

# Razvoj Land cover metodologije RH za 2020 godinu – prikaz prvih rezultata

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Radionica (Tip 1) - 5. rujna 2023. godine - hotel Lav, Vukovar



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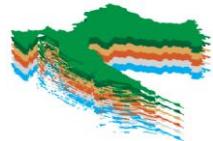


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POLJOPRIVREDI,  
RIBARSTVU I  
RURALNOM  
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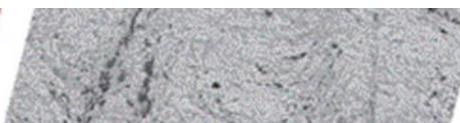
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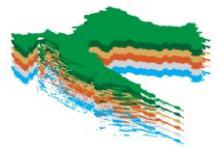




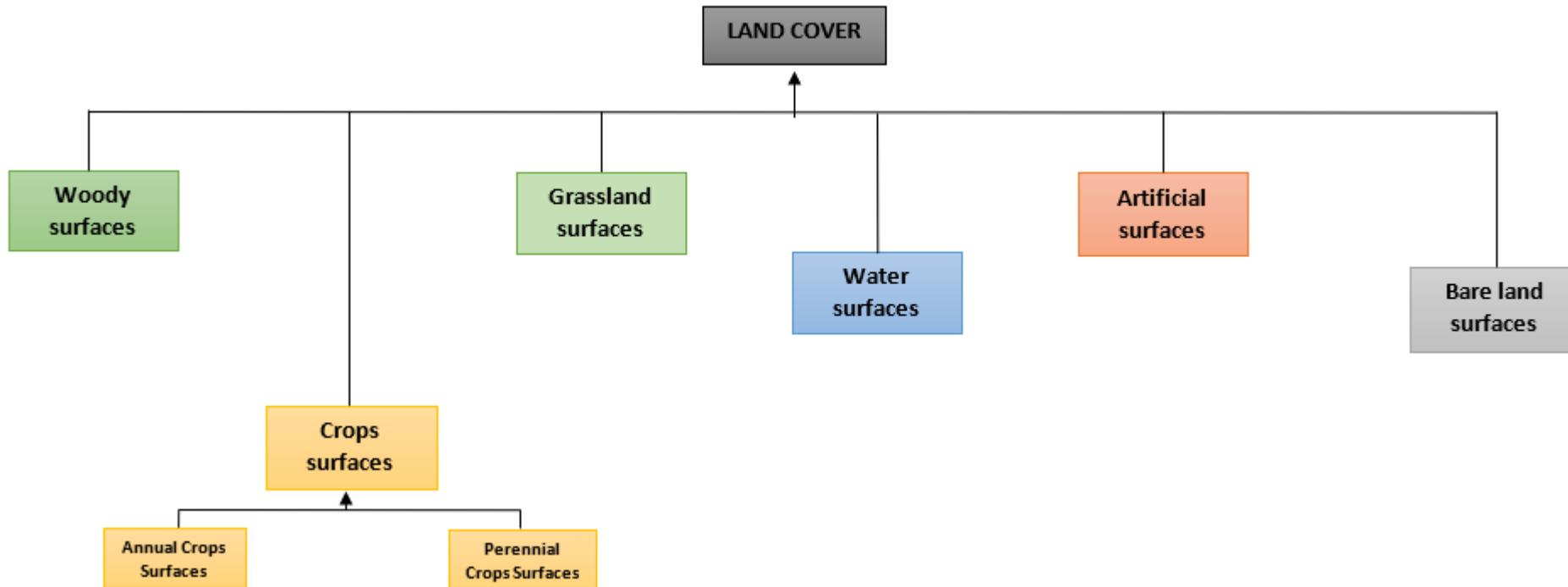
# Testno područje – Grad Dubrovnik i okolica

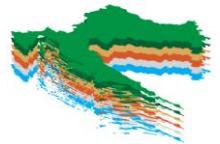
- Zahtjevno područje za klasifikaciju:
  - Pojava svih klasa (Vodene površine samo na nekoliko lokacija)
  - Miješanje klasa (Artificial s. and Bare land s.)
  - Manja površina testnog područja – lakše za testirati metodologiju





# Land cover konceptualni model





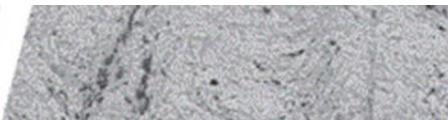
# Metodologija

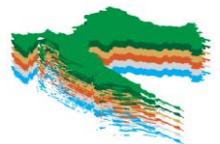


- Korišteni softver za razvoj metodologije:  
eCognition Developer 10.2
- Inputi: 1. DOF snimke 2019./2020. (4 kanala:R,G,B,CIR)
  - Prostorna rezolucija: 0.5 m
- Spektralni indeksi: NDVI, NDWI, NDSI

Izazovi:

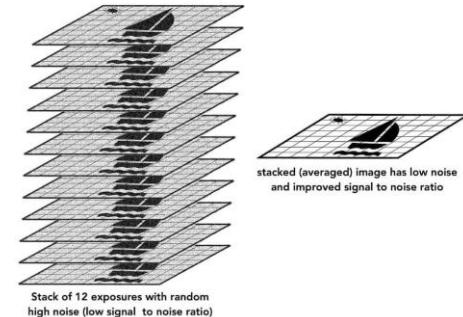
- Sjene
  - Područja snimljena u različitim dijelovima godine





