Geological Model of Pićan Area, Istria

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Krešimir Petrinjak[1]*, Stanislav Bergant[1], Nikola Belić[1], Tihomir Frangen[1]

[1] Croatian Geological Survey, Sachsova 2, 10000 Zagreb
*corresponding author: kpetrinjak@hgi-cgs.hr

https://geosekva.wordpress.com/

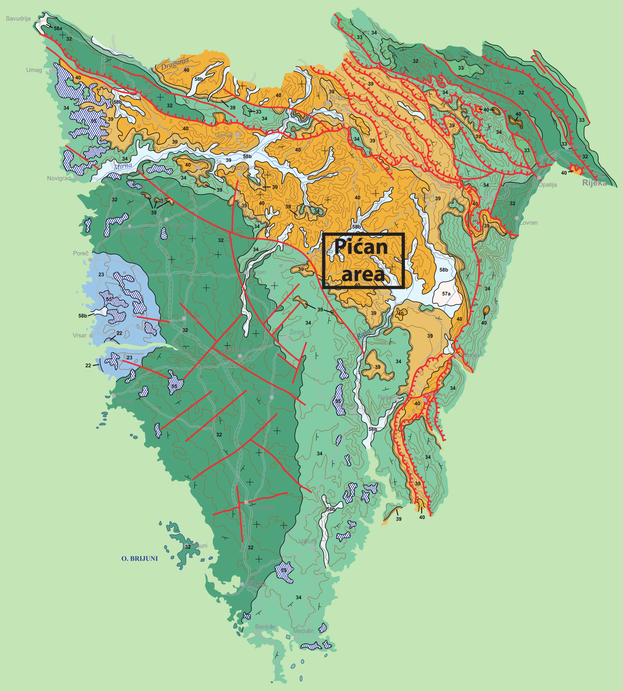

Fig. 1 Geological setting of Pićan area marked on Basic Geological map 1 : 300 000 of Croatia.

Fig. 4 A geologist operating e-Bee plus UAV used for creating orthophoto image and DSM (Digital Surface Model) of the Pićan area.

e-Bee plus – fixed wing drone by senseFly:
- Wingspan – 110 cm
- Weight (with standard camera & battery) – 1.1 kg
- Material – EPP foam, carbon structure & composite parts
- Battery – 3-cell Lithium-Polymer (0.3 kg)
- Nominal endurance – flight time – 59 minutes - field experinece – average of 45 minutes. (vary greatly depending on external factors such as wind, altitude change and temperature)
- Cruise speed 40 – 110 km/h (11 – 30 m/s)
- Wind resistance – up to 12m/s (45 km/h)
- Ground modem range – approx. 3km
- Maximum working range – approx. 8 km

senseFly S.O.D.A. Camera:
- 20 Mpx RGB sensor with 28mm focal lens (focal length fixed)
- 76 grams
- Automatic capture settings optimised for used in drones
- Removable protective lens
- The camera is controlled by the drone's autopilot
- Monitoring the camera thorugh eMotion
- Picutre format: JPG / JPG + DNG (raw photos)

Planning missions and managing eBee plus via eMotion software.
Processing flight data with photogrammetry software Pix4Dmapper.
Covering area of around 60 km2 in 5 days (11 km2/day).
8 batterys, chargers, laptop & power generator.
Ground sampling distance (GSD) approx. 6 cm.

During geological mapping of Istria (Croatia) numerous carbonate beds (megabeds) were recorded within the informal lithostratigraphic unit Istrian flysch. Istrian flysch deposits are mostly characterized by typical alternations of hemipelagical marl and gravity-flow deposits (BERGANT et al., 2003). The monotonous succession of marl and mixed carbonate-siliciclastic sandstone is intercalated with several relatively thick carbonate beds - megabeds, composed of breccia, conglomerate, bioclastic arenite/siltite and marl. The thickness of these megabeds varies between 0.5 – 5 m, rarely over 10 m. The megabeds are interpreted as complex sequences of rockfall, debrite and turbidite deposits, characteristic for the lower part of the basin fill (BERGANT et al., 2003). In eastern Istria, near the town of Pićan, an unusual carbonate layer is mapped, named "Pićan bed", whose genesis cannot be explained by the depositional mechanisms of turbidite currents or debris flows, characteristic for the Istrian Flysch deposits. For this purpose, a more detailed field investigation was performed and a sedimentary log (Pić-I) was recorded within a tectonically undisturbed succession of Paleogene deposits (Fig. 2). At the base of the succession an informal lithostratigraphic unit "Foraminiferal limestone" gradually transitions into "Marls with Crabs" and further into "Globigerina marls" informal lithostratigraphic units. The interval of massive "Globigerina marls" is approx. 100 m thick and transitions into the Istrian flysch lithostratigraphic unit, here represented with this unusual "Pićan bed". Flysch deposits are composed of calcarenite beds, marl, sandstone, and, of course, megabeds are well documented in the surrounding area. The sedimentary log was used to complement the new lithostratigraphic map of the area (Fig. 3, PETRINJAK et al., 2018).

