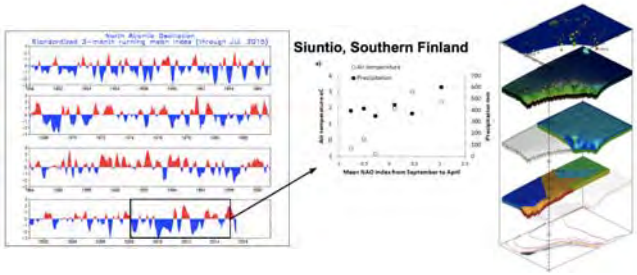


Water balances of high-latitude agricultural fields as affected by climatic variability

Koivusalo, H., **Turunen, M.**, Salo, H., Kersti, H., Nousiainen, R., Warsta, L.

Aalto University School of Engineering

Introduction:
High-latitude hydrological conditions

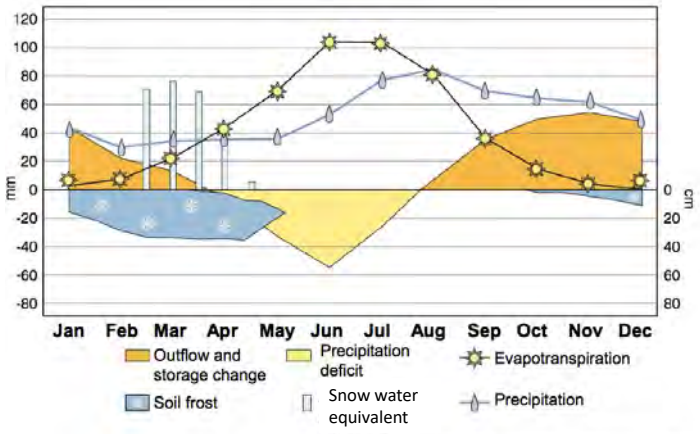


Figure: Finnish Field Drainage Association (modified).

Introduction:
High-latitude hydrological conditions

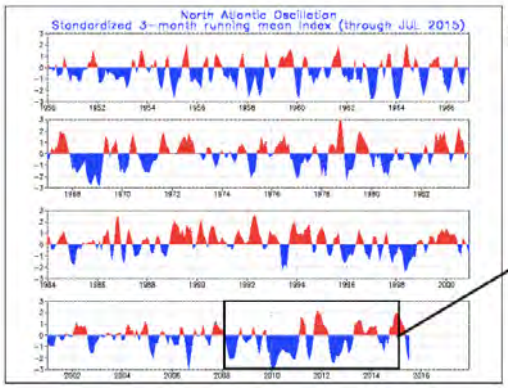
Seasonal snow cover & rapid snowmelt

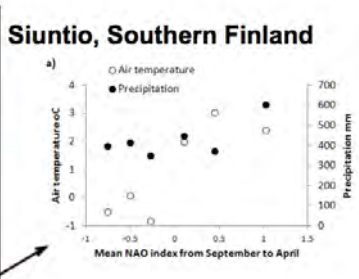
Spring runoff generation & floods and loads