# 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

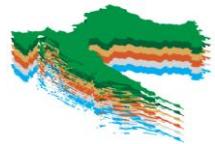


Datum snimke: 4. svibnja

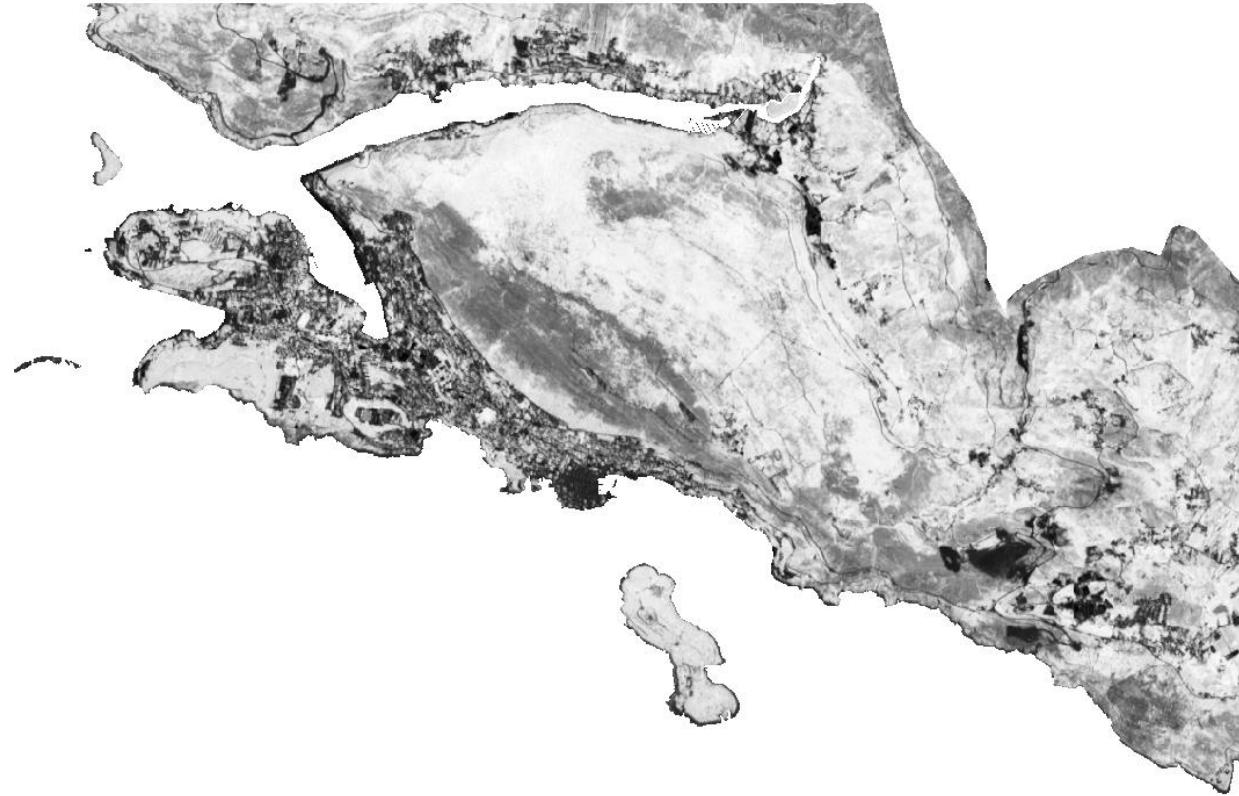


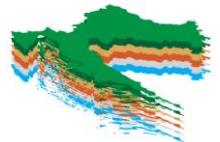
Datum snimke: 28. srpnja



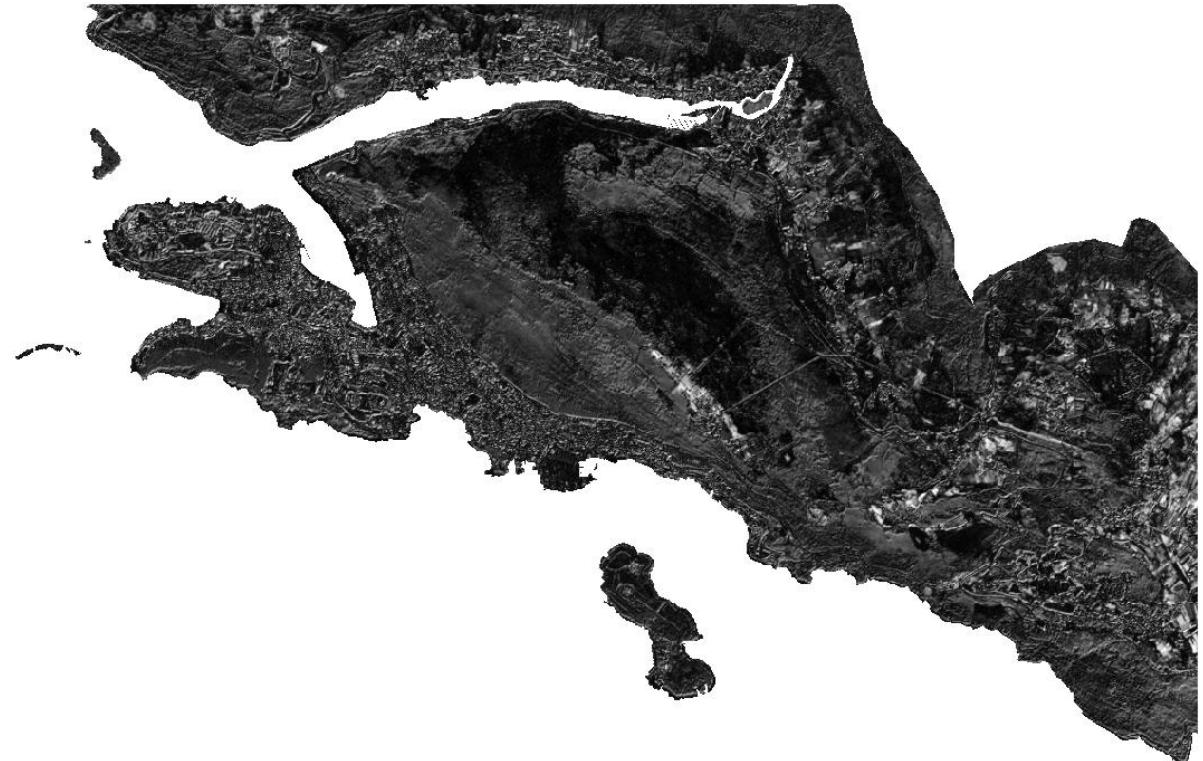


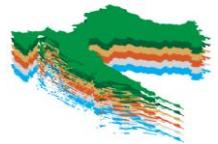
# Spektralni indeks: Max NDVI – Sentinel 2



