

# Atmospheric contaminations around the alumina complex



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Journées Scientifiques :  
"Bauxite Résidues"

Aix-en-Provence, du 08 au 09 juin 2021

# Very few data before 2009

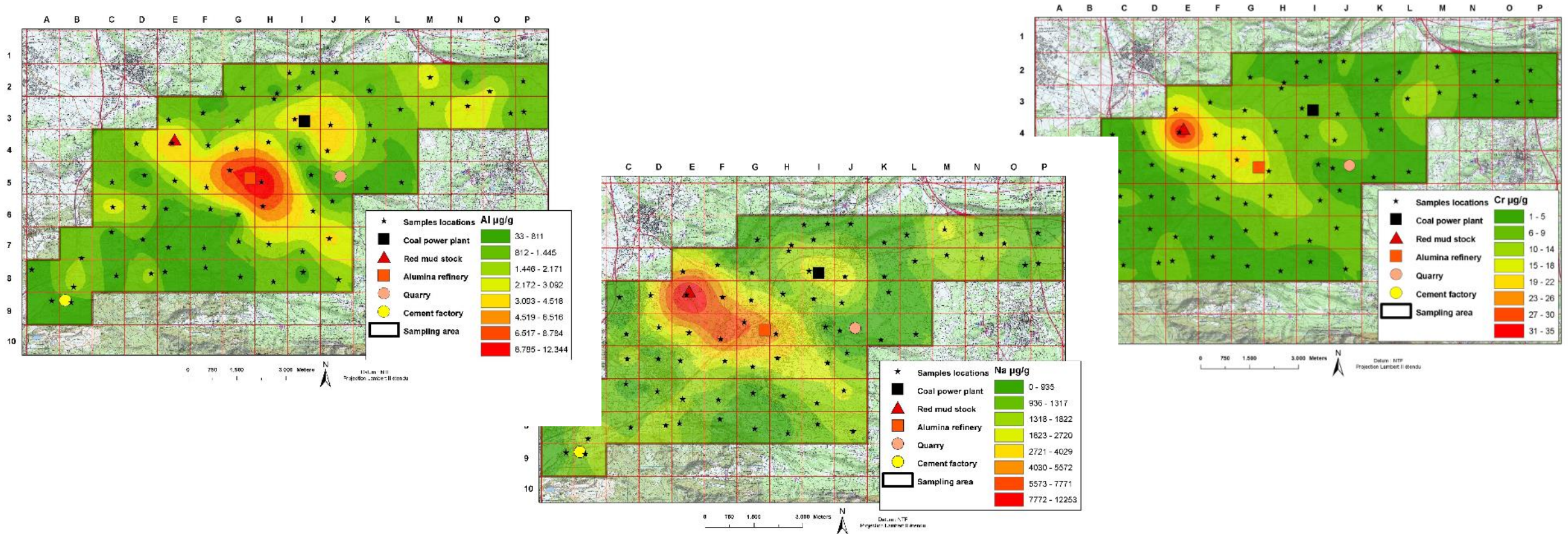
- **Measurement campaign  
AIRMARAIX – CEREGE en 2003 :**



- **In 2007, Gardanne was the worst station of AtmoSud survey network :**
  - **annual average : 46  $\mu\text{g}/\text{m}^3$  (limit value : 40  $\mu\text{g}/\text{m}^3$ )**
  - **number of days exceeding the daily limit value : 128 ( 35 days allowed)**