Clay soils & their hydraulic properties

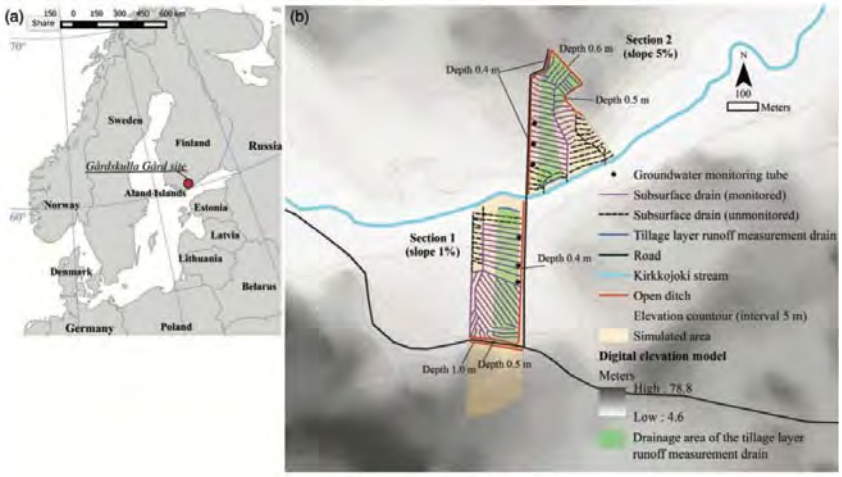
Erosion & load generation

Introduction:
Climate variability in northern Europe



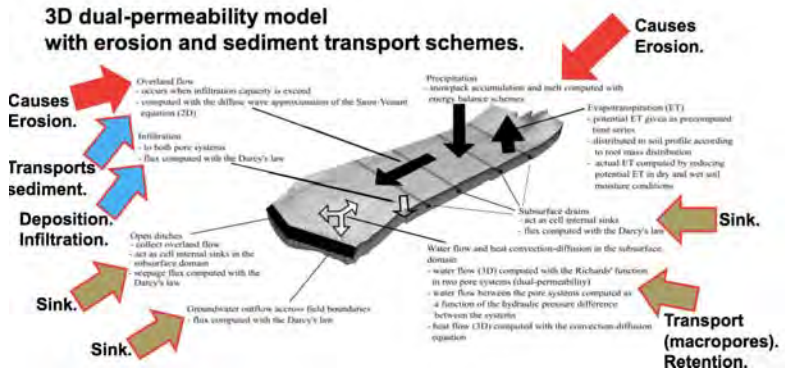


Methods:
Study site in southern Finland

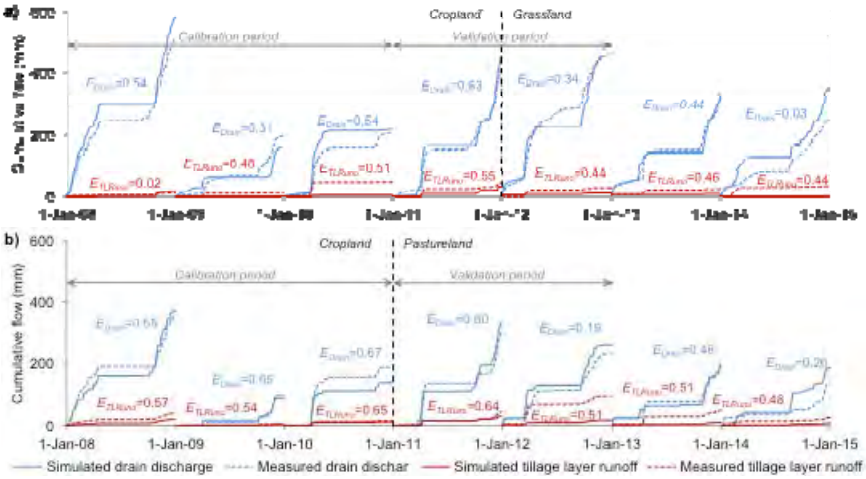


Methods:
Hydrological modeling in agricultural fields

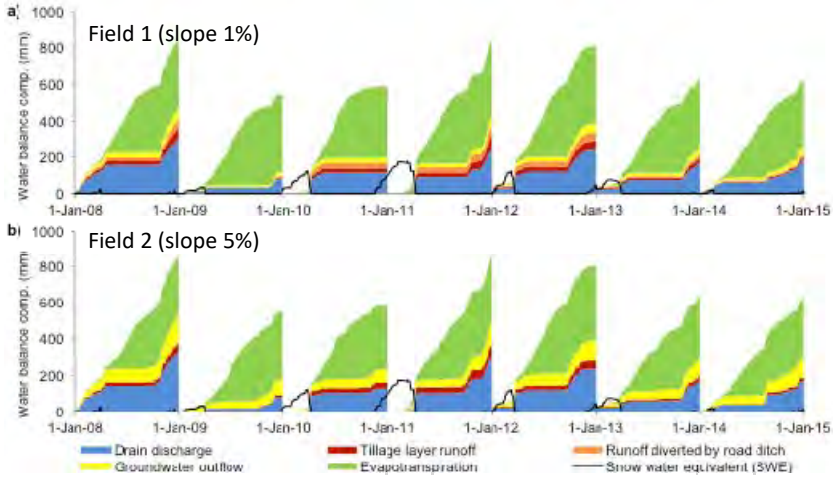
3D process-based approach.
Water-energy-erosion-solutes.
Benefit of the model to assess water balances holistically.



