

# Clay mineralogy and geochemistry of upper Jurassic bauxites and their immediate cover, Istria, Croatia [Prezentacija]

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# Clay mineralogy and geochemistry of upper Jurassic bauxites and their immediate cover, Istria, Croatia

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# Introduction and deposit overview

- ◆ The aim of this study was to determine the **mineralogy** and **geochemistry** of the Rovinj deposit (Fig. 1.) and of the clays/marls overlying the deposit
- ◆ Obtained results regarding the mineralogy, of clays especially, and the geochemical variations in the bauxite and overlying clays should allow the **reconstruction of the paleoenvironment and paleoclimate** in which the bauxite and its cover were forming
- ◆ The bauxite in the Rovinj deposit is of Upper Jurassic age,
- ◆ It formed during the emersion which lasted between **3 to 5 Ma**, in the the succession of the **Western Istrian anticline**
- ◆ On a large scale, the anticline is a part of the **Adriatic carbonate platform**
- ◆ The Rovinj deposit is the **only open bauxite mine in Croatia**
- ◆ The size of the deposit is estimated to be larger than 15 Mt, making it **one of the largest bauxite deposits in Croatia**

Figure 1. Rovinj bauxite deposit

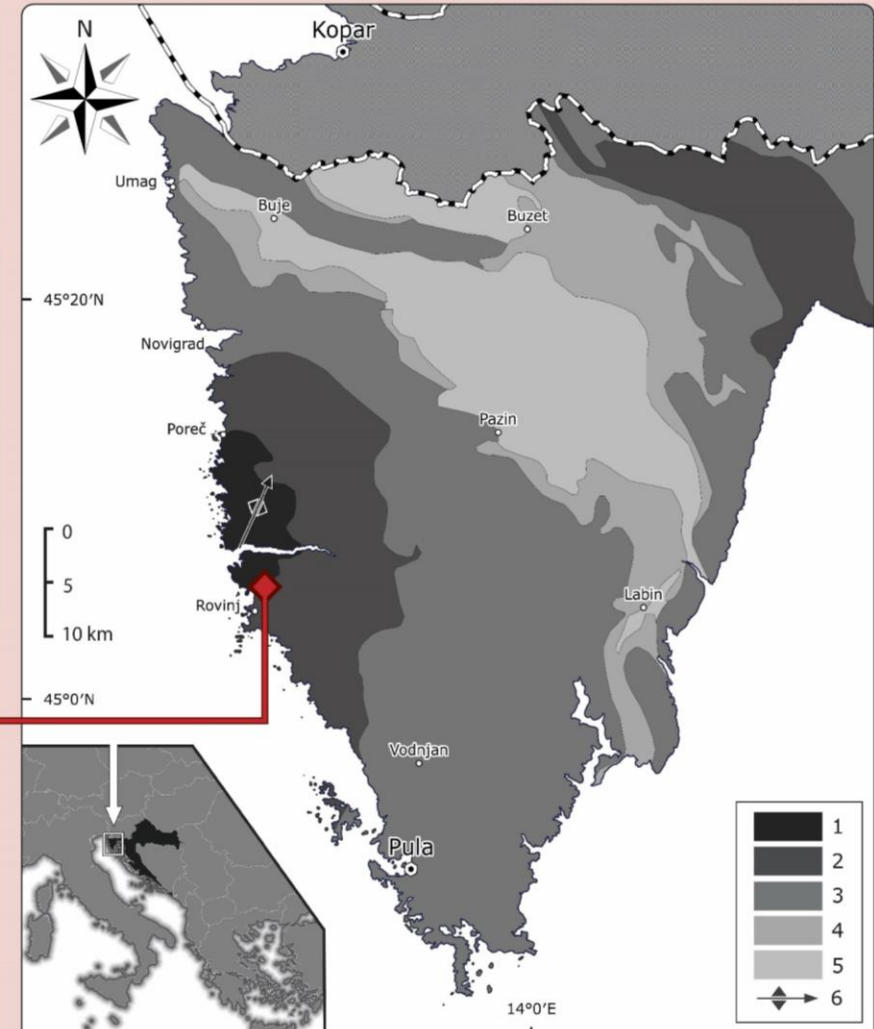


Figure 2. Simplified geological map of Istria modified after Velić (1995). 1 - 1<sup>st</sup> megasequence (Jurassic), 2 - 2<sup>nd</sup> megasequence (Lower Cretaceous), 3 - 3<sup>rd</sup> megasequence (Upper Cretaceous), 4 - 4<sup>th</sup> megasequence (Lower Eocene), 5 - 4<sup>th</sup> megasequence (Middle to Upper Eocene), 6 - Western Istrian anticline

## Methods

- ◆ Samples were collected from the selected profile on the bauxite outcrop
- ◆ In this research, data for 11 bauxite samples and 6 clays/marls is shown
- ◆ On bauxite samples, several analytical methods have been performed:
  - ◇ **XRPD** on bulk samples
  - ◇ **XRF**
  - ◇ **ICP-MS**
  - ◇ **SEM-EDS**
  - ◇ **Petrography**
  - ◇ **Micropedology** according to Stoops (2021.)

- ◆ On clay/marl samples only **XRPD** of bulk and <2 μm fraction was performed
- ◆ the <2 μm was extracted through gravitational separation after the removal of carbonates, organic matter and iron oxides
- ◆ **XRPD** patterns of non-oriented <2 μm fraction samples were taken after the following treatments:
  - ◇ **Air-drying**
  - ◇ **Ethylen glycol** solvation
  - ◇ **Glycerol** solvation
  - ◇ Dissolution in **1:1 HCl**
  - ◇ Heating to **550°C**



