



Structural stability of soil crusts. *Consequences for soil erodibility assessment*

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Erodibility



Definition

“Sensitivity of the soil to erosion”

“Easiness of the soil to release particles to the water flow”

A fuzzy concept, even if a key parameter in models of soil erosion by water

Assessment of an erodibility index

Comparison of erosion fluxes between field plots and statistical analysis (R-USLE)

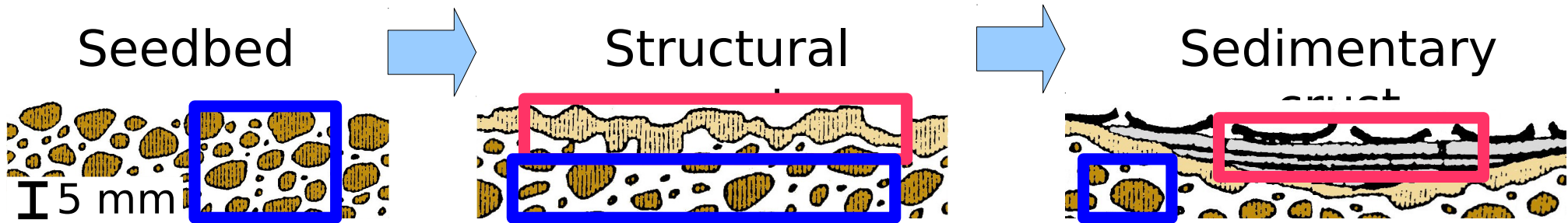
Tests of structural stability, i.e. laboratory measurements of the strength of soil aggregates

Erodibility

Current state

One soil = one erodibility

.. but the properties of the soil surface evolves



Evaluation by structural stability

Interrill

erosion stability

Samples for tests

occurs on crusted

soils

(layer)

BUT,

from the seedbed (or the plough

Do seedbed and crusted layer have similar stabilities

(erodibilities)?

Is "one soil = one erodibility" sufficient?

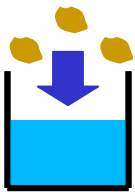
If not, how to do better?

Structural Stability Tests

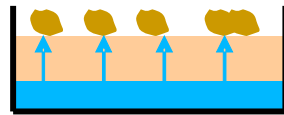
Method “Le Bissonnais, 1996”:

3 tests, based on breakdown mechanisms

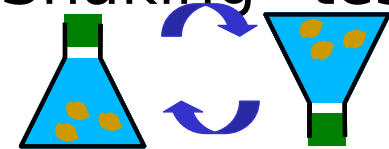
Air compression
“Fast wetting” test



Differential
Clay Swelling
“Slow wetting” test



Mechanical
Breakdown
“Shaking” test



- 1) Initial dry aggregates (3-5 mm)
- 2) Test
- 3) Sieving of the fragments

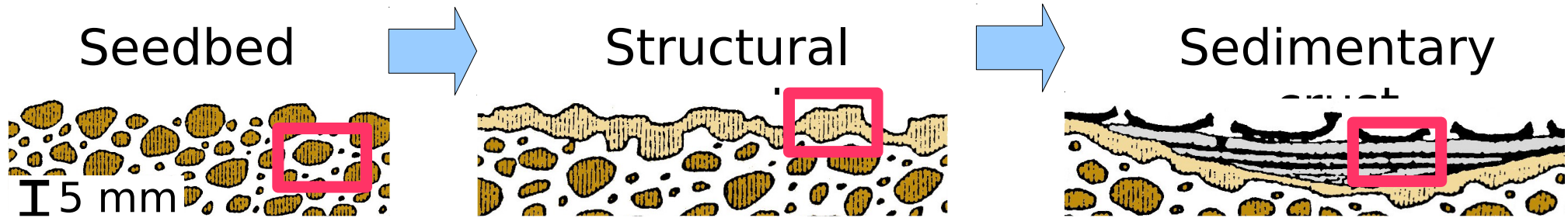
Results : Mean size of the fragments
= Mean Diameter