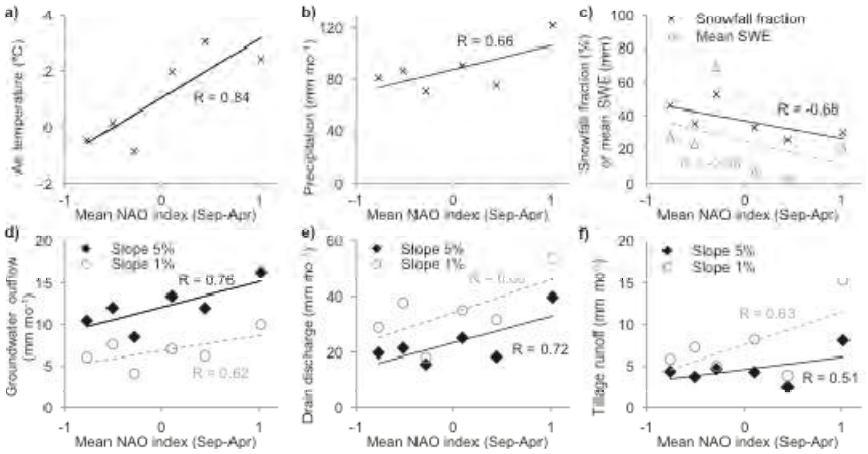
Results:
Model performance



Results:
Water balances



Results:
NAO impacts

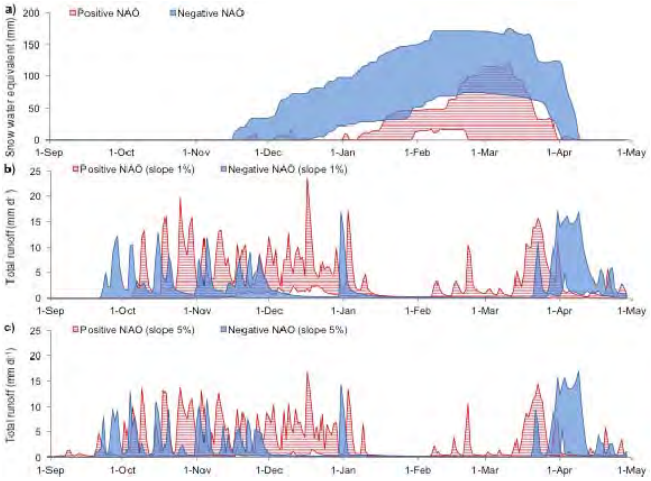


Results:
NAO impacts

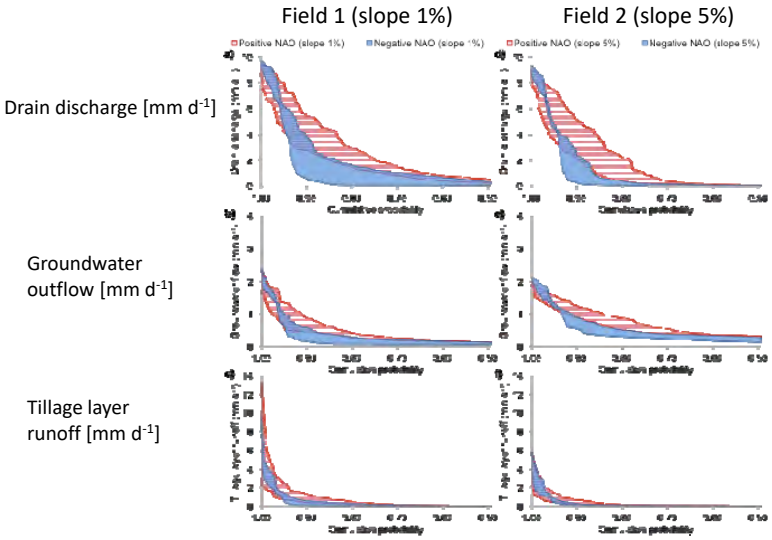
Snow water equivalent [mm]

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

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



Results:
NAO impacts - intensities



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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