EGU22-2803

SSS2.3

Aggregate stability and potential erodibility of dry steppe soils

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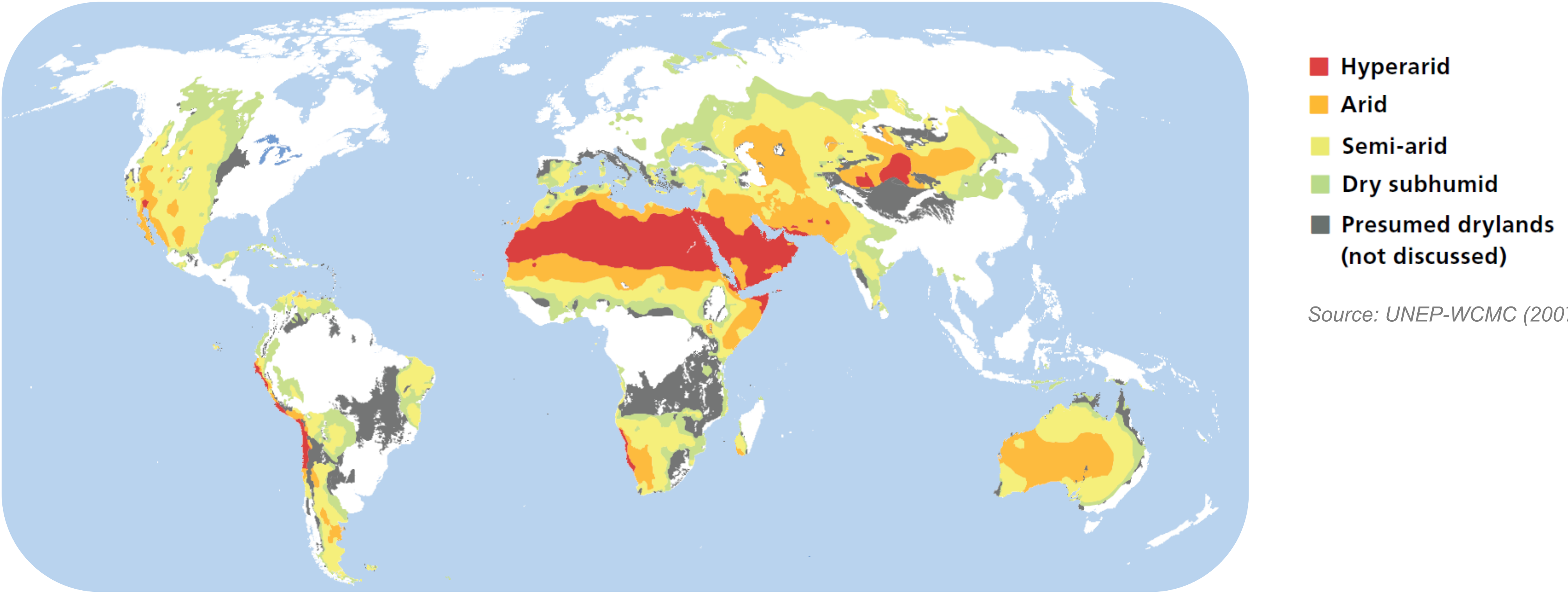
What is the overall problem?



Source: UNEP-WCMC (2007)

- drylands are particularly vulnerable to human activities and climate change

Reynolds et al. (2007)

Overall problem in Central Asia?

- intense agriculture and increasingly extreme climate conditions cause an increasing threat of soil erosion in semiarid ecosystems *Robinson et al. (2016)*

