Terrestrial deposits: Western Istrian Anticline as an ideal natural laboratory for the study of the regional unconformities in carbonate rocks: [poster]

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Other document types / Ostale vrste dokumenata

Publication year / Godina izdavanja: 2023

Permanent link / Trajna poveznica: https://urn.nsk.hr/urn:nbn:hr:169:248230

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Download date / Datum preuzimanja: 2024-05-14



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TERRESTRIAL DEPOSITS

Western Istrian Anticline as an ideal natural laboratory for the study of the regional unconformities in carbonate rocks



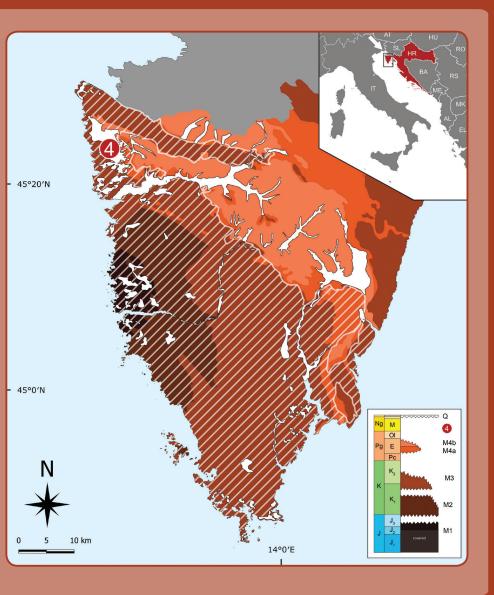




TERRA ROSSA



where can we find it? The southwestern Istrian planation surface, called "Red Istria".



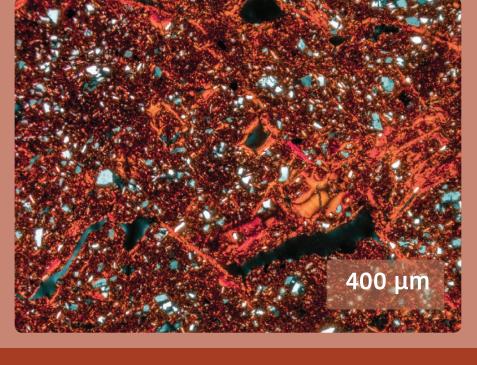
When? From Upper Eocene to Recent.

what happened?

The youngest late Eocene-Recent unconformity was triggered by the collision of the Adriatic Microplate with Eurasian Plate. The duration of the stratigraphic hiatus of the late Eocene-Recent subaerial unconformity in Istria varies. In the areas where flysch was deposited in the latest Eocene, the resulting hiatus is about 35 Ma. On the limbs of the West Istrian Anticline, the hiatus was even longer due to synsedimentary tectonics, from 40 to 45 Ma, while in the apical part duration of the stratigraphic hiatus might be more than 100 Ma.



what was left? ferent sediments and soils/palaeosols mong which terra rossa, loess-palaesol sequences and pedo-sedimentary complexes are predominant.





FE-SEM photomicrograph of soil microaggregates in the 3Btb3 horizon, Koreniki soil profile. Features indicate growth of pedogenic kaolinite nanoparticles in the soil.

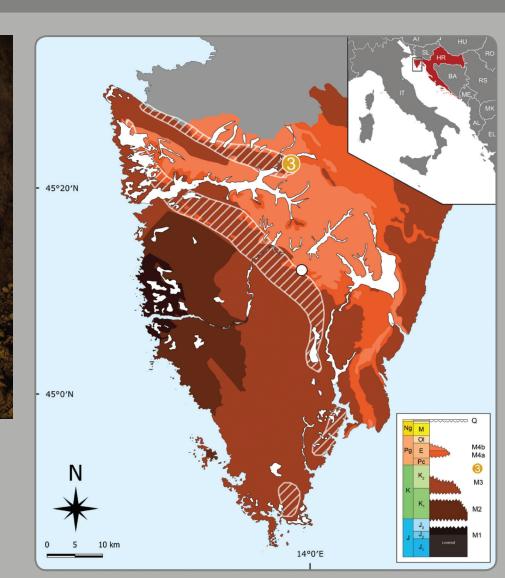
What was the environment like? Over this long period of subaerial exposure, this area was in diferent environments, from subtropical to mediterreanean and periglacial.

what is the mineral content?

Loess and terra rossa are mainly composed of minerals which provenance is related to the submerged alluvial plain/emerged Adriatic shelf, with two diferent signatures, Alpine/Apennine and from Eocene flysch as a dominant sources. Main authigenic mineral phases in terra rosa are nanosized kaolinite and haematite.



where can we find it? Minjera mine near Sovinjak, Macinići, Bertoši, Zulijani.