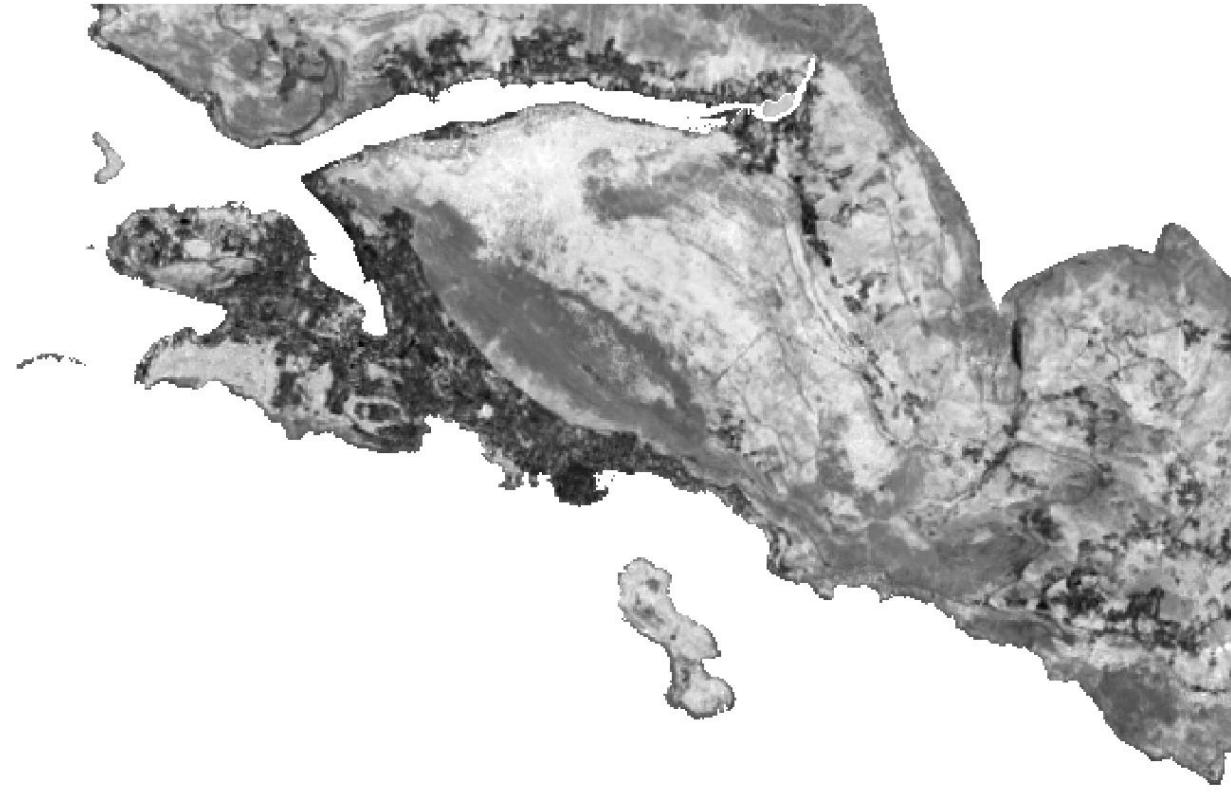


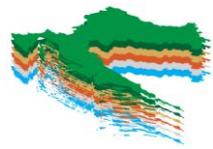
# Spektralni indeks: St. Dev. NDVI and Range (raspon) NDVI – Sentinel 2





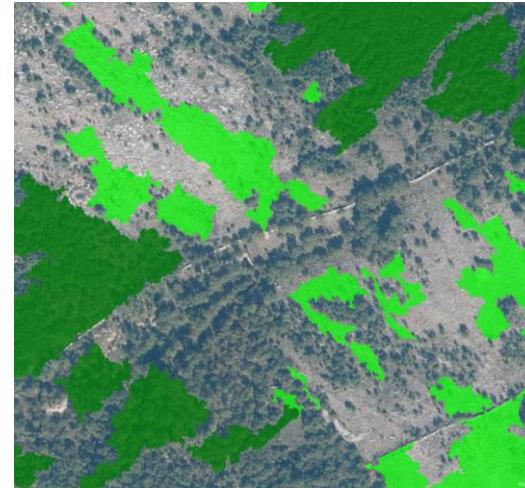
# Spektralni indeks: Max NDTI and sum NDTI – Sentinel 2





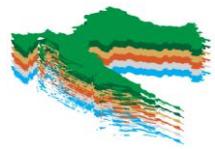
# Metodologija – Inputi: 3.Uzorci za treniranje

- 5 klase (Vodene površine izbačene za testno područje)
- Uzorkovanje – grid točke 500\*500 m
- Obogaćivanje uzorka:
  - manualno
  - koristeći threshold values (granične vrijednosti) u eCognitionu



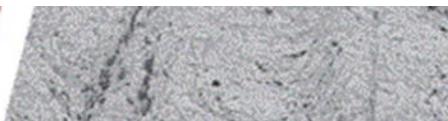
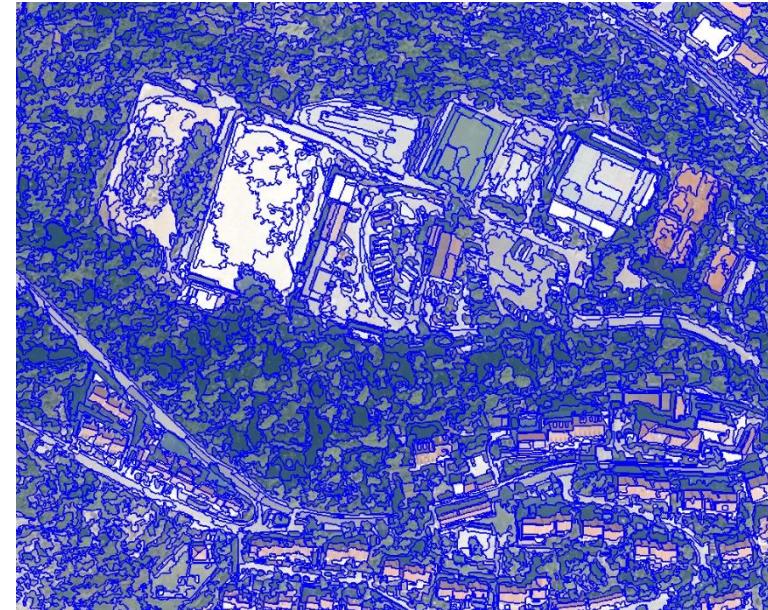
Klasa	Broj uzoraka
Artificial surfaces	579
Bare land surfaces	484
Crops surfaces	72
Grassland surfaces	85
Woody surfaces	304
Total	1328

