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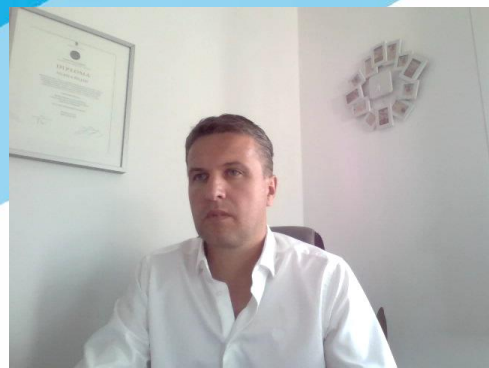
Development of the new methodological framework for multiscale modelling of urban pluvial flooding

Ante Šiljeg, Vlatko Roland, Lovre Panđa, Ivan Marić, Fran Domazetović, Silvija Šiljeg, Rina Milošević
Department of Geography, University of Zadar, Trg kneza Višeslava 9, 23000 Zadar

GAL GEOSPATIAL ANALYSIS LABORATORY
Department of Geography - University of Zadar



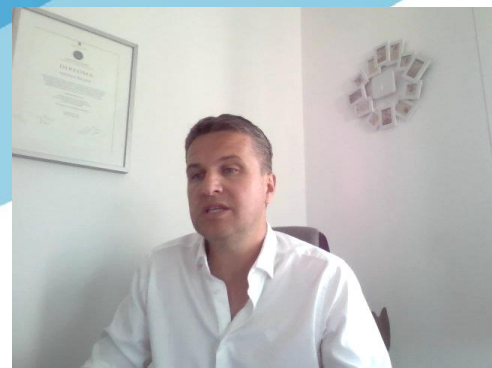
Consequences of the catastrophic flood event in Zadar 9/11/2017.

INTRODUCTION

- Floods have been always a serious natural threats significantly affecting many aspects of human activities and people's lives, especially in UA.

- In the future, an increase in urban sprawl, uncontrolled urbanization and in extreme precipitation events are expected, which imposes the need to develop a comprehensive (multiscale) methodological framework.

- There are numerous different approaches for modeling urban pluvial floods.



STUDY AREA

The City of Zadar is located in the middle of the eastern Adriatic coast (Fig. 1).

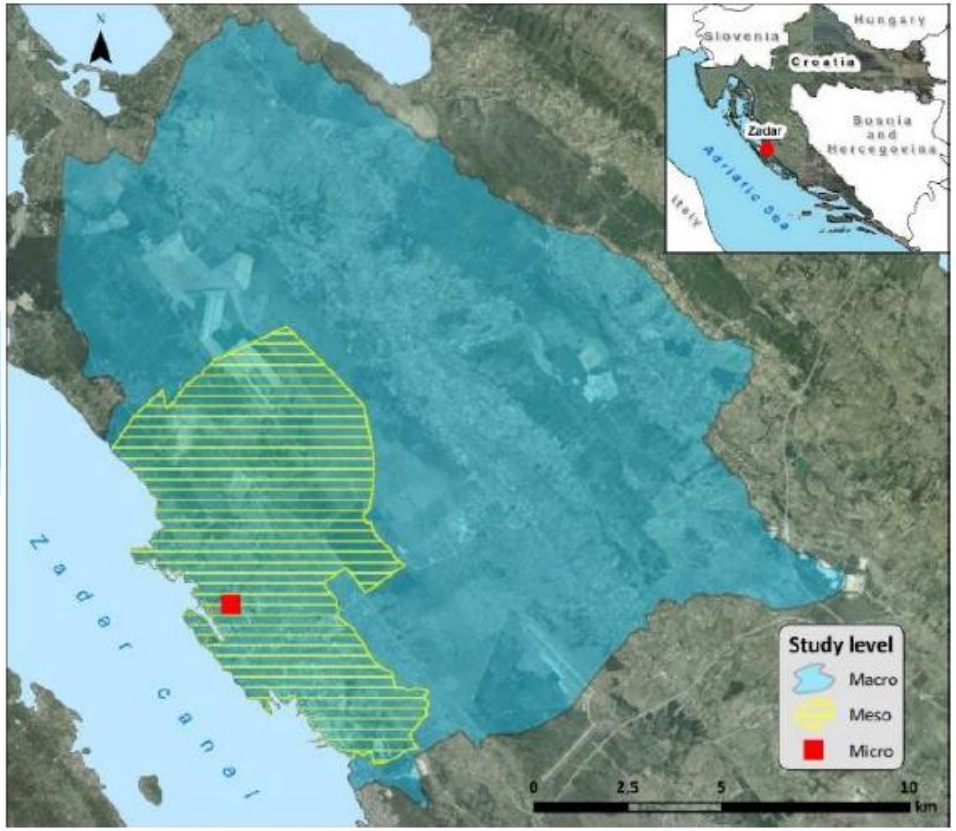
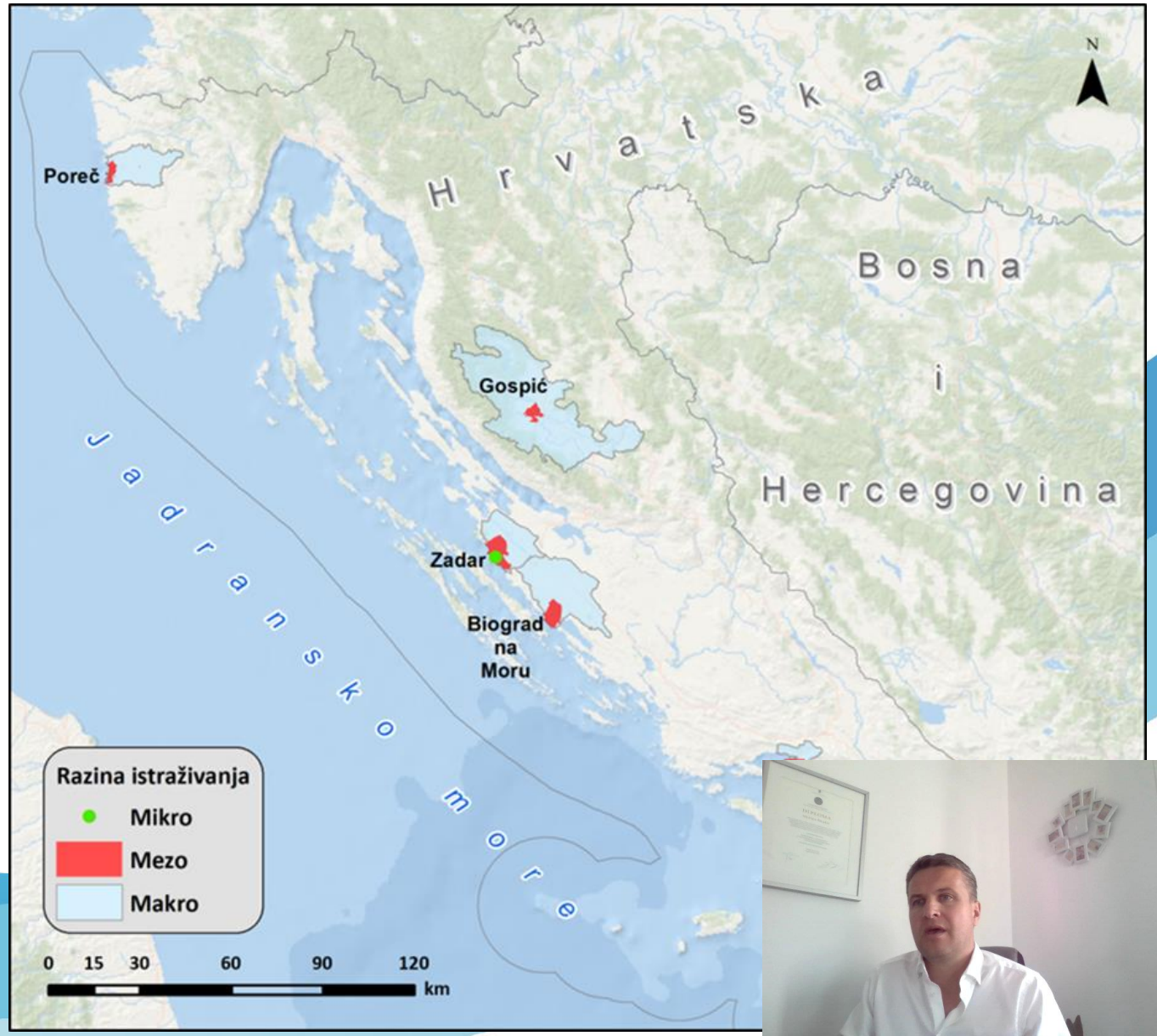