# First project in 2008 :

## *Répartition spatiale et temporelle des dépôts atmosphériques de métaux lourds sur la zone de Gardanne*



# 2013 : MANGEBAUX Project

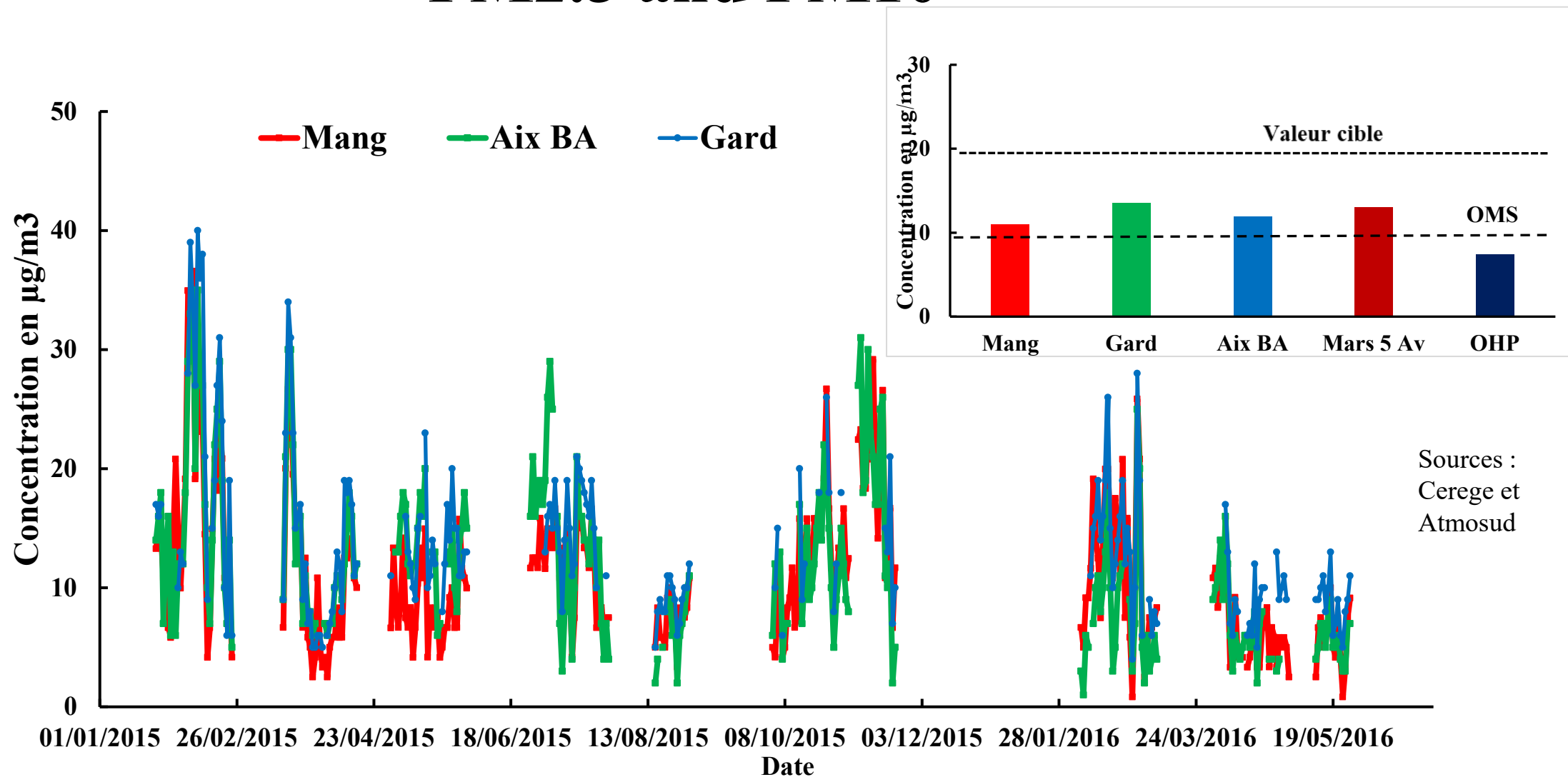


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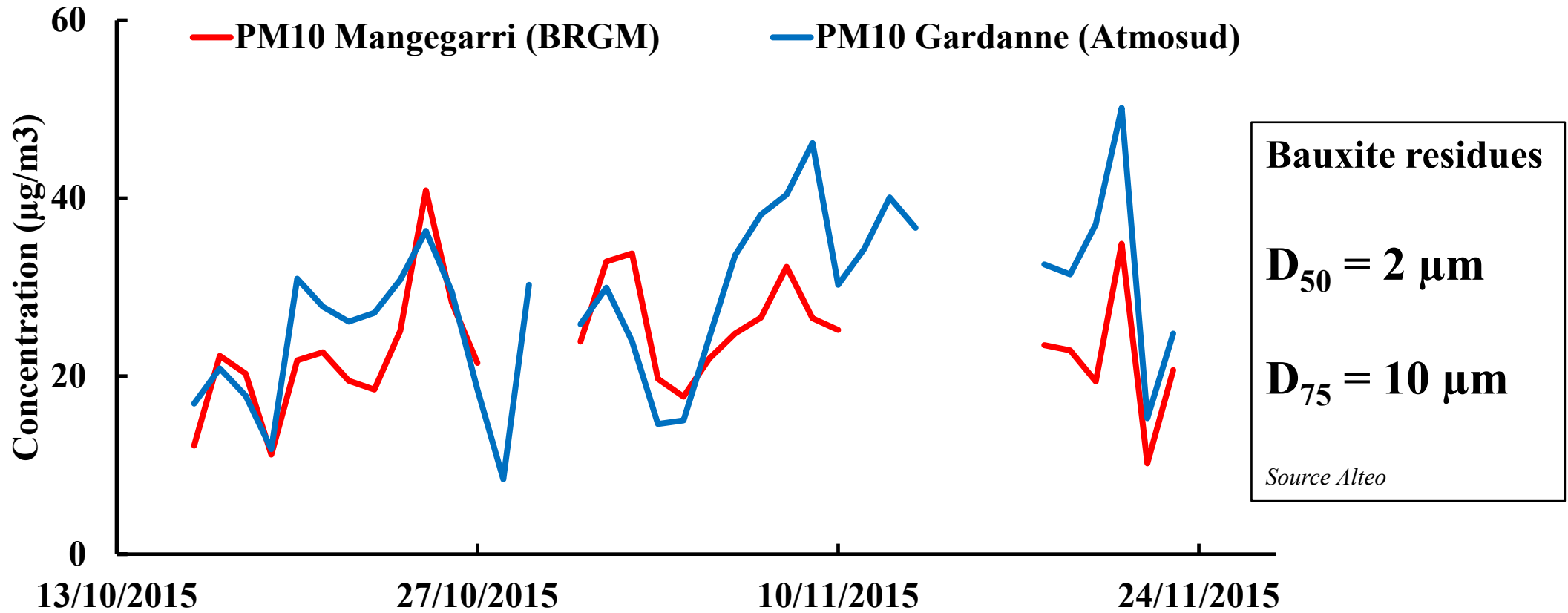
# PM2.5 and PM10



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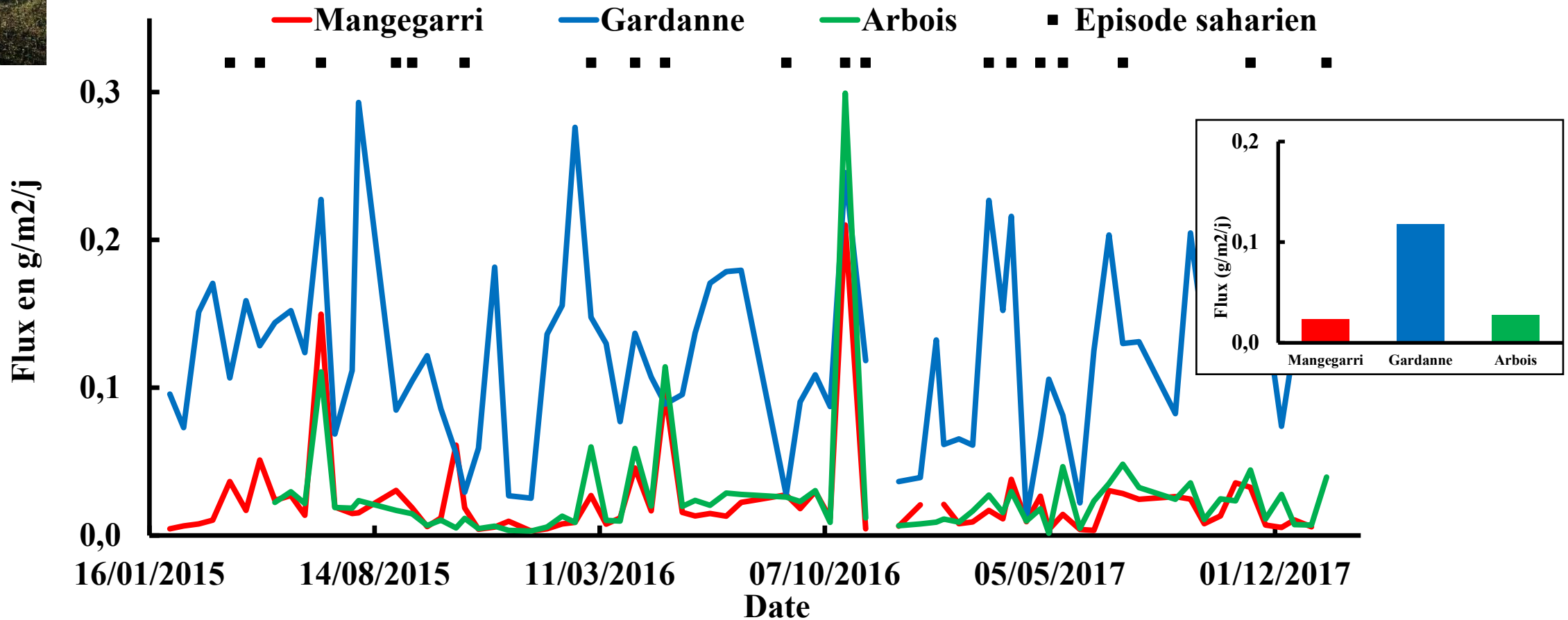
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# PM2.5 and PM10