# Rovinj bauxite profile

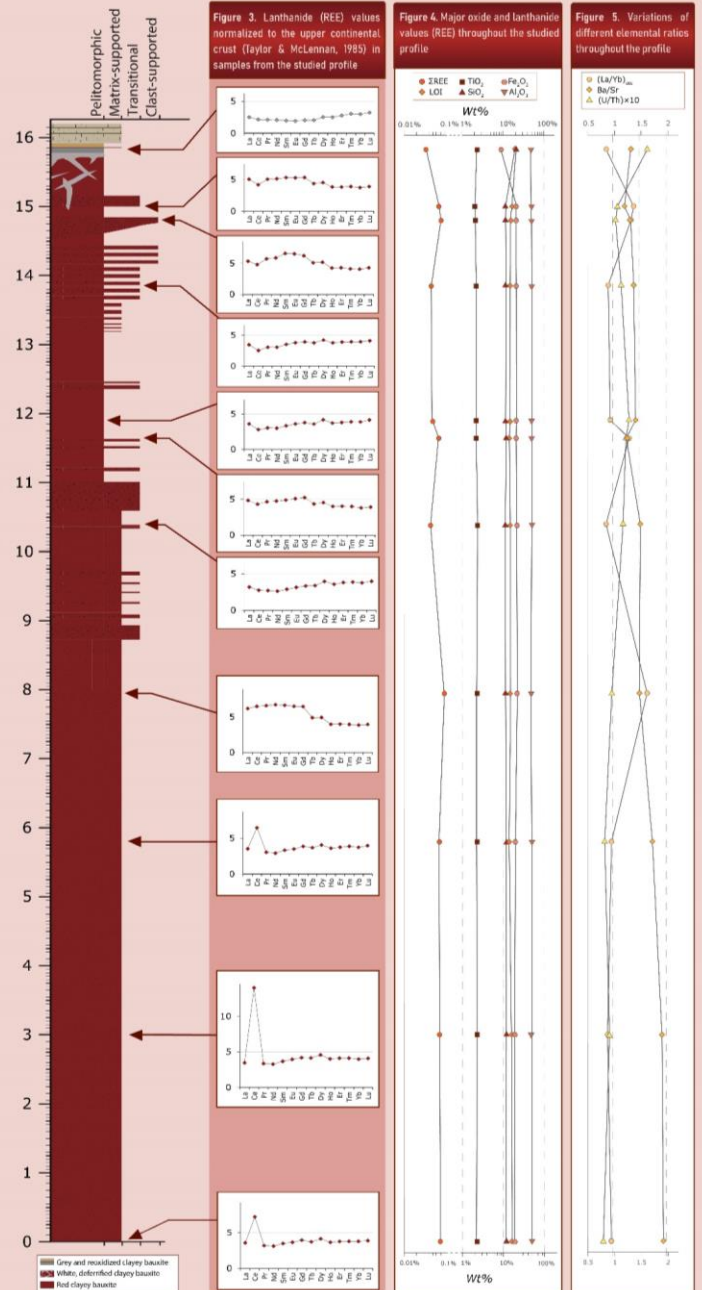


Figure 3. Lanthanide (REE) values normalized to the upper continental crust (Taylor & McLennan, 1985) in samples from the studied profile

