

HIDROGEOCHEMICAL PROFILE BALANCE OF FOREST *UMBRISOLS*

(SIERRA DE GATA MOUNTAINS, CW SPAIN)

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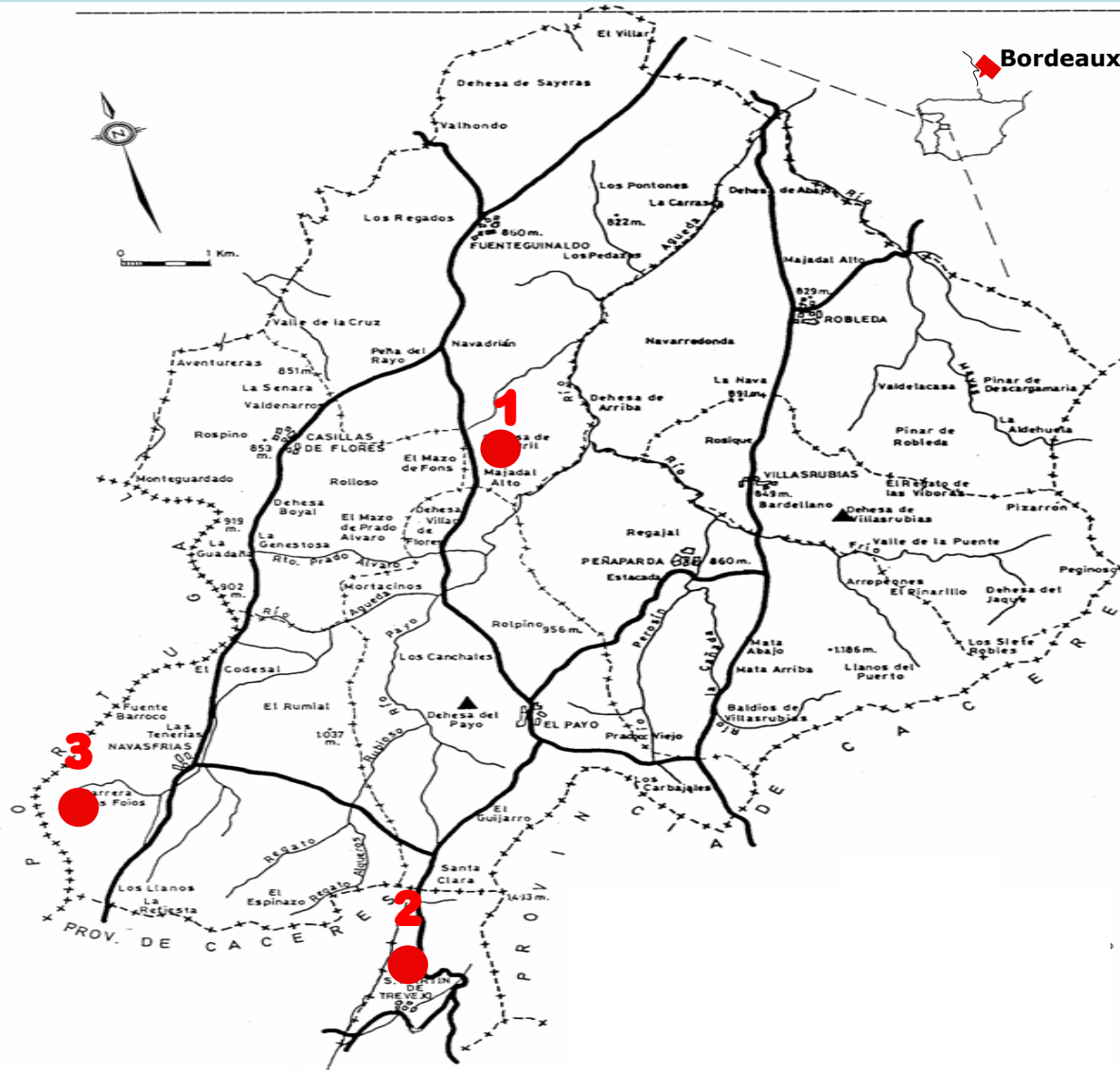
OBJETIVE

Study of the biogeochemical evolution of gravitational and matricial waters, from the *A_h* to the *B_wC* or *C* horizons belonging to *Umbrisols*

**SITE: *Quercus pyrenaica* & *Castanea sativa*
deciduous forests**



SITE: "Sierra de Gata" CW, Spain



SITE CHARACTERISTICS

- **Climate:** Sub-humid Mediterranean
- **Soils:** *Umbrisols* (F.A.O., 1998; *AhB_wC*)
- **Moderately acid** (pre-weathered acid substrate)
- **Relatively high pluviometry**
- **Moderate temperatures**

