

Relevance of Hydro-Mechanical-Chemical Processes Involved in the Construction and Operation of Copper Heap Leach Pads

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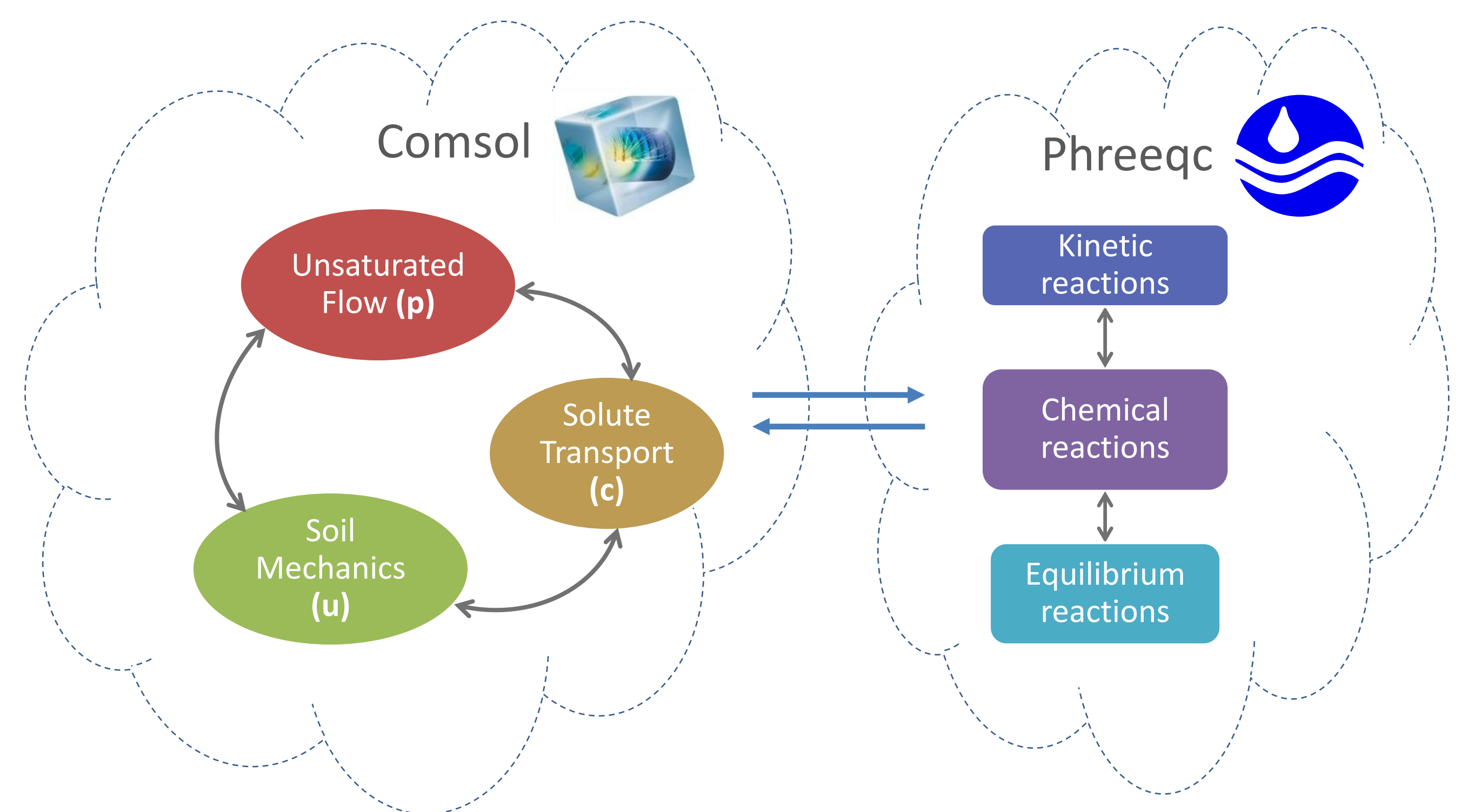
Introduction

Heap leaching is a mineral processing technology whereby large piles of crushed run-of-mine rock are leached with various chemical solutions that extract valuable minerals. This is one of several alternative processes for treating precious metal ores and it is selected primarily to take advantage of its low capital cost relative to other methods.