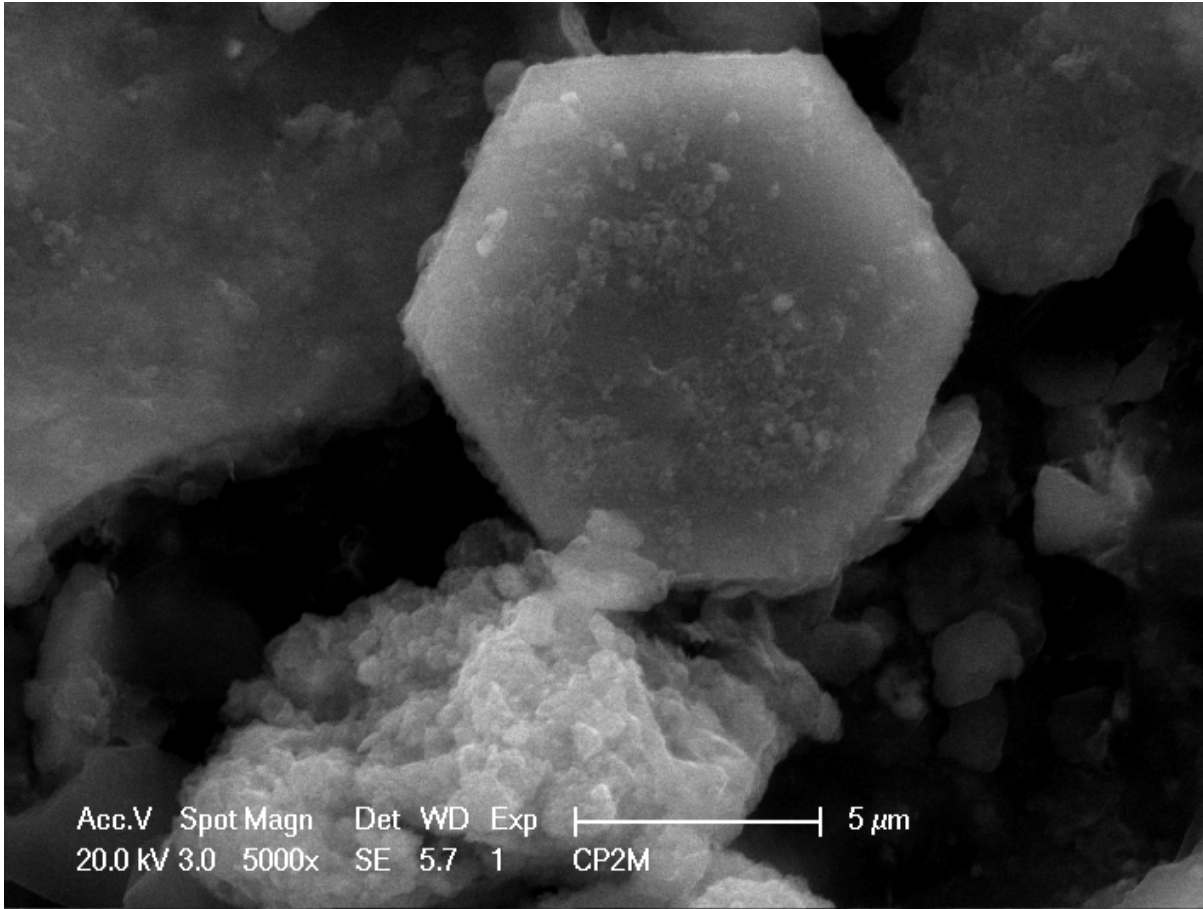




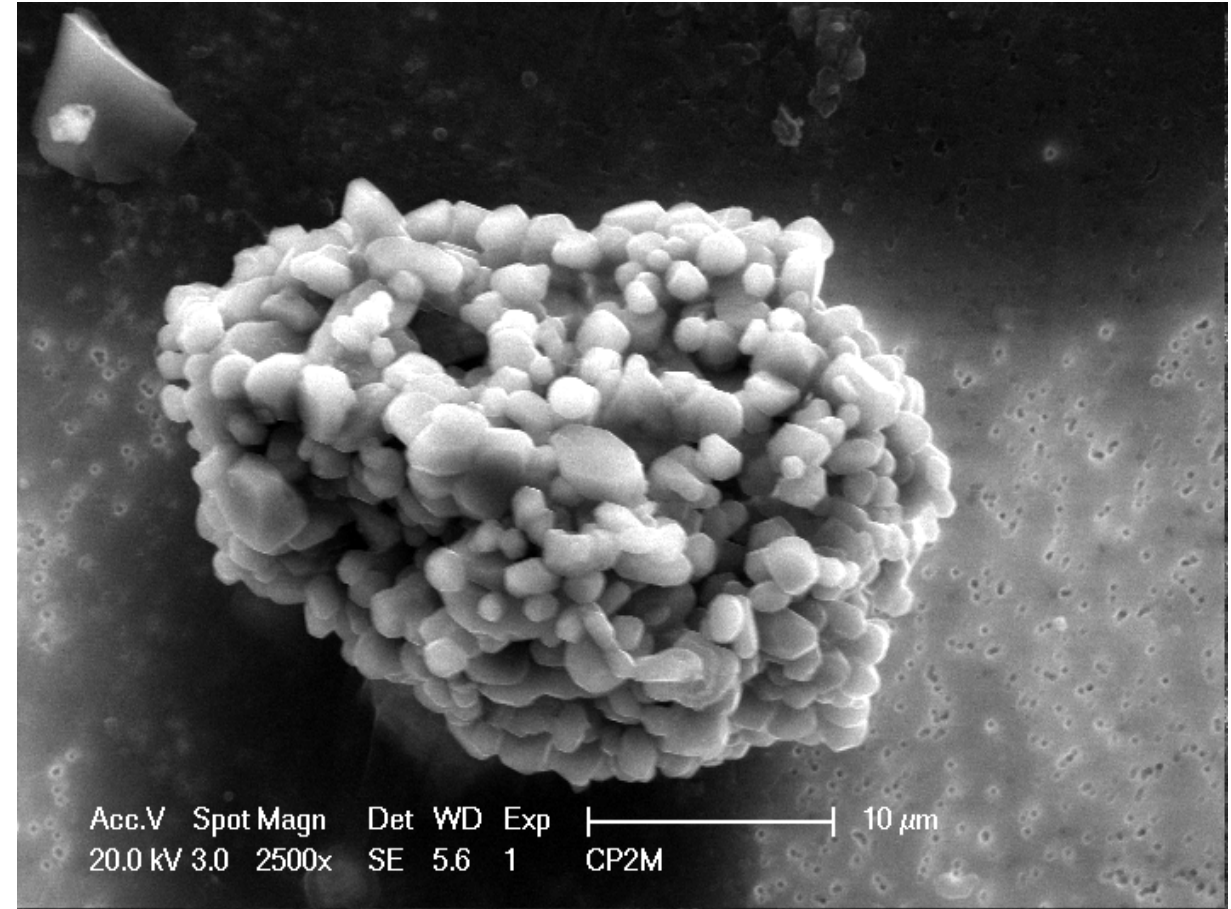
# Sédimentable dusts



# Alumina