

# Razvoj Land cover metodologije za Hrvatsku (2020.) – prikaz prvih rezultata

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AGENCIJA ZA  
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RURALNOM  
RAZVOJU

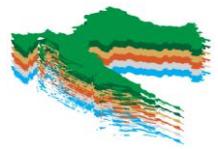


REPUBLIKA HRVATSKA  
Državna geodetska uprava



FOND ZA ŽAŠTITU OKOLIŠA I  
ENERGETSKU UČINKOVITOST

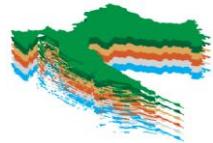




# Sadržaj

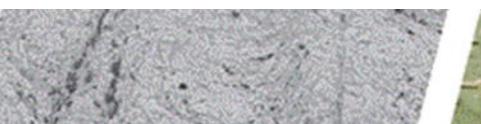
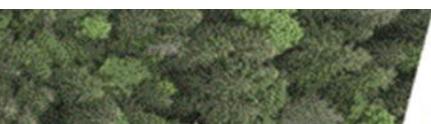
- 1. Testno područje
- 2. Konceptualni model
- 3. Metodologija – izvor 1: DOF
  - izvor 2: Sentinel 2 satelitske snimke
  - izvor 3: Uzorci za treniranje
- OBIA a) Segmentacija snimke
- b) Nadzirana klasifikacija
- 4. Rezultati

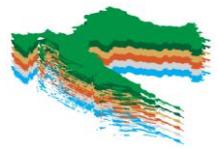




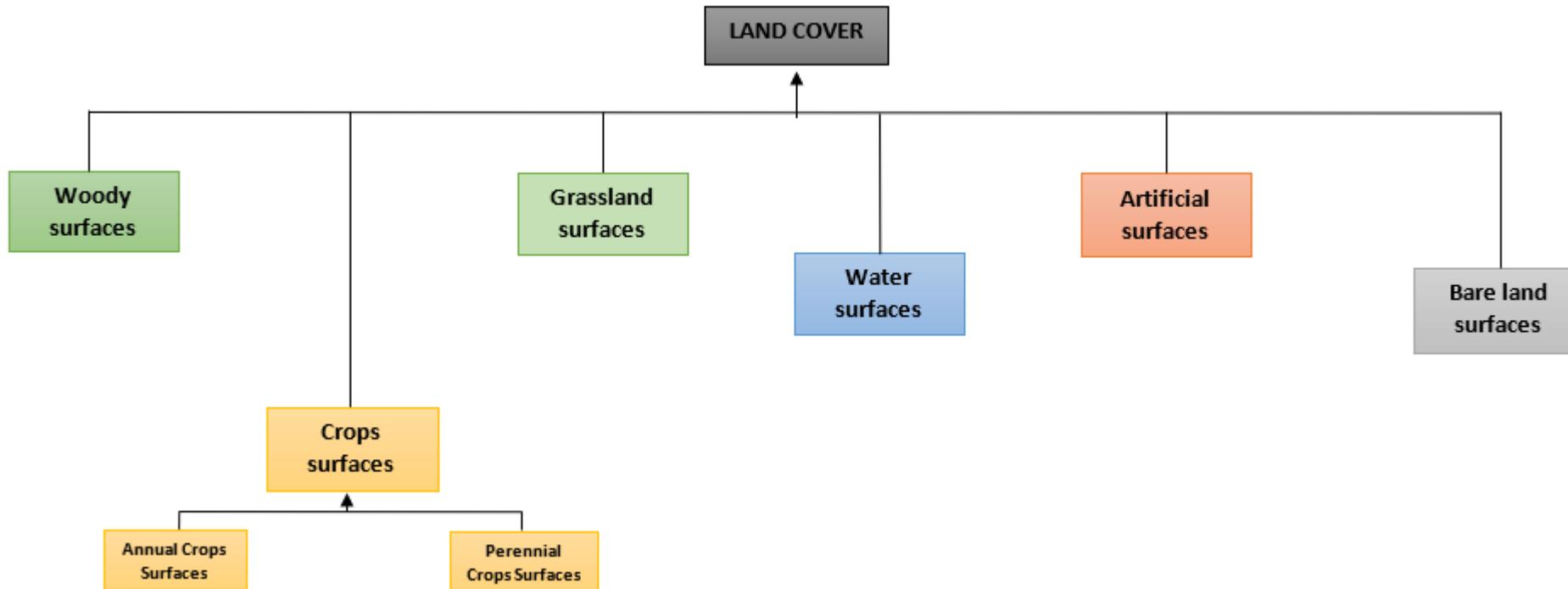
# Testno područje – Grad Dubrovnik i okolica

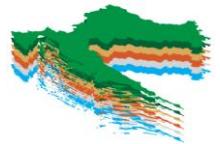
- Zahtjevno područje za klasifikaciju:
  - Pojava svih klasa (Vodene površine samo na nekoliko lokacija)
  - Miješanje klasa (Artificial s. and Bare land s.)
  - Manja površina testnog područja – lakše za testirati metodologiju





# Land cover konceptualni model





# Metodologija

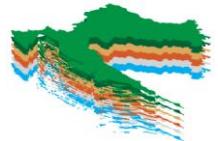


- Korišteni softver za razvoj metodologije:  
eCognition Developer 10.2
- Inputi: 1. DOF snimke 2019./2020. (4 kanala: R,G,B,CIR)
  - Prostorna rezolucija: 0.5 m
- Spektralni indeksi: NDVI, NDWI, NDSI

