

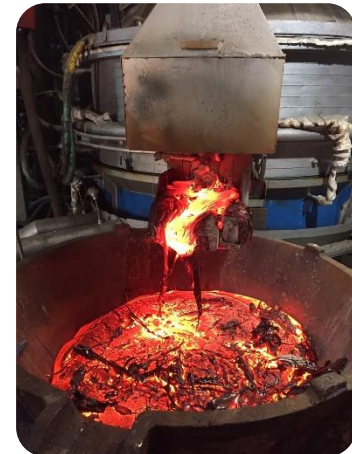
Fortran in Hydrometallurgy: Practice and Research



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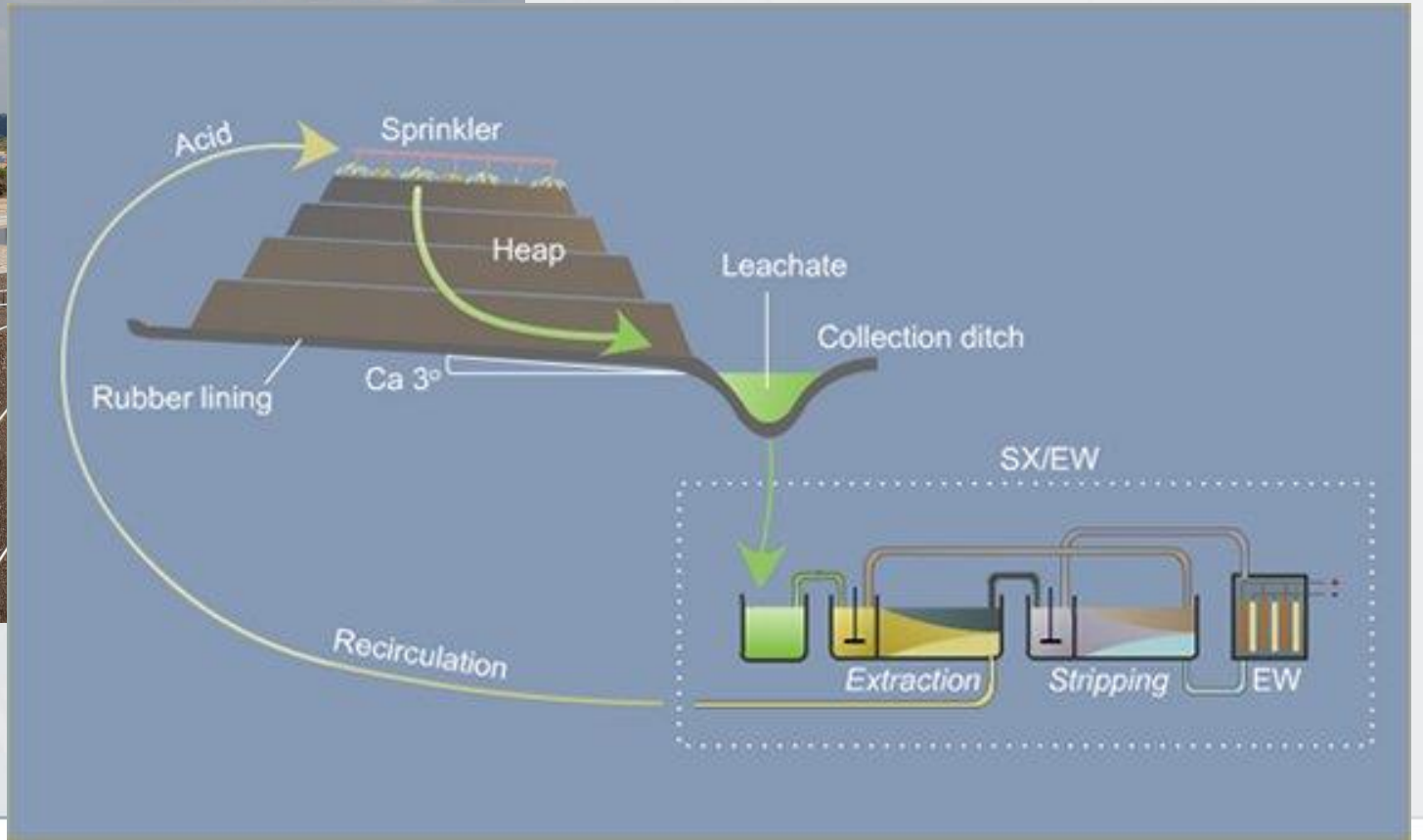


