

Changes in Structural Stability with Soil Surface Degradation. *Consequences for 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

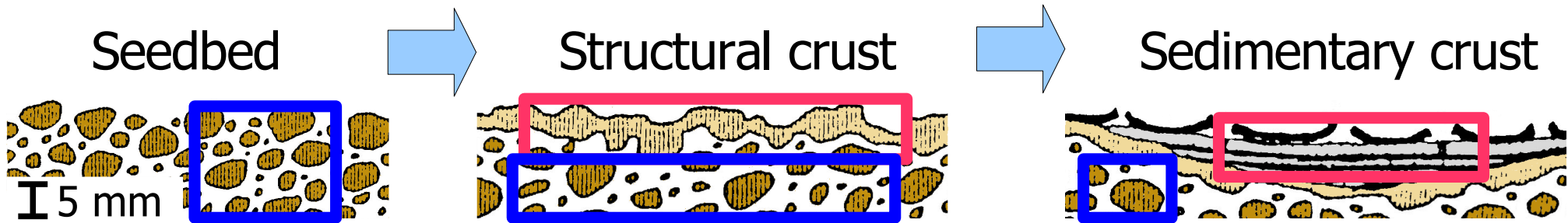
- Comparison of erosion fluxes between field plots and statistical analysis (R-USLE)
- Tests of structural stability, i.e. laboratory measurements of the strength of soil aggregates

Erodibility

Current state

One soil = one erodibility

.. but the properties of the soil surface evolves



Evaluation by structural stability

Interrill erosion: occurs on crusted soils BUT,

Samples for stability tests: from the seedbed (or the plough layer)

Do seedbed and crusts have similar stabilities (erodibilities)?

Is "one soil = one erodibility" sufficient?

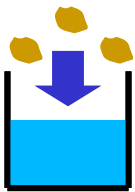
If not, how to do better?

Structural Stability Tests

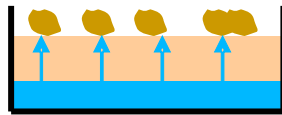
Method "Le Bissonnais, 1996":

3 tests, based on breakdown mechanisms

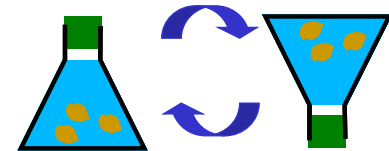
Air compression
"Fast wetting" test



Differential
Clay Swelling
"Slow wetting" test



Mechanical Breakdown
"Shaking" test



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

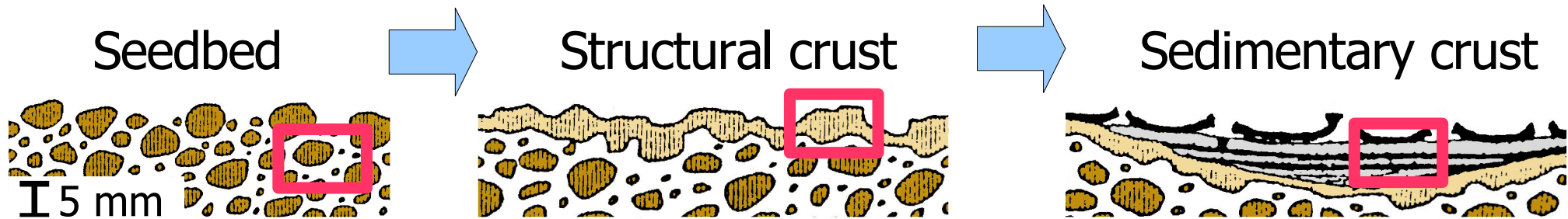
Results : Mean size of the fragments
= Mean Diameter

Structural Stability Tests and Successive Crusting Stages

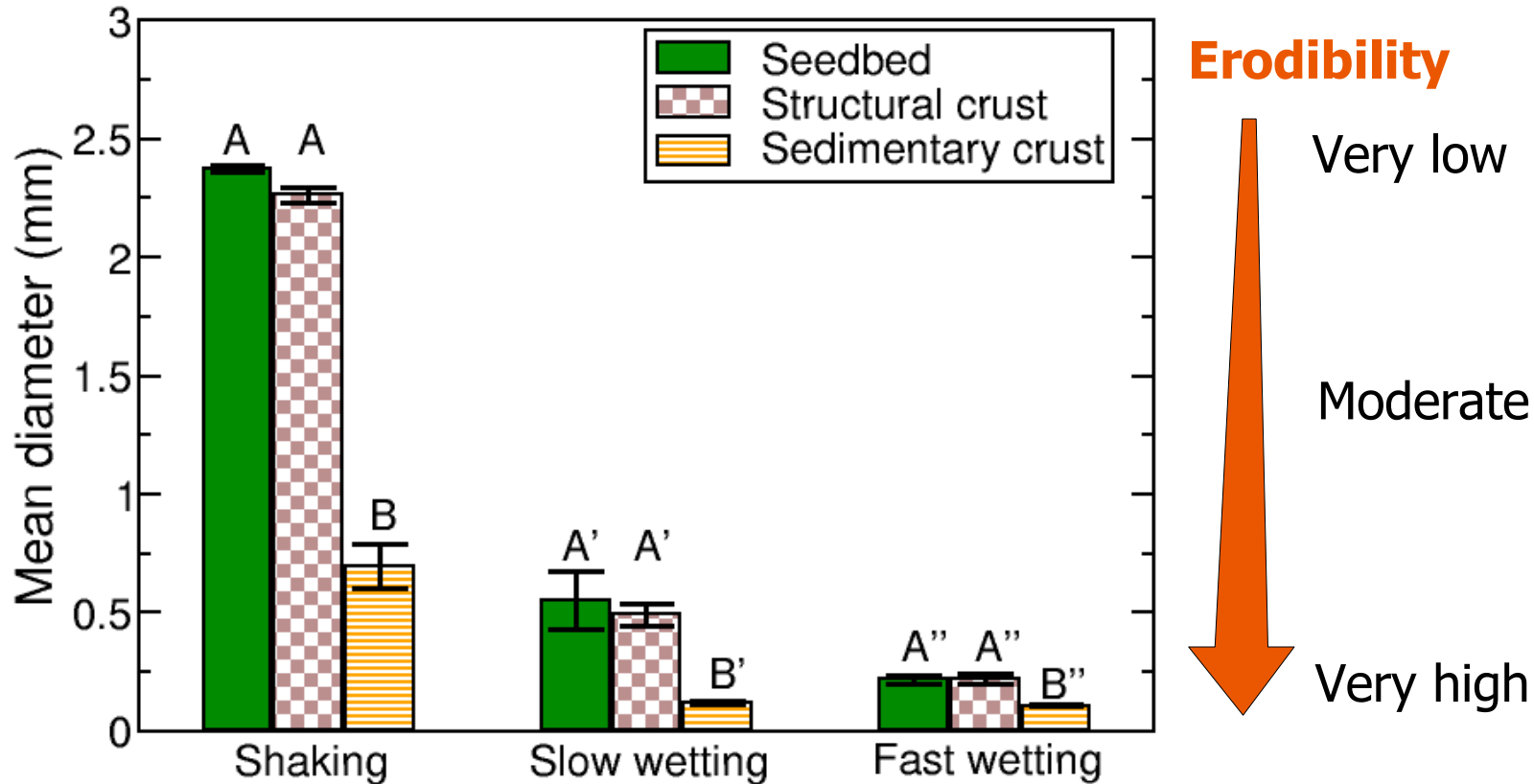
Silt loam soil

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

Conclusions

- 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