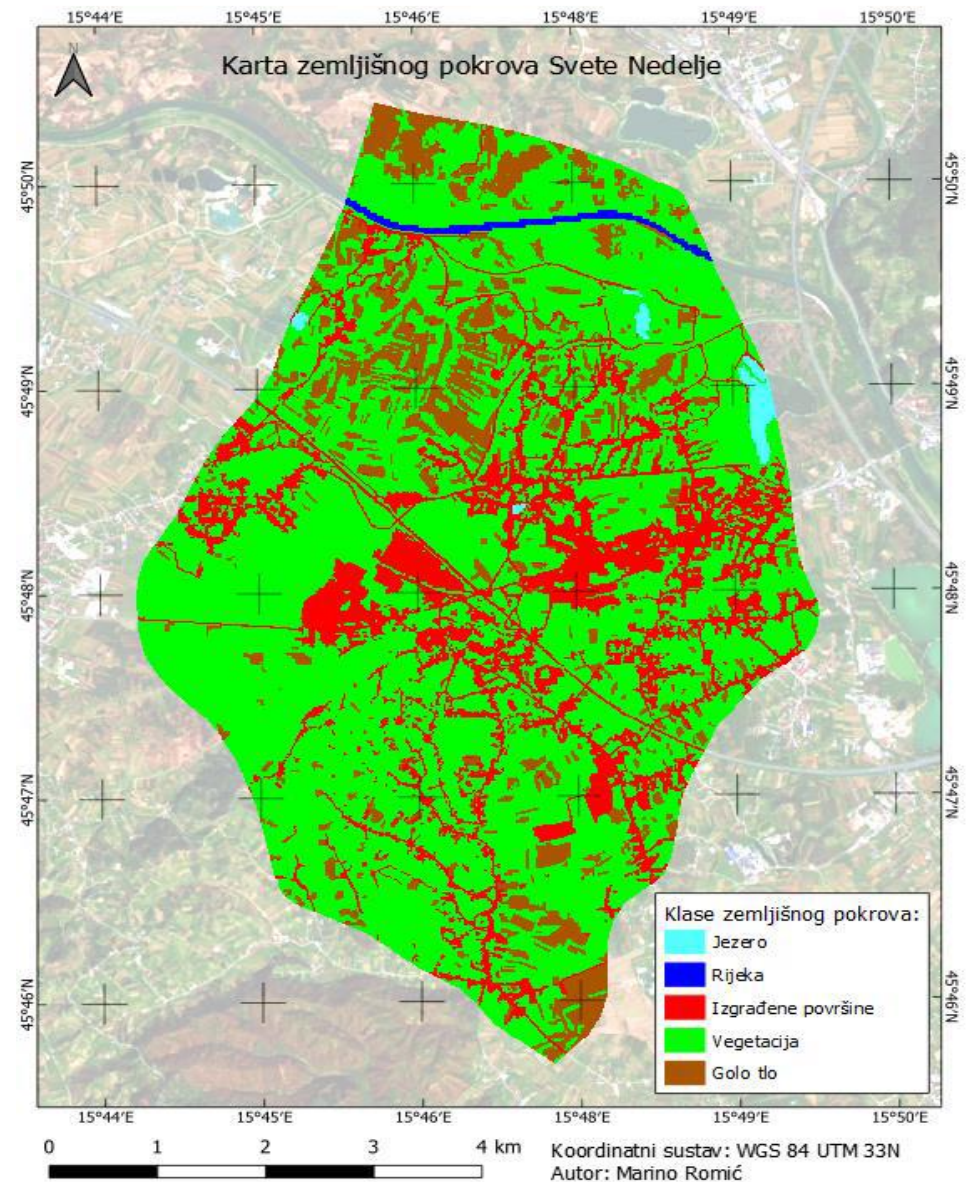
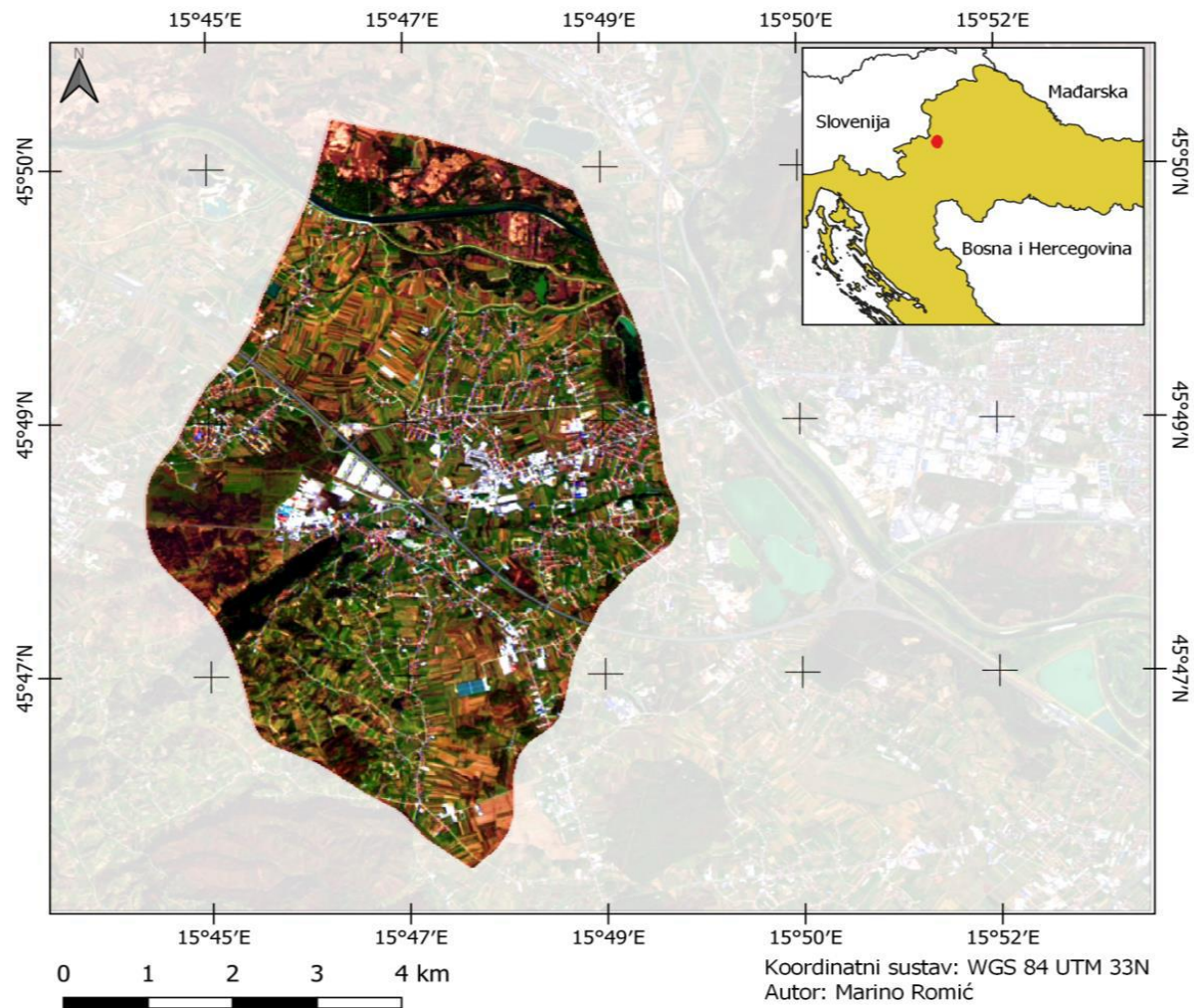
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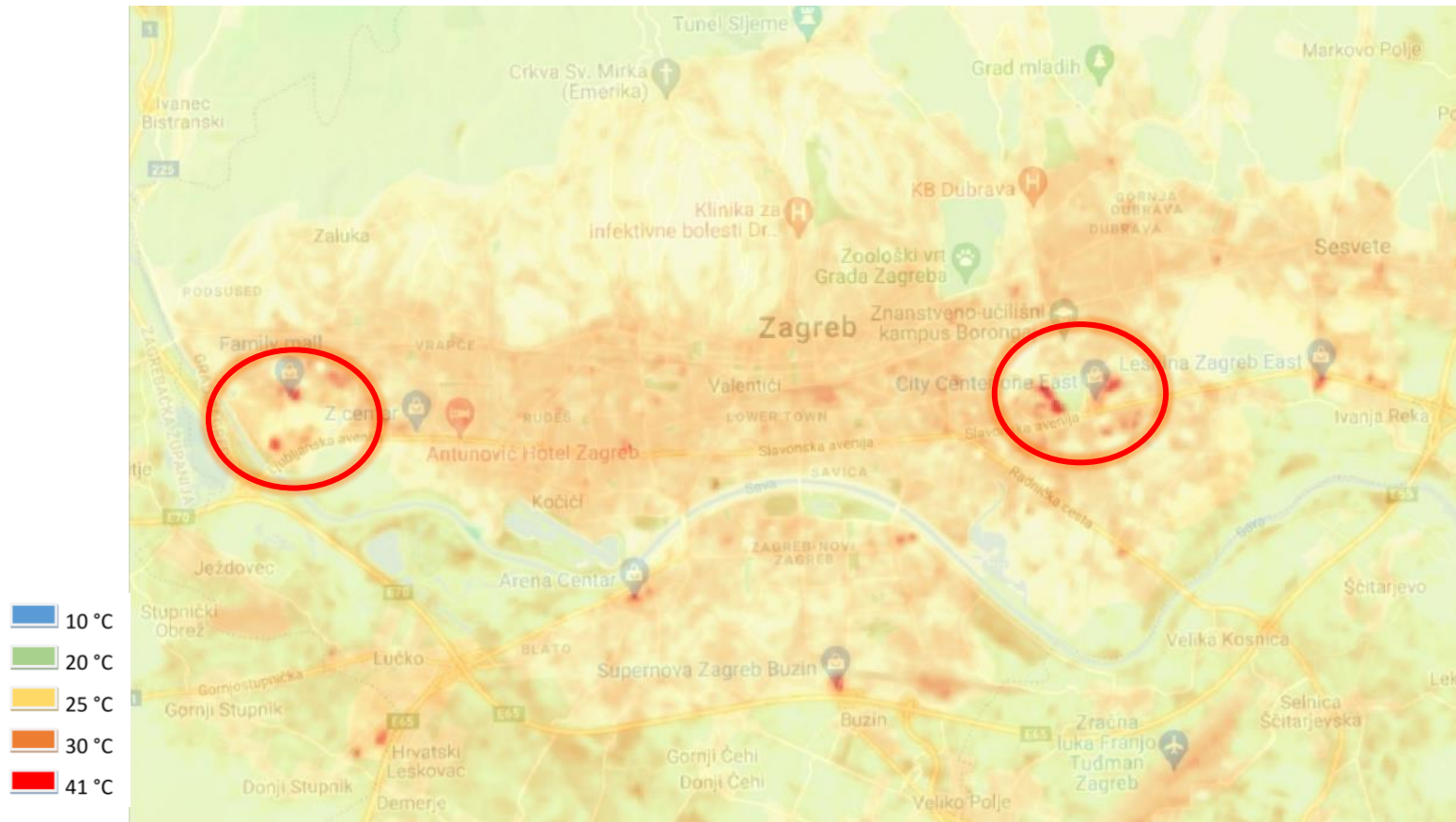
5-6-7