forms



**Al - hydroxide**

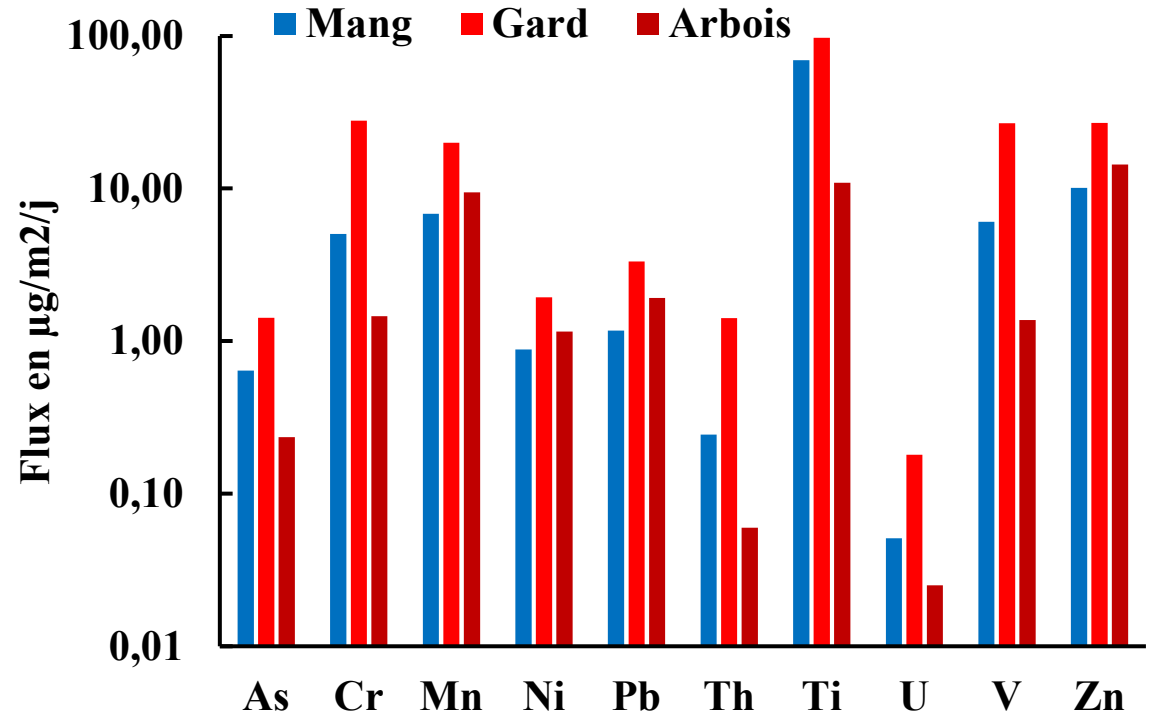
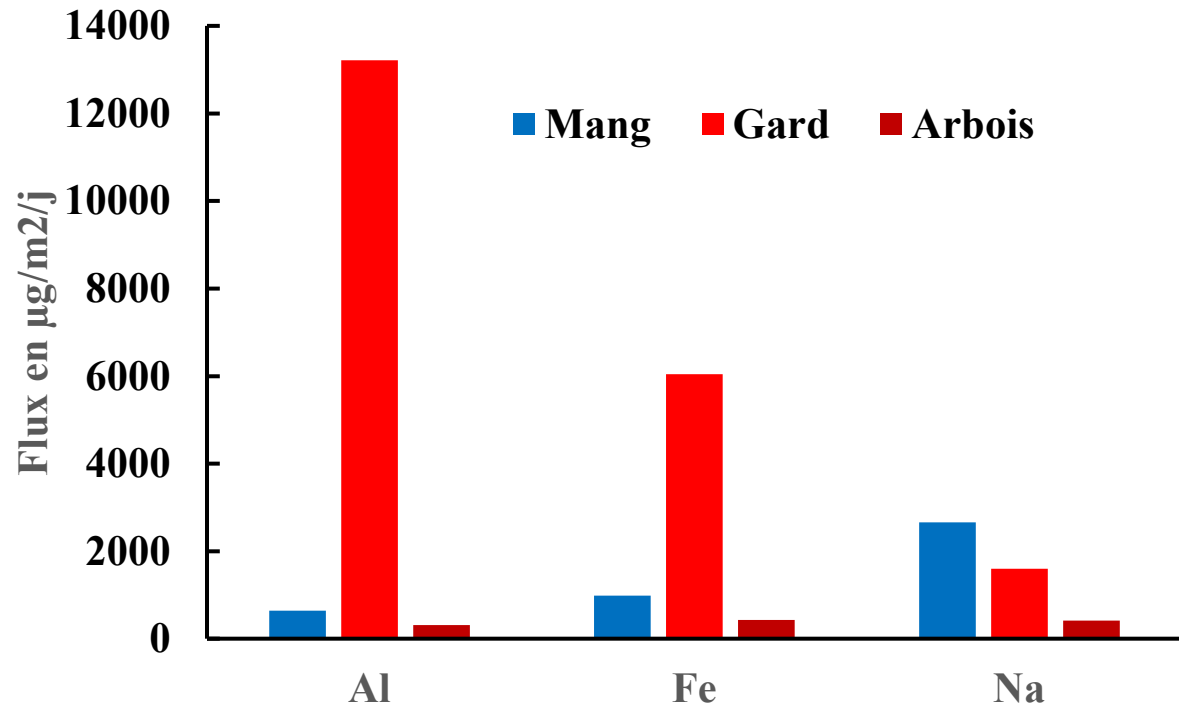