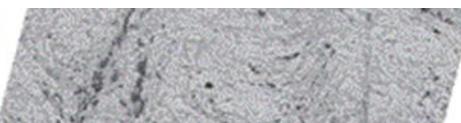
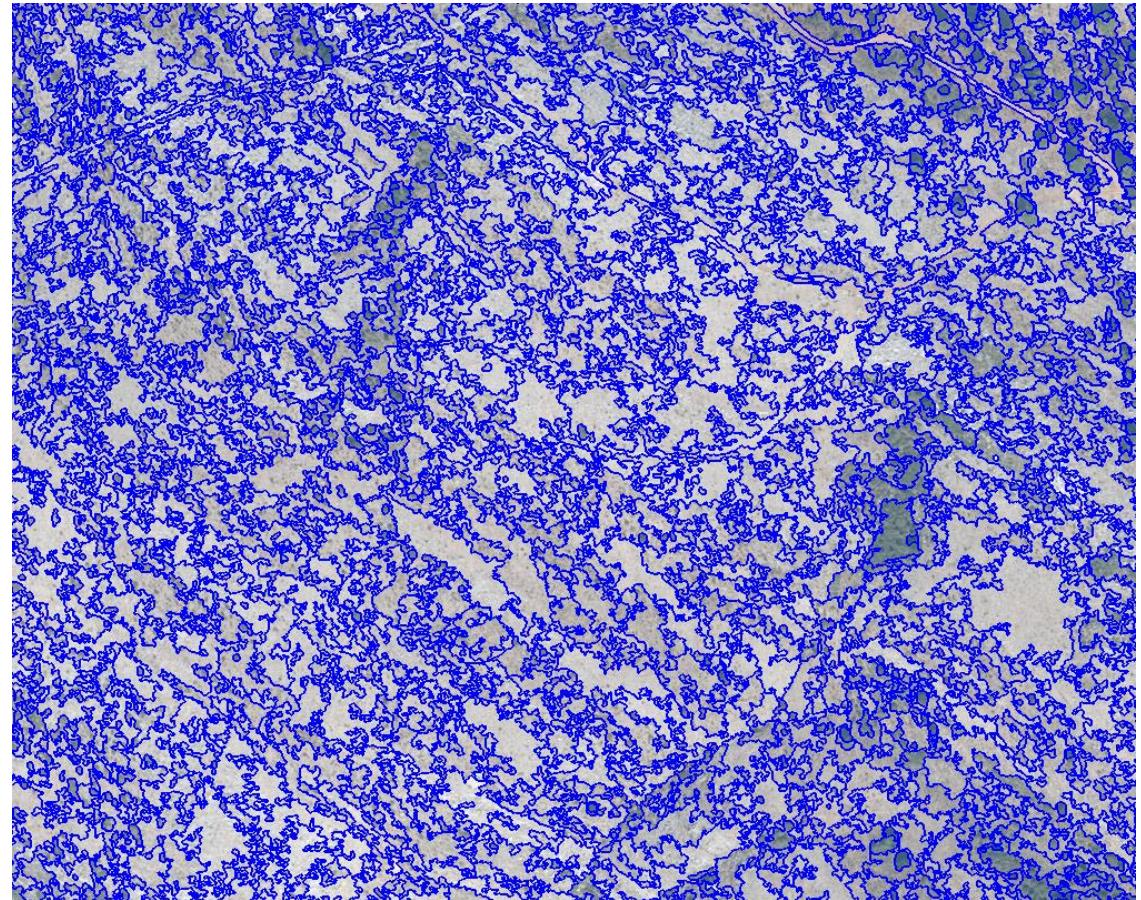
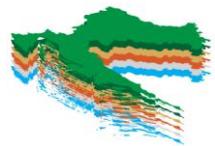


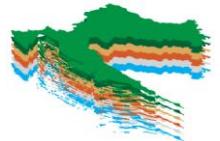


# Prvi korak: Multiresolucijska segmentacija- Početna

- Cilj: razdvojiti snimku u mnogobrojne dijelove bazirano na karakteristikama piksela
- Ključan je izbor slojeva i parametara
- Image layer weights: DOF R, G, B, CIR, NDVI, NDWI
- Algoritam: Random forest, Max number of trees: 100
- Scale parameter(Mjerilo): 25, Oblik: 0, Kompaktnost: 0.5

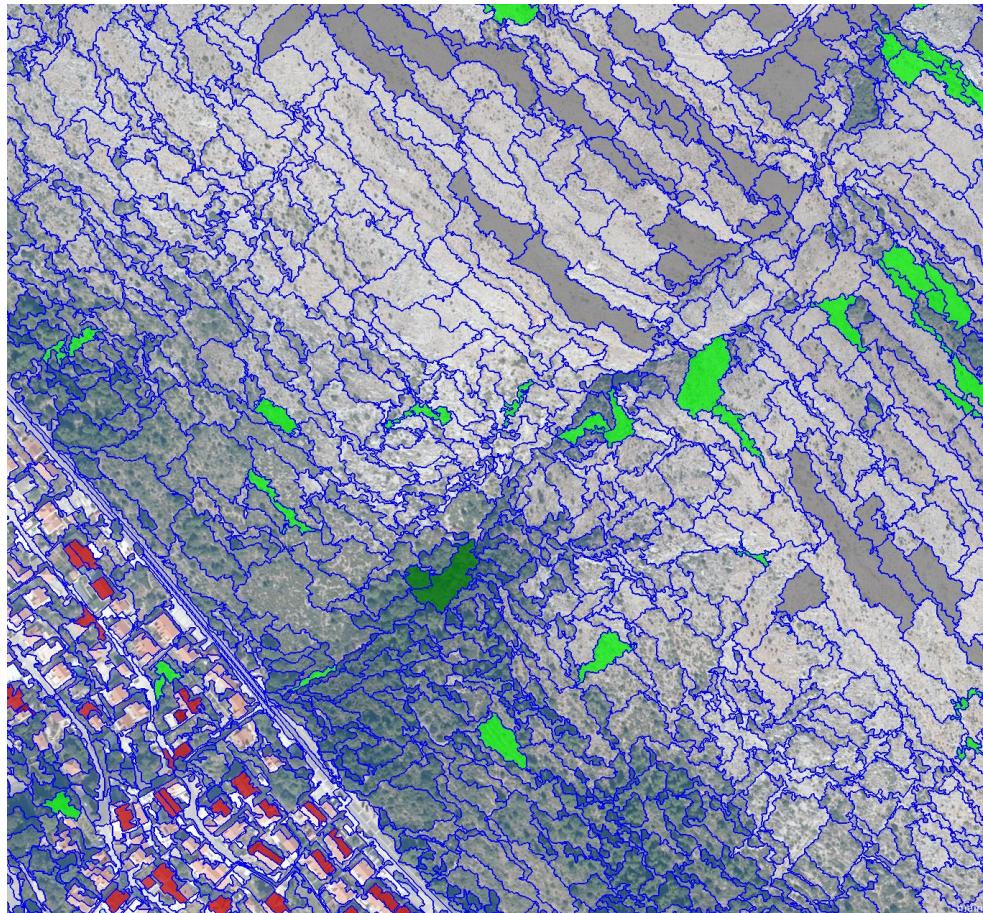
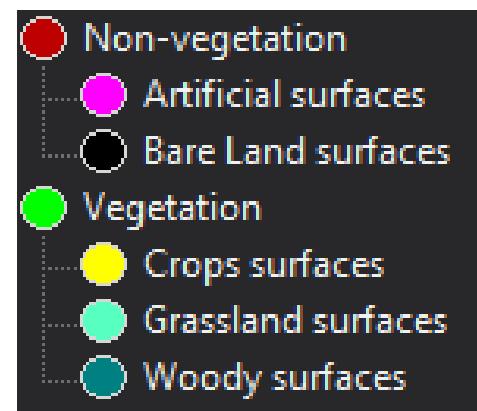