which favour **soil organic matter
accumulation**

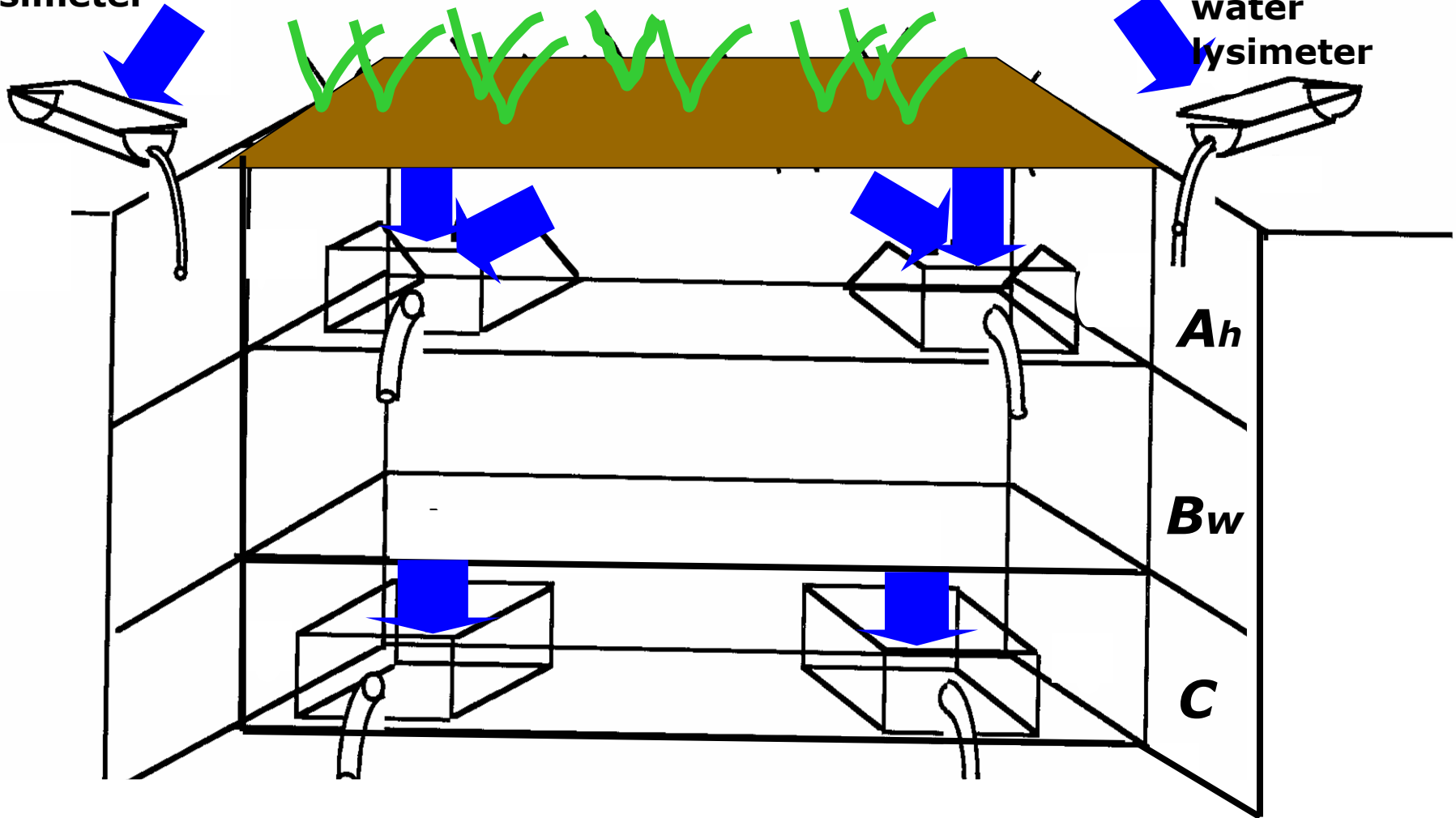
TECHNIQUES USED TO OBTAIN SOIL WATER

- Zero-tension lysimeters
gravitational waters
- Tension lysimeters (*in situ*) and
a pressure chamber (*in vitro*)
matricial waters

