

COMPARATIVE HYDROCHEMICAL BUDGETS AND WEATHERING RATES IN THREE LITTLE WATERSHEDS WITH CONTRASTED VEGETATION (MONT LOZERE, FRANCE)

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Measurements of water and solute inputs and outputs in three small watersheds covered with distinctive vegetation allow to quantify the effect of the vegetation on the hydrochemical budgets and on the rate of present day weathering.

The watersheds are considered as giant lysimeters for which the mass conservation equation is suitable :

Inputs (atmospheric precipitation + chemical weathering) = Outputs (discharge)
± stock variations

But the following conditions are to be satisfied :

- The representative watersheds must have exactly the same geological and physiographical characteristics, except vegetation. The three selected watersheds are located on the south slope of Mont Lozere (France), with homogenous granitic basement, and with distinct vegetations and areas :
 - watershed 1 (0.81 km²) : grass land,
 - watershed 2 (0.54 km²) : beech forest,
 - watershed 3 (0.19 km²) : spruce forest.
- The water discharge at the exutory must be sampled with variable time intervals to obtain the solute concentrations corresponding to the different discharge.
- The solute flux calculations must be optimized to reduce the measurement errors, so that small differences of calculate fluxes might be significant. Following this way the differences of hydrological and hydrochemical budgets and weathering rates according to the vegetation proved to be marked and significant.
- The hydrochemical budgets (input-output balance, cf. fig. 4) are for the cations more negative in the resinous watershed than is the deciduous one and for the anions opposite balances are apparent.
- from this data it is possible to evaluate the weathering rate for each chemical element, after making some assumptions upon the supplementary inputs and outputs such as dry fall out, particulate erosion, harvesting..., and upon the chemical stock variations in soil and biomass compartments. The so calculated weathering rates are, for the cations, clearly decreasing from the resinous ecosystem to the graminaceous ecosystem and to the deciduous one.

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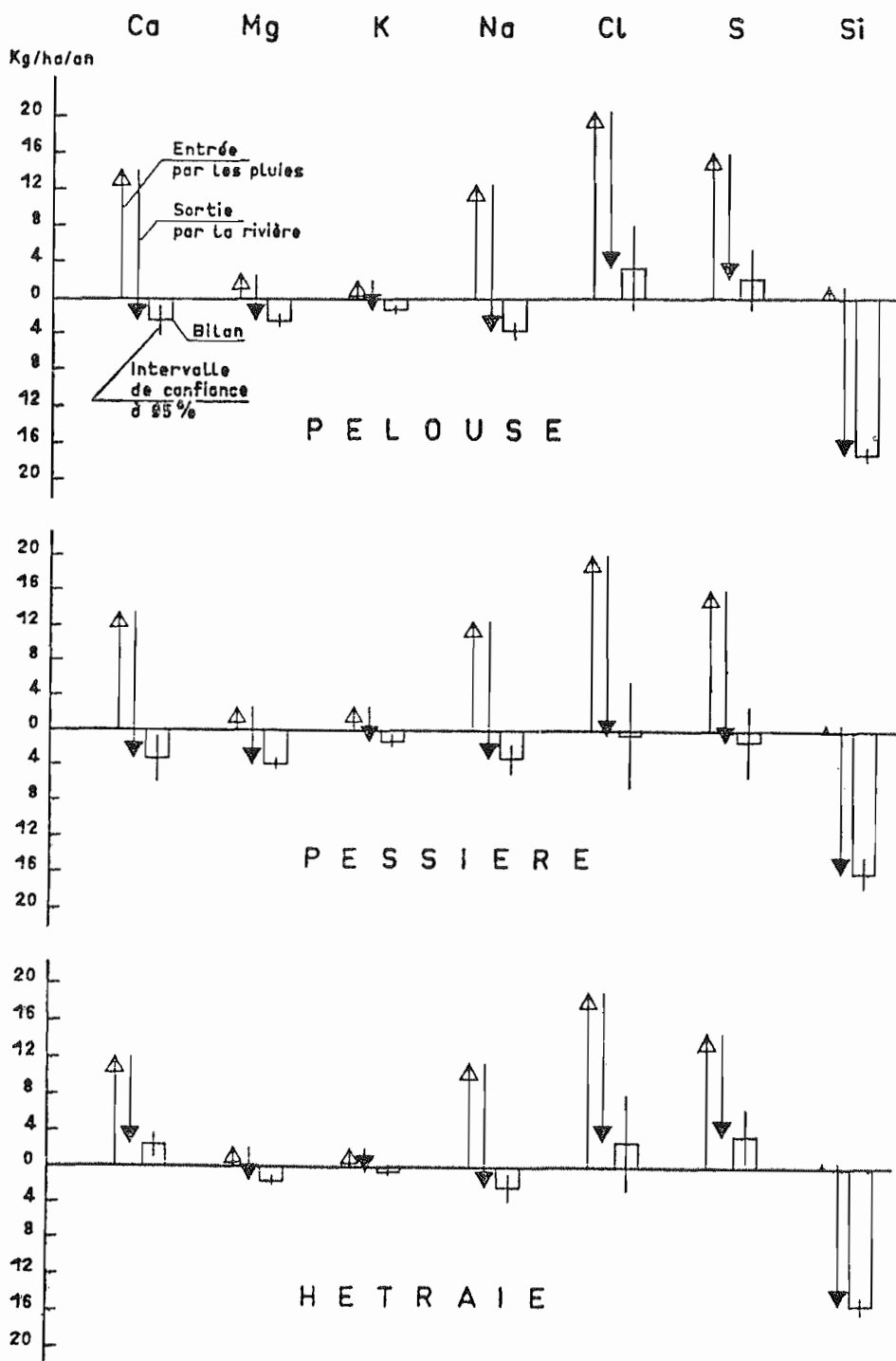


Figure 4 : Hydrochemical budgets with range of error for the three compared watersheds. Values are expressed in Kg.ha⁻¹. an⁻¹.