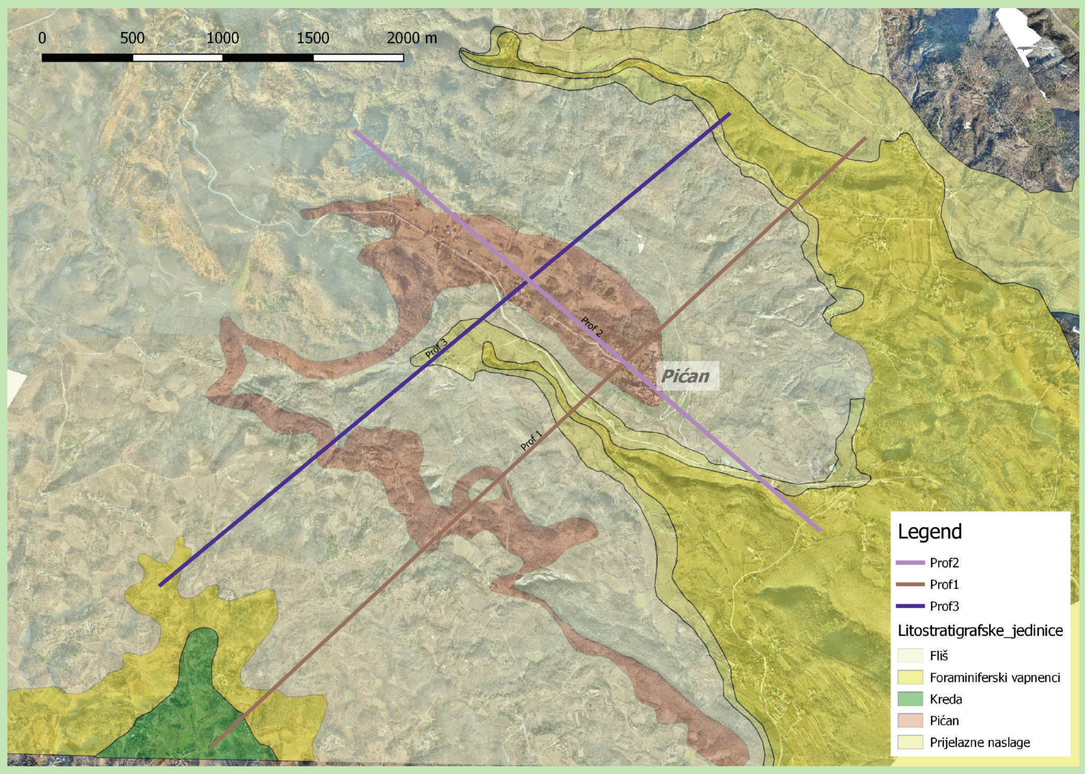

Fig. 3 Pićan area geological map

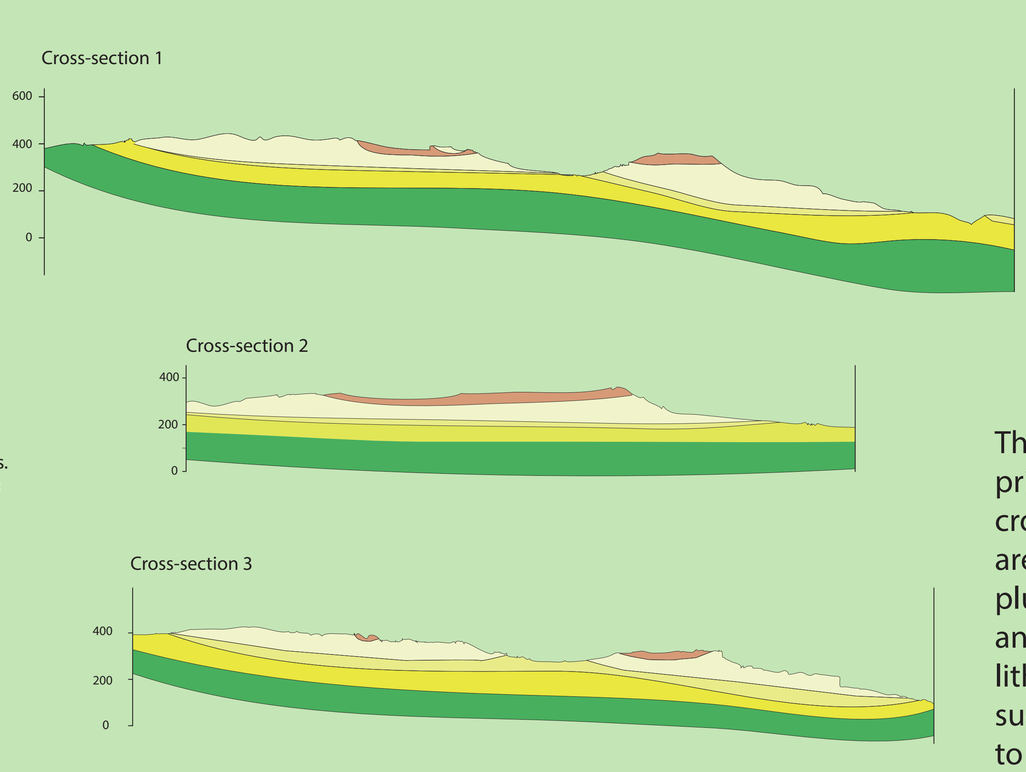

Fig. 5 Geological cross-sections of Pićan area.