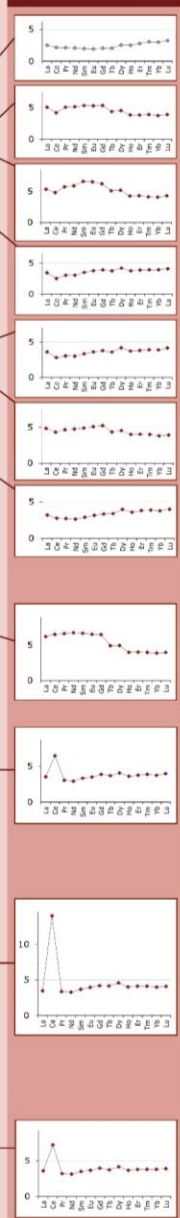


Figure 4. Major oxide and lanthanide values (REE) throughout the studied profile

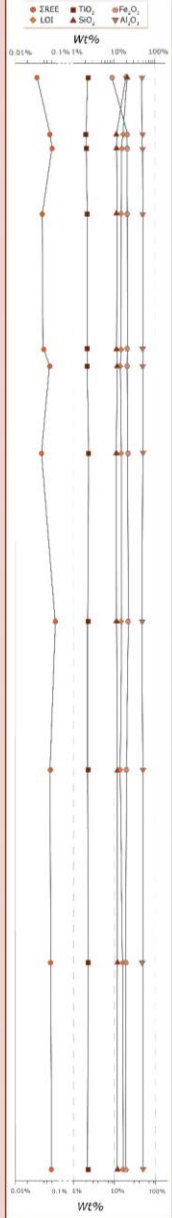


Figure 5. Variations of different elemental ratios throughout the profile

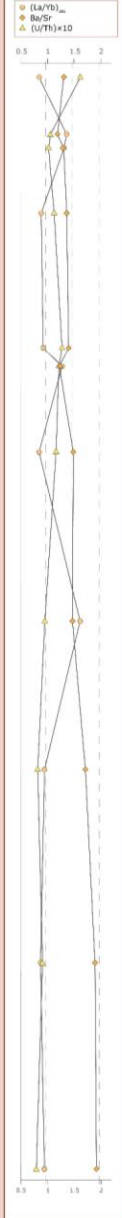


Figure 6. XRPD diffractogram of bulk grey bauxite sample

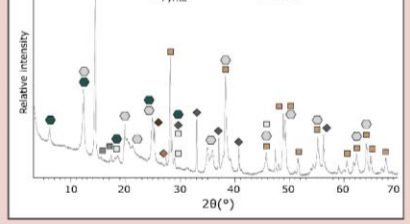


Figure 7. XRPD diffractogram of bulk white bauxite sample

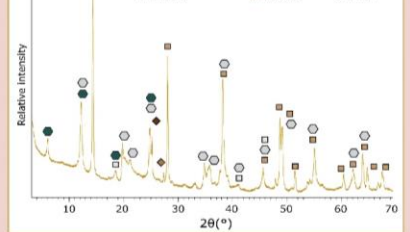


Figure 8. XRPD diffractogram of bulk red bauxite sample

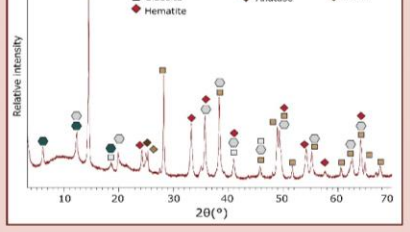