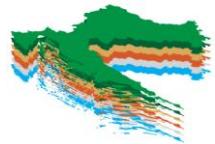




# Drugi korak: Konverzija vektorskih podataka u uzorke

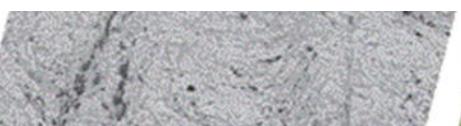
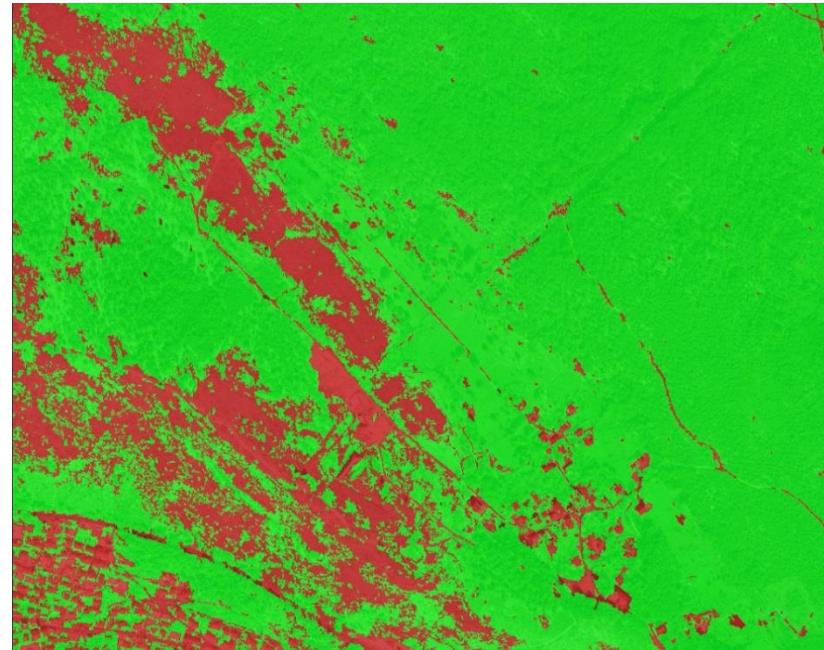
- Trening uzorci za objektno orijentiranu Nadziranu klasifikaciju
- Predstavljeni slojevi pridodaju statističku vrijednost objektima nastalima u segmentaciji

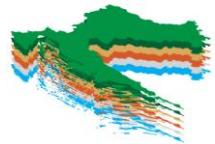


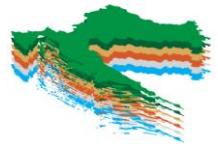


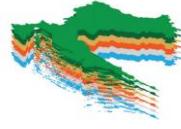
# Treći korak: Nadzirana klasifikacija 1

- Izbor algoritama: Random forest, Support vector machine (SVM)
- Classifier: Random forest, Max tree number: 100
- Slojevi korišteni za pridodavanje statističkih vrijednosti objektima: Mean NDWI, Mean NDVI, Mean NDSI, Max NDVI, St. dev. NDVI, Range NDVI
- Klase: 1. Vegetation, 2. Non - Vegetation









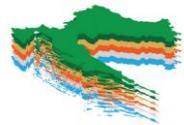
## Multiresolution segmentation - Vegetation

- Image layer: DOF R, G, B, CIR, NDVI
- Scale parameter 50, Shape: 0.3, Compactness: 0.5

## Multiresolution segmentation – Non Vegetation

- Image layer: DOF R, G, B, CIR, NDVI
- Scale parameter 50, Shape: 0.1, Compactness: 0.5

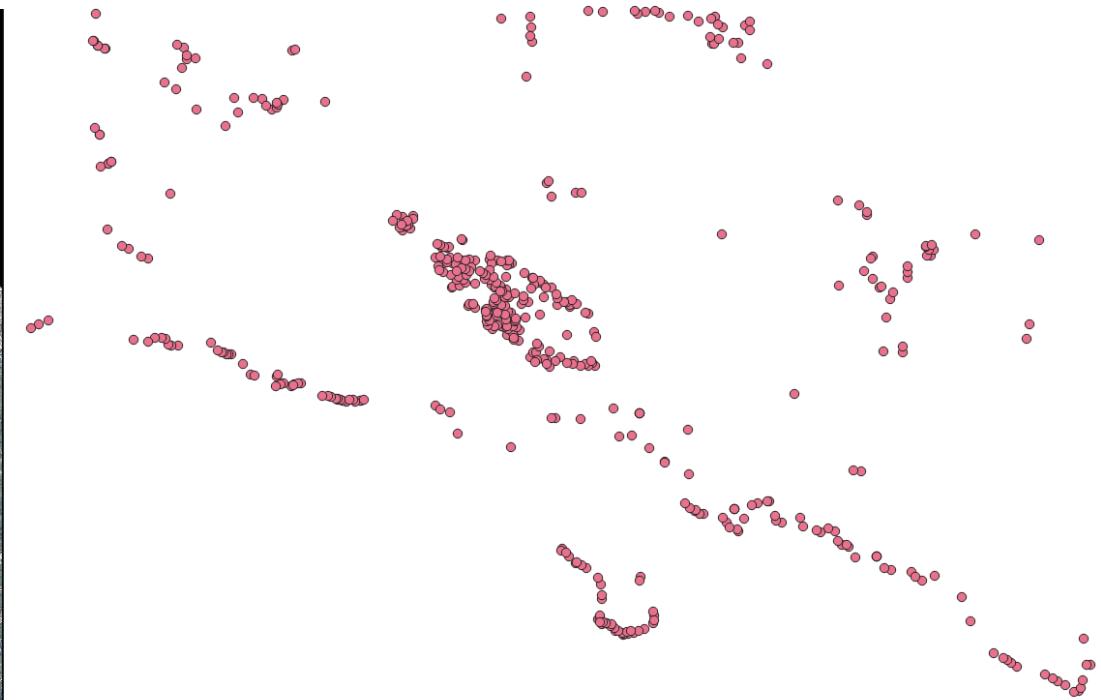




Work on 2020 LC layer methodology

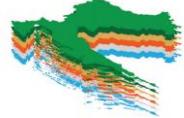
# Convert thematic objects to samples – centroidi klase