Izazovi:

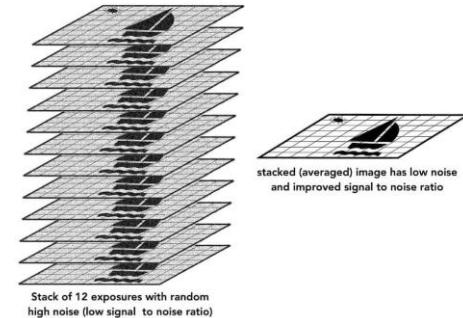
- Sjene
  - Područja snimljena u različitim dijelovima godine





# Metodologija - Inputi: 2. Sentinel 2 snimke

- 13 kanala, Prostorna rezolucija: 10 m
- Multitemporalna analiza: ključno za Crops surfaces
- Datum: 4. 5., 28.6, 28.7., 21.10 → Stacked



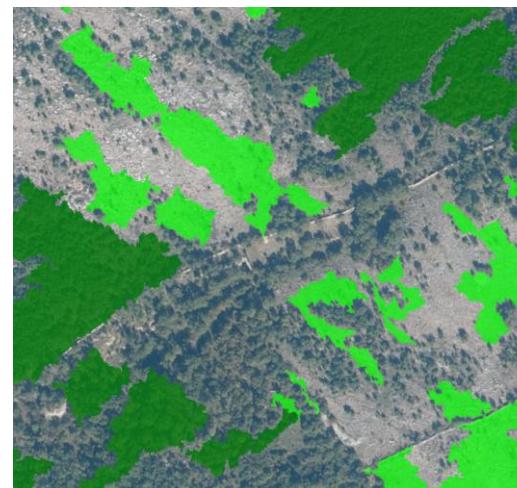
Datum snimke: 4. svibnja

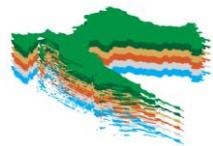


Datum snimke: 28. srpnja



- Cilj: Detektirati što više točaka/područja koje pripadaju pojedinoj klasi
- 5 klase (Vodene površine izbačene za testno područje)
- Uzorkovanje – grid točke 500\*500 m



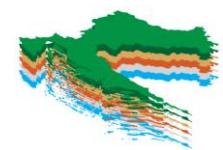


# Metodologija – Inputi: 3.Uzorci za treniranje

- Cilj: Detektirati što više točaka/područja koje pripadaju pojedinoj klasi
- 5 klase (Vodene površine izbačene za testno područje)

Klasa	Broj uzorka za treniranje
Artificial surfaces	579
Bare land surfaces	484
Crops surfaces	72
Grassland surfaces	85
Woody surfaces	304
Total	1328

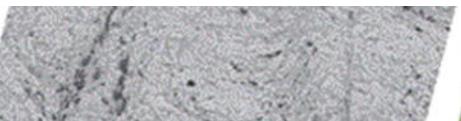
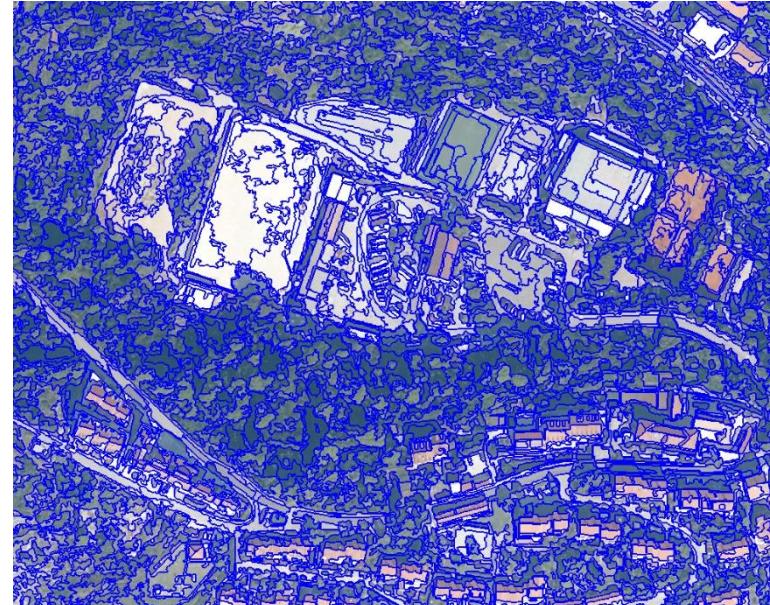


