

Abstract of the PhD Thesis Proposal Presentation

Palustrine and marginal marine deposits of a synorogenic carbonate platform: the Liburnian Formation of the northern part of the Adriatic Carbonate Platform

Palustrine carbonates are shallow fresh-water deposits showing evidence of pedogenic modification. In the stratigraphic record, palustrine deposits are often associated with sediments of coastal to marginal marine carbonate depositional settings from different tectono-sedimentary contexts. This PhD thesis is aimed at reconstructing the stratigraphic architecture and depositional environments of the Liburnian formation, a major palustrine-marginal marine carbonate complex deposited in the northern part of the Adriatic Carbonate Platform (AdCP). This sedimentary complex represents the lowermost unit of the synorogenic succession deposited on different parts of AdCP from the uppermost Cretaceous to the middle Eocene. Research is focused on outcrops and cores from the Kras (Karst) Plateau and will include selected examples from Istria and a broader Adriatic-Dinaric region.

A general working hypothesis of the PhD project is that reconstructing the sedimentary model and depositional history of the Liburnian formation in the study area (Maastrichtian-Paleocene) may provide insights into global climate change, regional basin and karst aquifer evolution, and local carbonate depositional environments.

The research plan is organized into the following interconnected work packages: (1) literature review, definition of knowledge gaps and formulation of a working hypothesis; (2) field work; (3) laboratory work; (4) data analysis and interpretation; and (5) presentation, publication and writing-up thesis chapters.

The first work package is focused on reviewing literature across two main thematic areas: (i) sedimentology of modern and ancient palustrine carbonates, and (ii) the stratigraphy and palaeogeography of the Liburnian formation and corresponding units within the regional context of the AdCP. A synthesis of current depositional models of both classic inland (continental) palustrine settings and those from marine coastal systems shall adequately address the development of accommodation space, control factors on facies distribution, and the exceptional thickness of deposits in parts of the Kras Plateau.

The field work comprises detailed stratigraphic logging, mapping, and sampling of well-exposed, continuous outcrops, exposed along the railway (the second track Divača-Koper), several continuous cores drilled for the railway project, and the motorway roadcuts (between Čebulovica and Kozina) on the southern part of the Kras Plateau. Large outcrops are being surveyed using UAV (drone) to construct 3D photogrammetric digital outcrop models. Areas with discontinuous outcrops are being mapped using lidar, detailed base-maps, and GPS equipment to construct stratigraphic sections throughout the Kras area and at selected sites in Brkini/Matarsko podolje, Čičarija and Istria.

The third work package encompasses laboratory work, consisting of sample preparation, standard carbonate petrography (hand-sample description, thin section analysis, identification of microfacies, depositional and diagenetic features), detailed petrographic analysis (including SEM EDS, CL), and geochemical characterization of carbonates and non-carbonate components ($\delta^{18}\text{O}$, $\delta^{13}\text{C}$, XRD and XRF).

The fourth work package is focused on data analysis, interpretation, visualization (including construction of interpreted stratigraphic logs, correlation charts, facies maps and models, 3D digital outcrop models) and a synthesis of the results.

The fifth work package include drafting of manuscripts, compiling thesis chapters and presenting key findings at national and international scientific meetings and seminars.