

Understanding alterations in ecosystem structure and function



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soil science 101 in 1 minute or less

climate

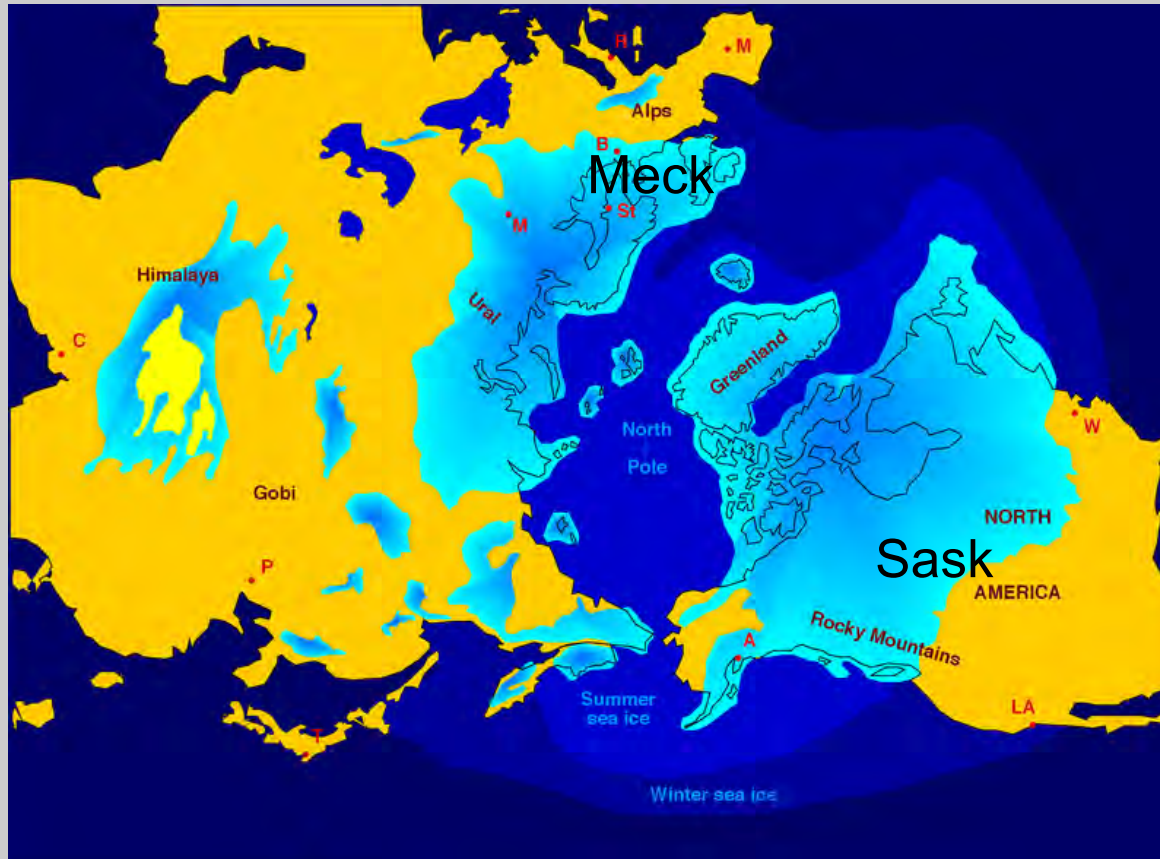


organisms

soil

parent material

basically
rainfall
acts over
time
to form
ecosystems



different
climate:
M- humid atlantic
S- dry continental

same
parent material:
glacial deposit

time:
22,000 y

Mecklenburg

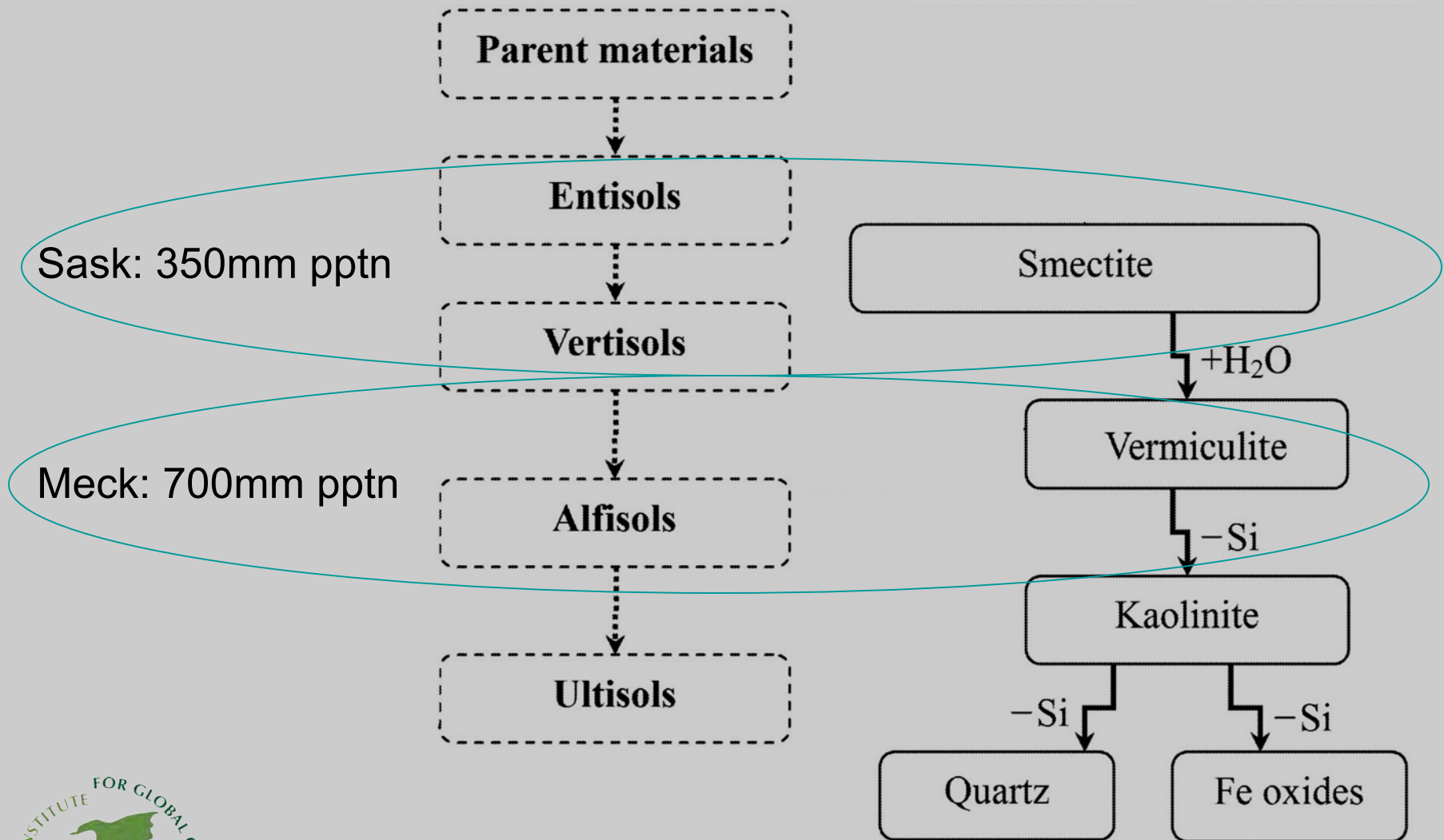


Saskatchewan



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long-term rainfall determines soils and clay minerals



the co-evolution over 22,000 years determines
soil type, texture and mineral composition

how do soils that evolved differently react to
short-term soil - water - climate interactions
and to management and use ?



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Mecklenburg:

light, well drained soils
are best at 700mm

in a 500mm year
this happens:



Saskatchewan:

heavy, water-holding soils
are best with 350mm

in a 500mm year
this happens:



the impact of rapid climate change
on established ecosystems
is totally different from
the co-evolution of climate and ecosystems

prediction of future systems and scenarios
cannot be inferred from existing ecosystems



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Let's apply that logic to these published statements:

Title: "decoupling of soil nutrient cycles
as a function of aridity in global drylands"

Conclusion: "any predicted increase in aridity with climate change
will probably reduce the concentrations of N and C
in global drylands, but increase that of P"

Policy warning: "increasing aridity will disrupt soil nutrient cycles
in global drylands"



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there is no "decoupling" - they were never coupled

P is inherited from the parent material

C and N are organic matter

- the result of soils and organisms

elemental transformations are very different:

- P at the rate of soil formation
- C and N at the rate of years (=climate change)



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an "increase" of P cannot happen

- it is not produced in the ecosystem
but inherited from the mineral suite

a decrease in C and N depends on

- the balance of production and decomposition
which have rapid rates
- the capacity of soil to stabilize organic matter
which depends on soil formation



therefore any change in nutrient cycles with increasing aridity will depend on

plant growth, decomposition, adaptation, management, mineral suite, soil type

arid, "younger" soils are normally P, K, Ca, Mg richer

the law of the minimum indicates that
the principal production constraint of increasing aridity
will simply be water shortage

- and that will simplify nutrient management



In scenario construction consider

other disciplines

time scales

process interactions

adaptation potentials

and don't forget

Ockham's razor



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