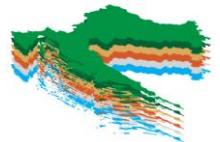


# OBIA Prvi korak: Segmentacija snimke - početna

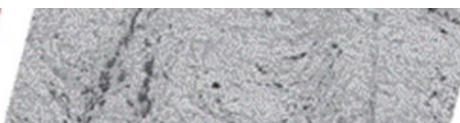
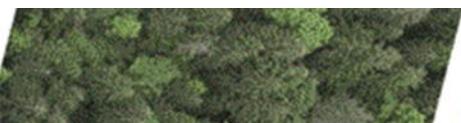
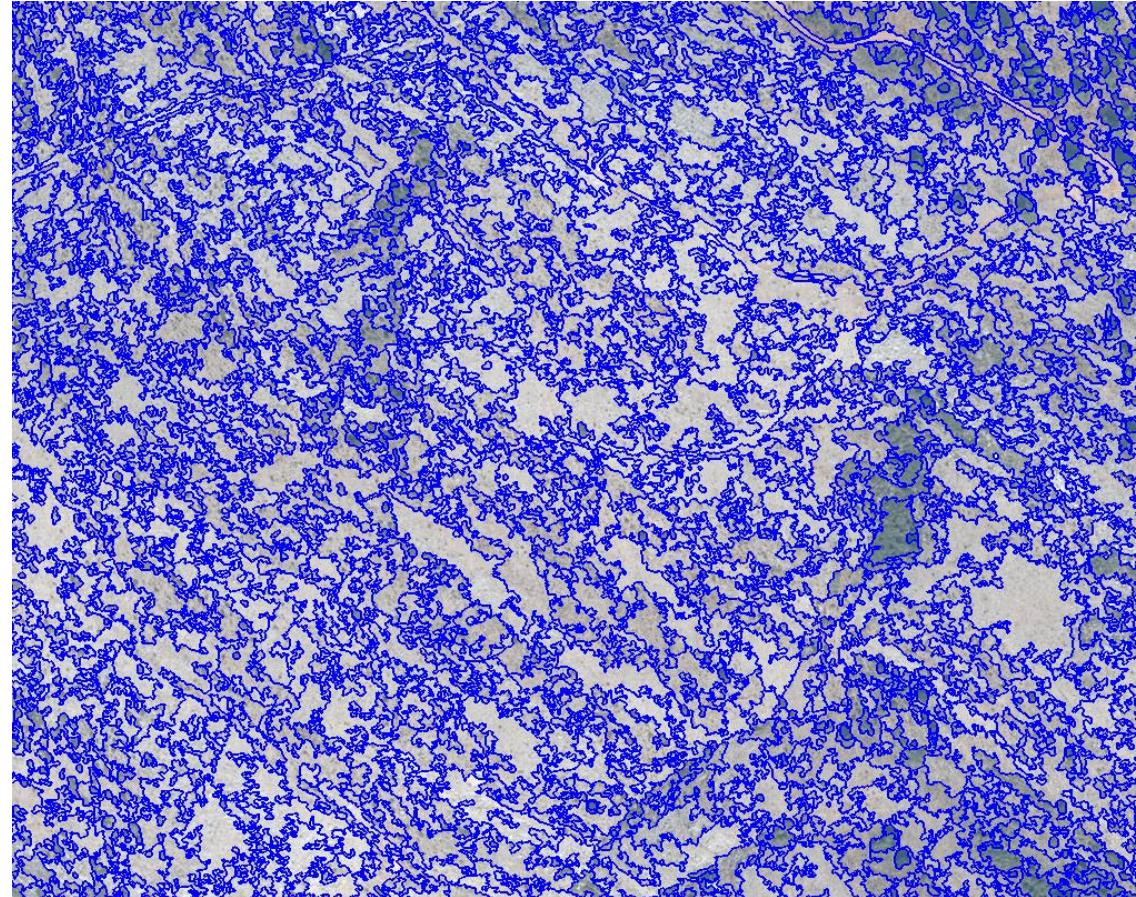


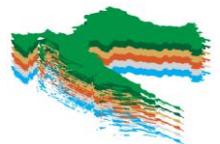
- OBIA: Object-Based Image Analysis
- Cilj segmentacije: razdvojiti snimku u mnogobrojne dijelove (objekte) bazirano na karakteristikama piksela
- Ključan je izbor slojeva i parametara