Klasifikacija zemljišnog pokrova



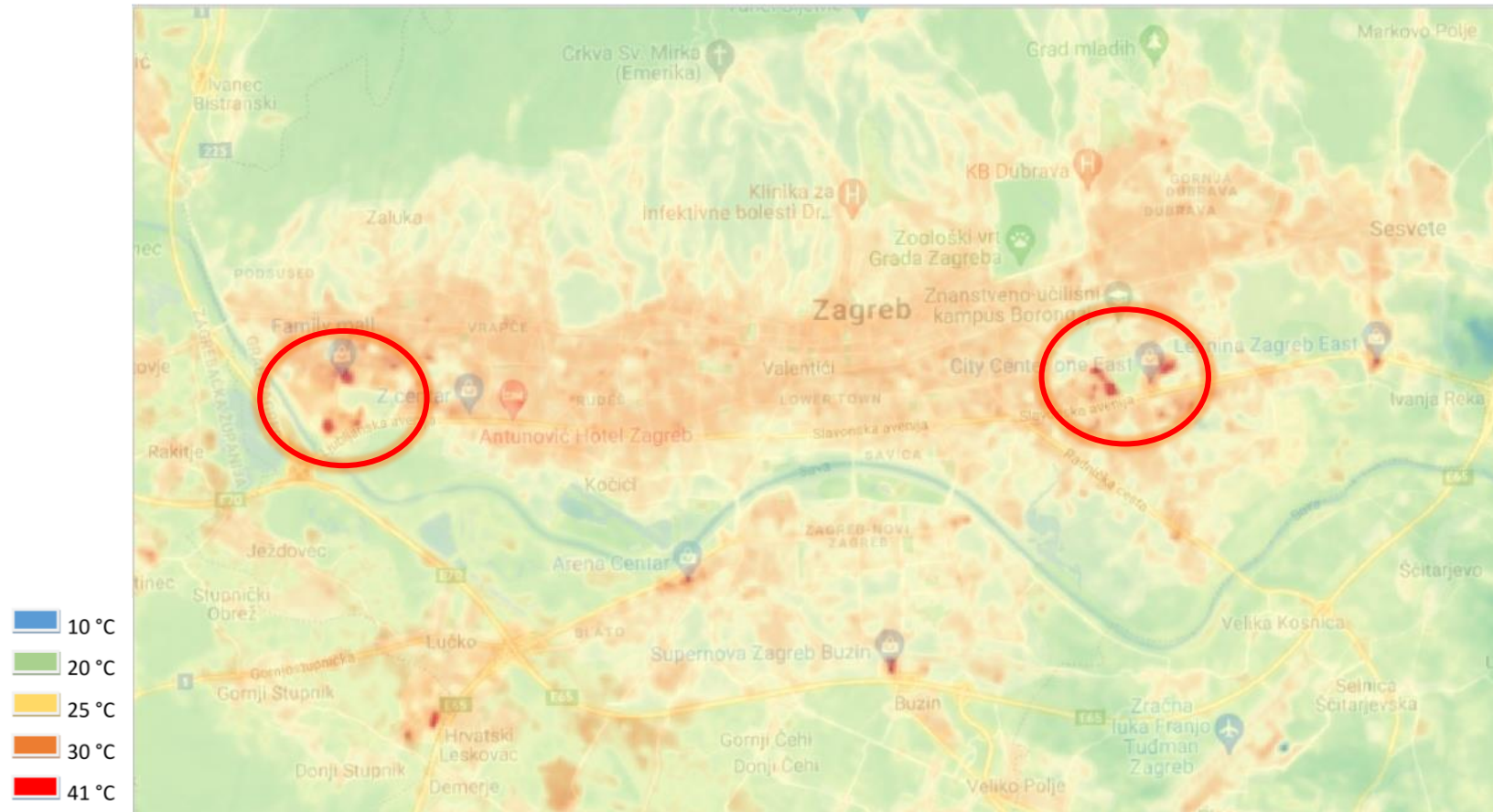
Površinska temperatura 11.8.2015.