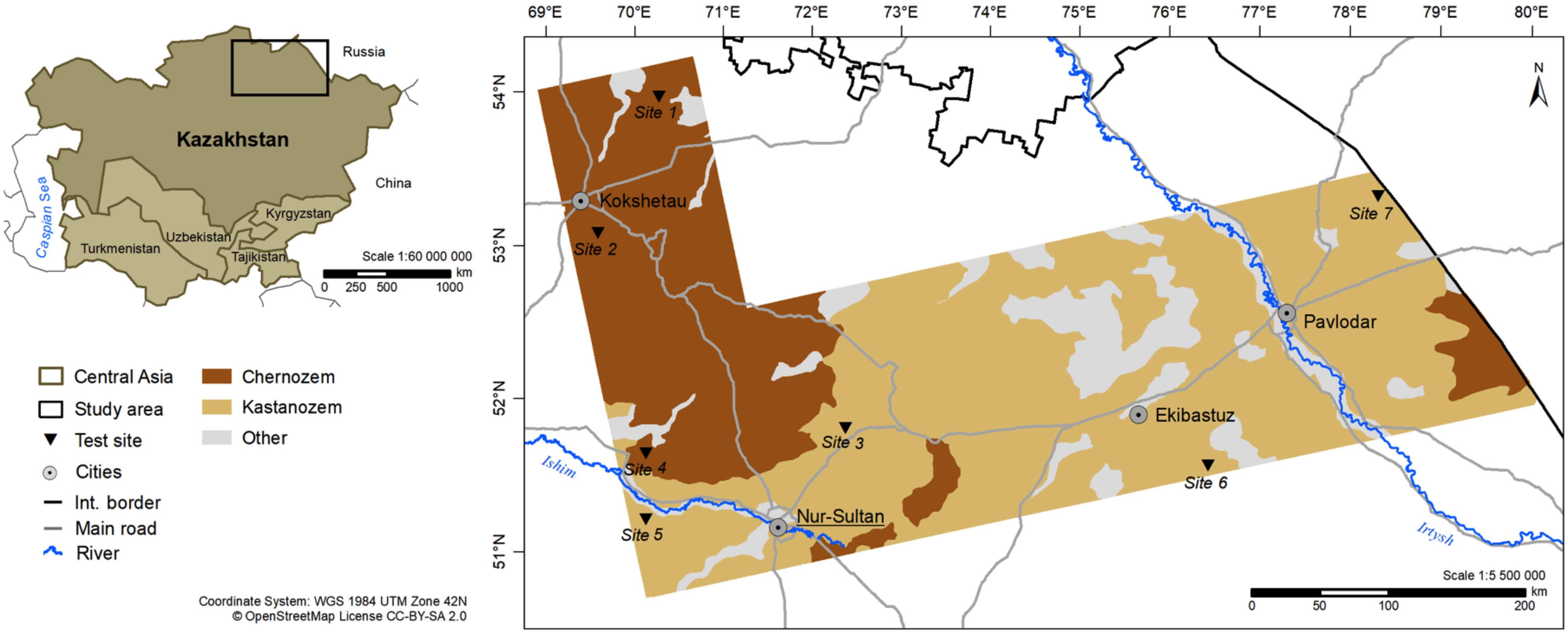
What was the aim of this study?