**Al – oxide**



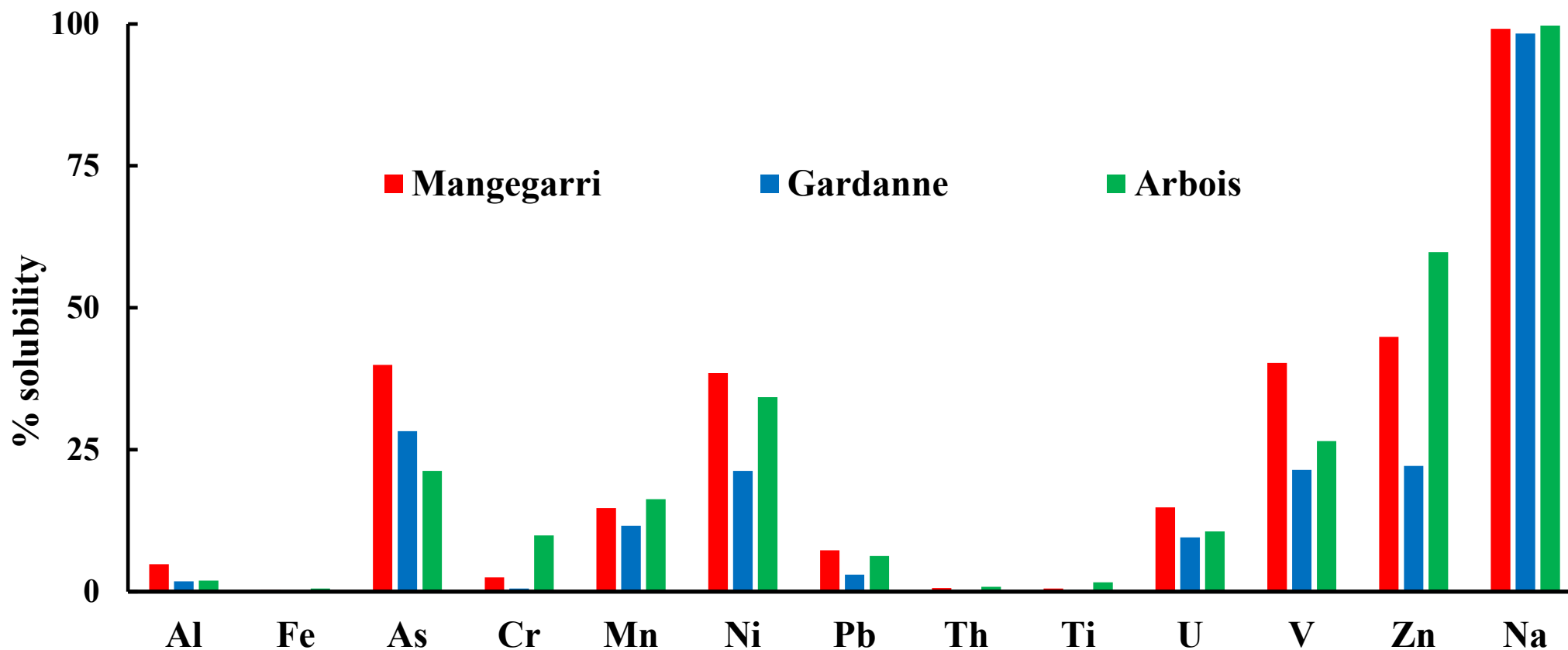


# Total flux of metals

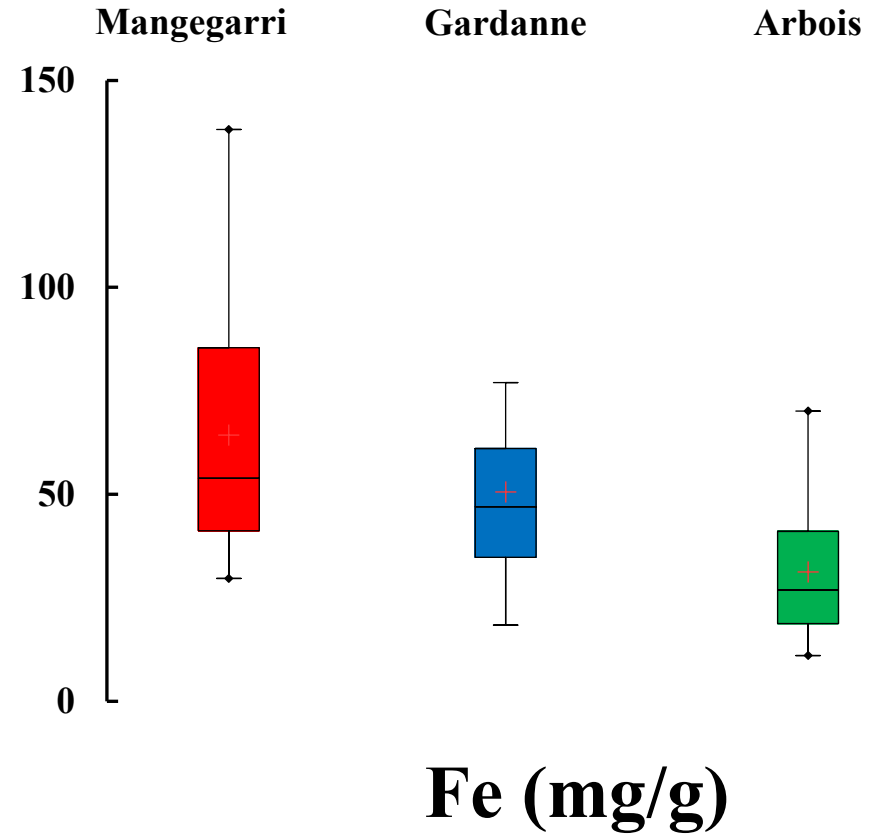
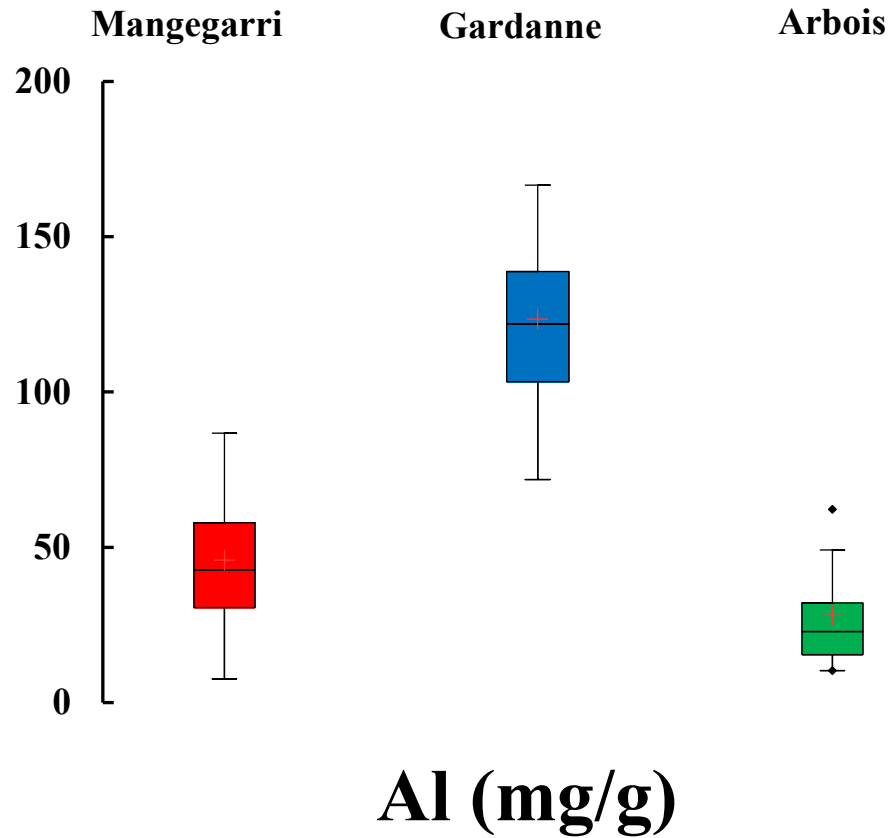




