

# Mine tailings

**Nuno Raposo**

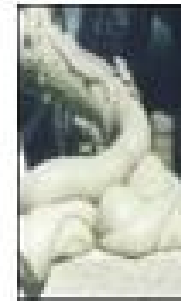
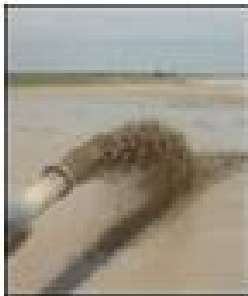
António Topa Gomes, António Viana da Fonseca

2016



## Motivation

- What are mine tailings?
  - A mixture of solid particles and water, forming a viscous fluid



Increasing solids content

- What are the problems?
  - Consolidation
  - Strength
  - Acid rock drainage.



# Motivation

Purpose? Contribute to prevent accidents like in Mariana, Brazil (2016)





# Motivation

Purpose? Contribute to prevent accidents like in Mariana, Brazil (2016)





# Motivation

Purpose? Contribute to prevent accidents like in Mariana, Brazil (2016)







# Neves Corvo (copper and tin mine)





# Historical evolution



**Underwater  
deposition  
(2006)**





# Historical evolution

**Thickened tailings  
deposition  
(2011)**







# Sampling



Very soft material...



that hardens as it dries



# Particle size distribution tests

**Average composition:**

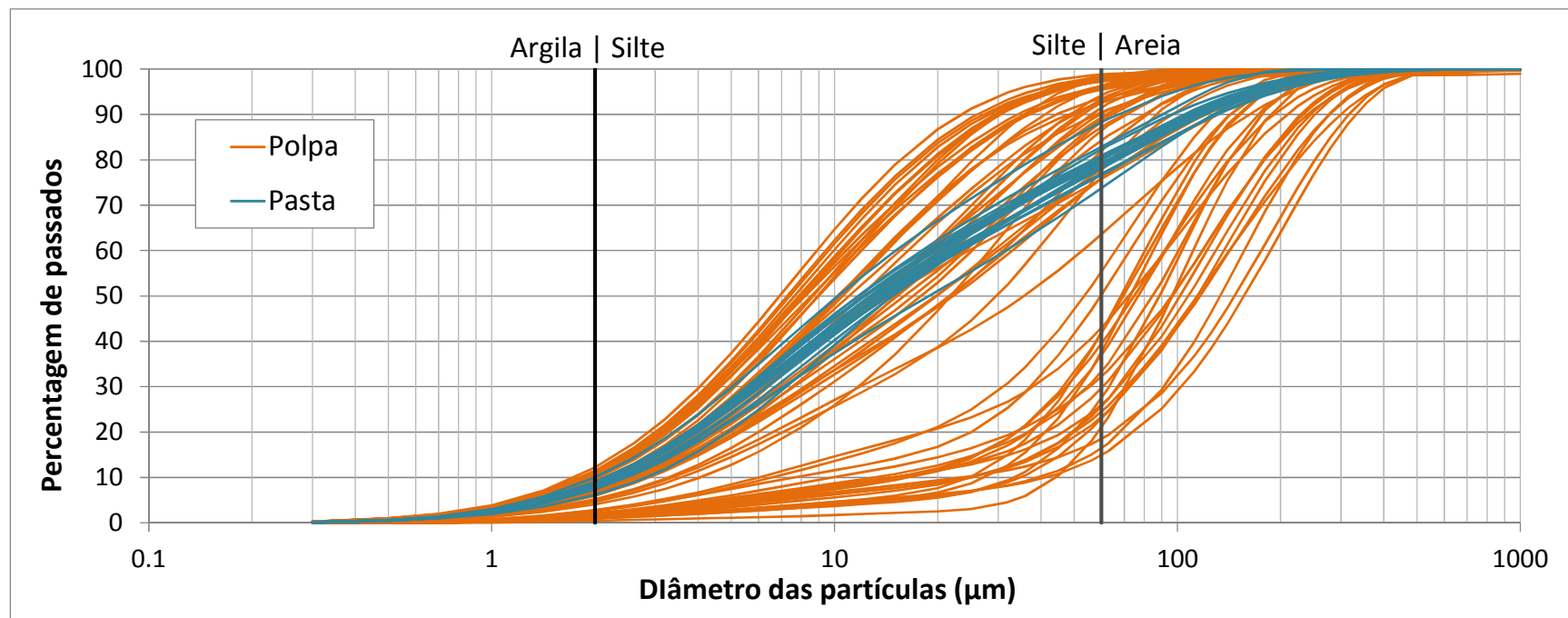
**70% Silt**

**20% Fine sand**

**10% Clay**

**Manmade particles:**

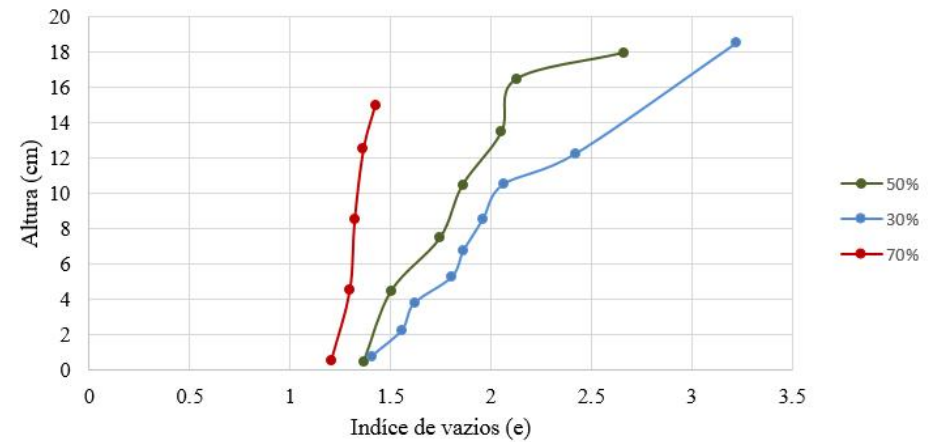
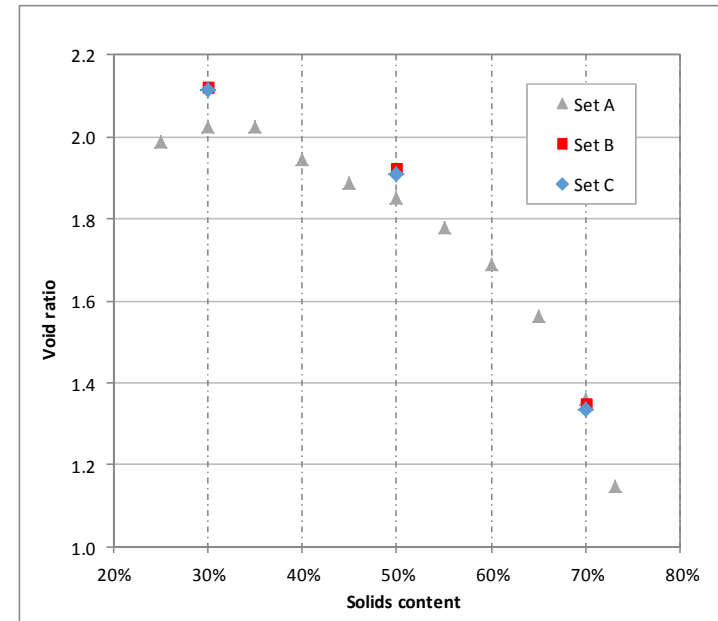
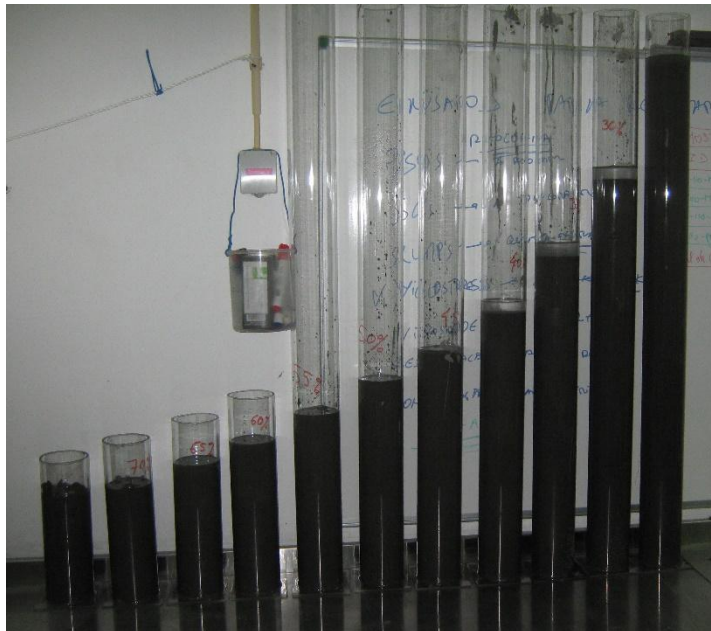
**similar in size but quite different  
from natural soils**





# Sedimentation tests

1kg of solids mixed with variable quantities of water







# Drying columns tests





## Work in progress

### **Other completed tests**

Oedometer tests

Rowe oedometer tests

Triaxial tests

Shrinkage tests

Drying columns

### **Work in progress**

Unsaturated triaxial tests

Unsaturated Rowe tests

Numerical modeling

**Conclusions...**

**September 2016**