Figure 1. Research levels of Zadar pilot area.



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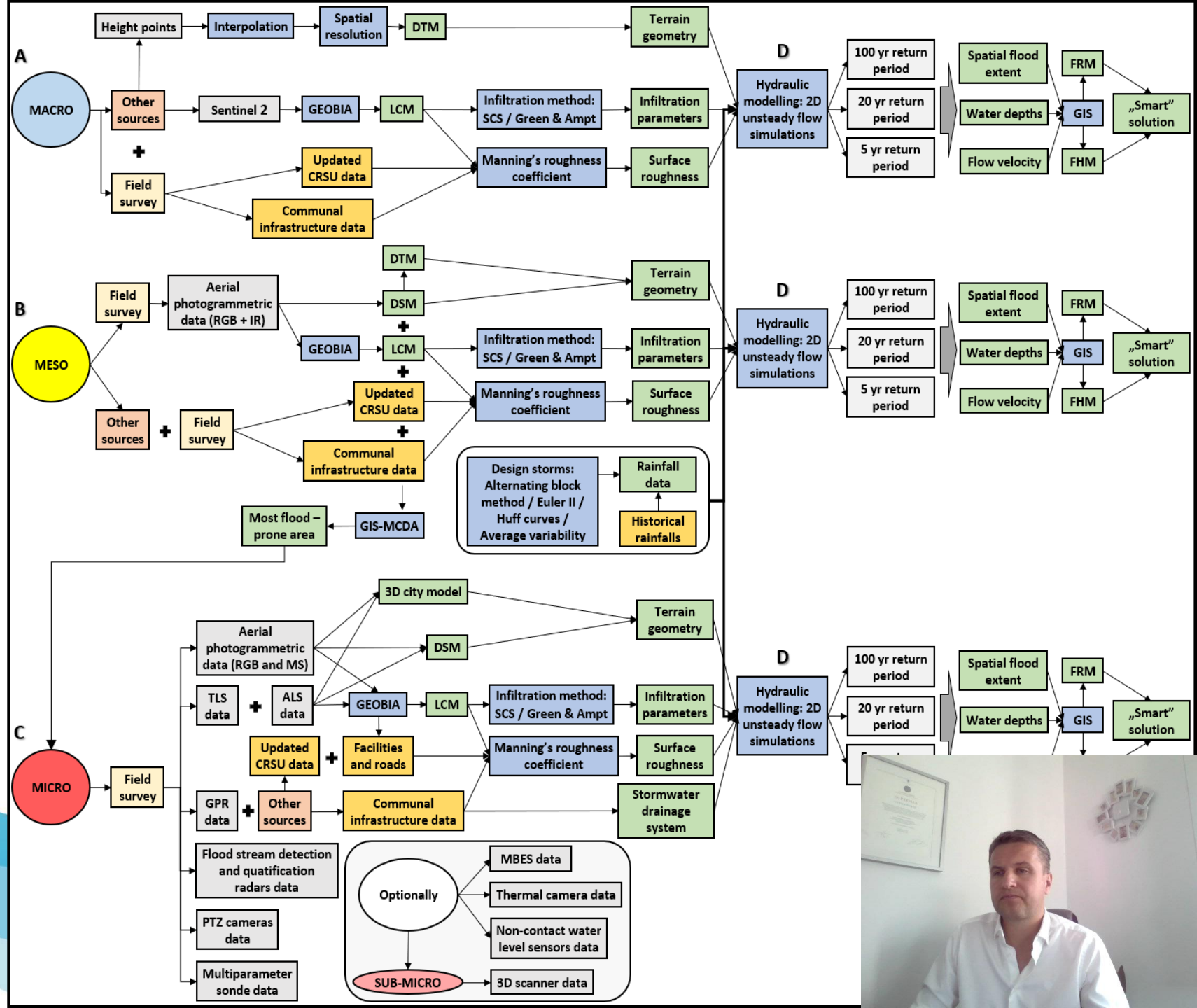
MATERIALS AND METHODS