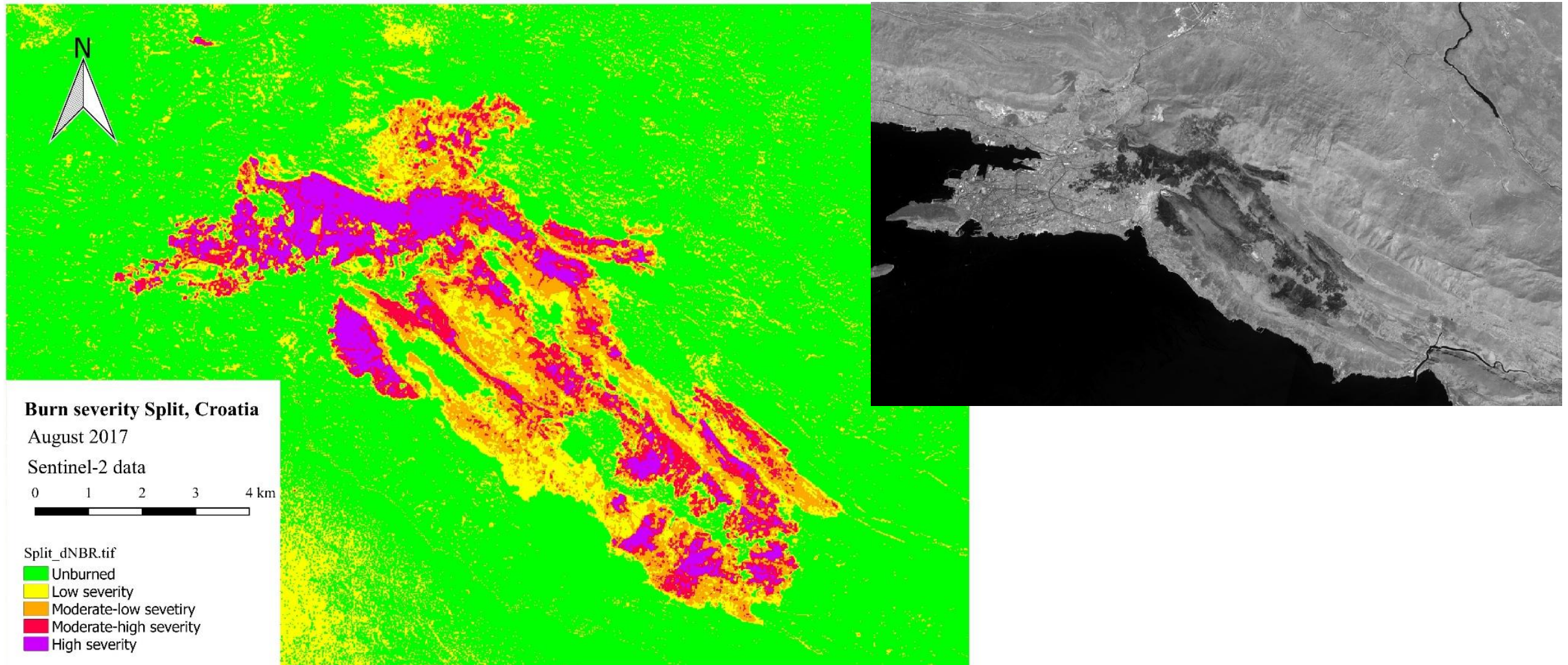
Površinska temperatura 19.8.2018.



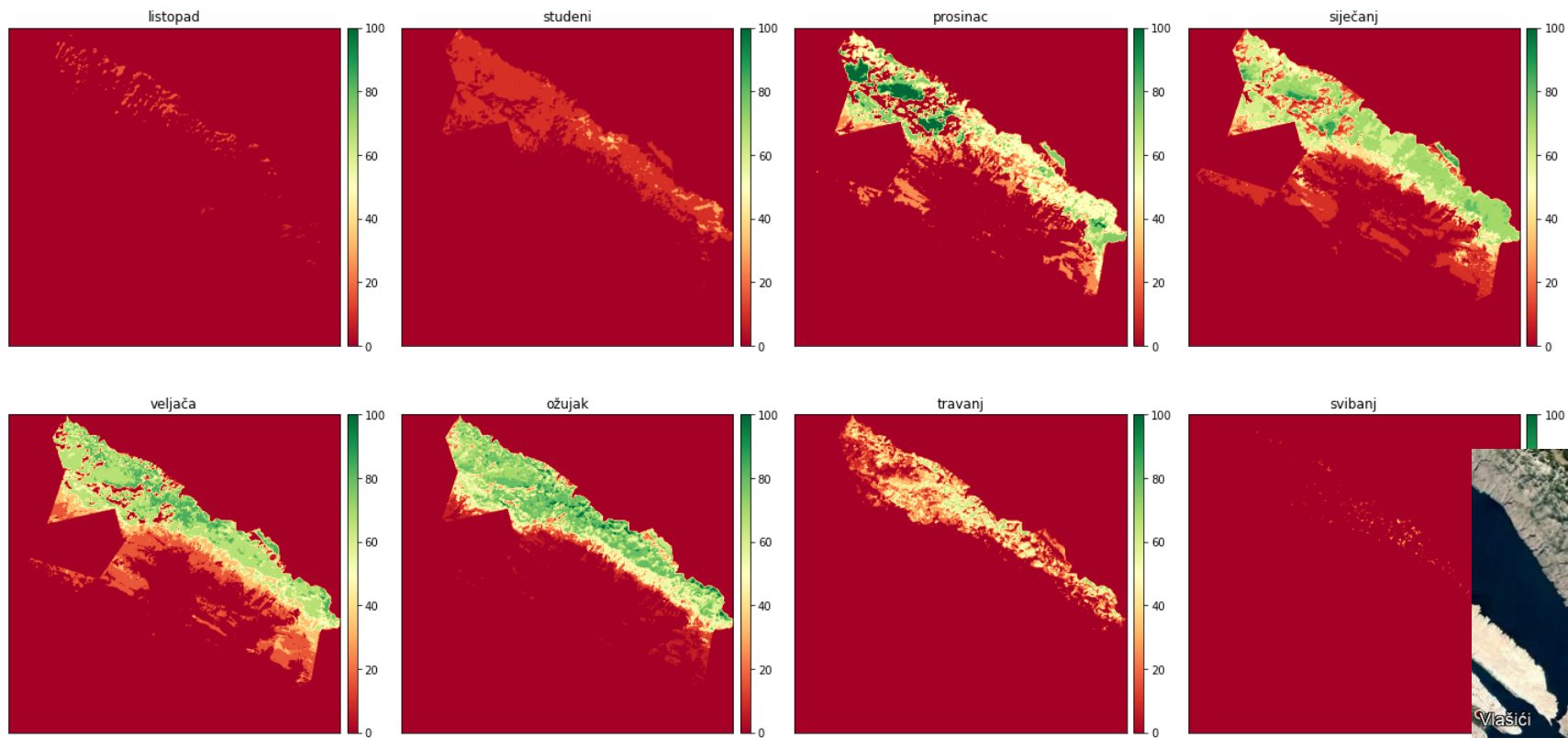
Površinska temperatura 1.8.2020.