1. determine the main soil properties enhancing aggregation

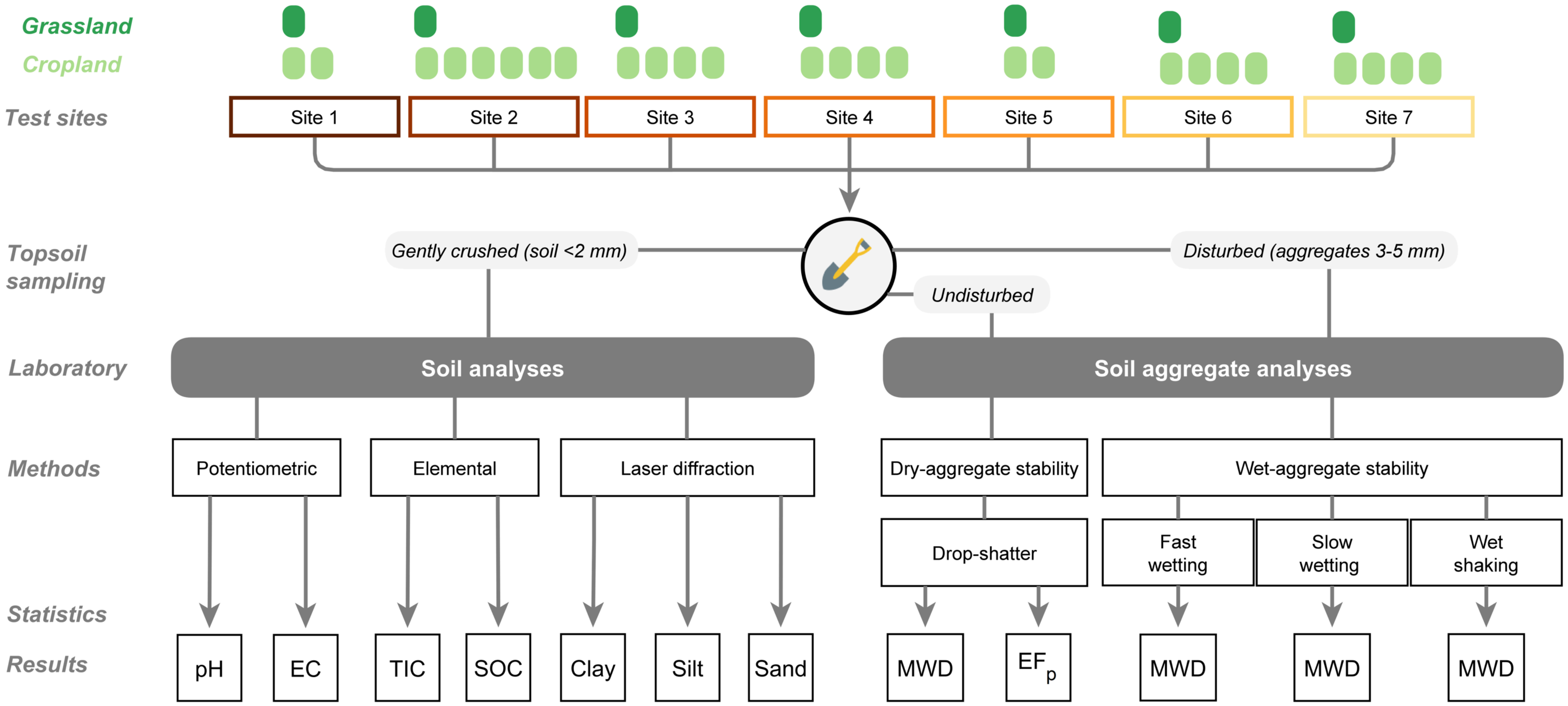
2. explore the mutual effect of agriculture and soil properties on aggregate stability as an indicator for erosion risk

3. to assess erosion risk on cropland by investigating the consequences of mechanical stress on aggregate stability similar to disruptive forces by wind and water

How did I tackle this problem?



How did I tackle this problem?



How did I tackle this problem?

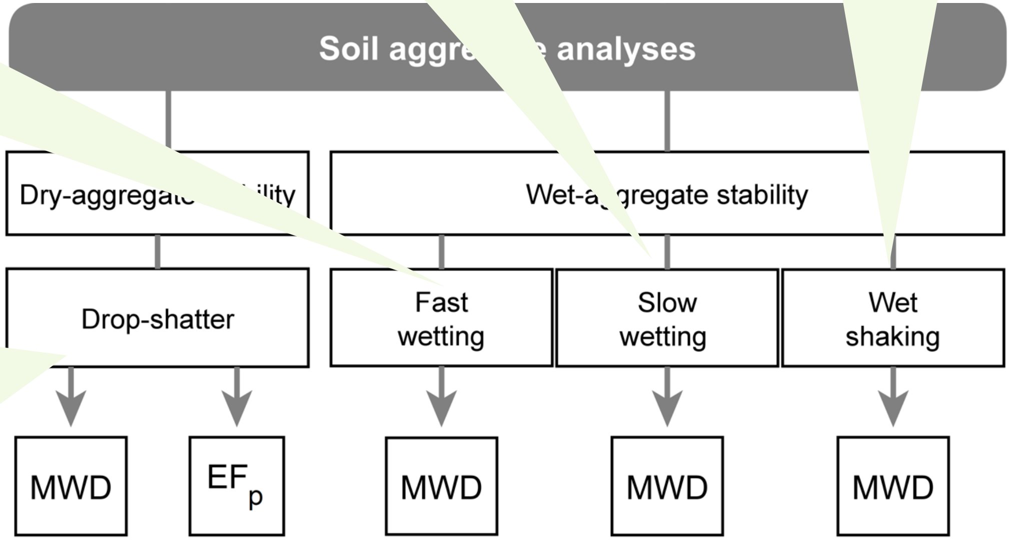
corresponds to light rain (swelling) *Le Bissonnais (1996)*