Methodology is divided into three levels of research:

macro, meso, and micro.



Methodological framework for modelling urban pluvial floods

MATERIALS AND METHODS

- Methodology is divided into three levels of research: macro, meso, and micro.

- **The macro-level** - catchment area of the Zadar settlement
- data will be collected by photogrammetric restitution (by State Geodetic Administration – SGA) and used to create DTM
- satellite imagery (Sentinel 2) with a spatial resolution of 10 m will be used to create a land cover model (LCM) using GEOBIA

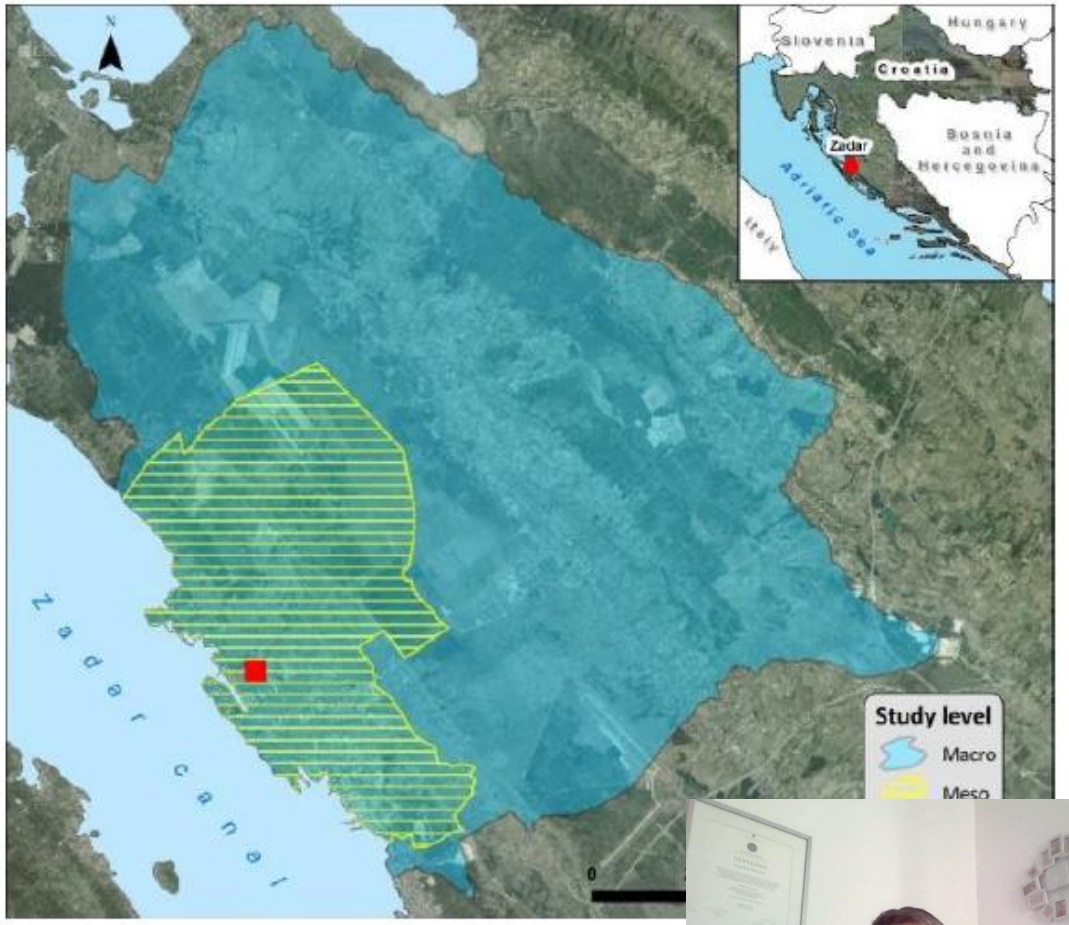
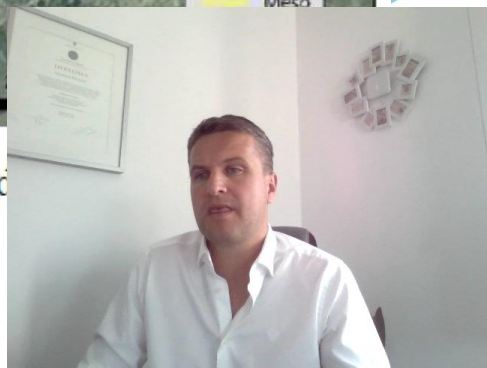