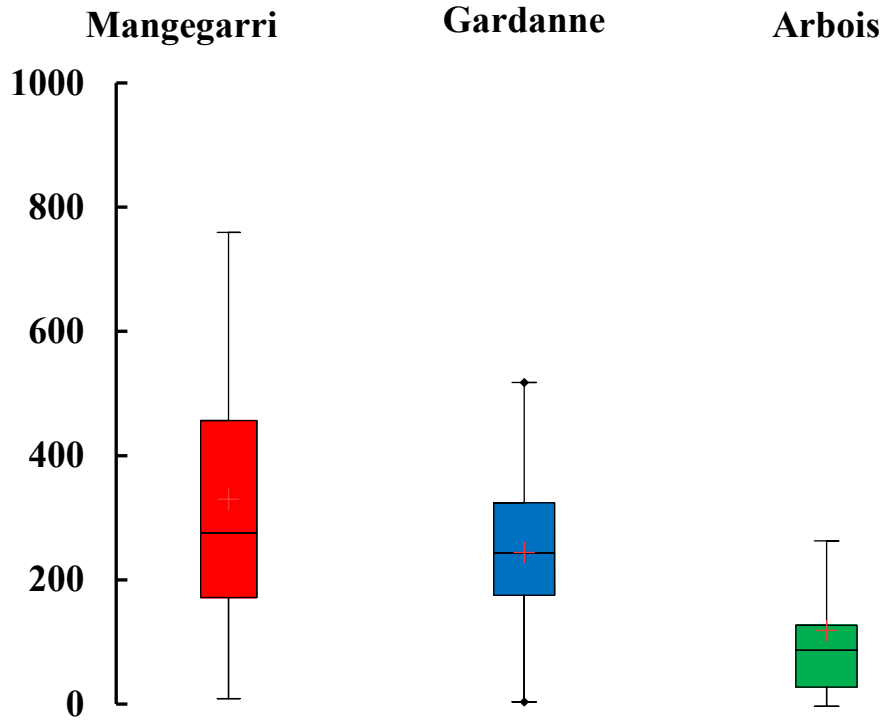
# Solubility of metals



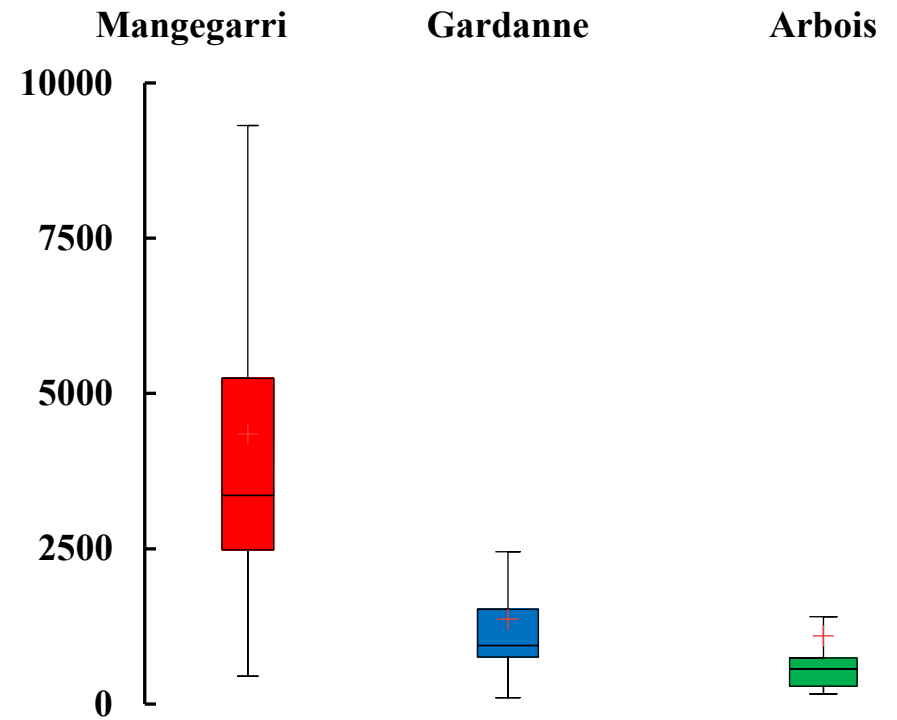
# Mass fraction



# Mass fraction



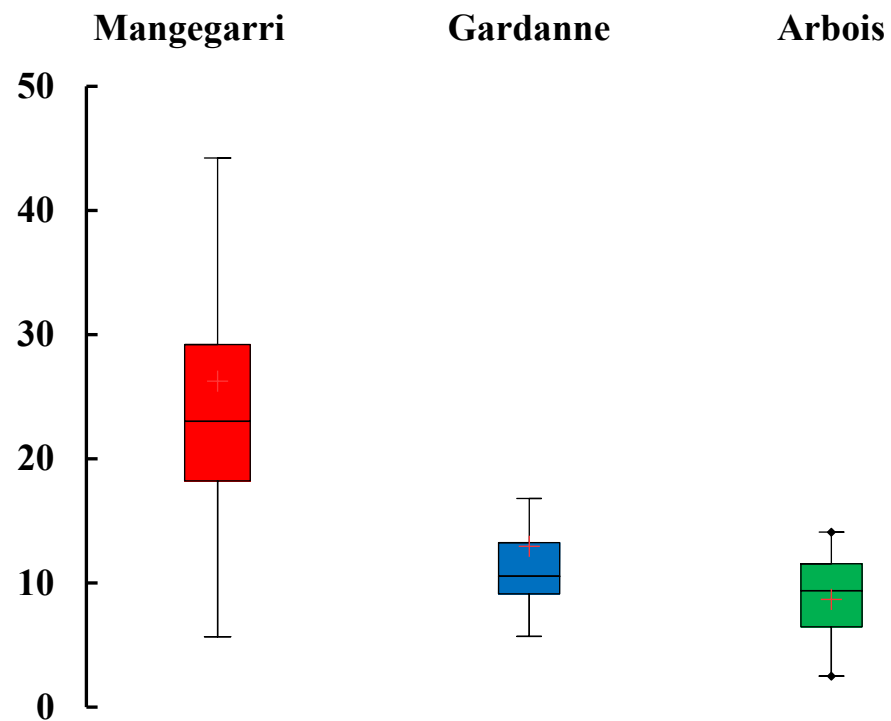
Cr ( $\mu\text{g/g}$ )



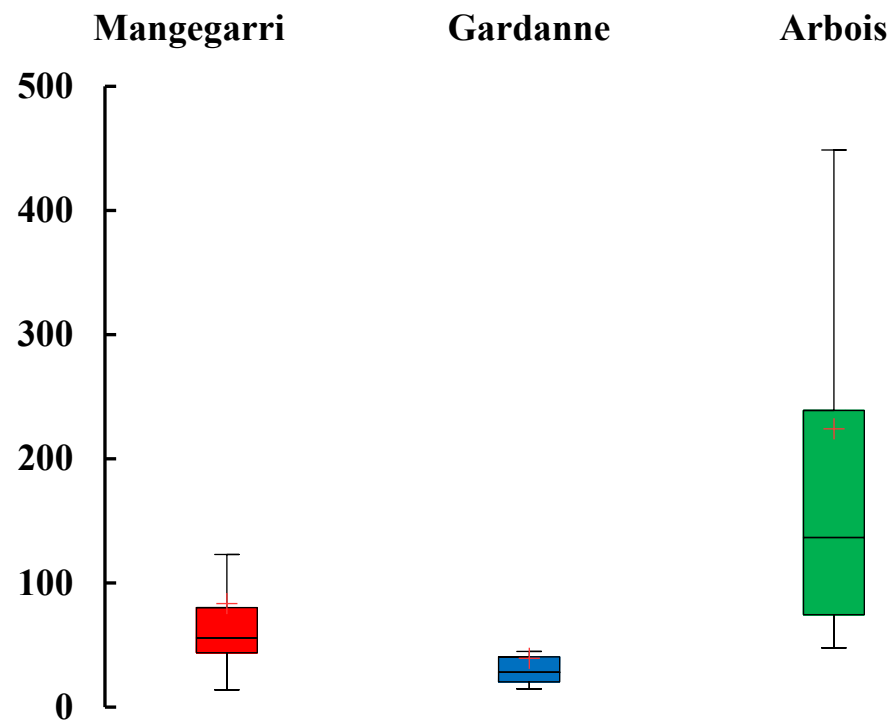
Ti ( $\mu\text{g/g}$ )



# Mass fraction



As (µg/g)



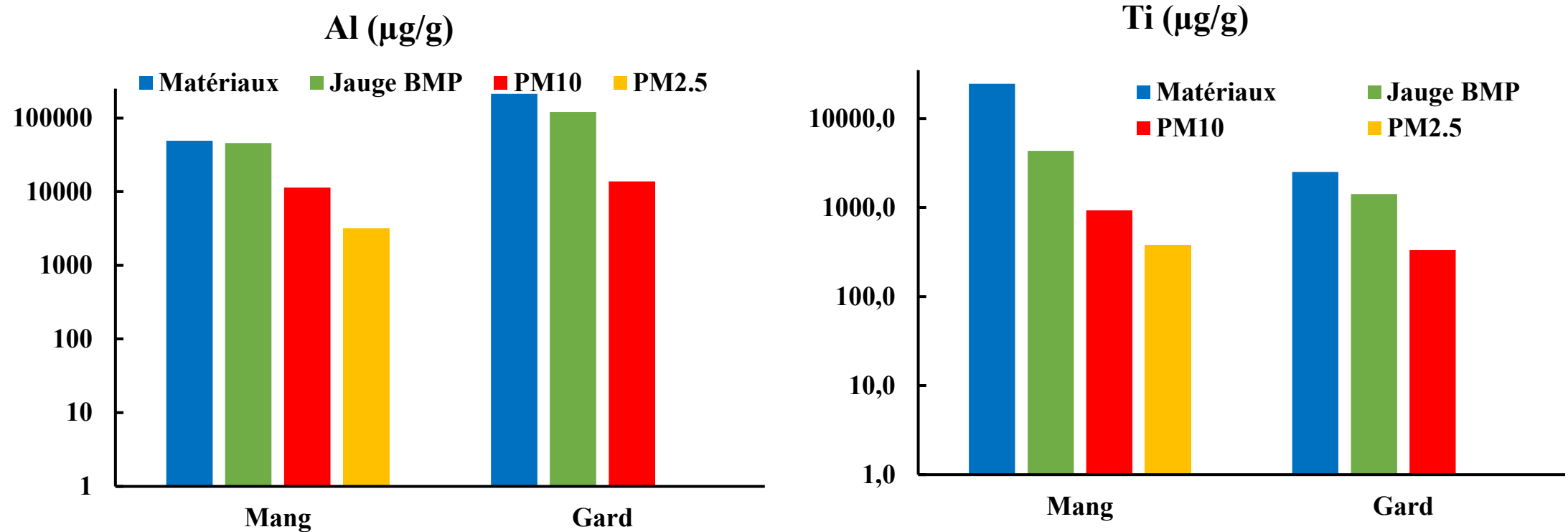
Pb (µg/g)