Structural Stability Tests and Successive Crusting Stages

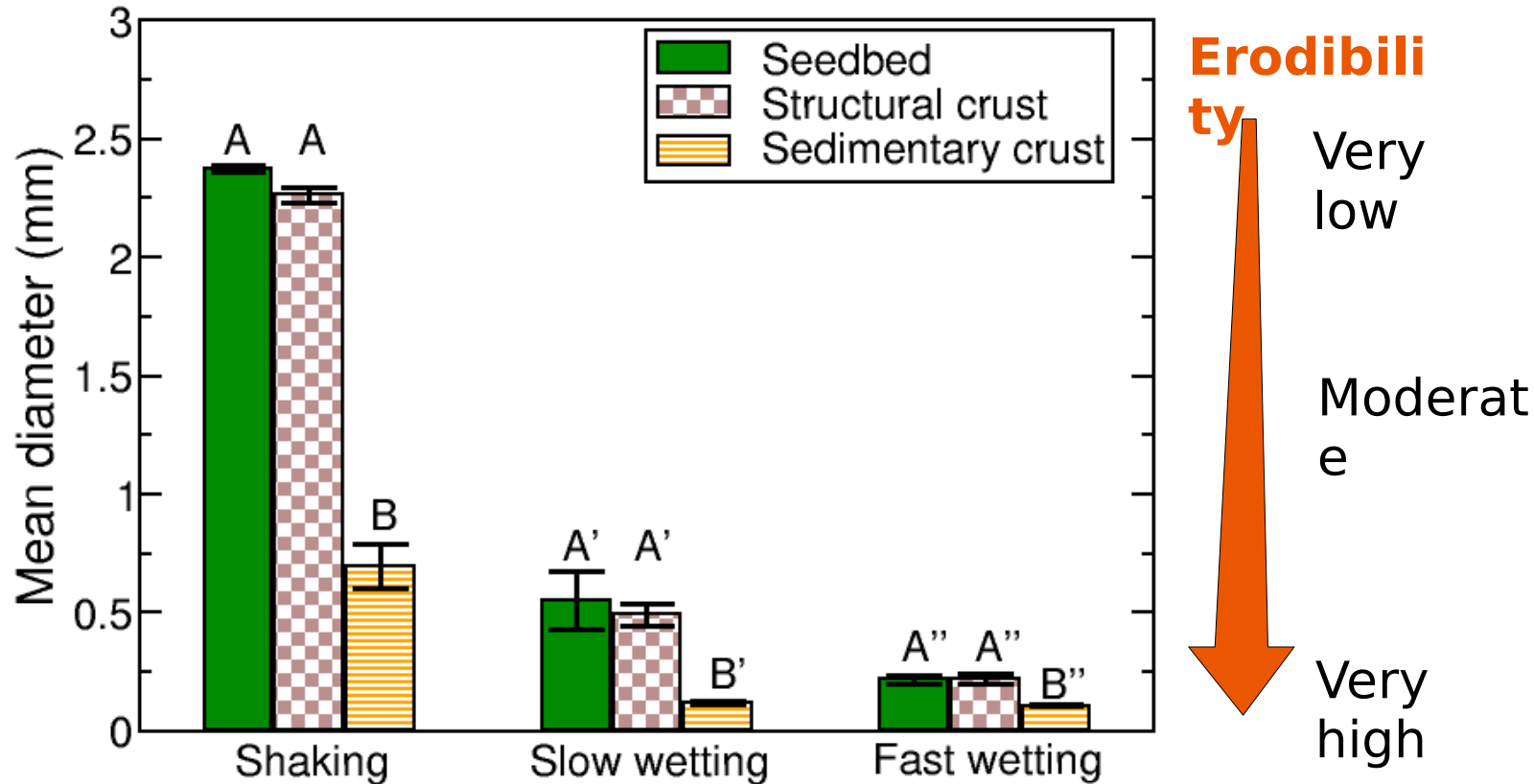
Silt loam soil

Rainfall simulation experiment

- crust formation
- crust sampling
- stability measurements



Results



Different erodibilities depending on the breakdown mechanisms

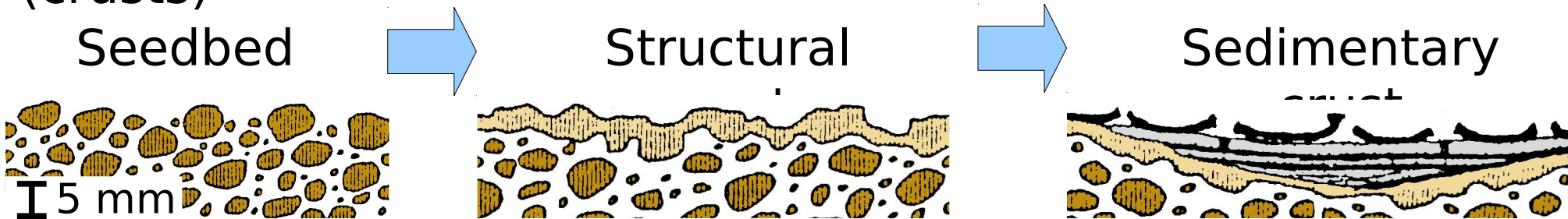
Different erodibilities depending on the type of surface samples

Conclusion

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Erodibility should be assessed on the exact material that will undergo erosion

Carry the stability tests on the material at soil surface (crusts)



Improvement of erodibility assessment
More accurate results for erosion models