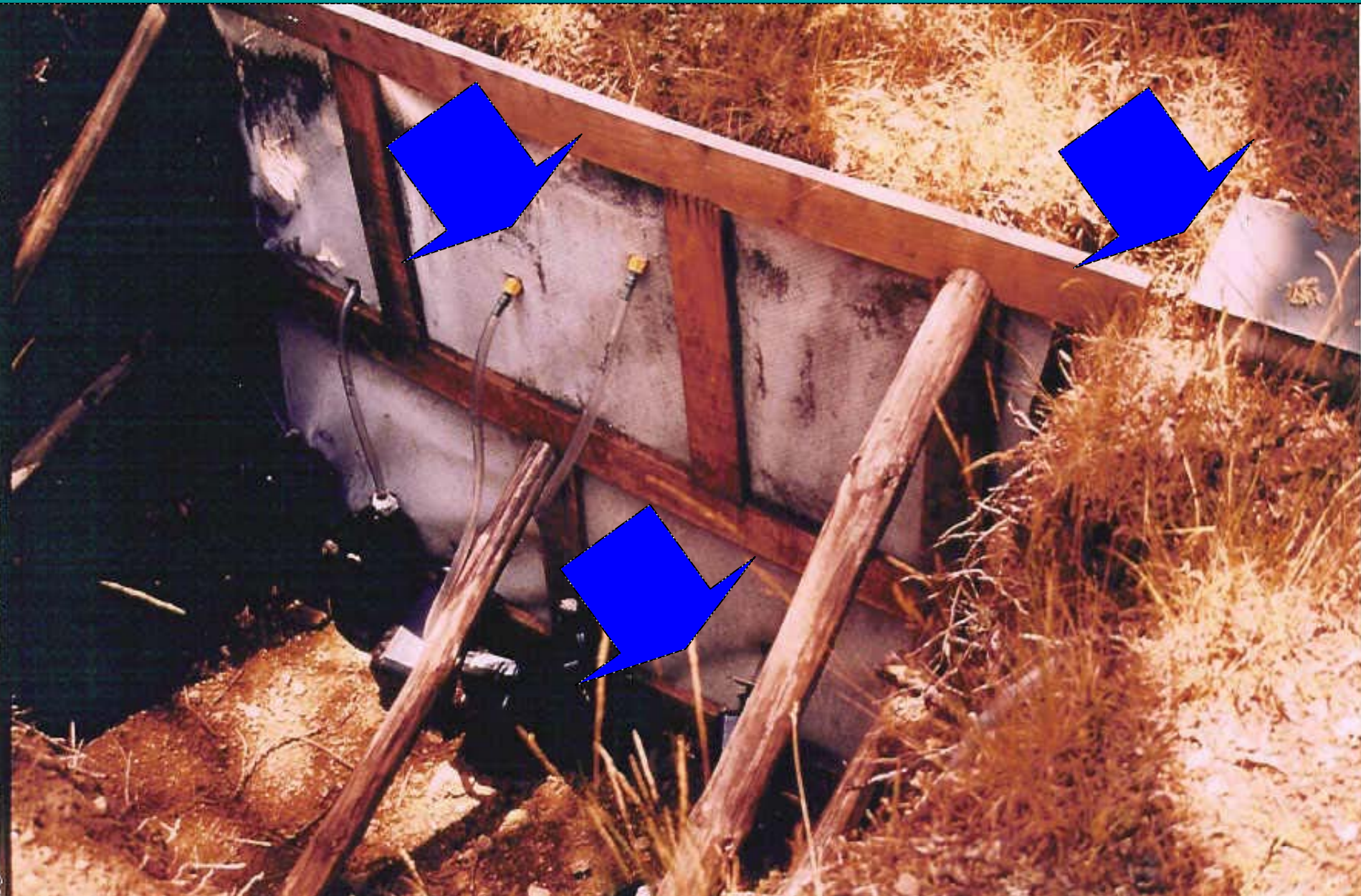
ZERO-TENSION LYSIMETERS

Litter-leaching water
lysimeter

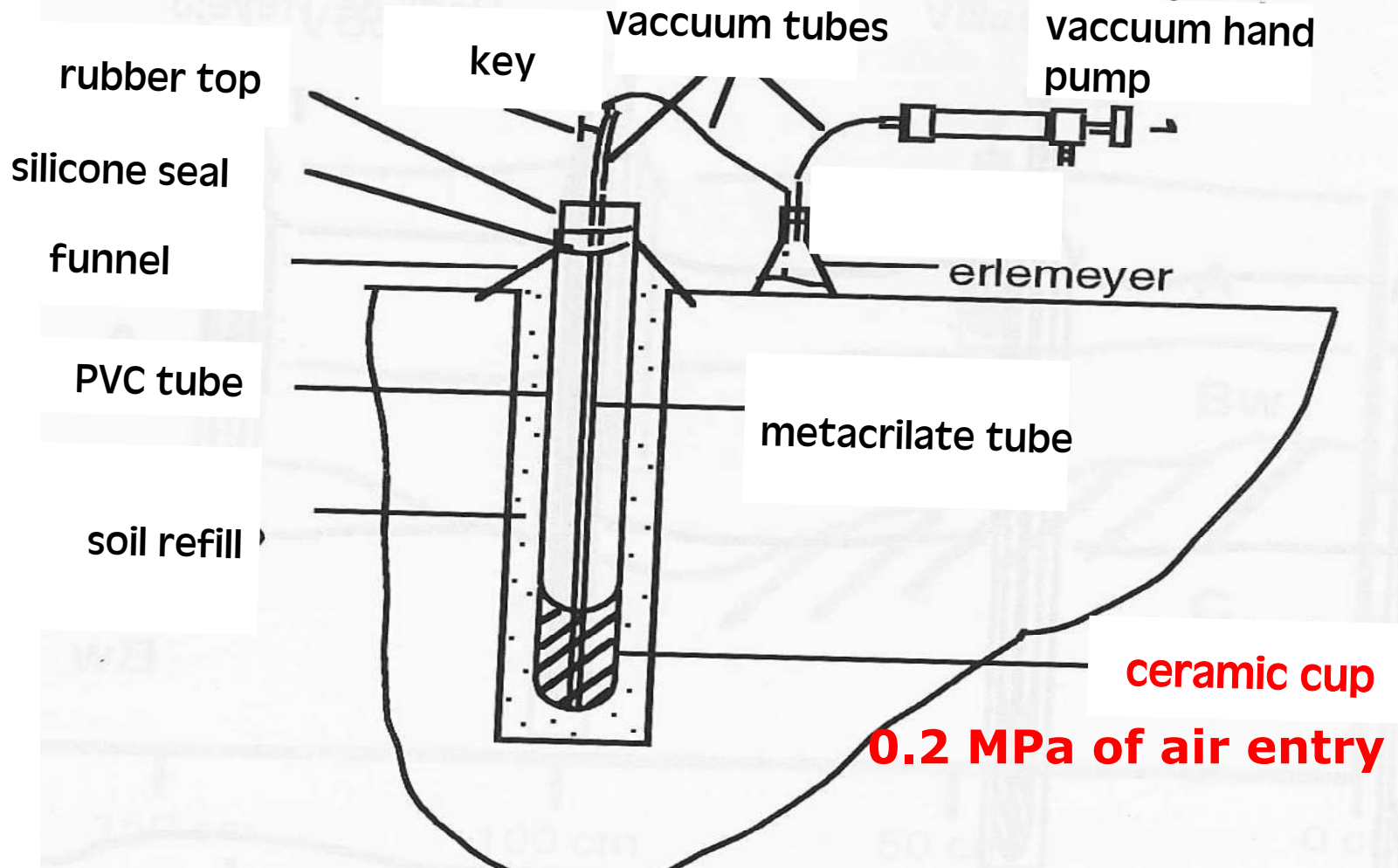
Litter-leaching
water
lysimeter



no tension lysimeters



TENSION LYSIMETERS

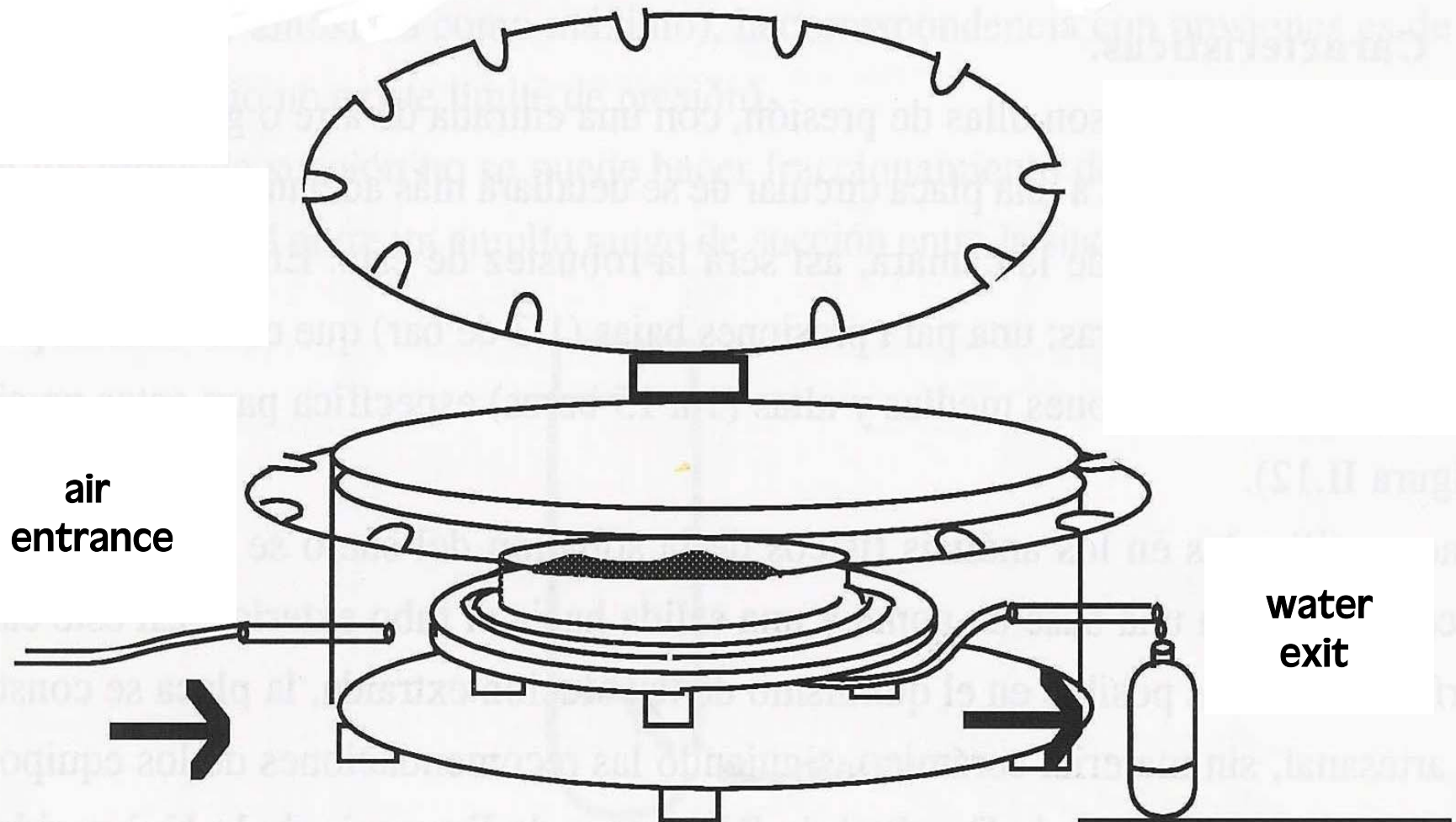