Figure 1. Research levels of Zad



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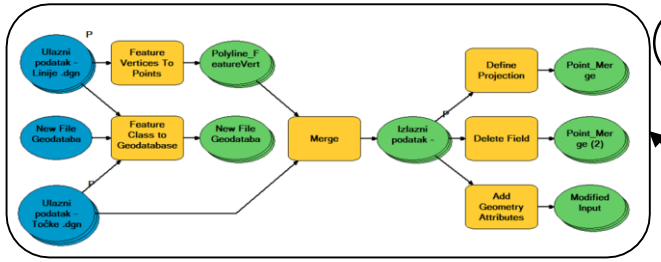
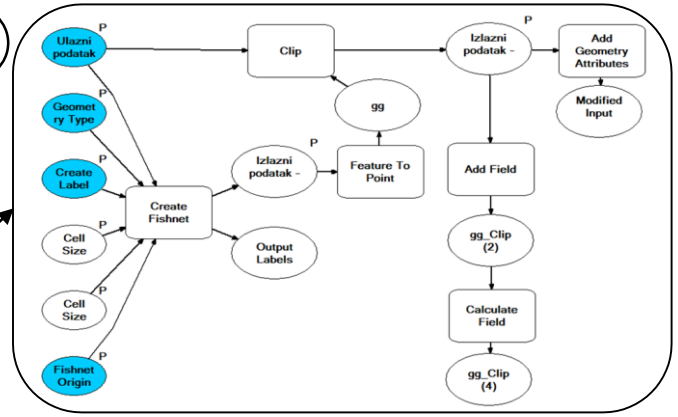
Macro level of research

Automated process for generating DTM

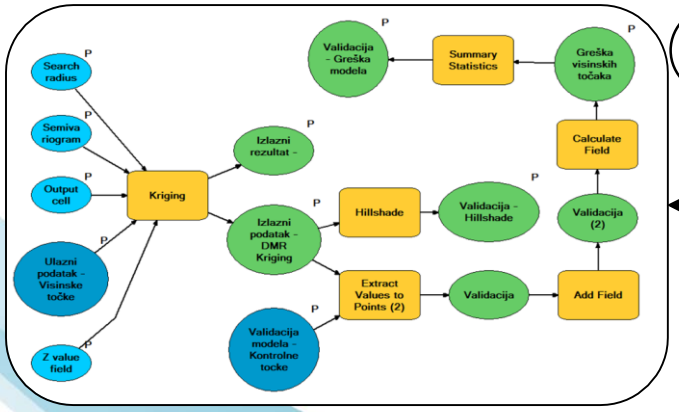
1)



2)

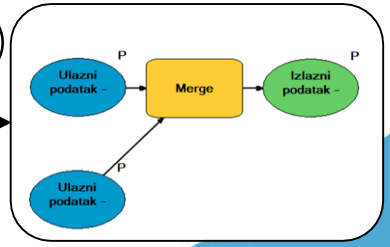


5c)

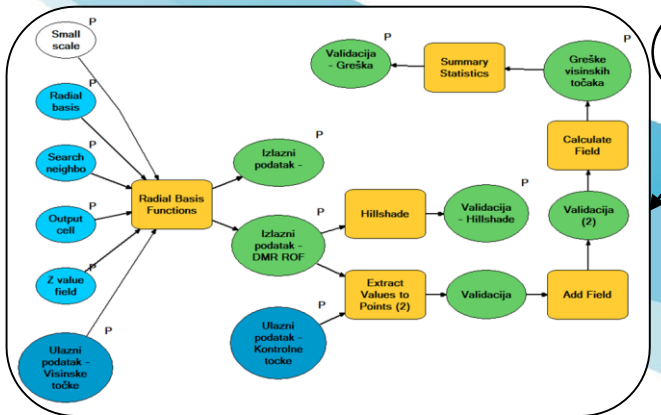


APIDMR - STREAM
- 1) Konvertiranje (.dng to .gdb)
- 2) Točke - ekstrapolacija
- 3) Spajanje točaka
- 4) Prostorna rezolucija
- 5a) Interpolacija NN i validacija
- 5b) Interpolacija RBF i validacija
- 5c) Interpolacija Kriging i validacija

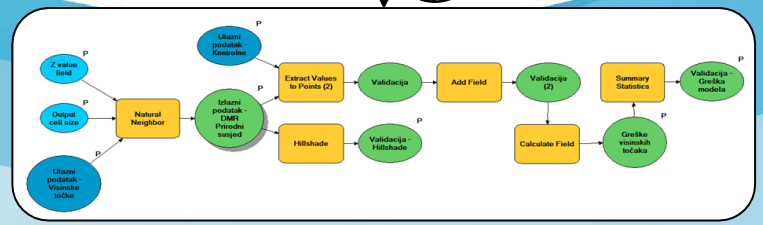
3)



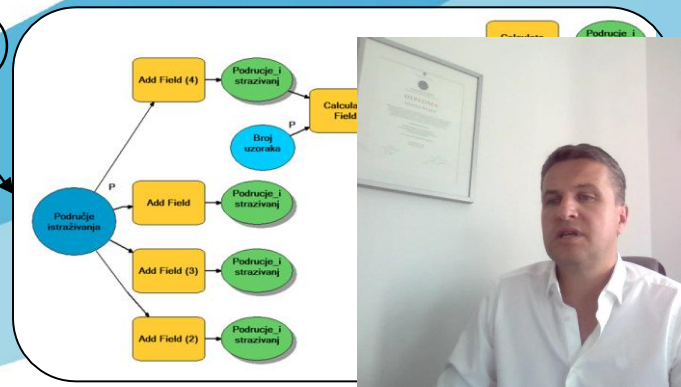
5b)