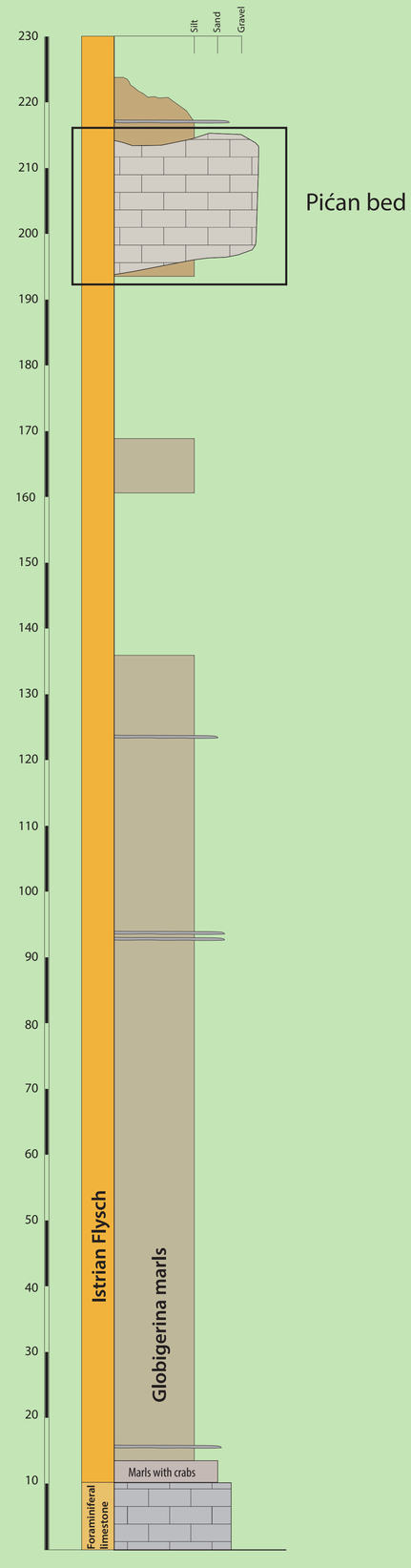

Fig. 2 Sedimentary log of the Pićan area.

The geological model of the Pićan area was built based primarily on the lithostratigraphic map and geological cross-sections, and the Digital Surface Model (DSM) of the area. The data were modelled using Quantum GIS, and plug-ins for creating geological cross-sections (qProf), and 3D visualization (Qgis2threejs). The new lithostratigraphic map together with other available data, such as Digital Orthophoto Images of the area were used to construct a series of geological cross-sections needed for the model, while an Unmanned Aerial Vehicle (UAV) was used to record the DSM of the area.

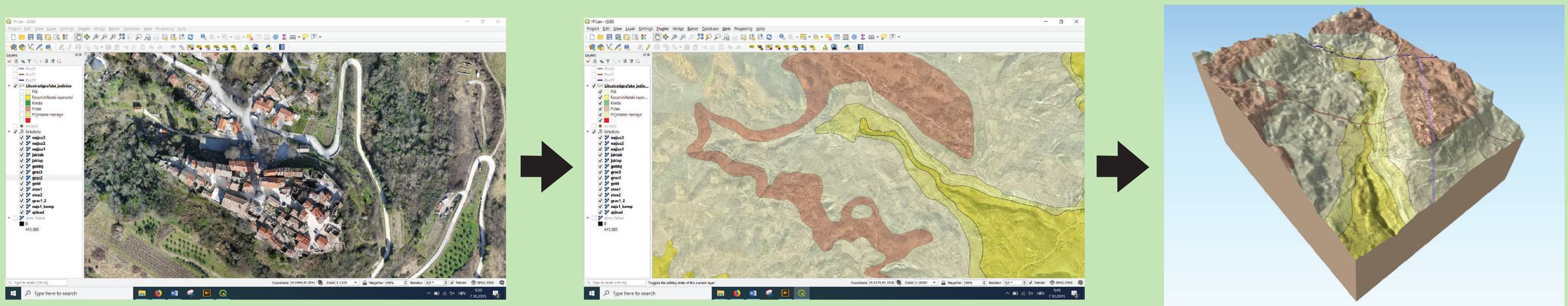

Fig. 6 The process of creating geological map and cross-sections based on Ortho Photo images and photogrametrically created DSM (Digital Surface Model), and 3D view using Qgis2threejs.

Finally, the geological model of the Pićan area displays, faithfully as possible, the spatial distribution of the "Pićan bed" and the interesting geological setting of the Pićan area, Istria.

ACKNOWLEDGEMENTS:
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