Figure 9. Microphotograph (PPL) of red bauxite (8.7 m on main profile) with visible deferrification, together with clear clay coatings and infillings

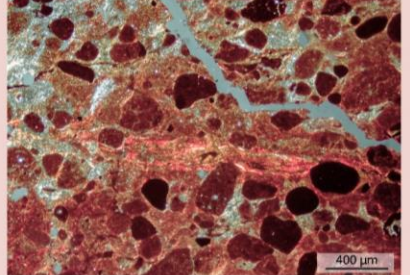


Figure 10. Intergrowing gibbsite crystals with clay aggregates filling the space in between them

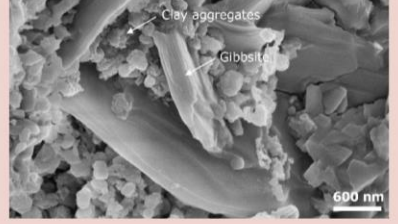


Figure 11. Kaolinite platelets and 'booklets'

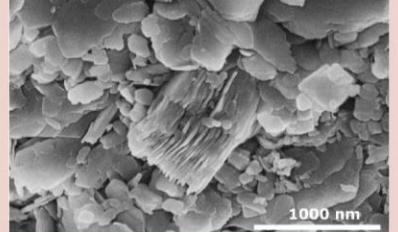


Figure 12. Kaolinite nanoparticles and aggregates

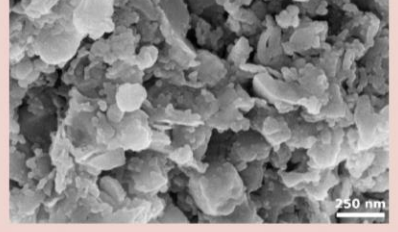
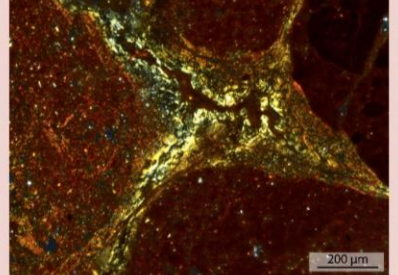


Figure 13. Microphotograph (XPL) of red bauxite (16.8 m on main profile) with visible deferrified clay coatings and reprecipitation of iron oxides as infillings