When? Between the early Cenomanian/ early Santonia

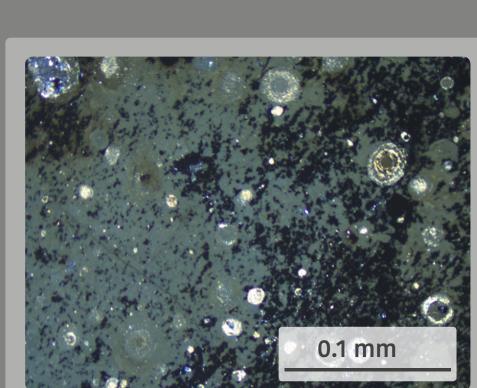
and lower Eocene, around 65 million years ago.

what happened?

In response to the collisional tectonics, related to the collision of the Adriatic microplate and Eurasia, the Istrian part of the Adriatic carbonate platform was once again uplifted, together with the rest of the Adriatic carbonate platform. This led to the long period of subaerial exposure, marked with karstification, erosion and bauxite formation, over the course of the period of at least 25 and up to 40 million years.



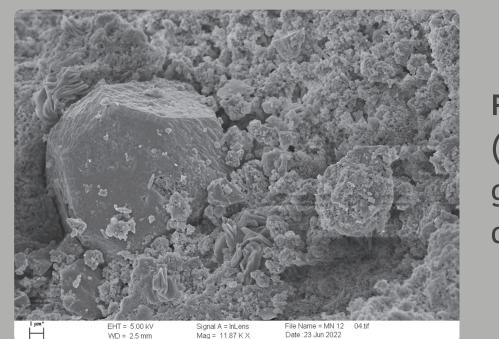
what was left? Bauxites, which formed in deep karstic depressions and canyons, together with other tropical soils and calcretes.



cture of bauxite and the replacement of iron oxides with iron sulphides (opaque grains in the right half of the photomicrograph).

(Minjera - D-1 deposit): The oolitic stru-

Photomicrograph



FE-SEM photomicrograph (Minjera – D-1 deposit): Large pyrite grain (15 μm), present as euhedral cuboctahedron.

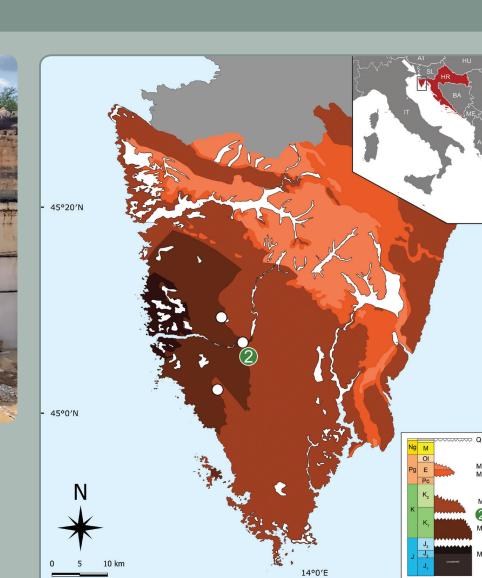
what was the environment like?

Over this long period of subaerial exposure, this area was in the tropical belt, which led to the developement of tropical soils and karstic bauxites under the vegatation cover of tropical rainforests. During the end of subaerial exposure, swamps developed atop of the bauxite bodies, which produced agressive and reducing solutions which removed iron oxides from the bauxites below, replacing them with pyrite and marcasite.

what is the mineral content? Boehmite, kaolinite, pyrite and sometimes diaspore, with minor amounts of titanium oxides, marcasite and gypsum.



where can we find it? Kanfanar quarry, Lakovići quarry, Tri jezerca quarry, Istrian Y (road cut).



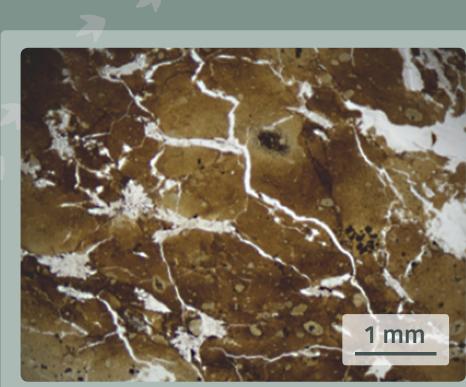
when? Between the Late Aptian and Early Albian, around 100 million years ago.

what happened?

This regional emersion phase was a consequence of a relative sea-level fall caused by the interaction of eustatic changes and synsedimentary tectonics in the Istrian part of the Adriatic Carbonate Platform, resulting in variable duration of emersion (11 to 19 million years) in different parts of the platform, as well as in varying intensity of erosion of Aptian and Barremian deposits.

