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# The terrestrial red mud deposits in Provence: Ongoing researches in soil science

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## Framework

These researches fit into the works coordinated by the **Observatoire Hommes-Milieus (OHM)** of **Bassin Minier de Provence (BMP)** and dedicated to **vegetal covers** and **microbial communities of soils**. They aim to study the **terrestrial deposits of red muds** resulting from **past and current activities of alumina extraction**.



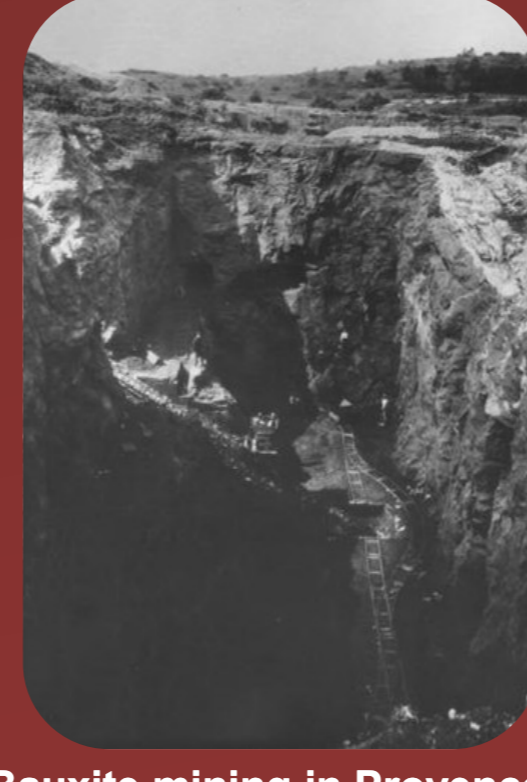
Pechiney Gardanne plant, 1951



Alteo Gardanne plant



Alusuisse Saint-Louis-les-Aygalades plant, 1964



Bauxite mining in Provence

Despite the **red muds** have been extensively studied about their industrial recycling potentials (Klauber et al., 2011), the studies on their **environmental effects**, especially on the **biological component of soils**, are far less numerous (Lombi et al., 2002; Garau et al., 2007, 2011, 2014; Krishna et al., 2014) and, furthermore, lacking in the context of BMP. To this date, the various studies available in the literature emphasize the importance of the **soil matrix** in the **modulation of biological responses** when it is mixed with **red muds**. Therefore, this aspect is important to invest at the local scale in the prospect of a **potential use of red muds as improvement to soils** or to the **development of artificial soils for various valuations** (e.g. pollution control, remediation, rehabilitation).

## Research objectives

*How these industrial activities interact with terrestrial ecosystems through the soil-plant continuum?*

The researches undertaken aim:

- ✓ To study the **effects of red mud inputs to soils** on their **physico-chemical and biological qualities**.
- ✓ To test their **harmlessness** on the **biological functions of soils**.
- ✓ To determine **how and to what extent** these **tailings modulate the structuring of vegetal and edaphic microbial communities** through **reciprocal functional relationships**.

## Research steps

❖ **Task 1 – Overall characterization of red mud deposits at the regional scale**

- **Biogeochemical analyses.**
- **Deposit typology** of various sites.
- **Spatialization.**
- **Ecotoxicological diagnostics.**

❖ **Task 2 – Effects of red mud deposits on soils: field, multi-scale and experimental approaches**