# OBIA Prvi korak: Segmentacija snimke - početna

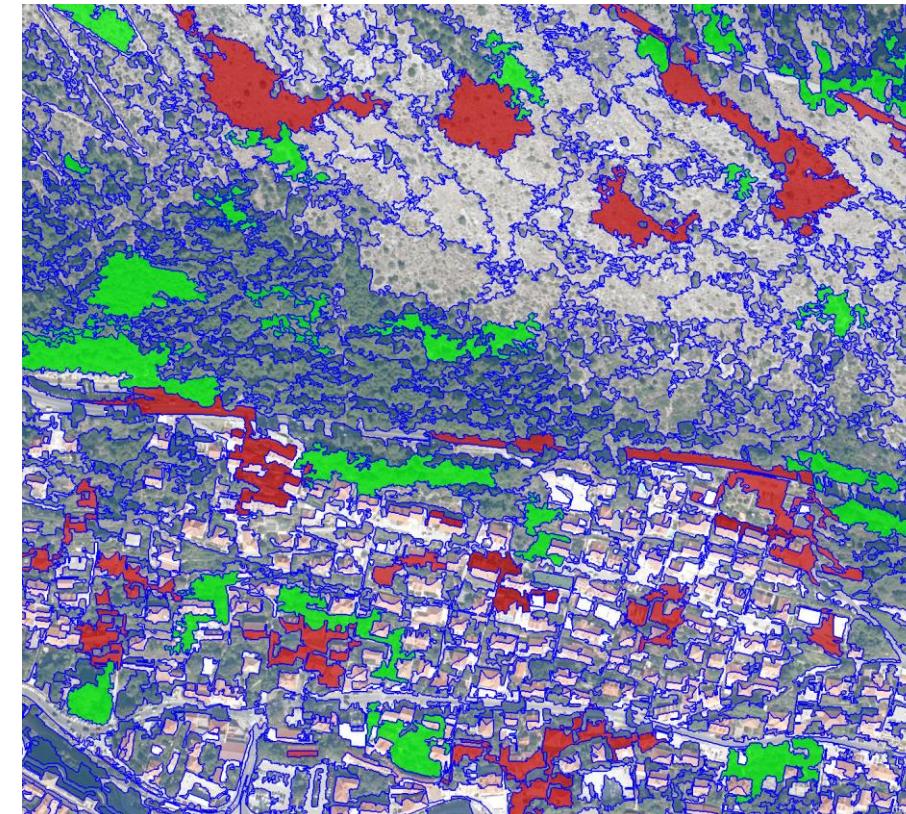


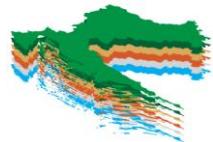


# OBIA Drugi korak: Pridodavanje klase objektima

- Ti objekti postaju trening uzorci za objektno orijentiranu nadziranu klasifikaciju (3. korak)

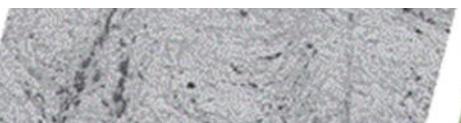
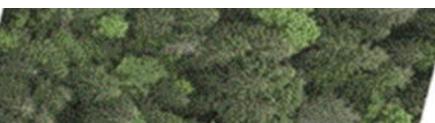
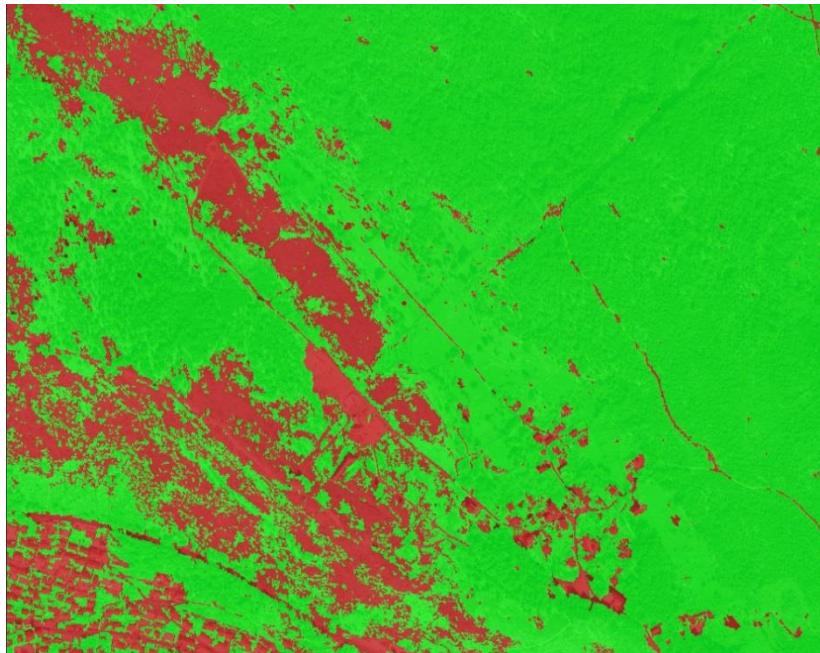
