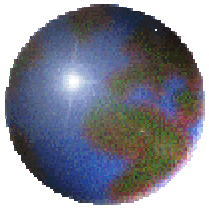

Partitioning and speciation of metals in surface soil: influence on ecotoxicity assessment

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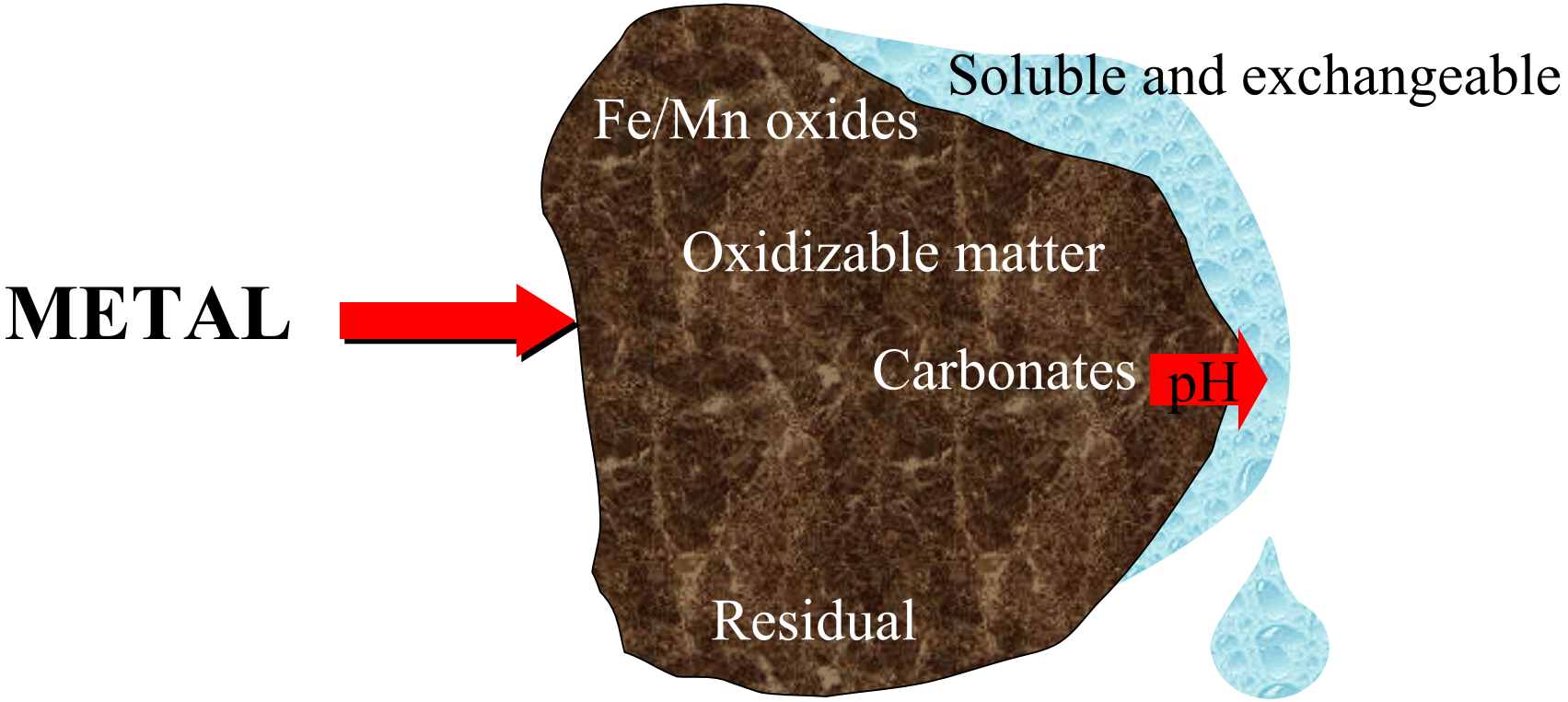
Metal partitioning in a soil system



User needs:

$$S_i^{nm} = E_i^m F_i^{nm} M_i^n$$

where: *i:* substance
M: emission
n: initial media
m: final media
E: effect
F: fate and exposure

However for metals, only a fraction of the mass M is associate with the toxic response

Moreover such toxicity is also relate to physicochemical characteristics of surface soils

Toxic response associate to metal in soil

$$T_{metal} = f(free\ ion)$$

$$T_{metal} = f(F_1 + F_2)$$

Carbonates

Free ion

Labile
$ML \leftrightarrow M^{2+} + 2L^-$

Soluble complexes

How to characterize metal partitioning in soil?

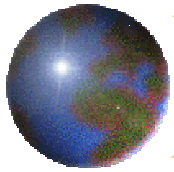
Fractions : *Selective Sequential Extraction*

- **Fraction 1** : soluble and exchangeable ($MgCl_2$ 1M)
- **Fraction 2** : bound to carbonates or specifically adsorbed (NaOAc 1M)
- **Fraction 3** : reducible form or bound to reducible Fe/Mn oxides (NH_2OH - HCl 0,04M in 25% (v/v) HOAc)
- **Fraction 4** : bound to oxidizable matter (HNO_3 0,02M and H_2O_2 30%)
- **Fraction 5** : residual (HNO_3 $HClO_4$, and HF)

However…

$$F_1 + F_2 = f(\textit{soil characteristics})$$

- pH
- Redox
- Cation Exchange Capacity
- Organic matter content
- Calcium carbonate content
- Fe oxides, Mn oxides, Al oxides



Therefore we propose

- A mapping system based on soil characteristics to assess the potential toxicity of metals
- Such mapping system is based on mass fraction of metal causing a potential ecotoxic effect