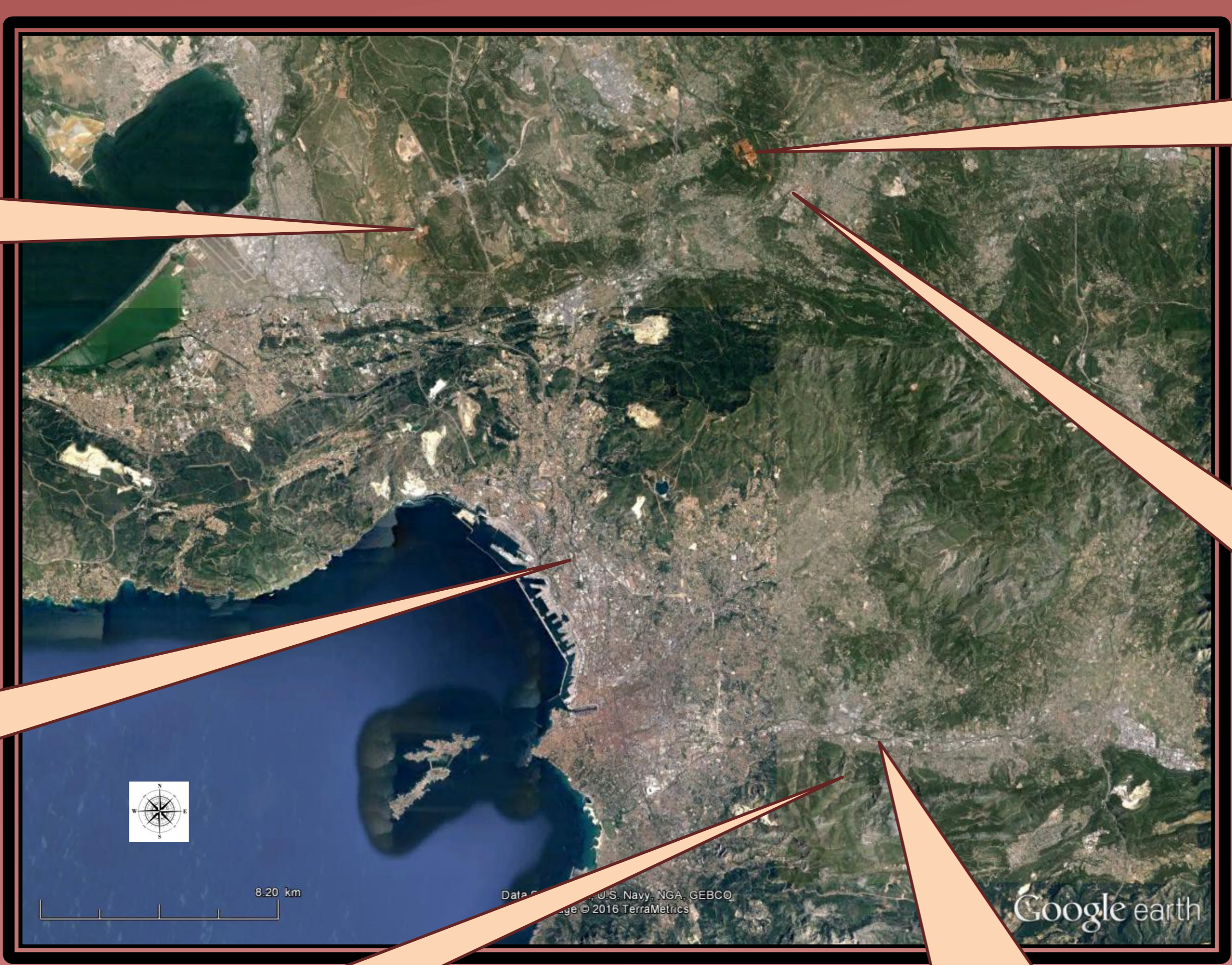
- **Structure and diversity of plant communities.**
- **Dynamic of soil microbial communities.**
- **Functional interactions: aboveground-belowground linkages.**

## Expected results

- ✓ Acquisition of **fundamental data**.
- ✓ **Ecosystemic diagnostics**.
- ✓ To consider **valuation solutions** of past deposits.
- ✓ To recommend **management actions** of forthcoming deposits.



Study sites



**Griffon**  
Township: Vitrolles  
Coord.: 43 26'27" N / 5 18'00" E  
Average alt.: 156 m  
Area: 99 090 m<sup>2</sup>



**Mange-Garri**  
Township: Bouc-Bel-Air  
Coord.: 43 27'58" N / 5 25'57" E  
Average alt.: 234 m  
Area: 465 350 m<sup>2</sup>



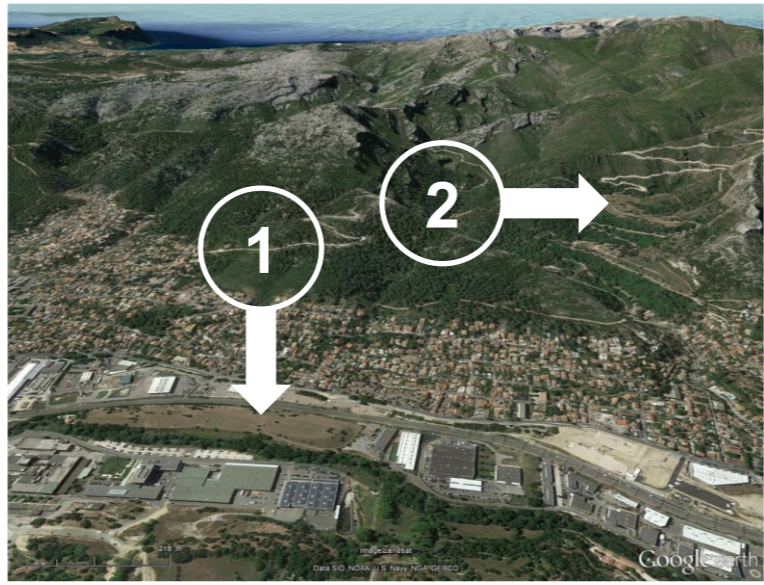
**La Delorme**  
Township: Marseille (15<sup>th</sup> district)  
Coord.: 43 20'26" N / 5 21'52" E  
Average alt.: 37 m  
Area: 37 570 m<sup>2</sup>



**alteo**  
A NEW WORLD OF ALUMINA  
Gardanne plant built in 1893  
Coord.: 43 27'8" N / 5 27'35" E



**La Barasse (2)**  
Township: Marseille (11<sup>th</sup> district)  
Coord.: 43 16'32" N / 5 28'47" E  
Average alt.: 196 m  
Area: 68 700 m<sup>2</sup>



**La Barasse (1)**  
Township: Marseille (11<sup>th</sup> district)  
Coord.: 43 17'6" N / 5 29'35" E  
Average alt.: 76 m  
Area: 49 980 m<sup>2</sup>