VEGETATION  
NON-VEGETATION

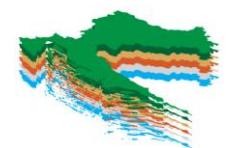




# OBIA Treći korak: Nadzirana klasifikacija

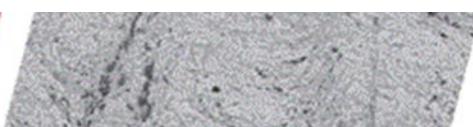
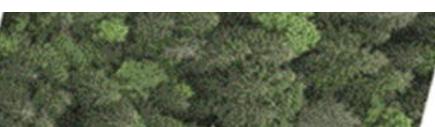
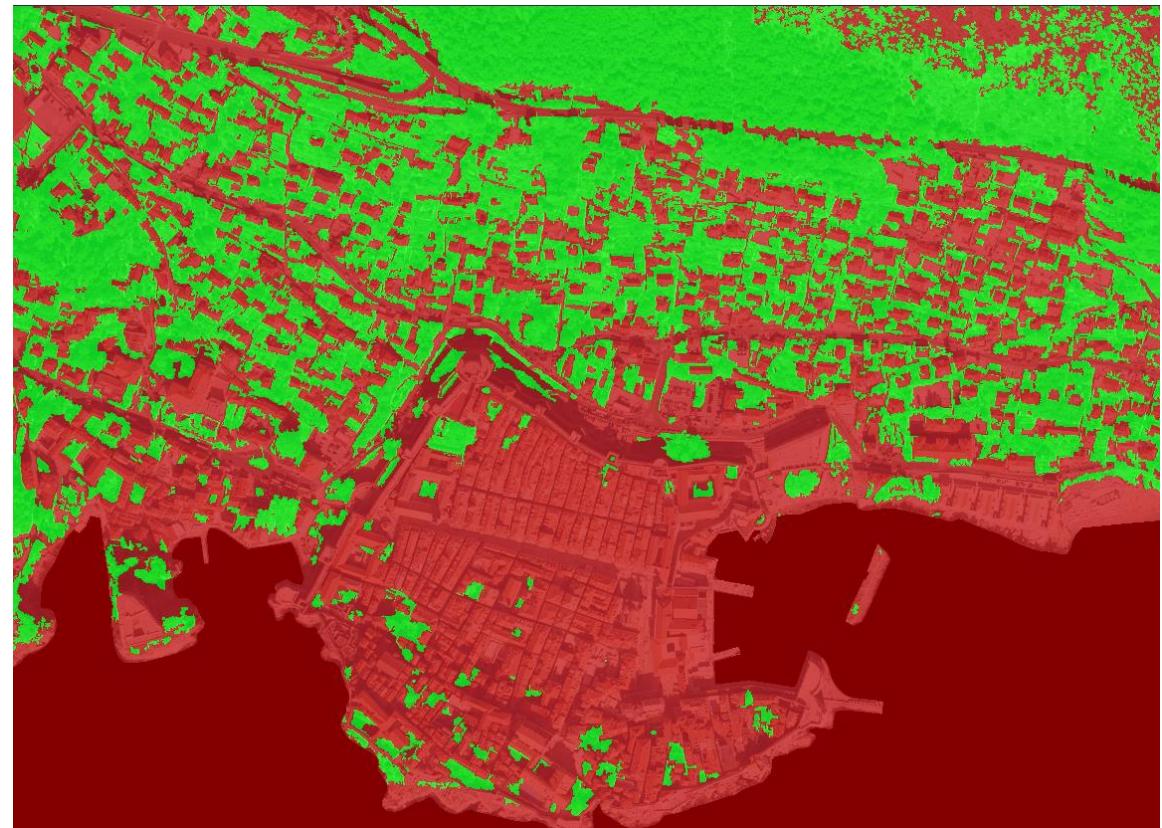
- Izbor algoritama i parametara
- Algoritam prema uzorcima za treniranje i ostalim karakteristikama dodijeli klasu svakom objektu
- Klase: 1. VEGETATION 2. NON-VEGETATION