# Bauxite cover succession

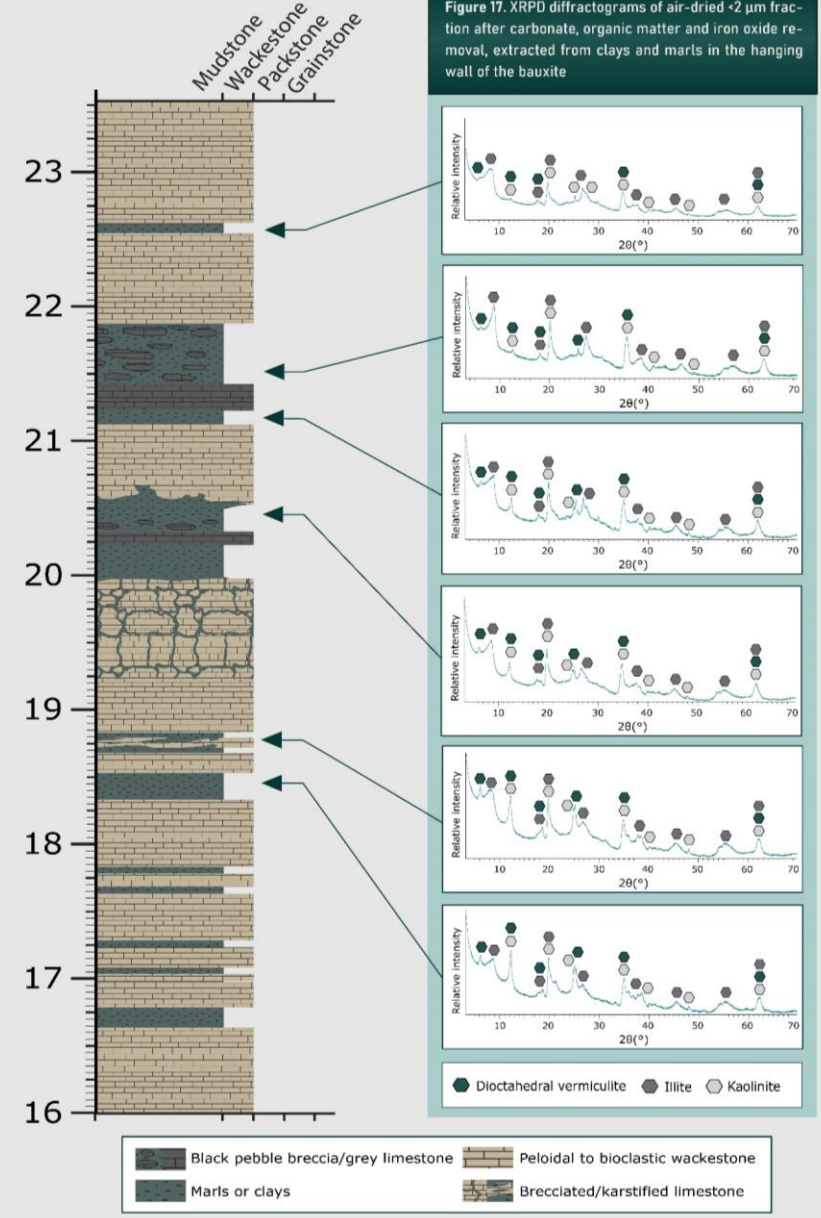
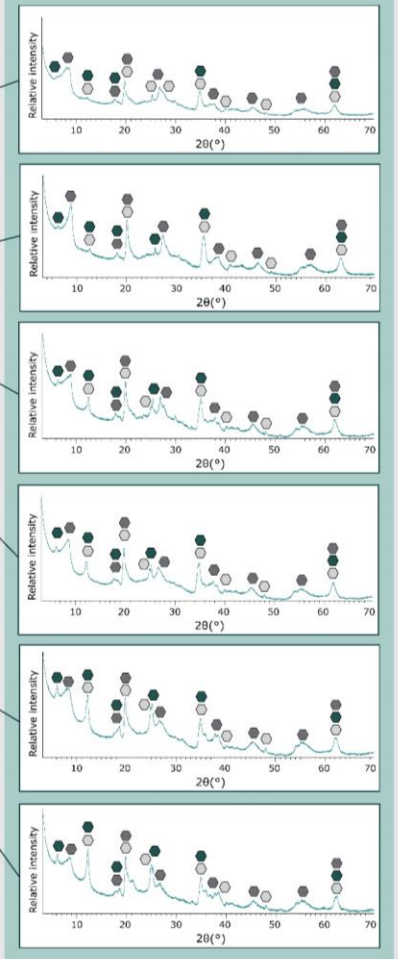


Figure 17. XRPD diffractograms of air-dried <2 μm fraction after carbonate, organic matter and iron oxide removal, extracted from clays and marls in the hanging wall of the bauxite



- Black pebble breccia/grey limestone
- Peloidal to bioclastic wackestone
- Marls or clays
- Brecciated/karstified limestone





Thank you for your attention!



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