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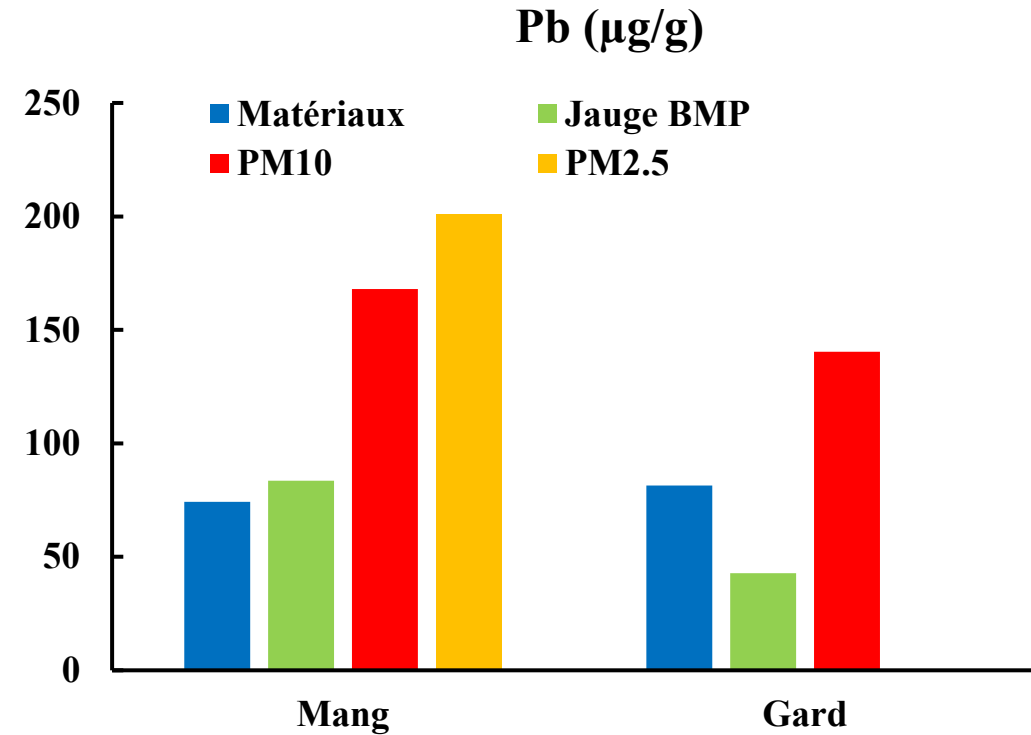
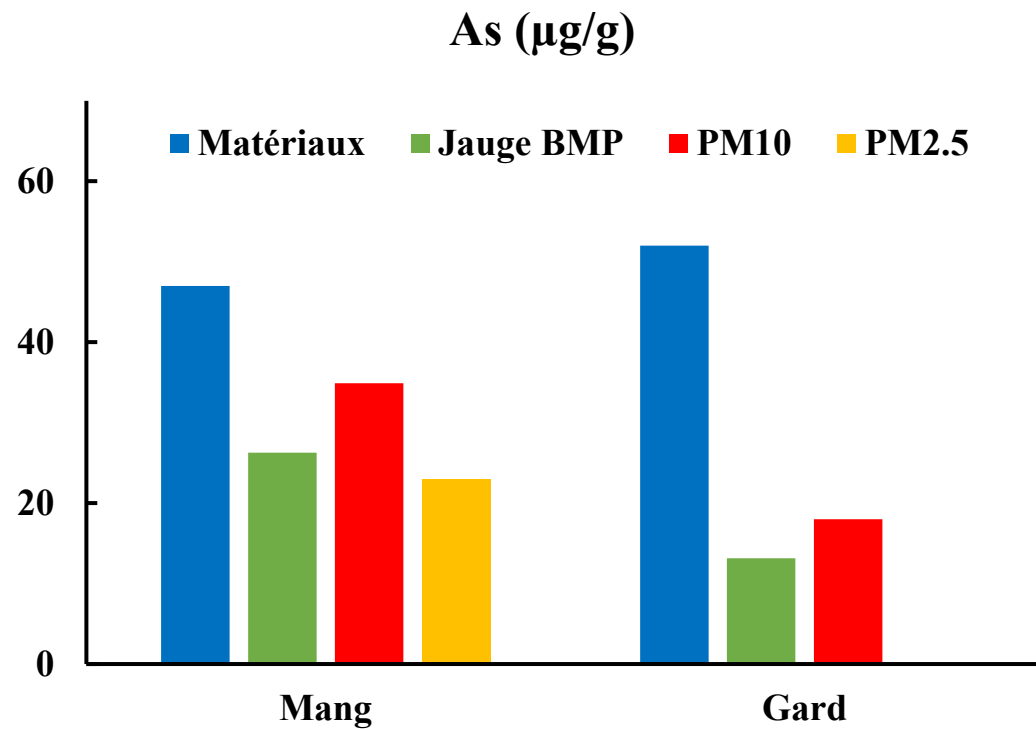
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# Evolution of mass fraction with granulometry