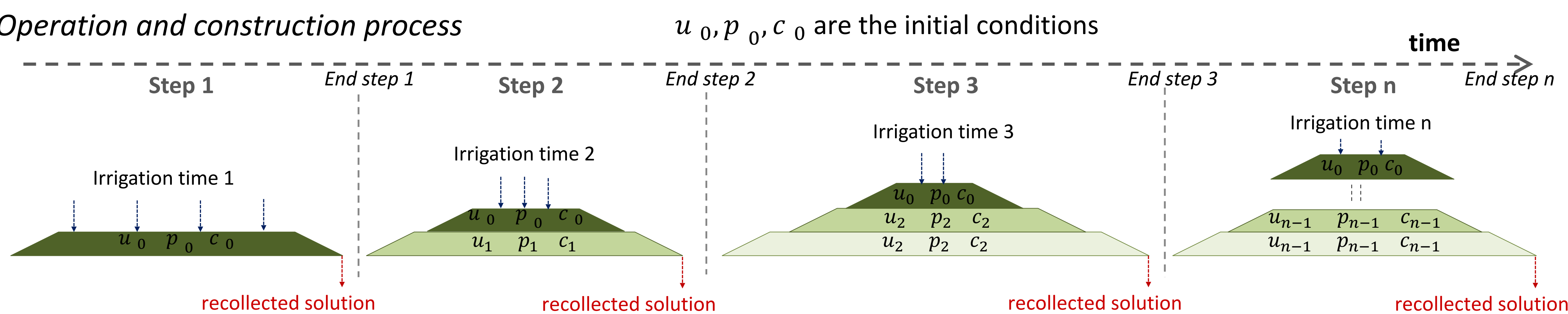
There are many critical aspects in heap leach pad construction and operations. At least two of them could be improved by an appropriate design and management: the mechanical stability and the mineral recovery efficiency. They are of paramount importance for two main reasons: (1) they could play an important role on the safety of the operation and; (2) they are keys for the metallurgical process efficiency, especially in the mid-long term