TENSION LYSIMETERS



PRESSURE CHAMBER

0.2 - 1.5 MPa



PRESSURE CHAMBER



METHODOLOGY

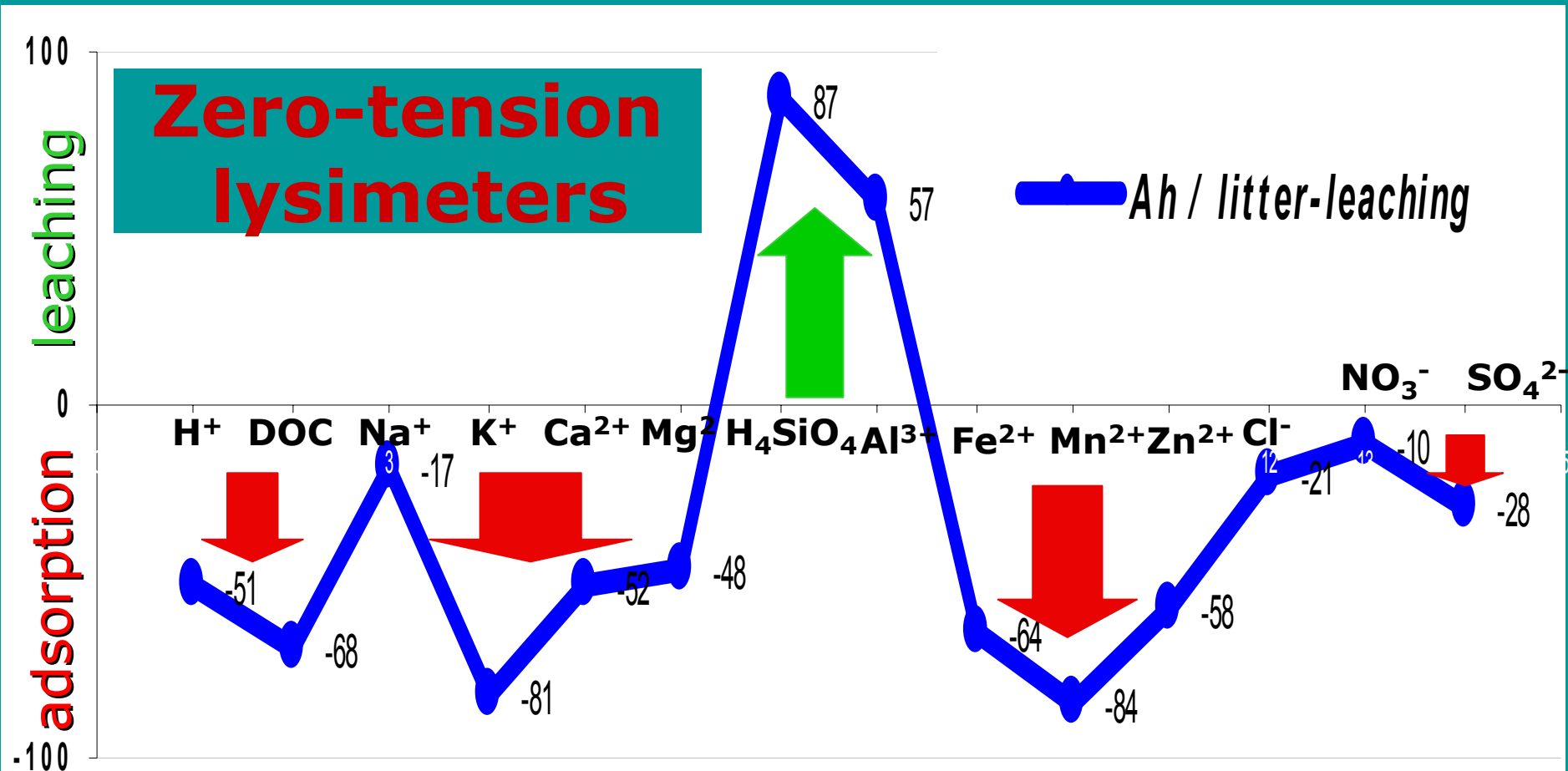
- **Matricial waters (<0.2 MPa) and gravitational waters** were collected during 2 hydrological cycles (1992–94), 2-weeks periodicity