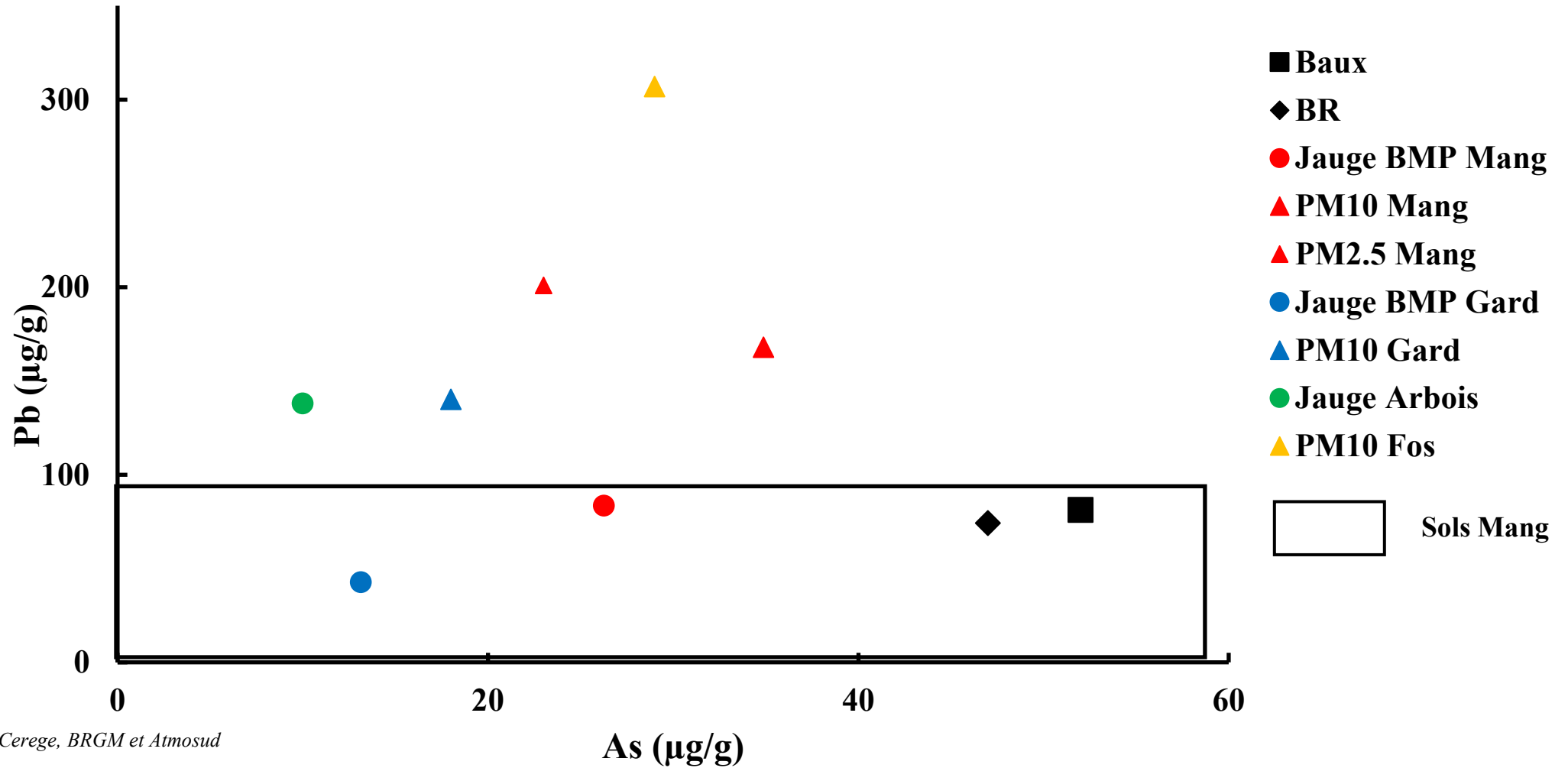
Sources : Cerege, BRGM et Atmosud

# Evolution of mass fraction with granulometry



Sources : Cerege, BRGM et Atmosud

# As and Pb sources ?



Sources : Cerege, BRGM et Atmosud

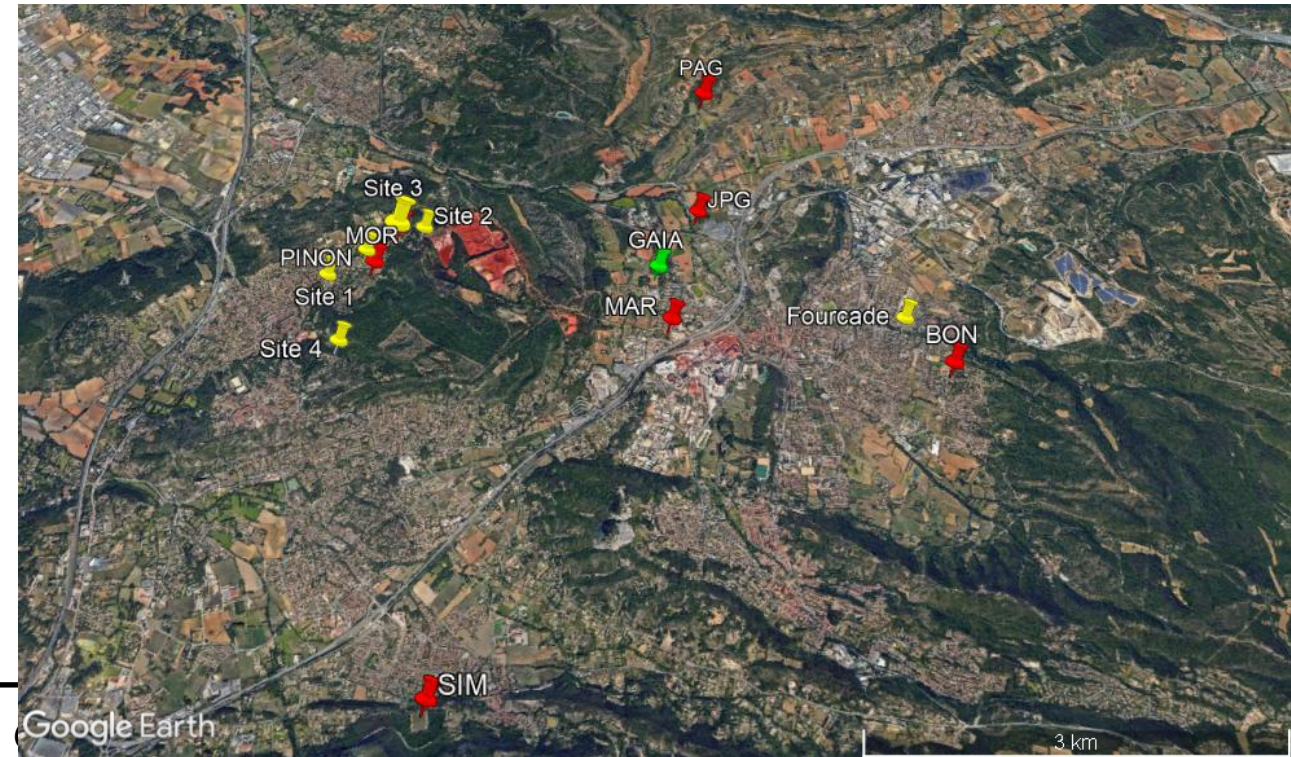
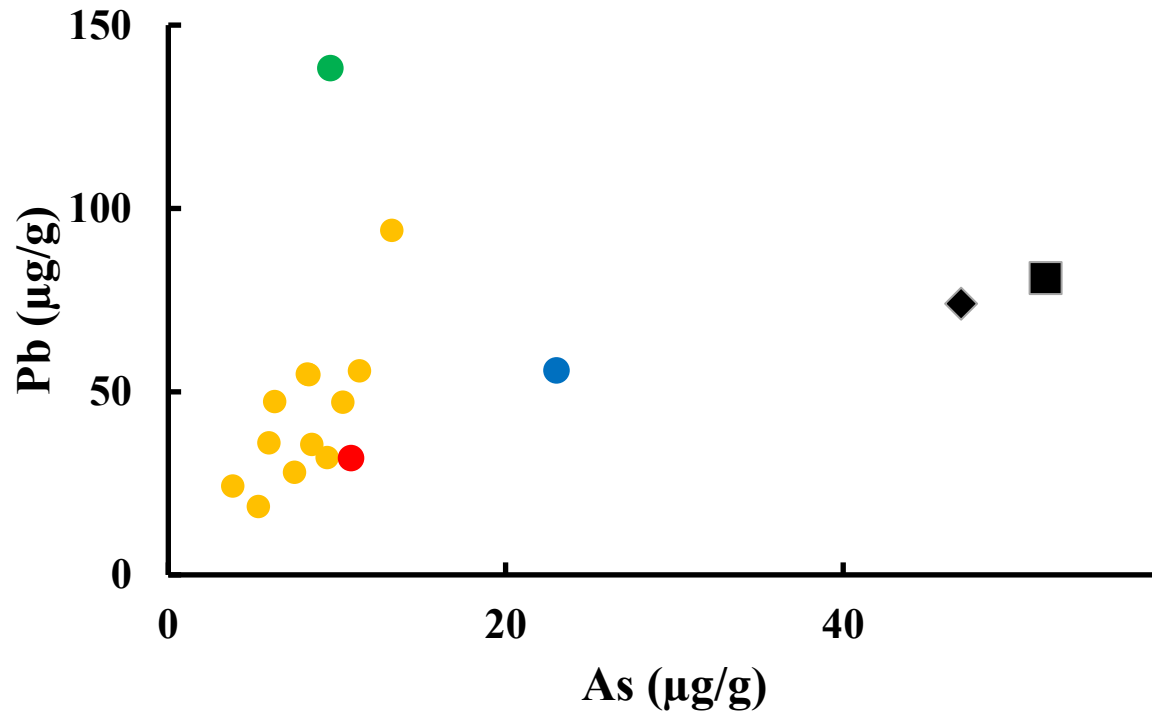


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# As and Pb source ?



# Conclusion

- The atmospheric particulate contamination is lower around the storage site than around the factory.
- The atmospheric contamination by the storage is always present, even if the wind speed is low.
- The chemical composition of the dusts in the Garadanne city and around the storage site is not the same
- The mass fraction of the metals decrease with the particle granulometry, except for As and Pb → It doesn't mean that the toxicity of the finest particles is lower.
- The gastric bioaccessibility is often higher for the bauxite residues than for the bauxite → important for the health impact.
- There is no effect of the contamination on vegetables in the gardens around the Al-complex.
- It will be very interesting to survey the contamination evolution after the end of the "Bayer".



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