## Bare land surfaces



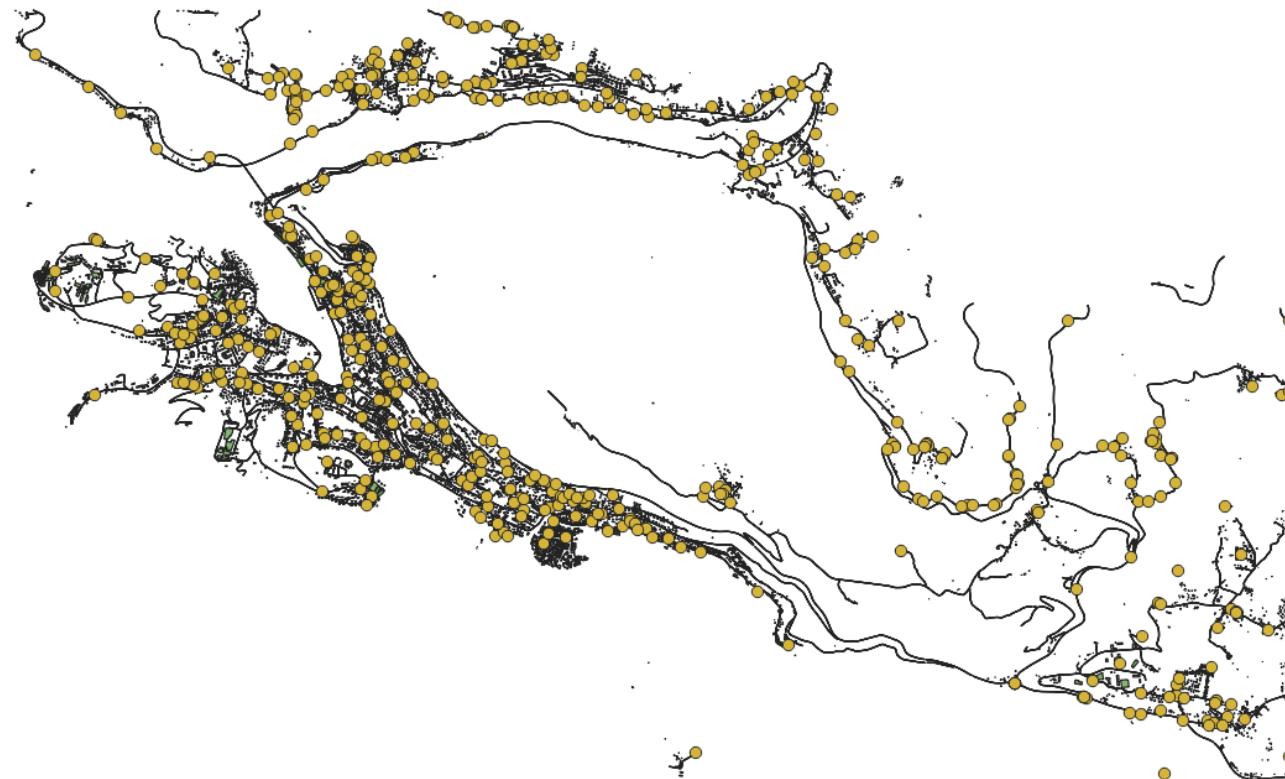
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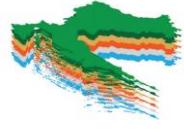
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# Convert thematic objects to samples – centroidi klase Artificial surfaces



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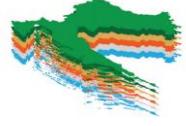




## Nadzirana klasifikacija 2 – Non-vegetation

- Algorithm: SVM, C: 100, gamma: 0.1
- Slojevi korišteni za pridodavanje statističkih vrijednosti objektima : Max NDVI S2, Max NDTI, Sum NDTI
- Karakteristike objekata korišteni za Nadziranu klasifikaciju : Kompaktnost, Indeks oblika, Duljina/širina