5a)



4)



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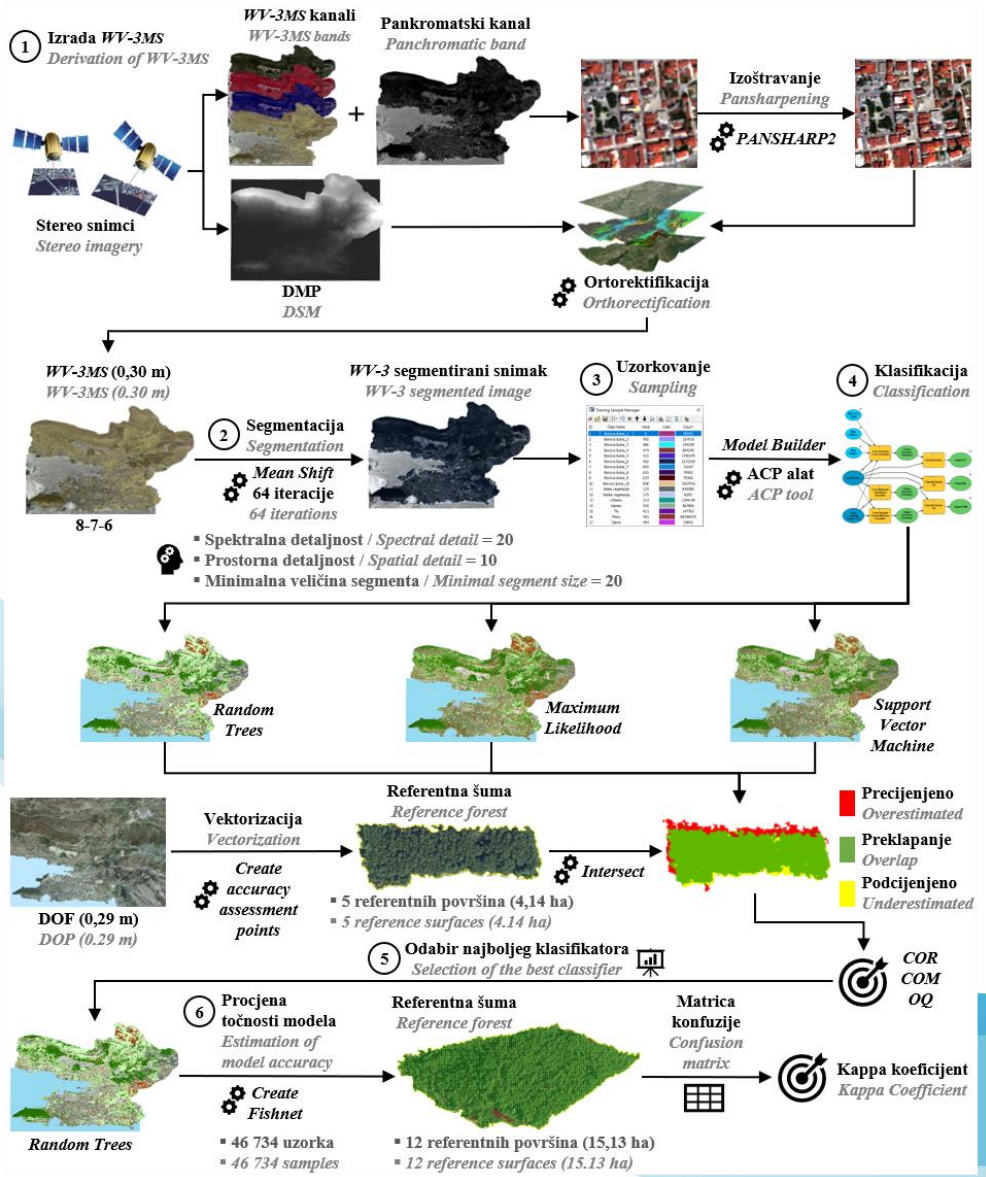
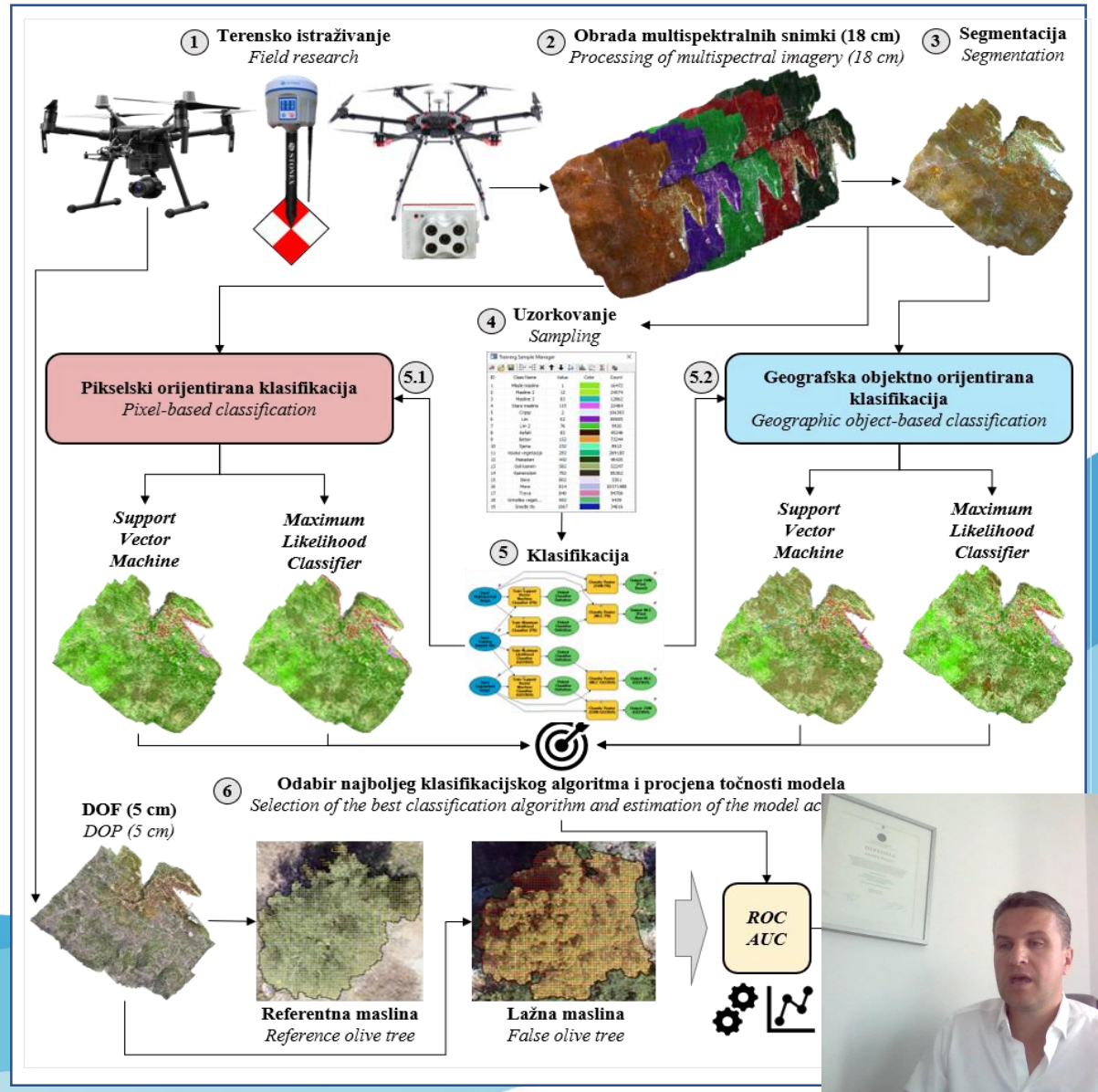