- South African science council conducting research, development, and technology transfer for the minerals beneficiation sector
 - Established 1934 (87 years old)
 - Annual budget ~ R500M (€ 30M)
 - Diversified state, contract, and industry funding sources
 - Multiple technical and support divisions with field-specific expertise

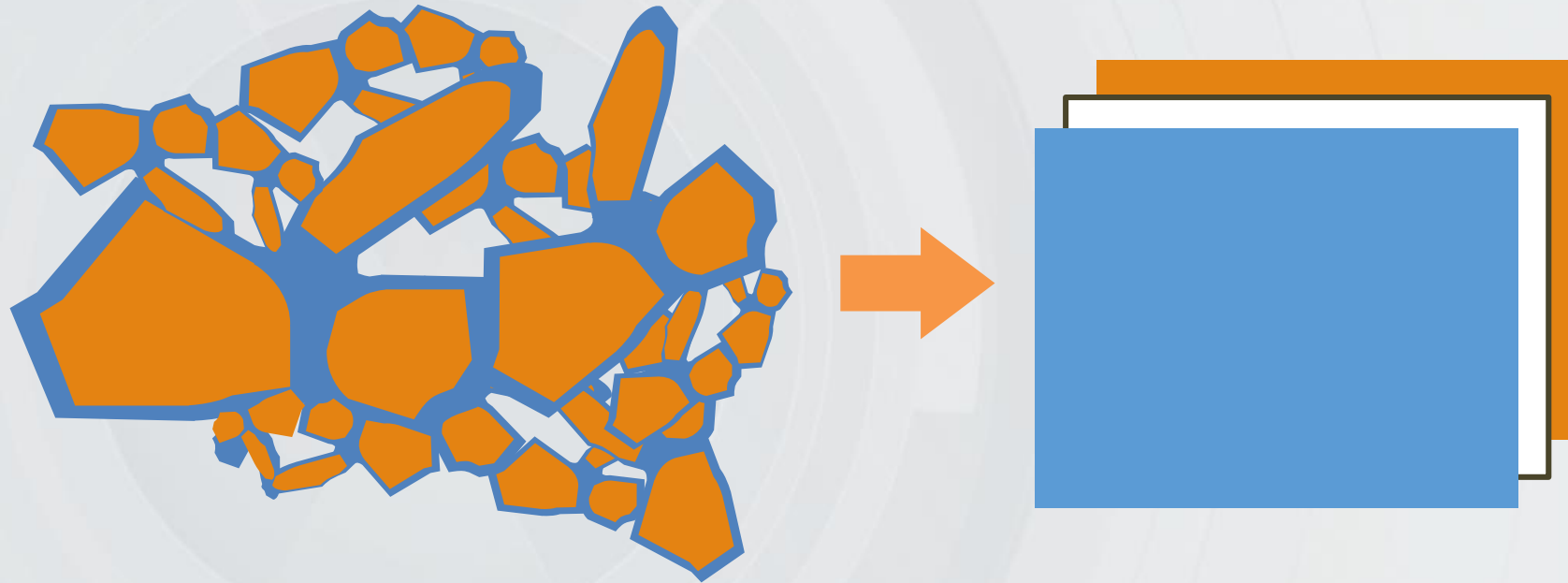




Hydrometallurgy: heap leaching



A bit about hydrology



Richards equation



water content (vol water / vol total)

hydraulic conductivity

$$\frac{\partial \theta}{\partial t} - \nabla \cdot [\mathbf{K} \cdot (\nabla h - \mathbf{e}_z)] = 0$$

suction head

$$\mathbf{K} = \mathbf{K}_s K_r(\theta)$$

$$h = h(\theta)$$



Why Fortran?



- The easiest
- Space discretization: PDE to ODE
 - Simple domain
 - I am lazy...
 - ODE: LSODA
- LSODA:
 - Old
 - It works
 - Just 3 files to drop into the project (no CMAKE hell)
- What to do with Excel?





- C binding
- Modules
- OOP
- Passing internal functions as arguments
- Dynamic memory allocation
- Sadly no: coarrays.
- OpenMP: didn't improve the performance



Demo