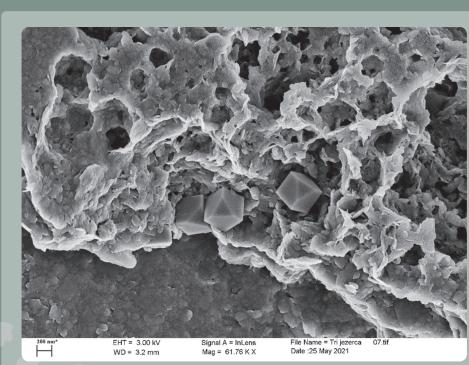


what was left? Greenish-grey clays, marls, and lime bre ccias (several cm to 1 m in thickness)



blocky microstructure with visible gypsum rosettes and impregnation of peds with iron oxides.

Photomicrograph (Kanfanar): subangular



FE-SEM photomicrograph (Tri Jezerca): Mineral particles of illite and probably mixed-layer clay minerals and idiomorphically developed pyrite with a size of 500 nm with clearly expressed hexahedral and partially octahedral

what was the environment like? Transitional zones between the shallowwater carbonates and emergent parts of the platform were characterized by either clay and marl deposition, or extensive coastal marshes with reducing conditions and deposition of black-pebbles enriched in plant remains and pyrite formed by sulfate reducing bacteria.

what is the

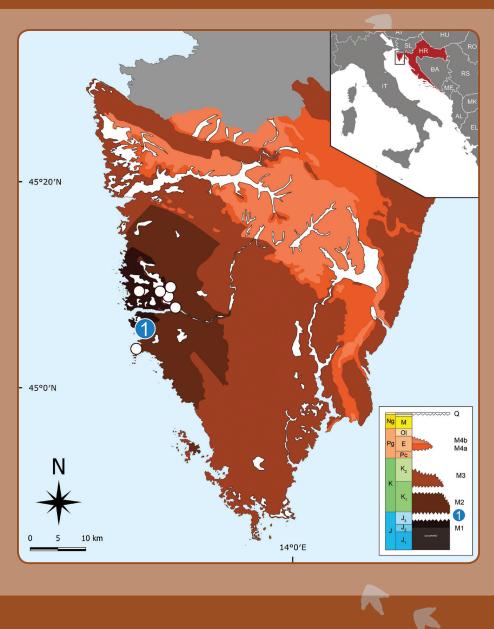
what was the

and illite.

mineral content? Iillitic material and illite/smectite mixed layer minerals, with occasional presence of pyrite, gypsum, and chlorite.

JURASSIC BAUXITES



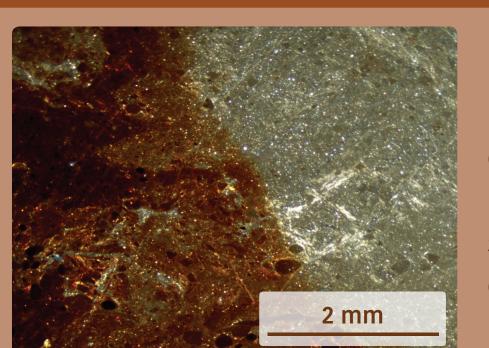




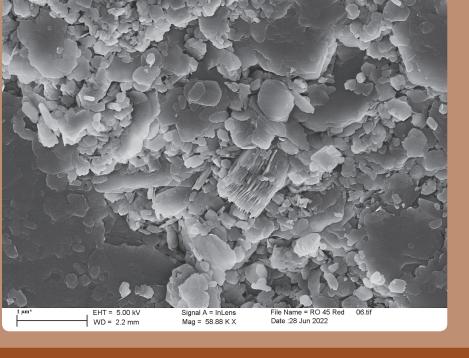
What happened? The Istrian part of the Adriatic carbonate platform was uplifted in response to the overburden pressure of the obducted oceanic crust of the Vardar ocean, which led to the karstification and erosion of the carbonate bedrock over the period of at least 6 million years.



what was left? Large planar bauxite bodies, up to 20 m in thickness, and wetland palaeosols up to 1 m in thickness.



Photomicrograph (Rovinj-1): contact between the white and red bauxite, with visible pelitomorphic structure, bauxite clasts and clear clay



FE-SEM photomicrograph (Rovinj-1): cluster of kaolinite platelets (100-1000 μm in size), with one kaolinite grain exhibiting a typical booklet morphology.

environment like? Tropical rainforests developed over the karstified terrain as this area was well within the tropical belt during this time, which led to the formation of tropical soils and karstic bauxites below the vegetation cover. In the areas with lower palaeotopographic position

wetlands developed opposed to tropical rainforests. what is the mineral content? Boehmite, kaolinite and haematite, with

minor amounts of titanium oxides, chlorite