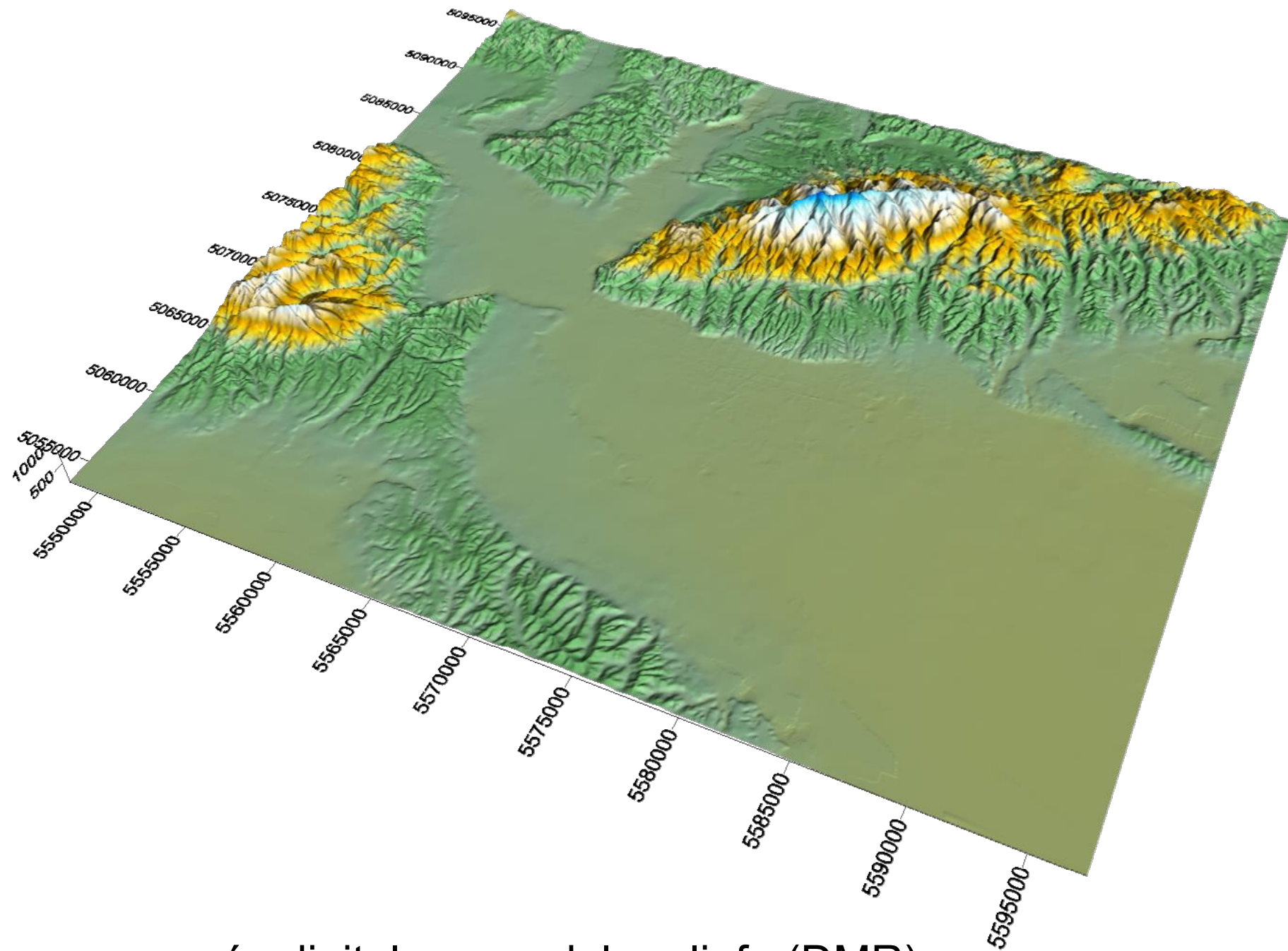


Detekcija opečarenog područja

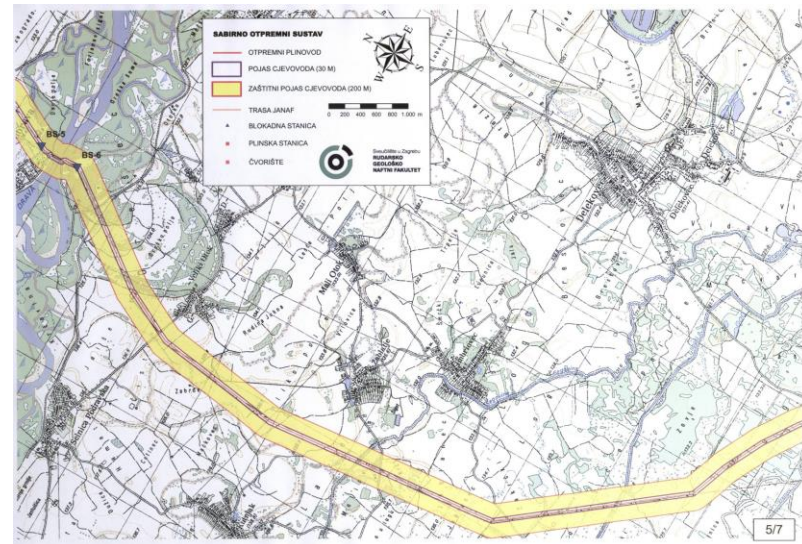
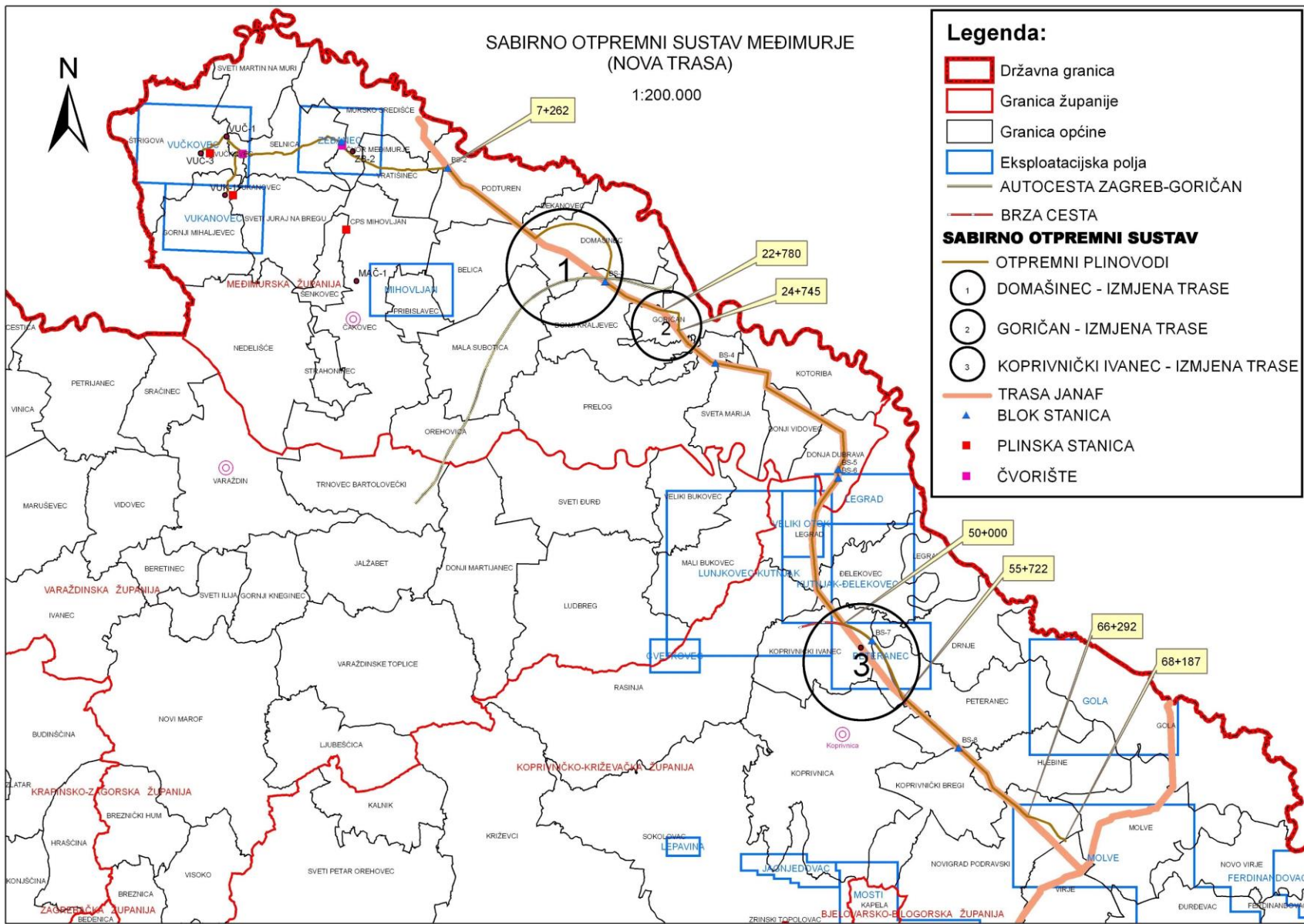