corresponds to raindrop-impact *Le Bissonnais (1996)*

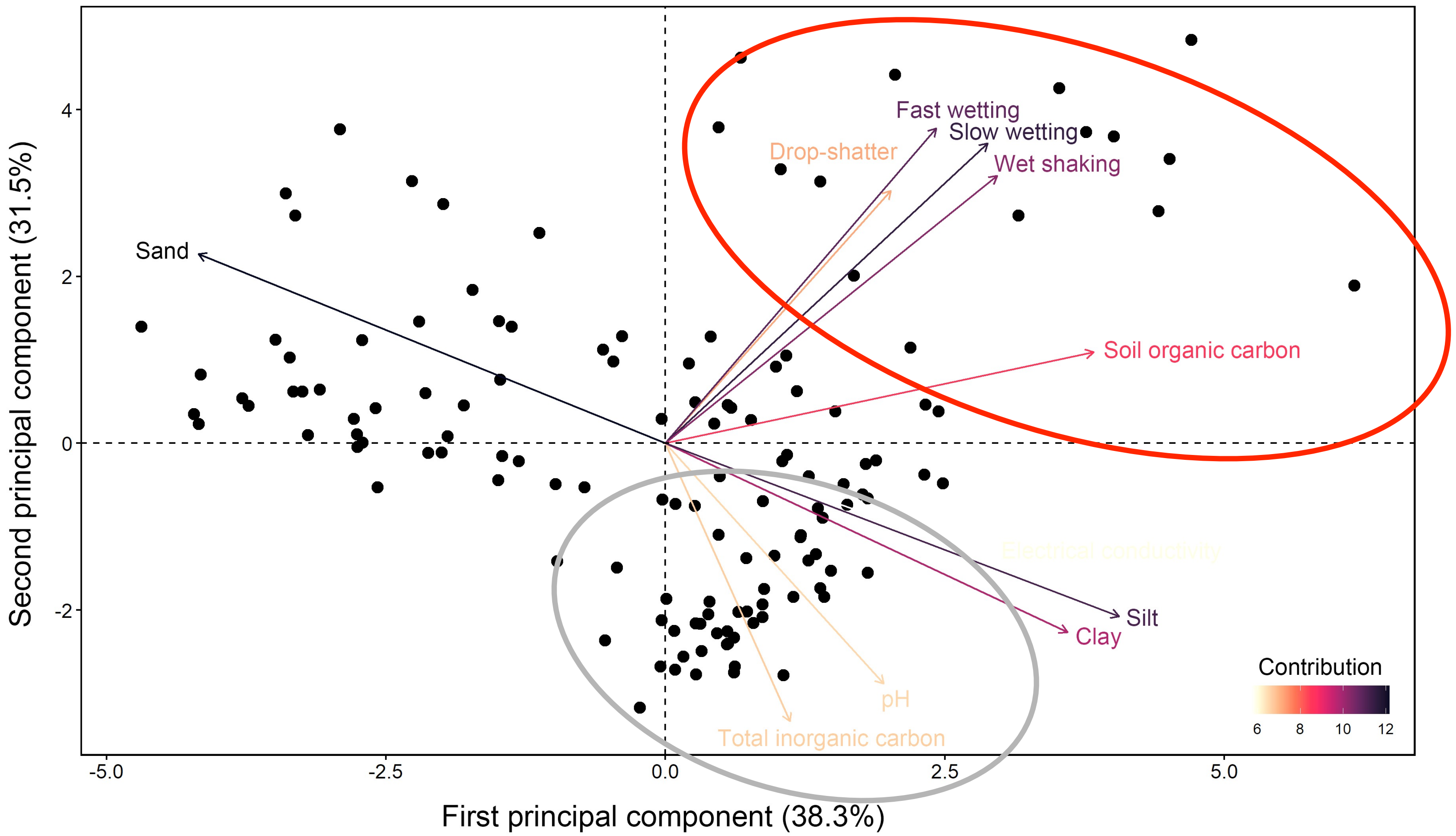
corresponds to heavy rain or snowmelt (slaking) *Le Bissonnais (1996)*