MATERIALS AND METHODS

- Methodology is divided into three levels of research: macro, meso, and micro.
- **The meso-level** - the administrative border of the Zadar settlement
- Aerial photogrammetric data (RGB + infrared (IR)) from the SGA will be used to create a digital surface model (DSM), DTM and LCM
- WorldView2 multispectral and stereo images

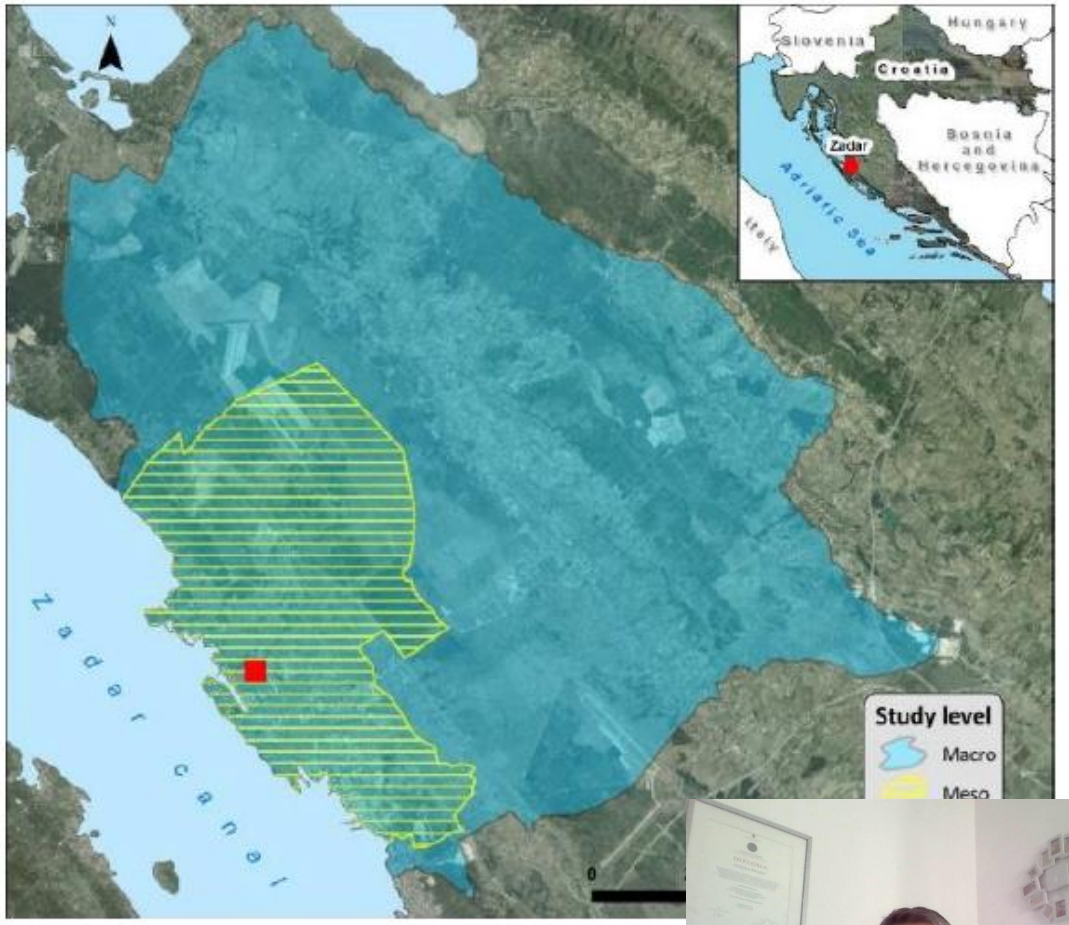
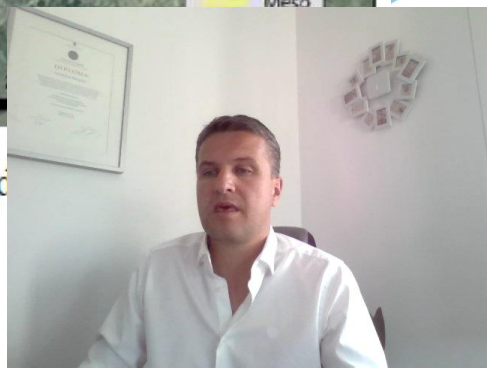
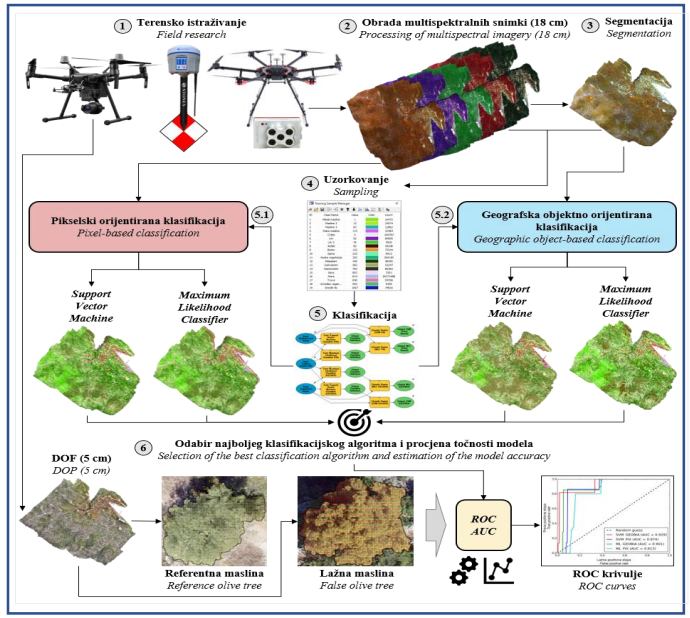