Detekcija snježnih površina





Grad Zagreb prikazan pomoću digitalnog modela reljefa (DMR)



Prostorno modeliranje u studijama utjecaja na okoliš na primjeru plinovoda Međimurje – Molve

TUMAČ OZNAKA ZA HIDROGEOLOŠKU KARTU I PROFIL

Hidrogeološke značajke stijena	Litološki sastav	Stratigrafska pripadnost
Dobro propusne stijene	Debelo uslojeni, gubenski masivni okrenuti vapnenaci	K_2^1 ; K_2^2
Srednje do dobro propusne stijene	Dobro uslojeni, rijetko tankoploštasti vapnenaci ponegdje dolomitični	$K_3^{1,2}$; $K_3^{2,1}$; K_3^3 ; K_3^4
Slabo do srednje propusne stijene	Dolomitični vapnenaci, kalcitni dolomiti, izmješani vapnenaci i dolomita	K_1^1 ; K_1^2
Slabo propusne stijene	Dolomiti i dolomitične breče	J_3 ; K_1 ; K_2
Stijene promjenjive propusnosti	Crvenica, karbonatno krije, bumas	Q

KOPANI BUNARI:

oznaka izdašnost (l/s)

- < 5
- 5 - 15
- > 25
- nepoznata, napušten
- CRPILIŠTE VODOVOD

IZVORI:

oznaka izdašnost (l/s)

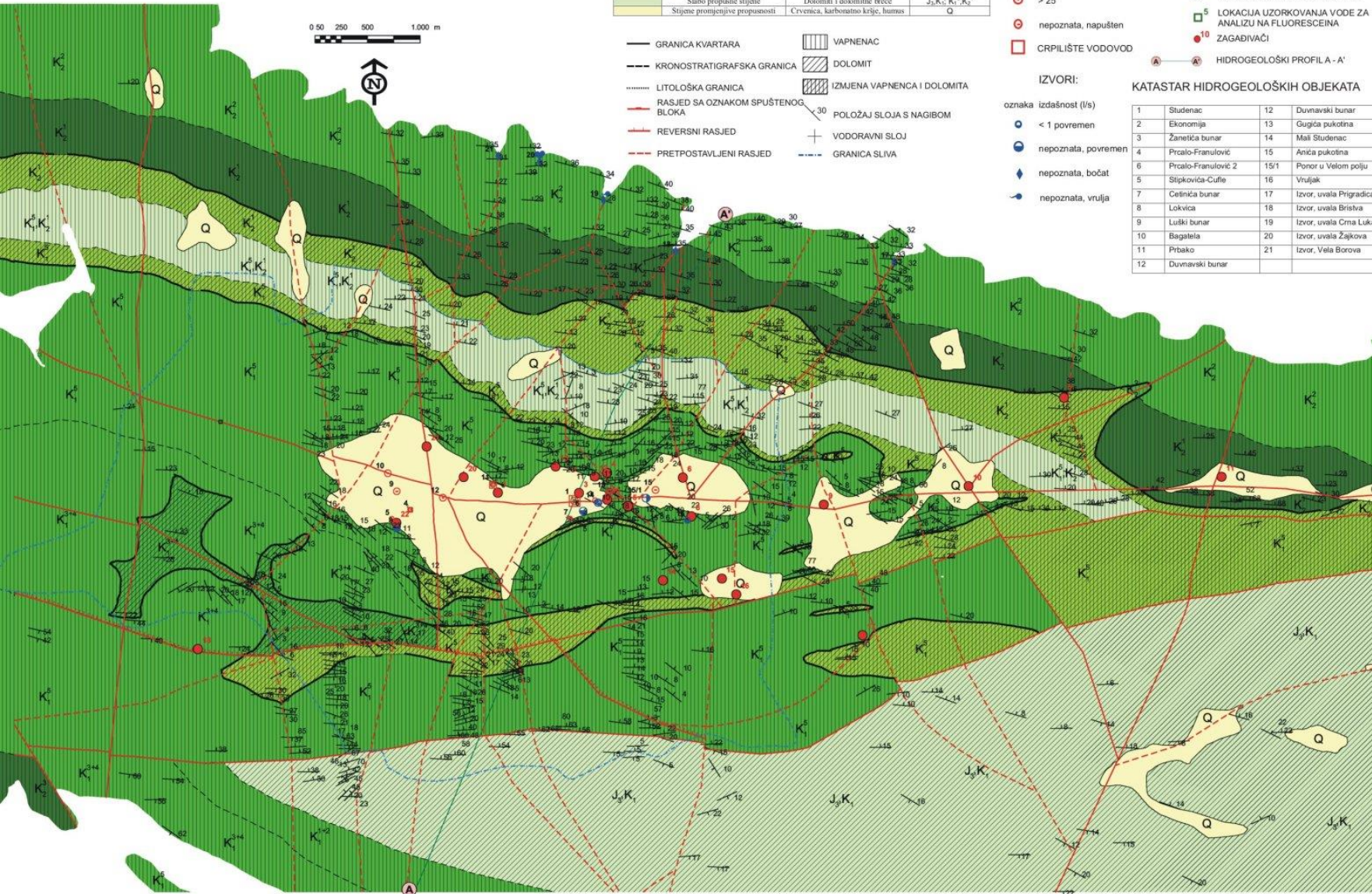
- < 1 povremen
- nepoznata, povremen
- ◆ nepoznata, bočat
- ⬇ nepoznata, vrulja

OSTALE OZNAKE:

- ⊕ ESTAVELA
- ⊖ PONOR S POVREMENIM UVIRANJEM
- LOKACIJA UBACIVANJA TRASERA
- LOKACIJA UZORKOVANJA VODE ZA ANALIZU NA FLUORESCENCIJA ZAGADIVAČI
- 10 ZAGADIVAČI
- HIDROGEOLOŠKI PROFIL A - A'