- **Matricial waters (0.2 – 1.5 MPa)** were extracted from soil samples, in duplicate, using a pressure chamber

Water Parameters Analyzed

- **pH & electric conductivity**
- **DOC (TOCA, *Bekman-315A*)**
- **Major cations (by AAS, *Varian-1475*)**
- **Minor cations & silica**
(by IPC, *Perkin Elmer Plasma-II*)
- **Major anions (by ionic chromatography, *Dionex 350*)**

PRELIMINARY RESULTS & CONCLUSIONS

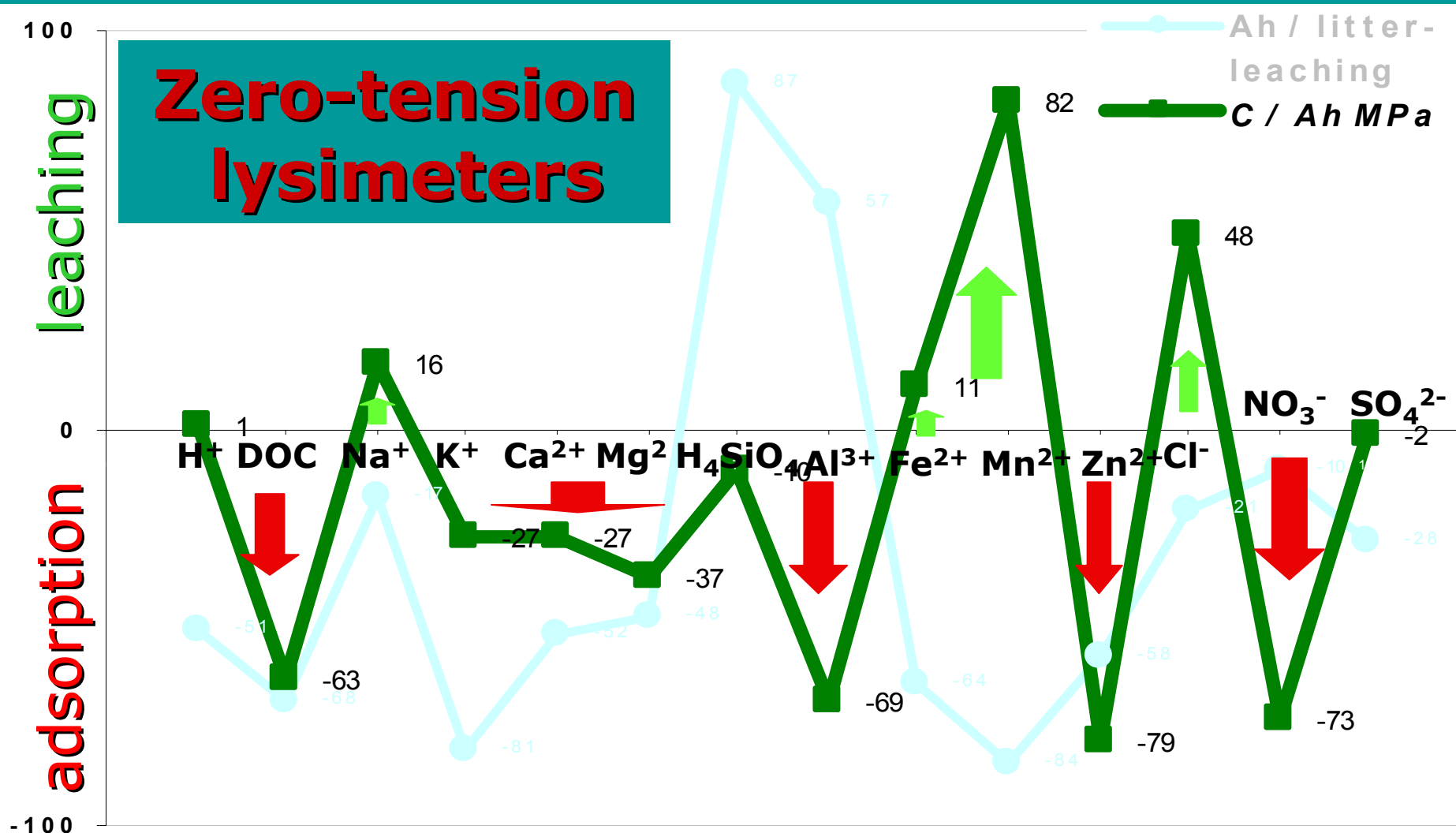
Ah drainage water / *Litter-leaching* drainage water