was used to estimate stability against weak mechanical forces during wind erosion events (e.g. saltation)

Hadas and Wolf (1974); Marshal and Quirk (1959)

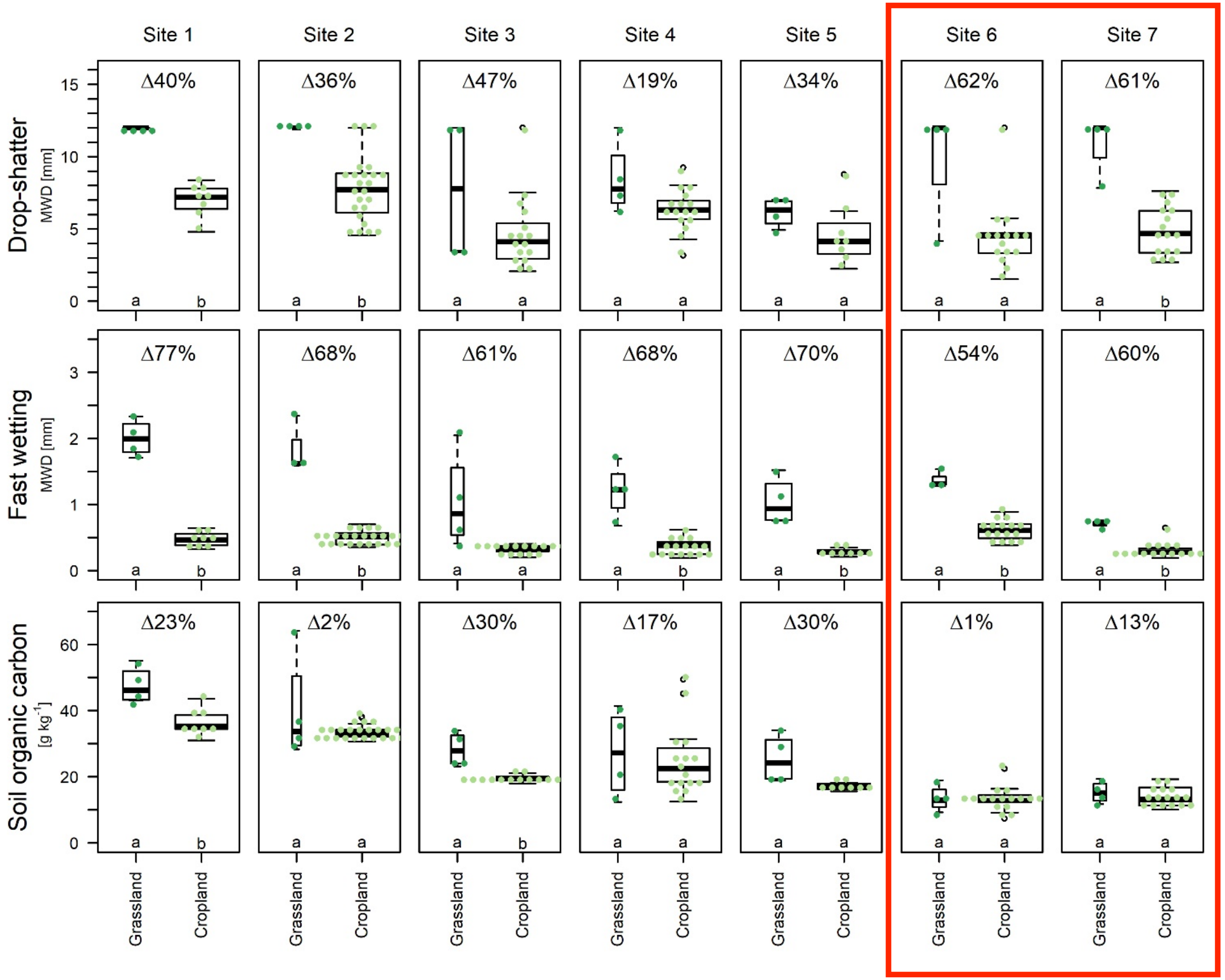


