Water balances of high-latitude agricultural fields as affected by climatic variability

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Introduction:
High-latitude hydrological conditions
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High-latitude hydrological conditions

- Seasonal snow cover & rapid snowmelt
- Spring runoff generation & floods and loads
- Clay soils & their hydraulic properties
- Erosion & load generation

Introduction:
Climate variability in northern Europe

[Graphs and charts showing climate data for Siuntio, Southern Finland]
Methods:
Study site in southern Finland

Methods:
Hydrological modeling in agricultural fields

3D process-based approach.
Water-energy-erosion-solutes.
Benefit of the model to assess water balances holistically.
Results:
Model performance

Results:
Water balances
Results:
NAO impacts

Total runoff [mm d\(^{-1}\)]
Field 1 (slope 1%)

Total runoff [mm d\(^{-1}\)]
Field 2 (slope 5%)

Snow water equivalent [mm]
**Results:**
NAO impacts - intensities

Field 1 (slope 1%)  
Field 2 (slope 5%)

- Drain discharge [mm d⁻¹]
- Groundwater outflow [mm d⁻¹]
- Tillage layer runoff [mm d⁻¹]

**Conclusions**

- 3D models useful in holistic assessments.
- Climate change can have major impacts on load generation.
- Drainage efficiencies likely adequate for the changing conditions.
- Load mitigation measures in current conditions could be targeted based on NAO?
- Irrigation needs may increase.
Thank you!

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