PRELIMINARY RESULTS & CONCLUSIONS

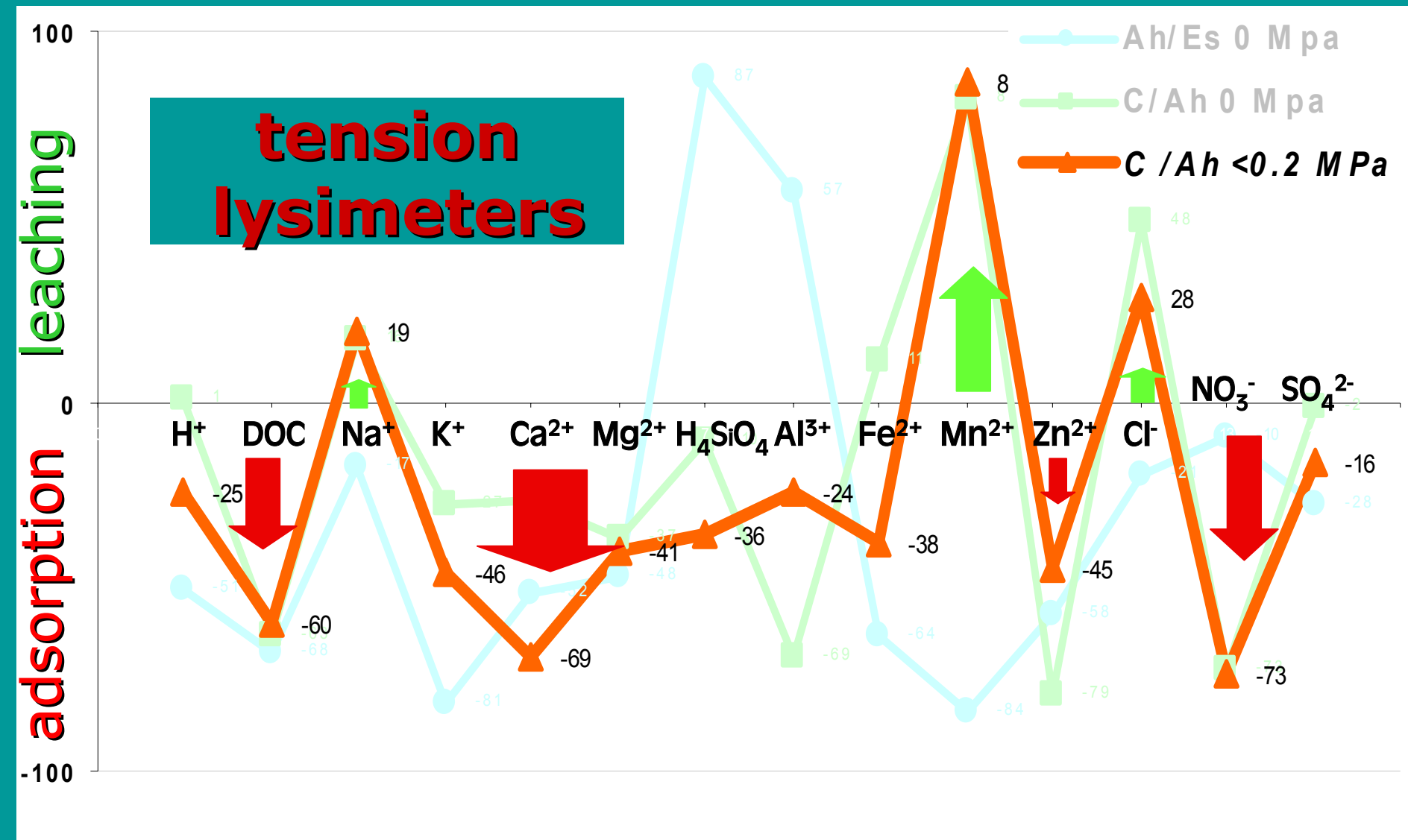
C drainage water / *Ah* drainage water

**Zero-tension
lysimeters**



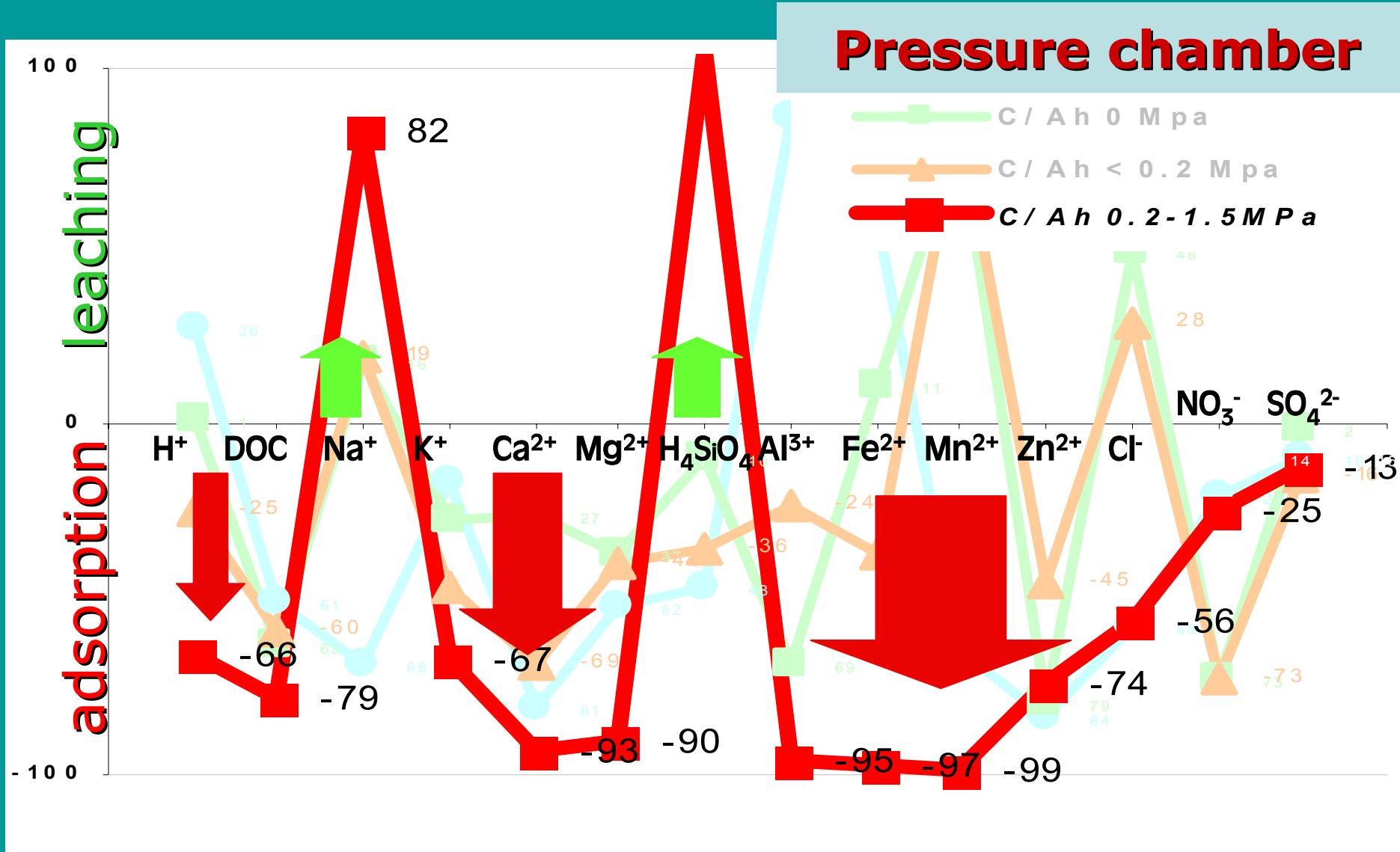
PRELIMINARY RESULTS & CONCLUSIONS

C matricial water / Ah matricial water (< 0.2 MPa)