What did I figure out?



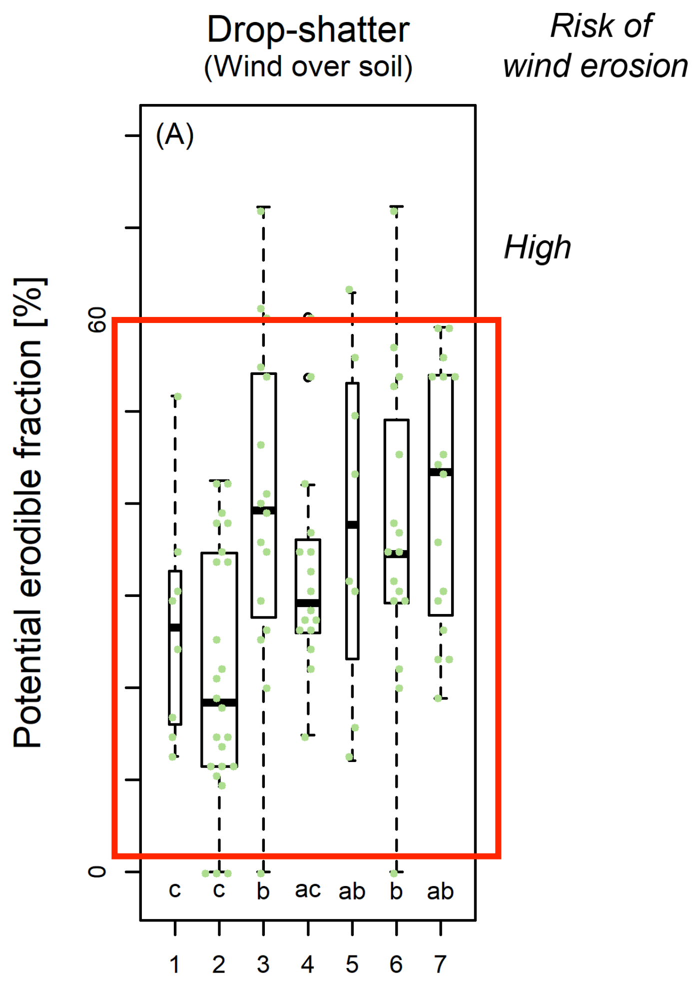
- organic matter contributes decisively to aggregate stability
- inorganic carbon is less relevant as a binding agent

What did I figure out?