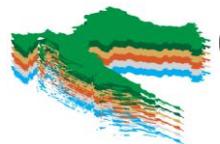




# OBIA Treći korak: Nadzirana klasifikacija

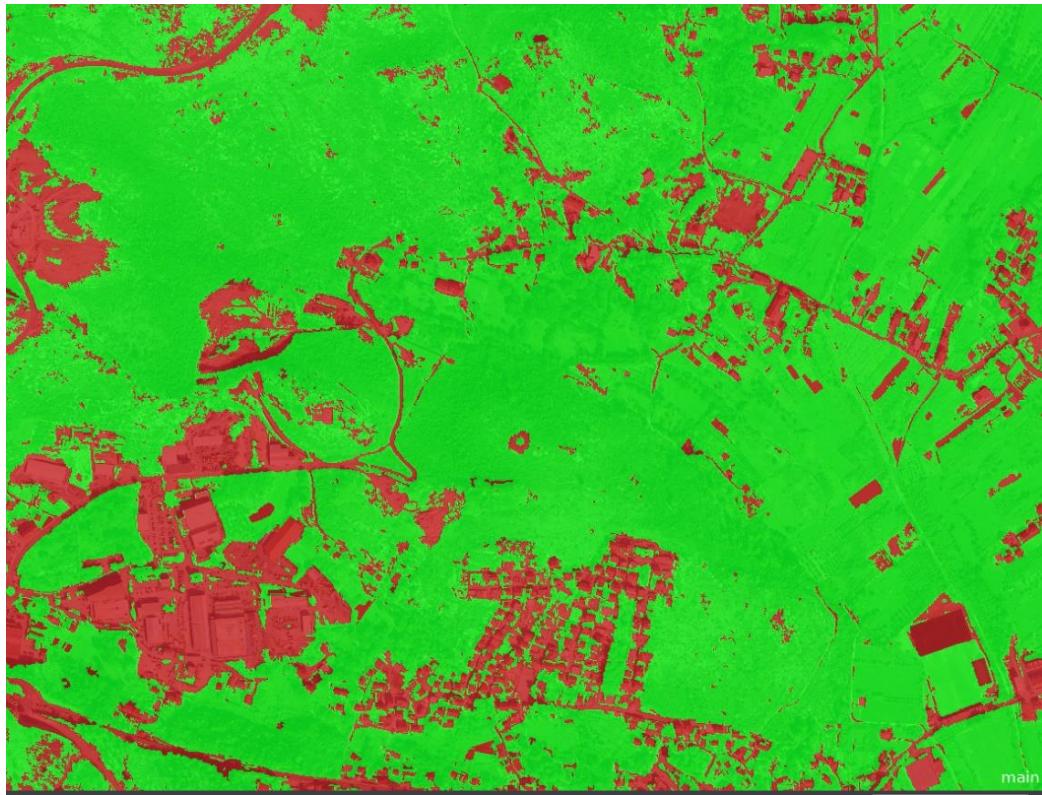
- Klase: 1. VEGETATION 2. NON-VEGETATION