KATASTAR HIDROGEOLOŠKIH OBJEKATA

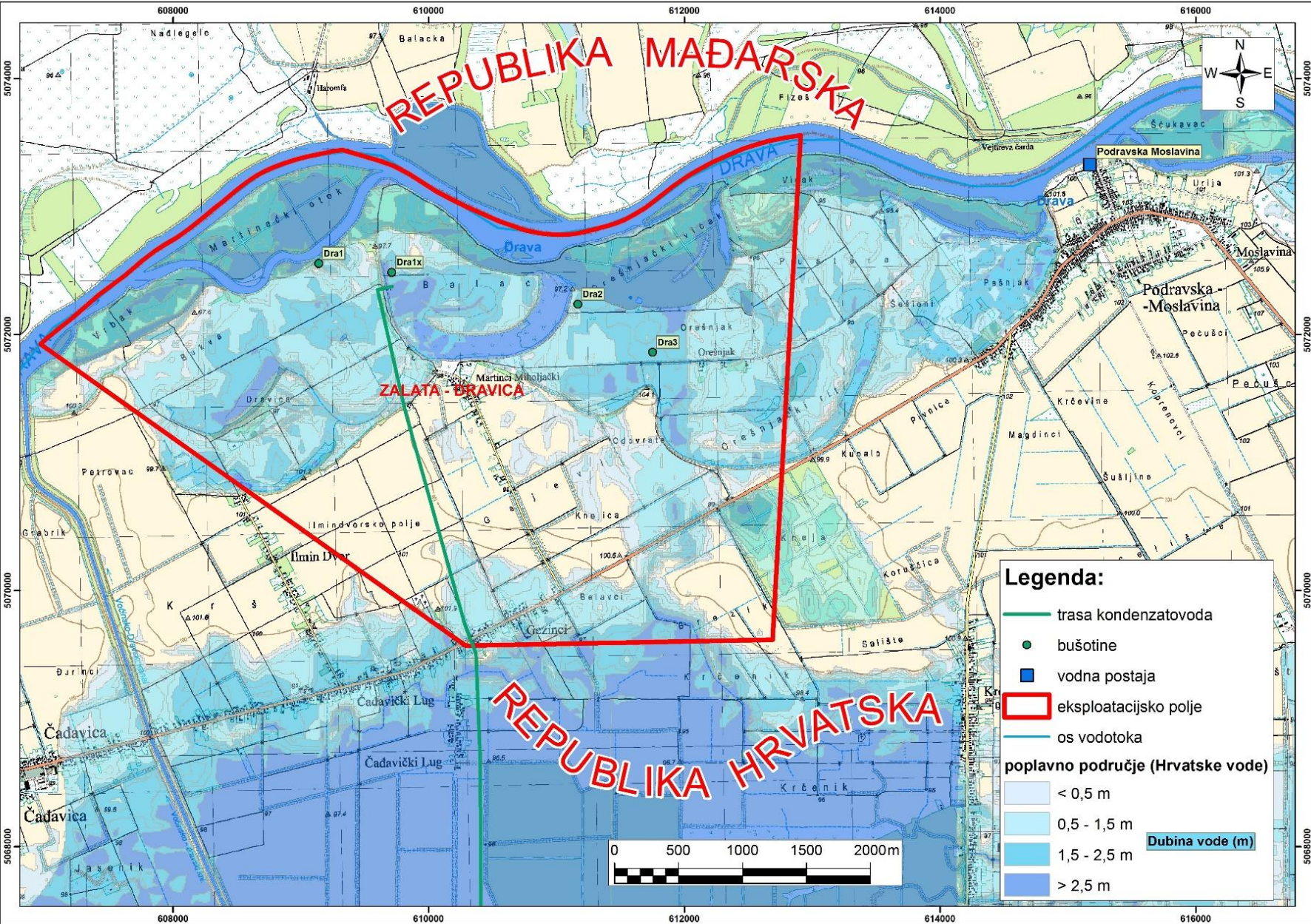
1	Studenac	12	Duvnavski bunar
2	Ekonomija	13	Gugića pukotina
3	Zanetića bunar	14	Mali Studenac
4	Prcalo-Franulović	15	Anića pukotina
6	Prcalo-Franulović 2	15/1	Ponor u Velom polju
5	Stipkovića-Cufte	16	Vrujak
7	Četinića bunar	17	Izvor, uvala Prigradica
8	Lokvica	18	Izvor, uvala Bristva
9	Luški bunar	19	Izvor, uvala Crna Luka
10	Bagatela	20	Izvor, uvala Zajkova
11	Prbako	21	Izvor, Vela Borova
12	Duvnavski bunar		



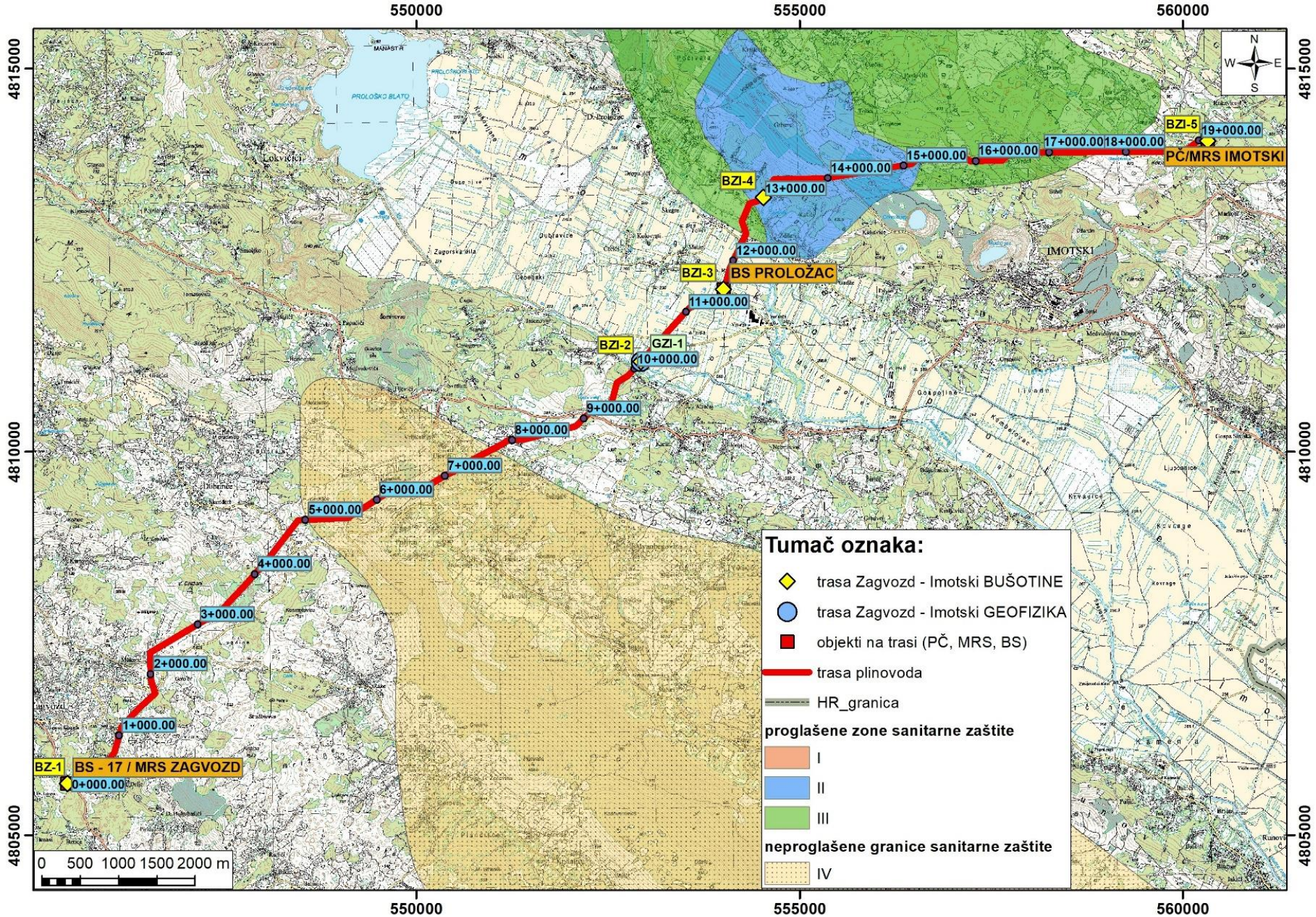
Izrada hidrogeološke karte dijela otoka Korčula



Sisačka rafinerija ili kako u GIS-u naći ono čega nema na nekoj karti



U Podravini postoji ležište ugljikovodika i želi se eksploatirati, ali što ako se ponovi poplava kao prije 50 godina?