Figure 1. Research levels of Zad

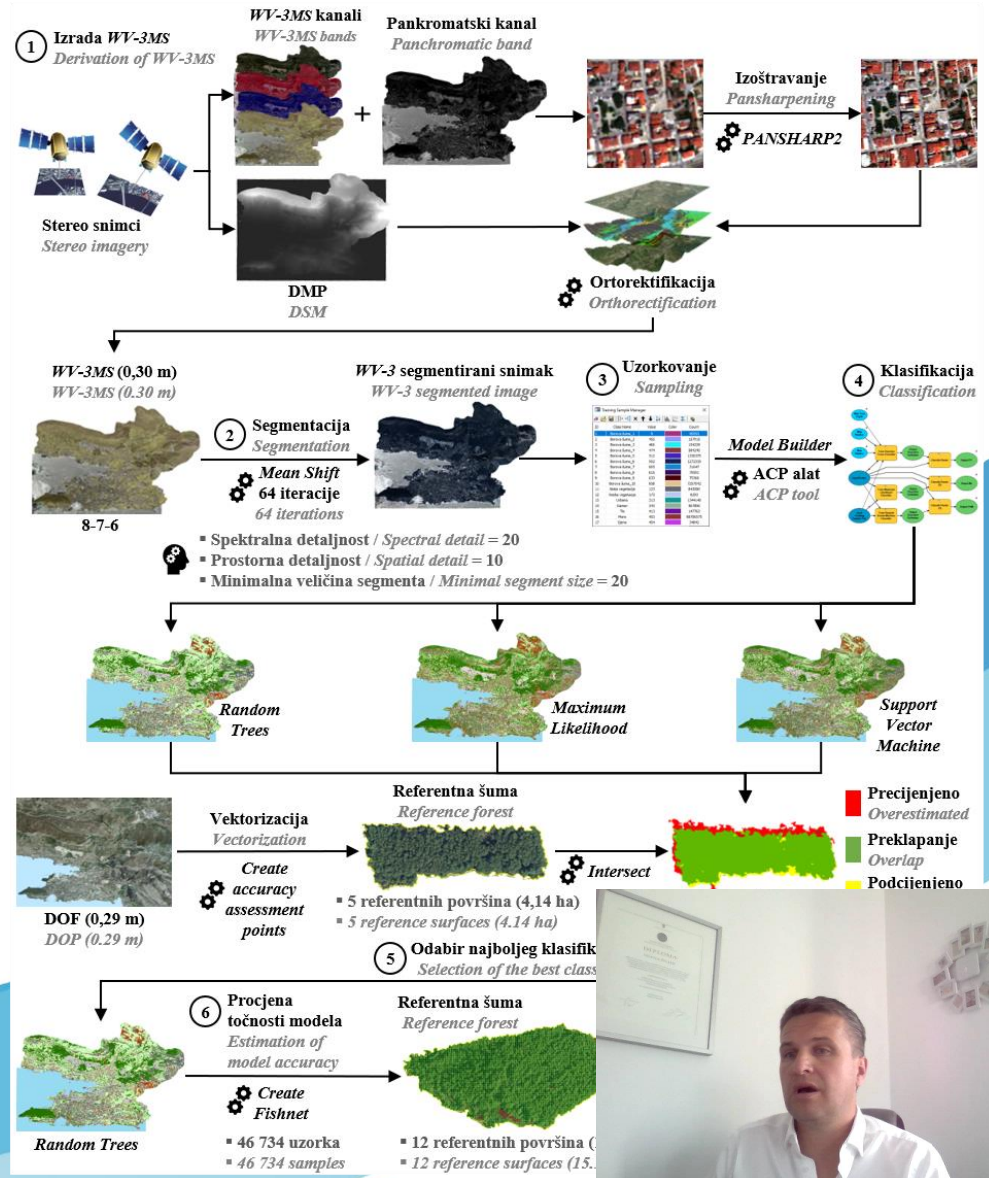


DEM (High resolution <1 m)