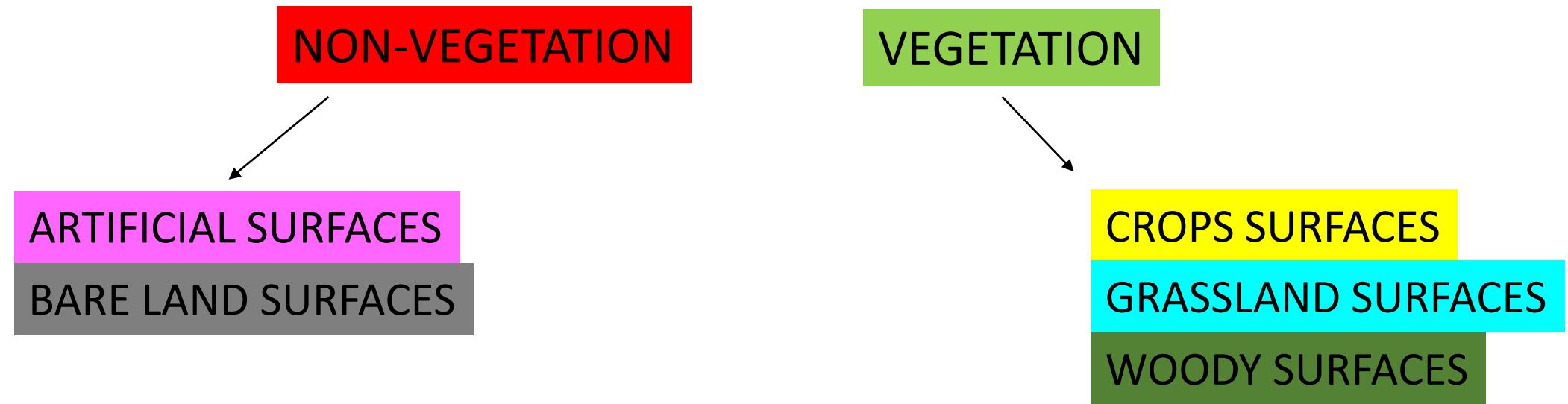
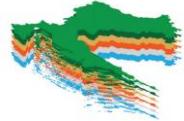




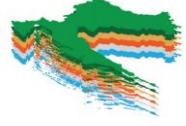
# OBIA Treći korak: Nadzirana klasifikacija

- Klase: 1. VEGETATION 2. NON-VEGETATION

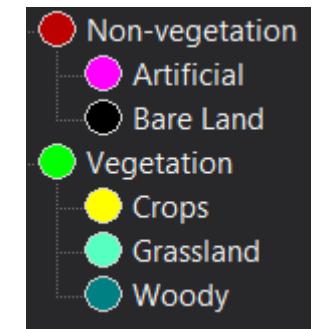
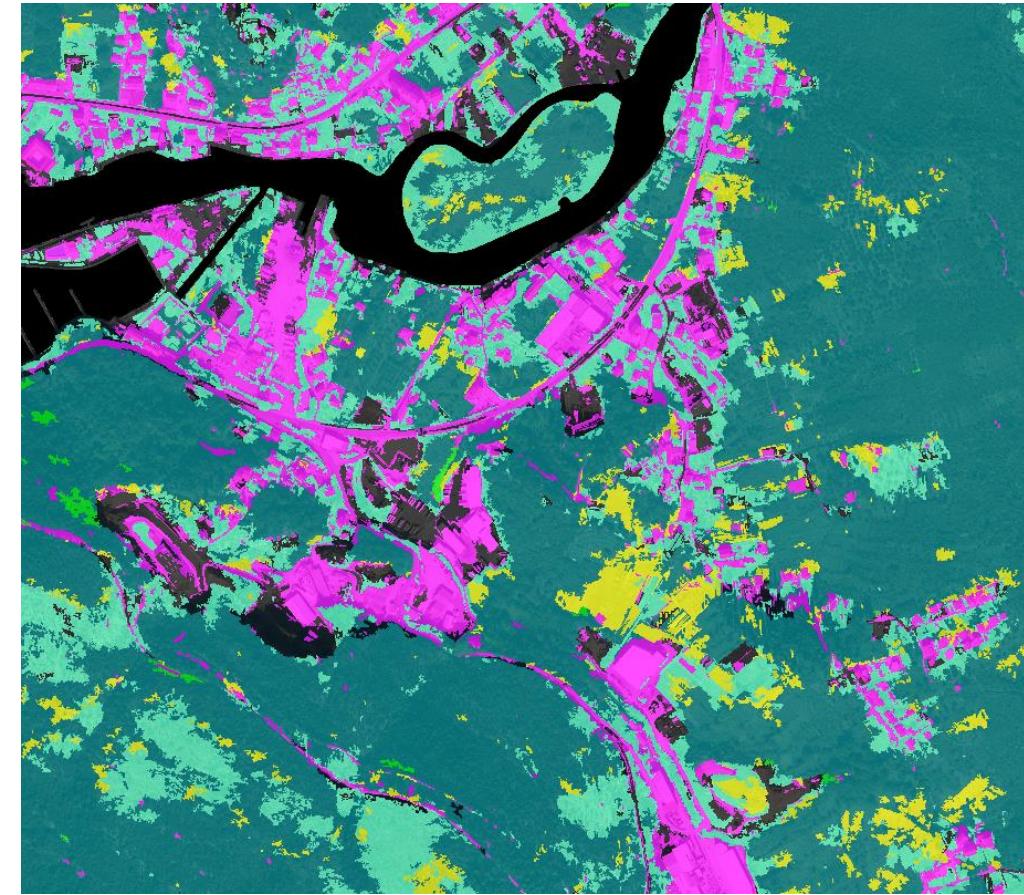
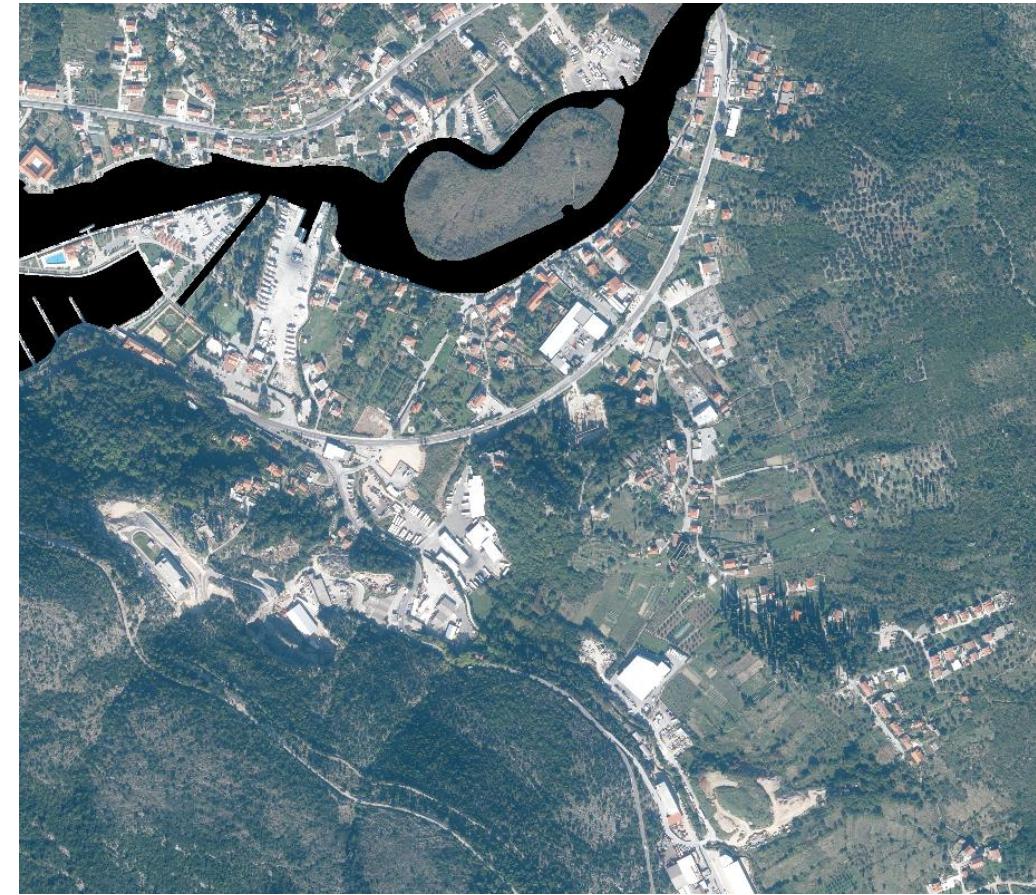