2D model of a synthetic heap leach pad

Physics involved

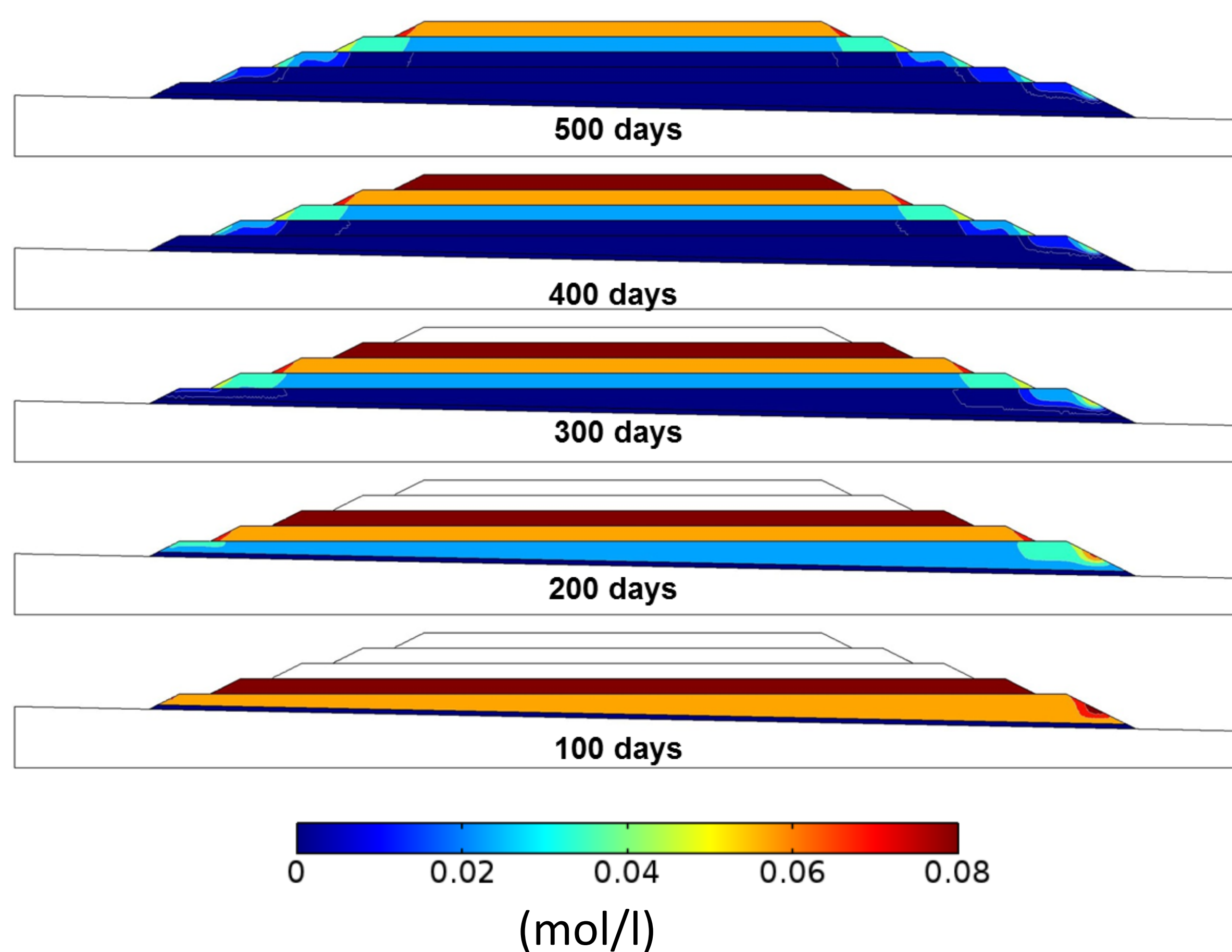


Operation and construction process

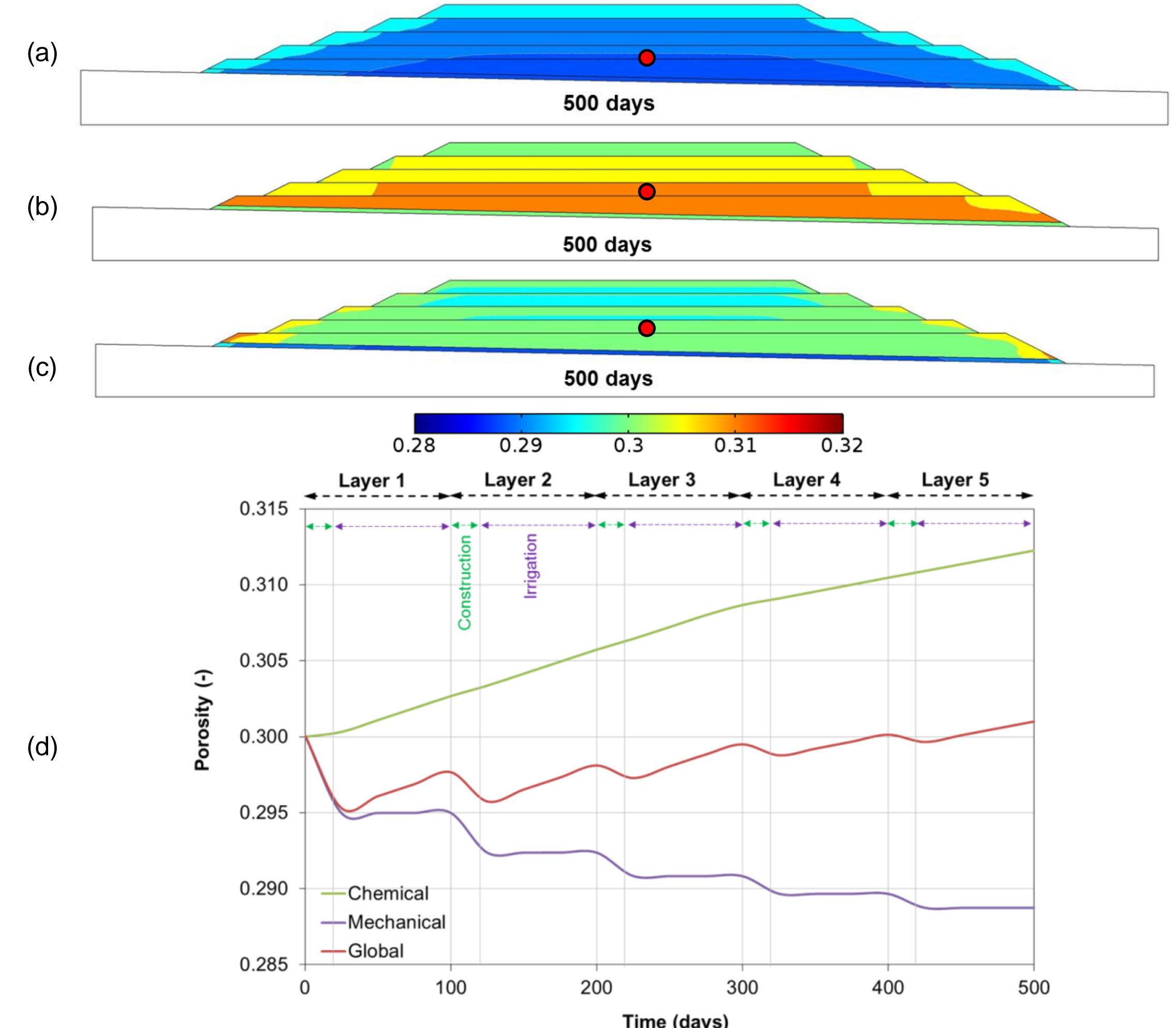


The different stages of operation and construction have been taken into account in the simulation

Presence of mineral rich in copper simulated along the operation time



Computed changes in mechanical (a), chemical (b) and global (c) porosity due to the mineral compaction and dissolution in the ore domain at 500 days. In (d) these variables are evaluated at the red point.



Conclusions

- The proposed numerical tool allows integrating in a single framework hydromechanical and geochemical coupled phenomena and the processes involved in the construction and operation of heap leach pads.
- The irrigation time plays an important role in the system behavior. This is due to the influence of irrigation on the liquid pressure and mass of recovered mineral.
- Some concentration of copper remains in the pad close to the slope limits, because irrigation is not very effective on those zones. Ideally those zones could be exploited as well.

Computed evolution of copper concentration of the recovered solution