Gradi se plinovod Zagvozd-Imotski. Preko kojih zaštićenih područja ne smije prelaziti?

Site selection for Croatian low and intermediate level radioactive waste repository

Dario Perković*, Željko Vrnović**, Roman Lescok*** & Andrea Rapić****

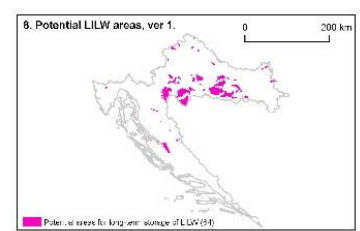
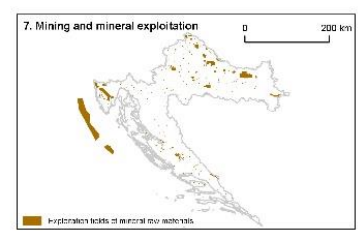
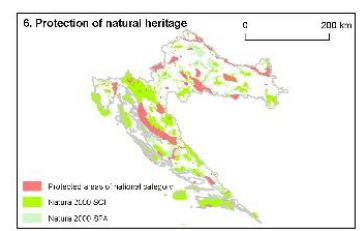
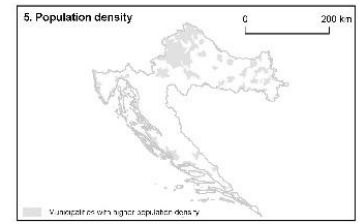
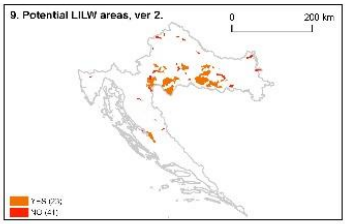
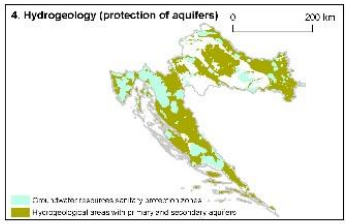
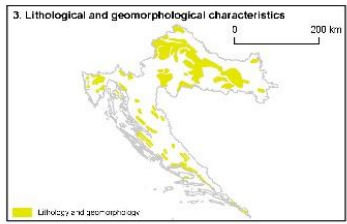
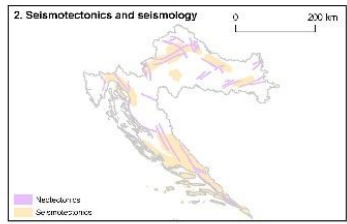
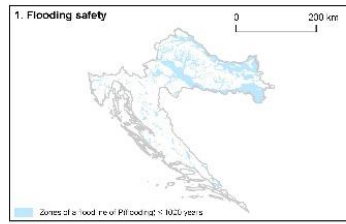
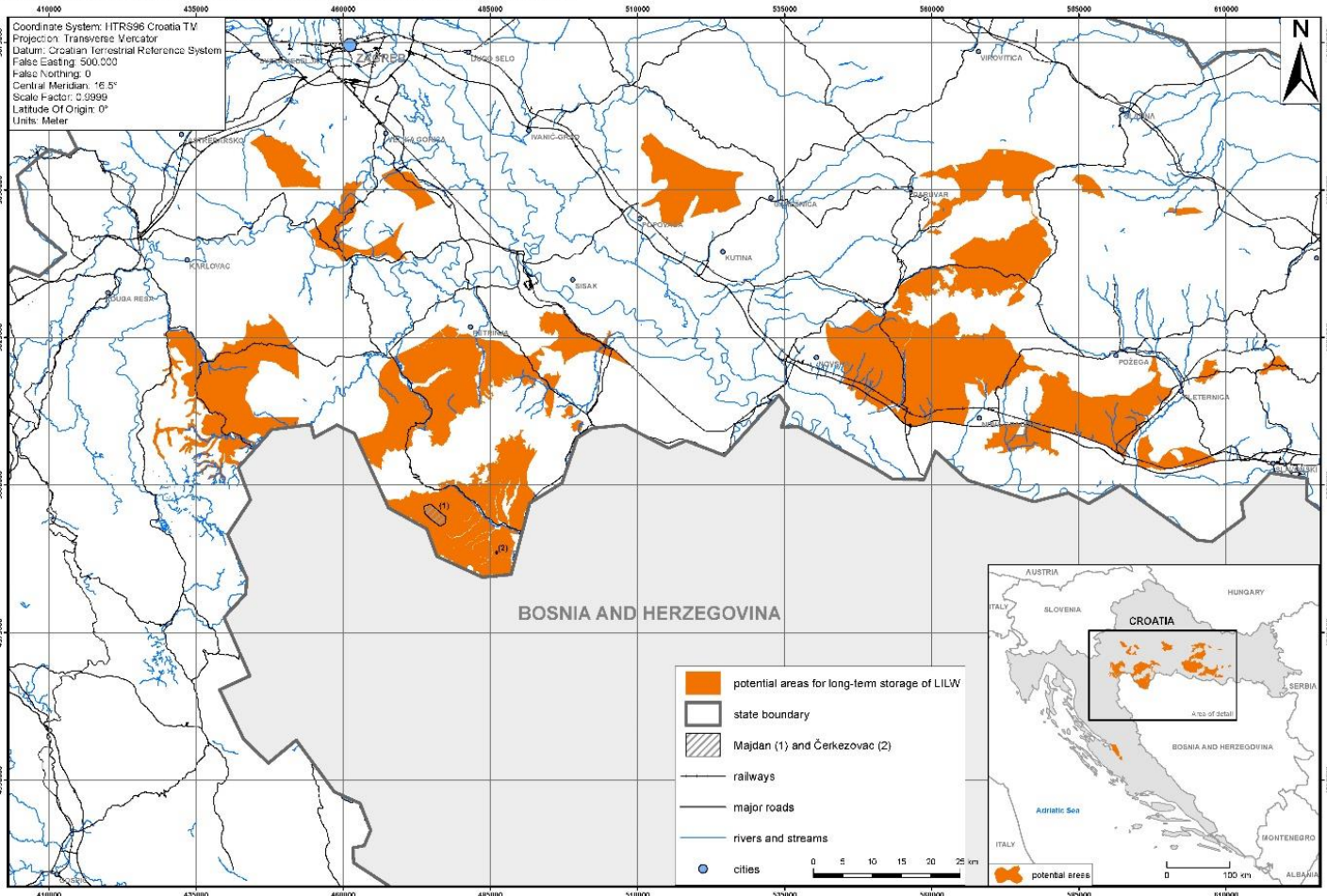
* University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering, Zagreb, Croatia

** The Environmental Protection and Energy Efficiency Fund, Zagreb, Croatia

*** Fund for financing the decommissioning of the Krško Nuclear Power Plant and the disposal of NUK radioactive waste and spent nuclear fuel, Zagreb, Croatia