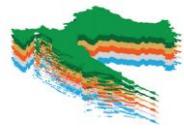


- Postupak ponavljamo odvojeno za klase vegetation i non-vegetation:
  - 1. Segmentacija snimke (stvaranje objekata)
  - 2. Dodavanje novih trening uzoraka
  - 3. Nadzirana klasifikacija
- Različiti parametri - karakteristike objekata, statističke vrijednosti objekata

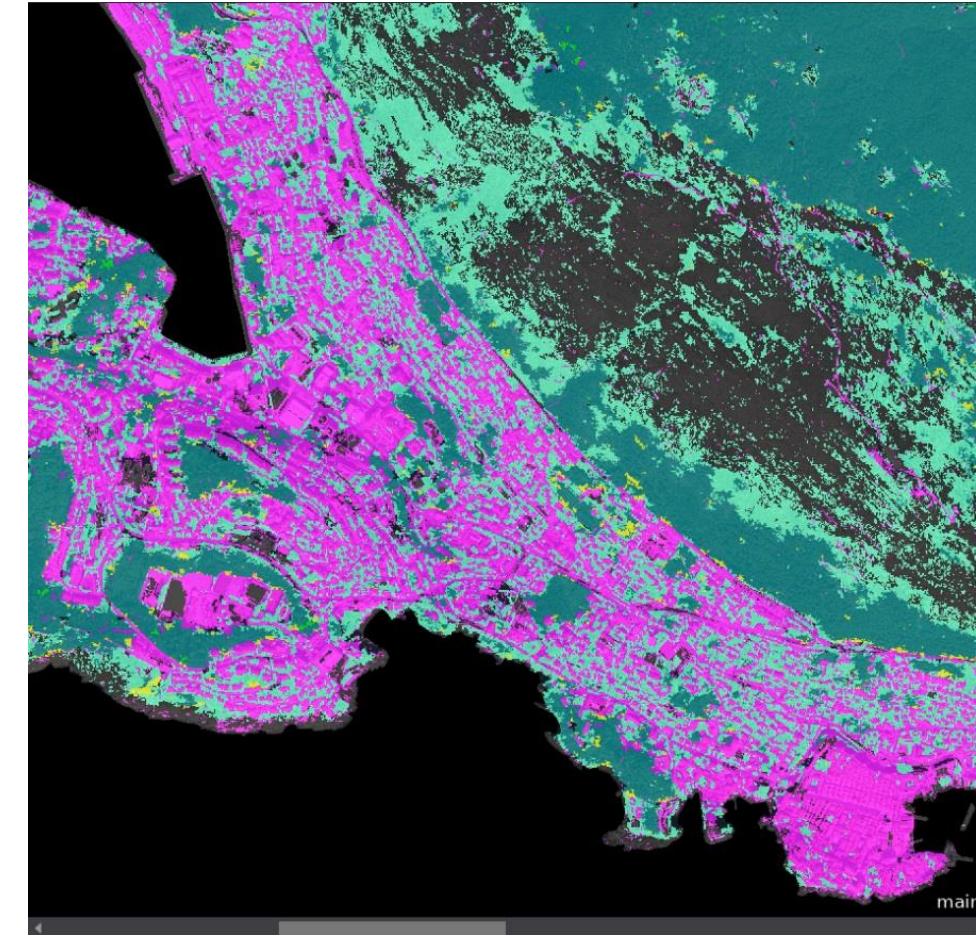


# Finalni rezultati LC sloja



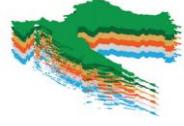


# Finalni rezultati LC sloja

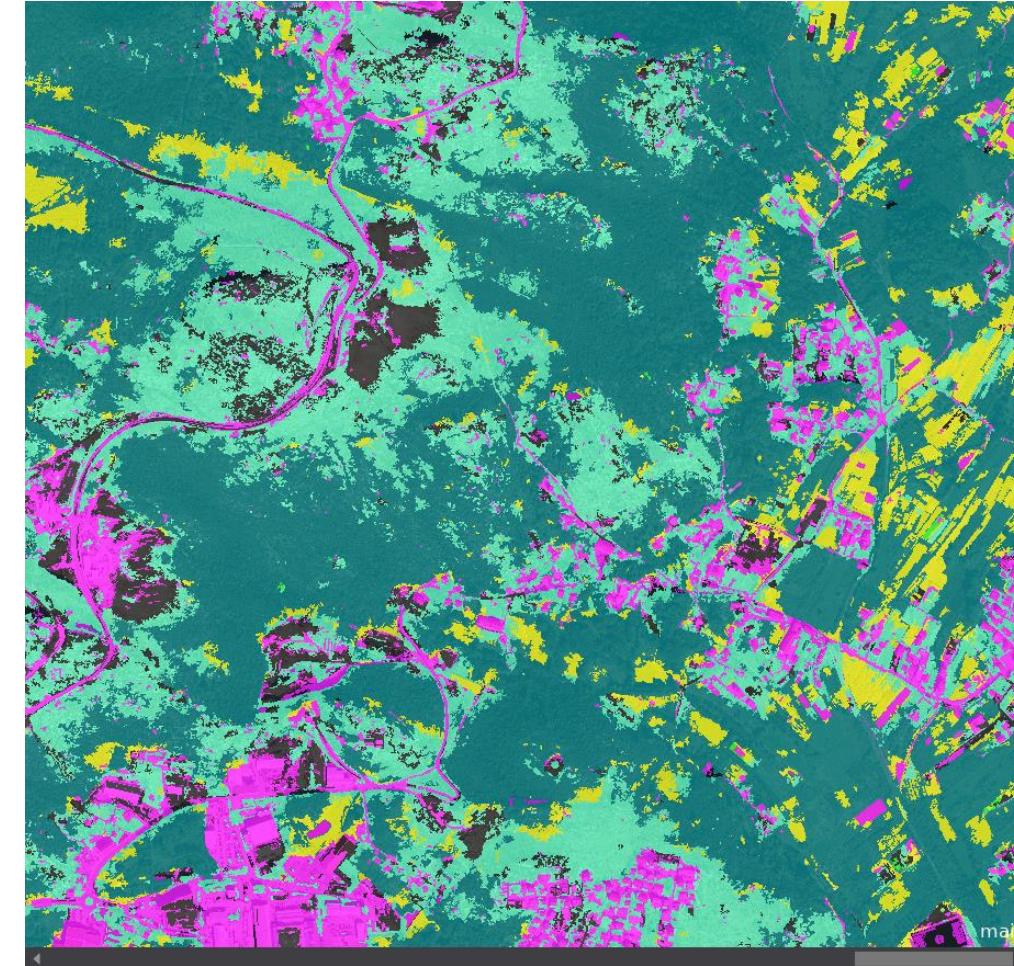


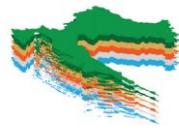
● Non-vegetation  
● Artificial  
● Bare Land  
● Vegetation  
● Crops  
● Grassland  
● Woody





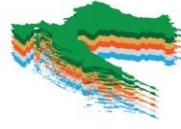
# Finalni rezultati LC sloja





# Finalni rezultati po klasama

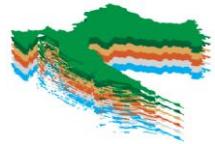
Klasa	Površina (ha)	Broj uzoraka za treniranje
Artificial surfaces	478	579
Bare land surfaces	479	484
Crops surfaces	116	72
Grassland surfaces	1003	85
Woody surfaces	2040	304
Total	4116	1328



## Zaključak

- Efikasno klasificiranje dviju klasa: Vegetation, Non-vegetation
- Vrlo dobri rezultati u klasifikaciji klase Woody surfaces
- Izazovi:
  - pogrešna klasifikacija klasa Grassland i Crops surfaces
  - pogrešna klasifikacija klasa Artificial and Bare land surfaces
- Problemi sa sjenama
- Poboljšanje metodologije izradom novih proizvoda u sklopu CROLIS-a





# Hvala na pažnji!

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