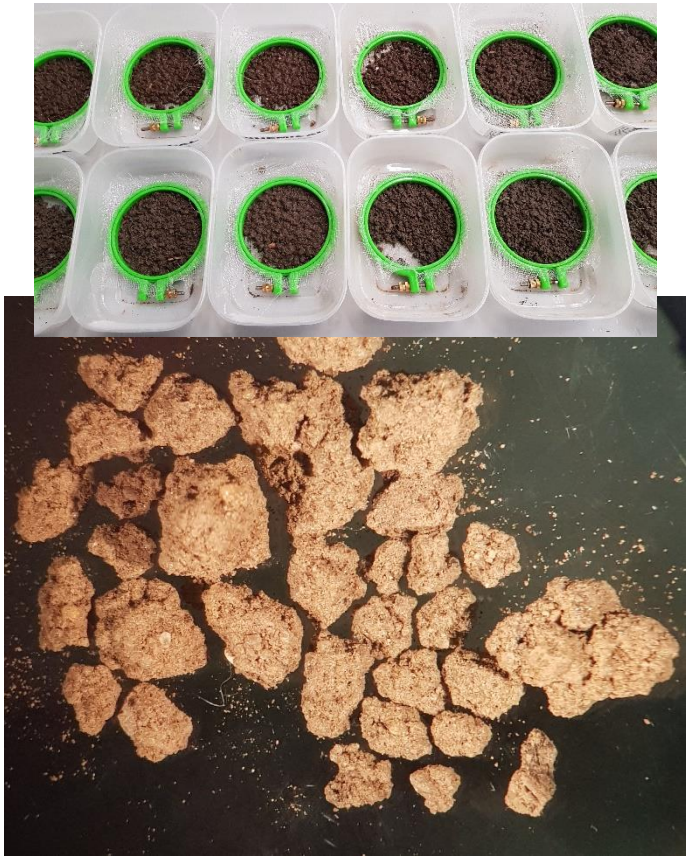

Temperature and moisture content influences aggregate stability: linking climate induced microbial change to aggregate (de)stabilisation

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STARS

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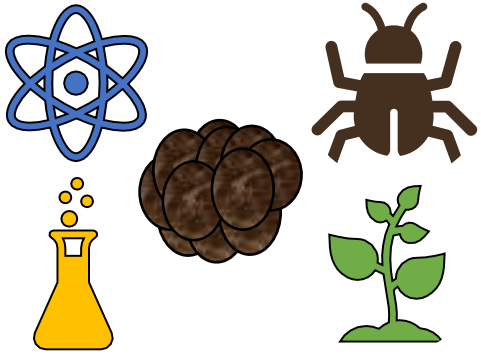
1. Summary

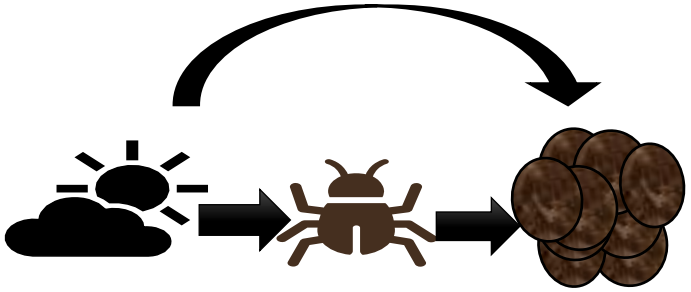
Key Questions: How does climate (temperature and soil moisture content) affect aggregate stability and what are the operating mechanisms?

- Aggregate stability = key soil property influencing soil structure and soil erodibility



- Aggregate stability is influencing by multiple physical, chemical and biological mechanisms operating simultaneously.
- Aggregate stability changes spatially/temporally: often aligned with climate
- Climate also affects microbial community (& potentially microbial stabilising mechanisms)

- Overall hypothesis: climate conditions drive changes in aggregate stability, which can be partly explained by the effect of climate on the soil microbial community.



2. Methods

- We incubated 2 soils (loamy sand and clay) in aggregate microcosms using environmental chambers and a gravity-fed rainfall simulator.
- First experiment applied 9 treatments (3 temperatures x 3 moisture contents).
- Second experiment applied summer-winter incubations with 3 treatments (representing future climate scenarios) alongside season controls (constant summer/ constant winter)
- We measured:
  - ❖Aggregate stability
  - ❖Microbial community composition
  - ❖Microbial respiration
  - ❖Microbial biomass carbon

3. Results (Experiment 1)

Soil temperature and moisture content influence aggregate stability, dependent on soil texture

- Increasing temperature = significant increase in aggregate stability in clay aggregates.
- Increasing moisture content = significant decrease in aggregate stability in loamy sand aggregates.
- Temperature and moisture content = significant effects on microbial community properties
- Multiple regression analysis showed loamy sand aggregate stability best predicted by soil moisture content, microbial biomass, G- bacteria and fungal abundance. Temperature = significant predictor for clay.

4. Results (Experiment 2)

Successional seasons had a lasting influence on aggregate stability

- Aggregate stability was lower after summer-winter incubations compared to constant conditions, effects on microbial community dependent on soil texture.
- Climate scenario treatments did not drive significant differences in aggregate stability – but did in microbial responses.
- Relationship between microbial properties and aggregate stability is complex

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Any Questions?

Please join the chat for SSS6.8 on Tuesday 5th May at 10:45-12:30 (CET)

Or get in touch by email: e.dowdeswell@cranfield.ac.uk

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