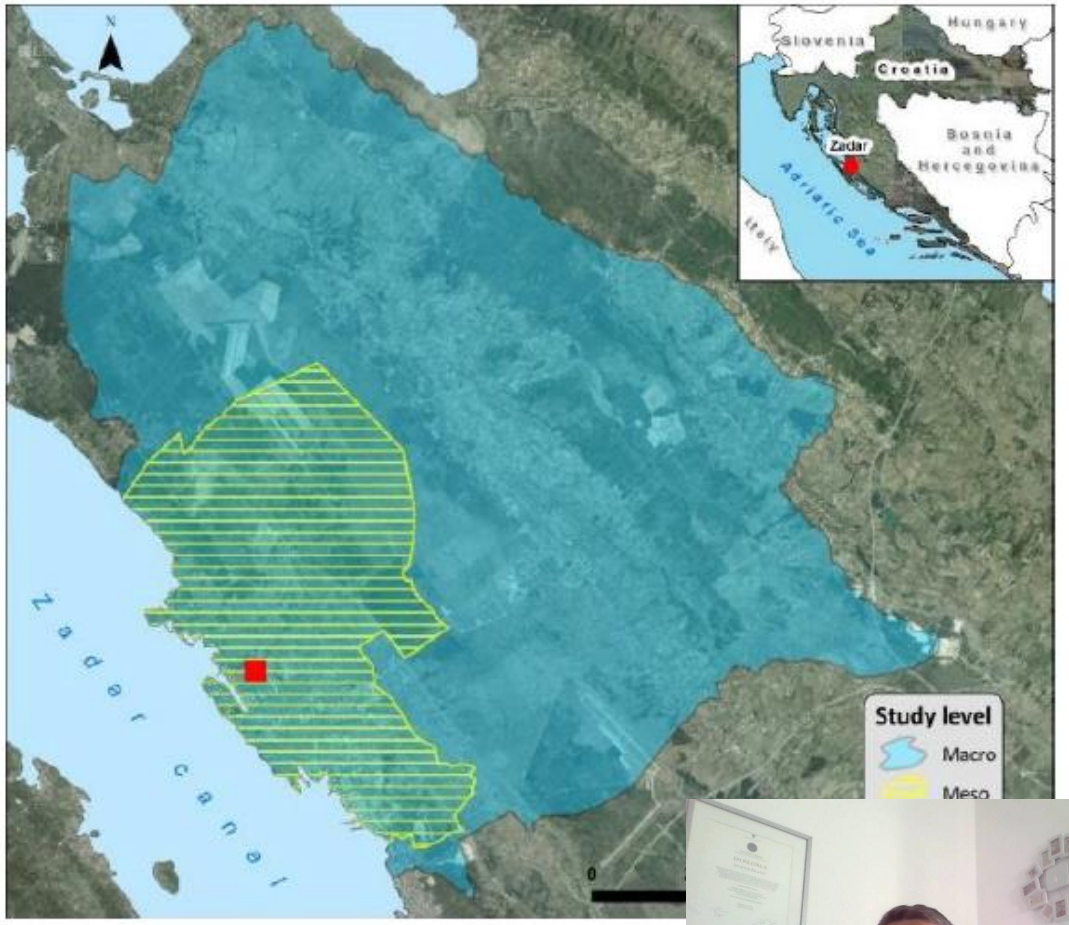
DOF (High resolution <1 m)

MS (High resolution <1 m)



MATERIALS AND METHODS

- Methodology is divided into three levels of research: macro, meso, and micro.
- **The micro-level** - the administrative border of the Zadar settlement
- aerial photogrammetric (RGB and multispectral images (MS)), Terrestrial Laser System (TLS), and Aero Laser System (ALS) data all with a spatial resolution of 5 cm will be conducted.



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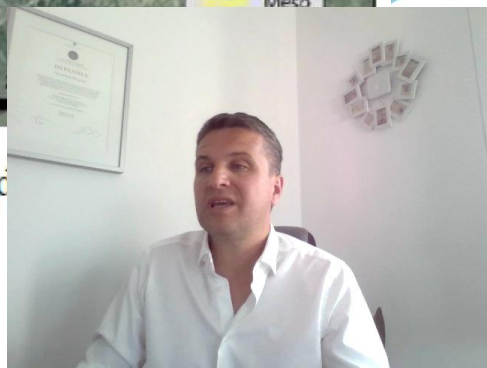

- **CONCLUSIONS**

- The main purpose of pluvial flood modeling in urban areas is to obtain results for the preparation of flood hazard maps, which will be used to prepare flood risk maps.
- Flood hazard maps will be derived for three scenarios:
- 100yr return period; 20yr return period; 5yr return period.

- Pluvial floods in urban areas will be simulated by a 2D hydraulic model at all three levels
- The hydraulic model will have sub-grid bathymetry to include irregular bathymetry at each computational cell.
- Considering that pluvial floods are generated by extreme rainfalls, special atte be placed on the selection of appropriate design storm to describe a synthetic hyetograph

- Thank you for your attention!