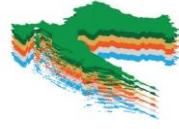




## Nadzirana klasifikacija 2 - Vegetation

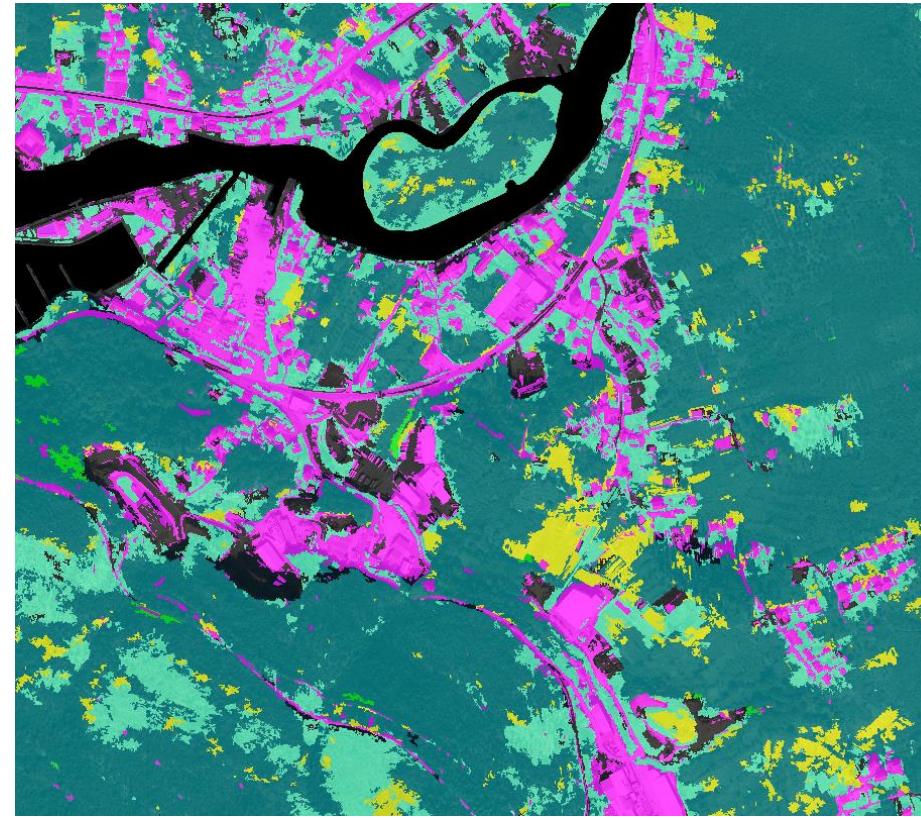
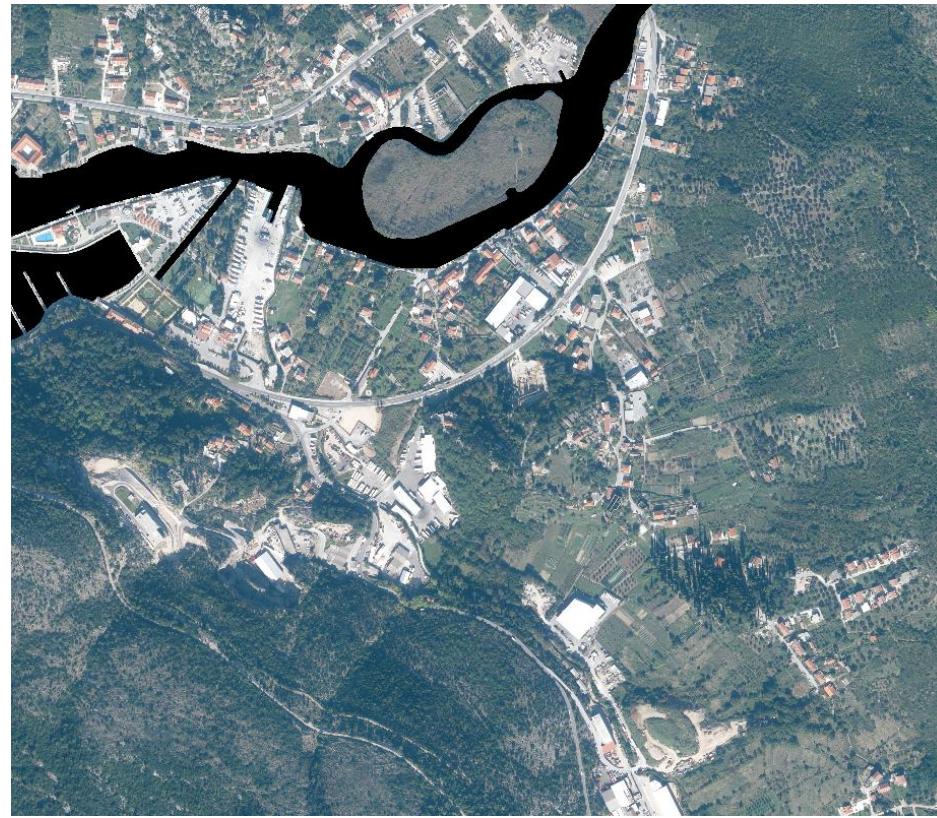
- Algorithm: SVM, C: 100, gamma: 0.1
- Slojevi korišteni za pridodavanje statističkih vrijednosti objektima: Mean NDVI, Max NDVI S2, St. Dev. NDVI S2, GLCM Homogenost NDVI
- Karakteristike objekata korišteni za Nadziranu klasifikaciju: Rectangular fit (pravokutni oblik)



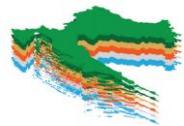


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## Finalni rezultati

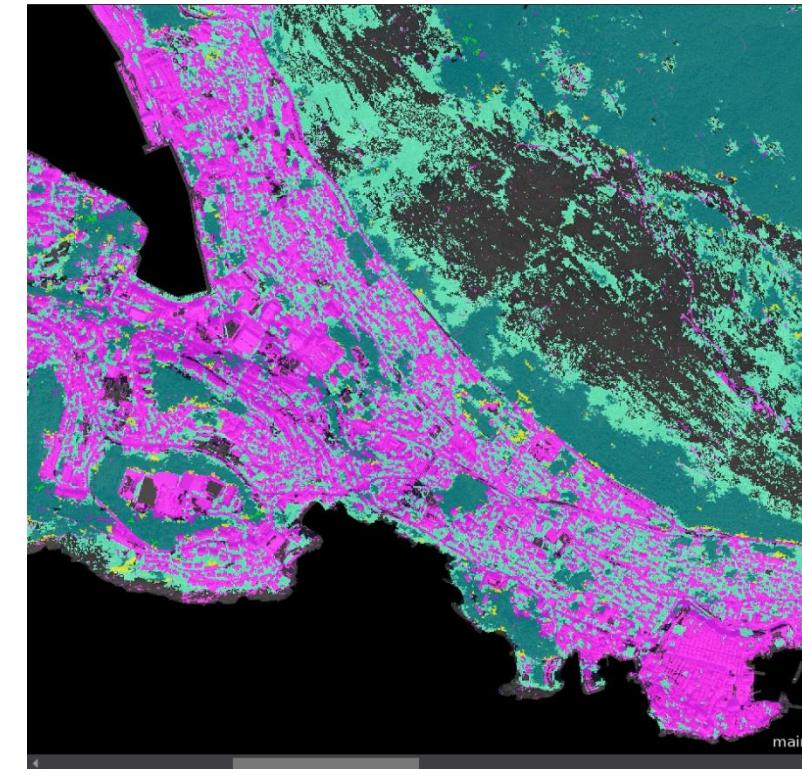


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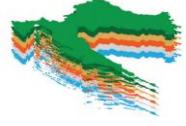