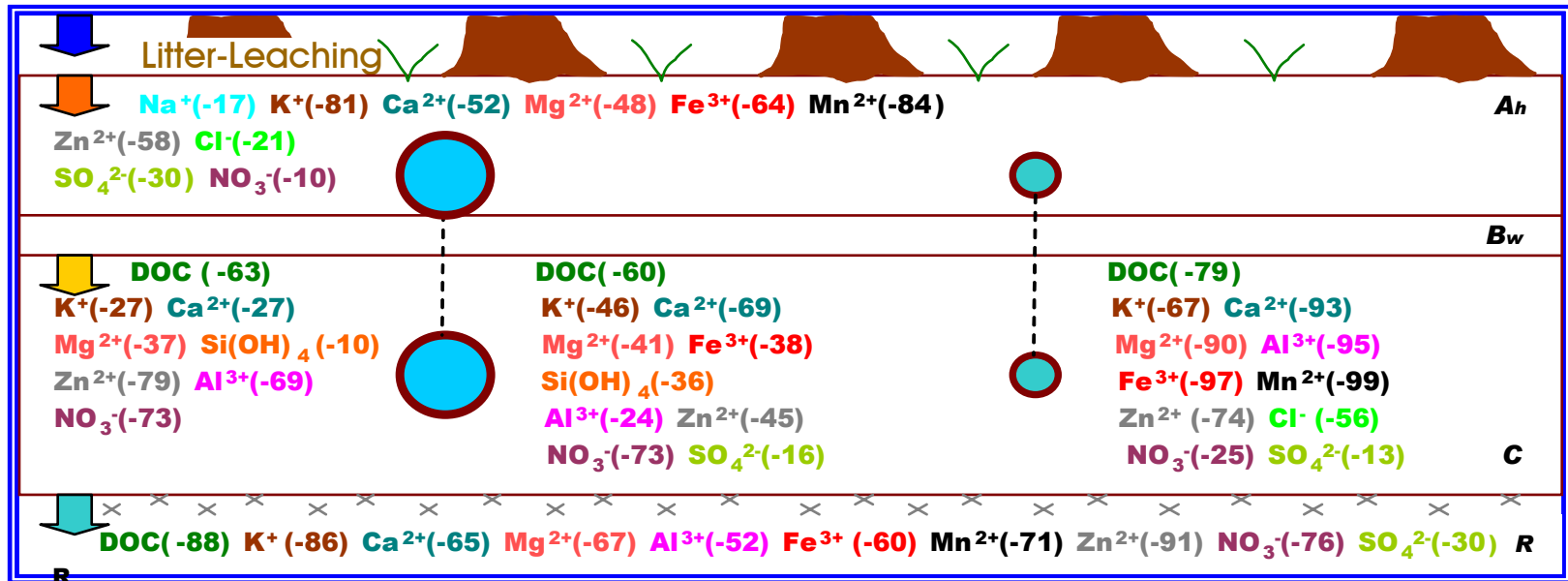
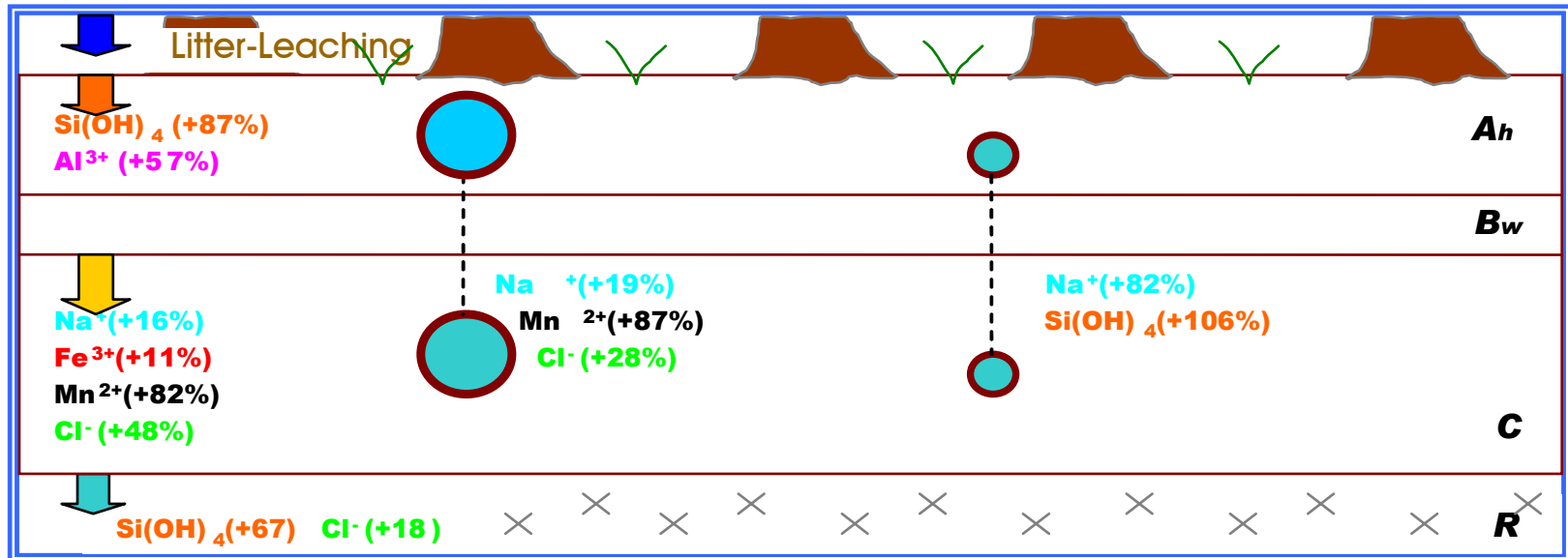


PRELIMINARY RESULTS & CONCLUSIONS

C matricial water / Ah matricial water (0.2 - 1.5 MPa)



LEACHING



ADSORPTION

PRELIMINARY RESULTS & CONCLUSIONS

LEACHING:

MINERAL WEATHERING

parent rocks (granites & very low schist):

quartz, biotite, moscovite-illite, chlorite, kaolinite



H_4SiO_4 Na^+ Al^{3+} Fe^{2+}

enhanced at A_h and smaller pores

PRELIMINARY RESULTS & CONCLUSIONS

ADSORPTION:

OPTIMIZATION OF BIOELEMENT RECYCLING IN THE SOILS (ORGANIC MATTER AND ROOT SYSTEM)

K^+ (67 %) Ca^{2+} (93 %) Mg^{2+} (90 %)

Fe^{2+} (97 %) Mn^{2+} (99 %) Zn^{2+} (74 %)



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THANK YOU!

Any questions...?