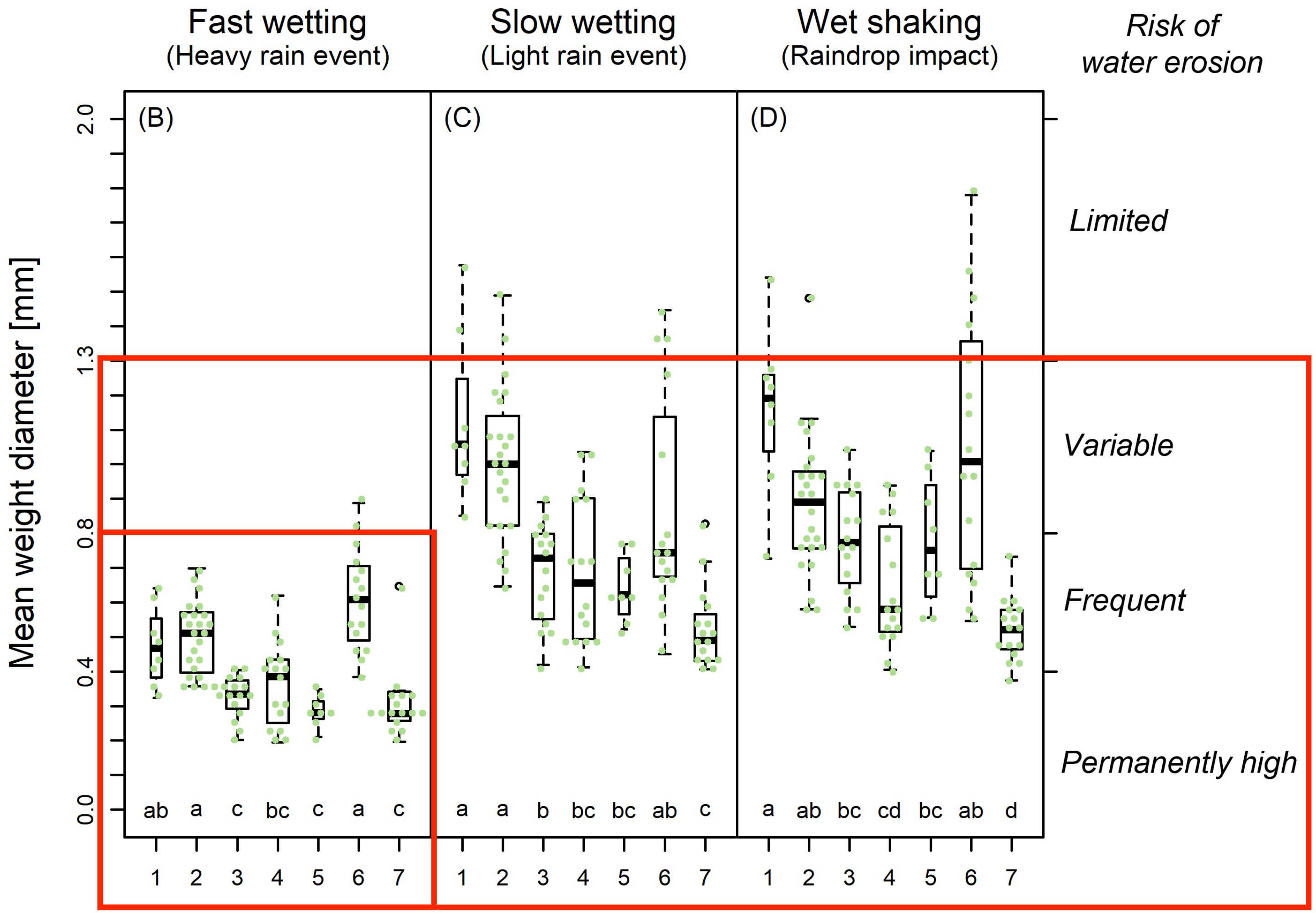
- aggregate stability was lower for cropland
- SOC decreases with tillage
- especially if content is >1%
- aggregation decreases with decreasing SOC content, tillage further worsens soil structure

What did I figure out?



- overall prone to wind erosion
- erosion risk is only moderate

What did I figure out?



- overall prone to water erosion
- erosion risk after heavy rain or snowmelt event is severe

Conclusion

1. **Organic is the most critical binding agent enhancing aggregation in steppe soils.**

2. **Tillage always declines aggregate stability even without SOC changes.**

3. **All croplands are prone to wind and water erosion independent of their soil properties.**

4. **The risk of water erosion is underestimated and must be considered when developing sustainable land-use strategies.**

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Thanks a lot for your attention.

Questions and feedback are always appreciated.

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