## Work on 2020 LC layer methodology

## Finalni rezultati



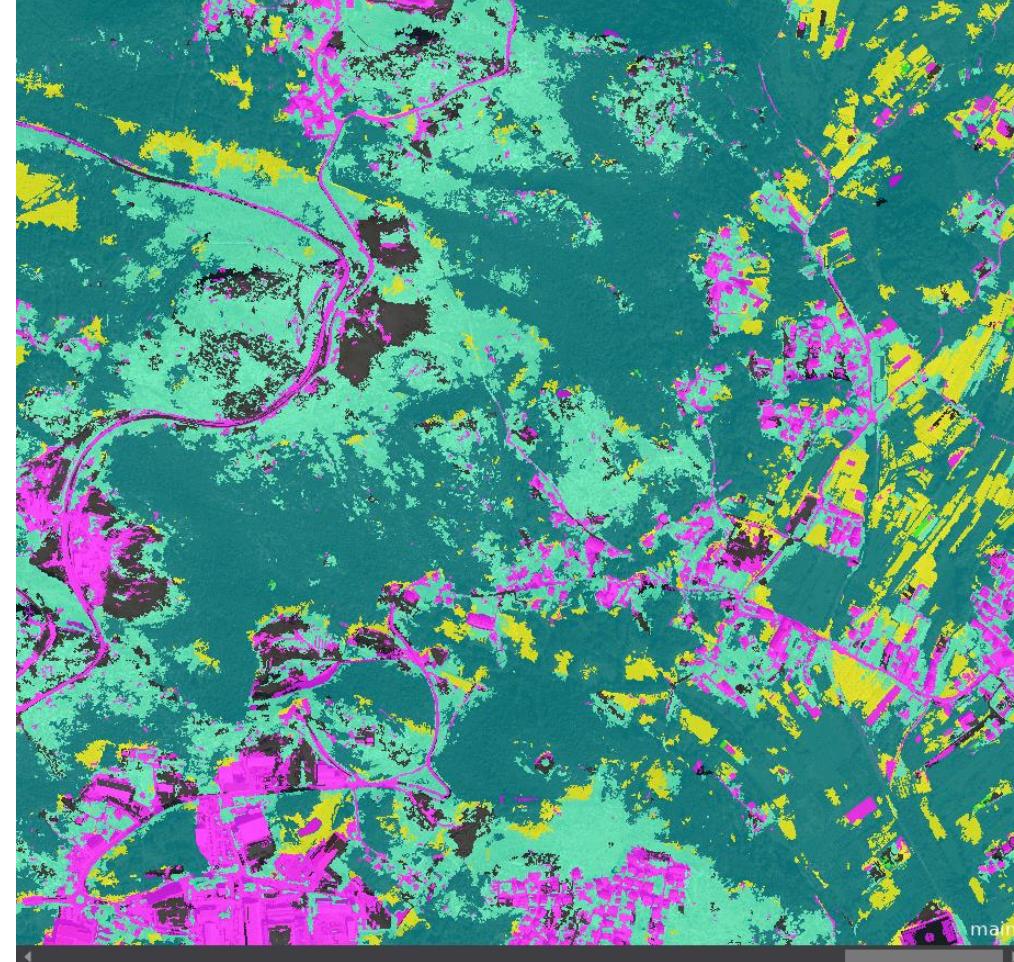
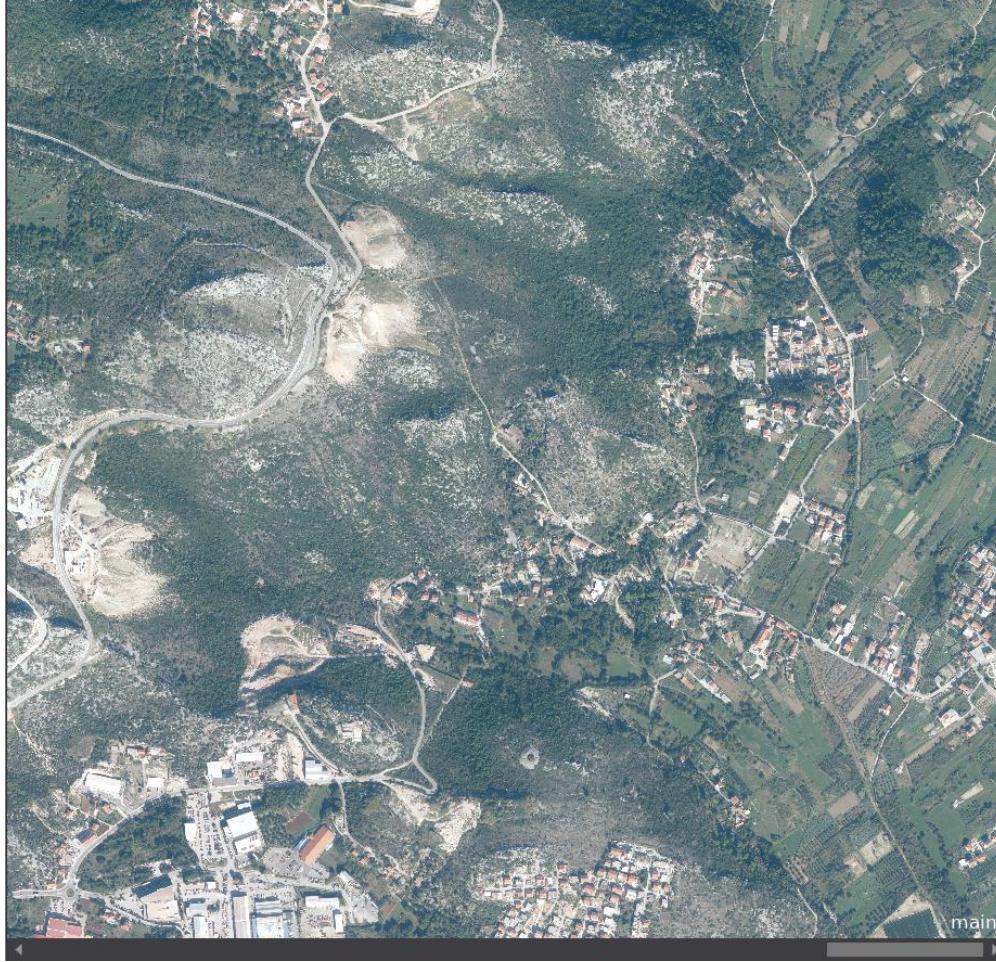
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# Finalni rezultati

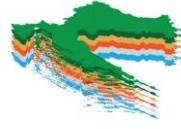
- Non-vegetation
- Artificial
- Bare Land
- Vegetation
- Crops
- Grassland
- Woody

Work on 2020 LC layer methodology



## Work on 2020 LC layer methodology

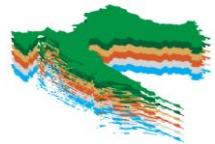
Klasa	Površina (ha)
Artificial surfaces	478
Bare land surfaces	479
Crops surfaces	116
Grassland surfaces	1003
Woody surfaces	2040
Total	4116



## 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 koristeći nDSM?





# Hvala na pažnji!

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