Topographical layers on main map and locator map: © OpenStreetMap (and) contributors, CC-BY-SA

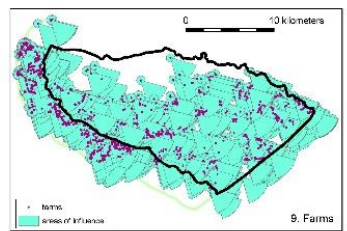
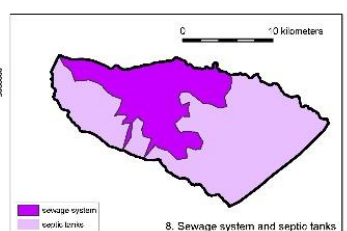
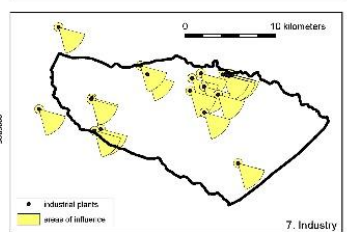
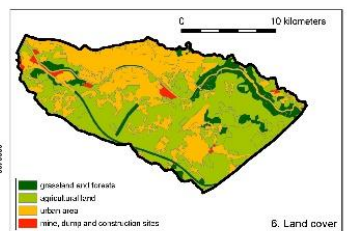
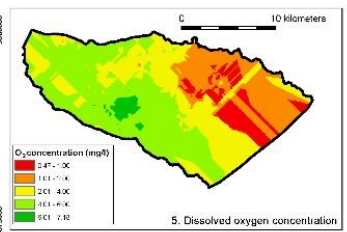
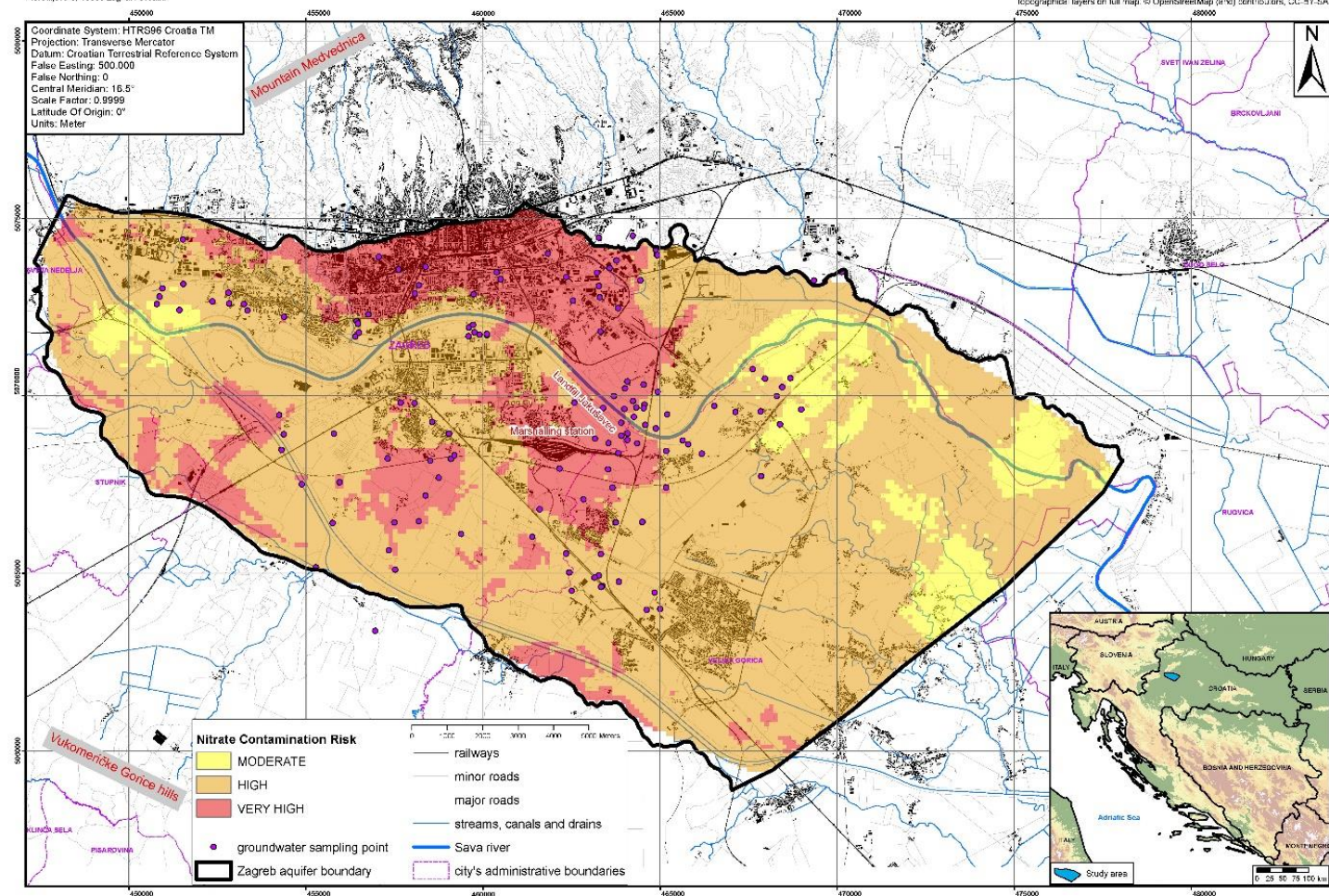
© Journal of Maps, 2019



Korišteni slojevi:

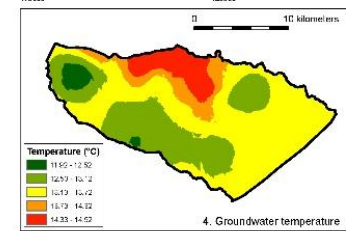
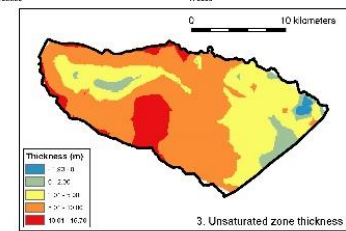
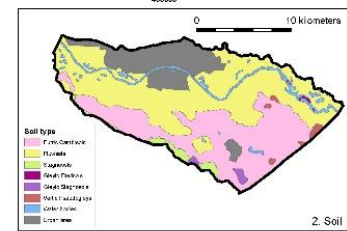
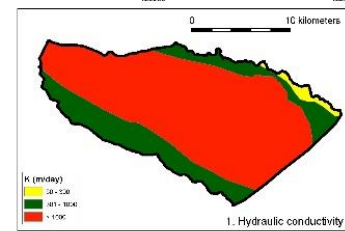
1. poplavna područja
2. seizmotehtonika i seizmologija (rasjedi i potresi)
3. litološke i geomorfološke karakteristike stijena
4. hidrogeologija (zaštita vodonosnika)
5. gustoća naseljenosti
6. zaštita prirodnih dobara (Natura 2000)
7. eksploatacija mineralnih sirovina

Traži se lokacija za odlagalište RAO. Gdje ga izgraditi obzirom na nepogodne i zaštićene prostore?



Korišteni slojevi:

1. hidraulička vodljivost
2. karta tla
3. karta debljine nesaturirane zone
4. temperatura podzemne vode
5. otopljeni kisik
6. utjecaj pokrova
7. industrija
8. kanalizacija i septičke jame
9. farme



Poligon predstavlja prostiranje zagrebačkog vodonosnika, koji sadrži podzemnu vodu koju pijemo. Gdje postoji problem s nitratima i gdje je trebalo već intervenirati?