

Results of a 3D facies modelling attempt in the Lower Main Plains (Frankfurt, Germany)

Hannah Budde

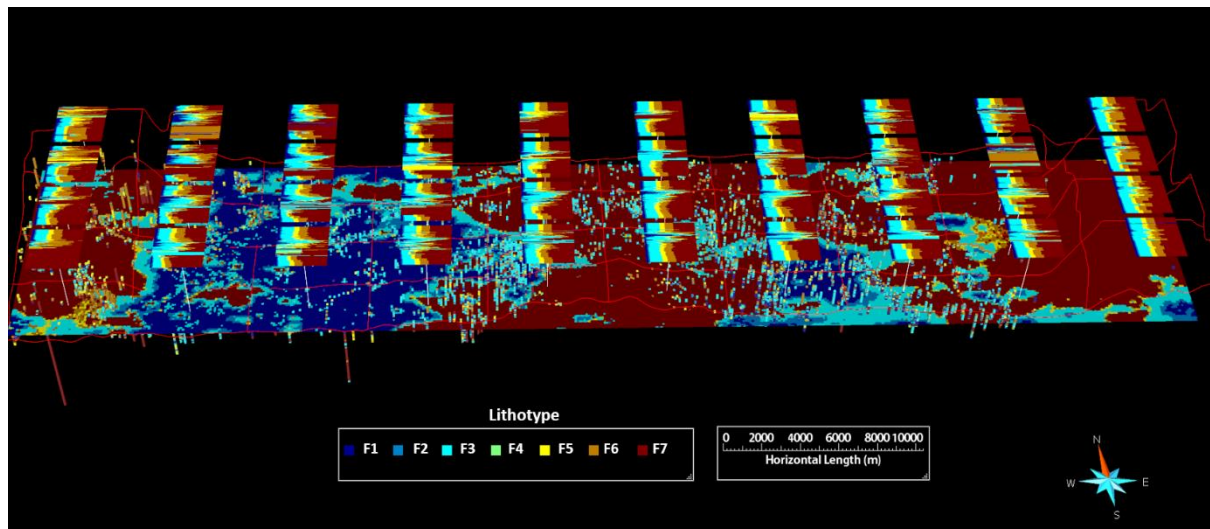
Christian Hoselmann, Rouwen Lehné, Gudrun Radtke, Heiner Heggemann, Andreas Hoppe



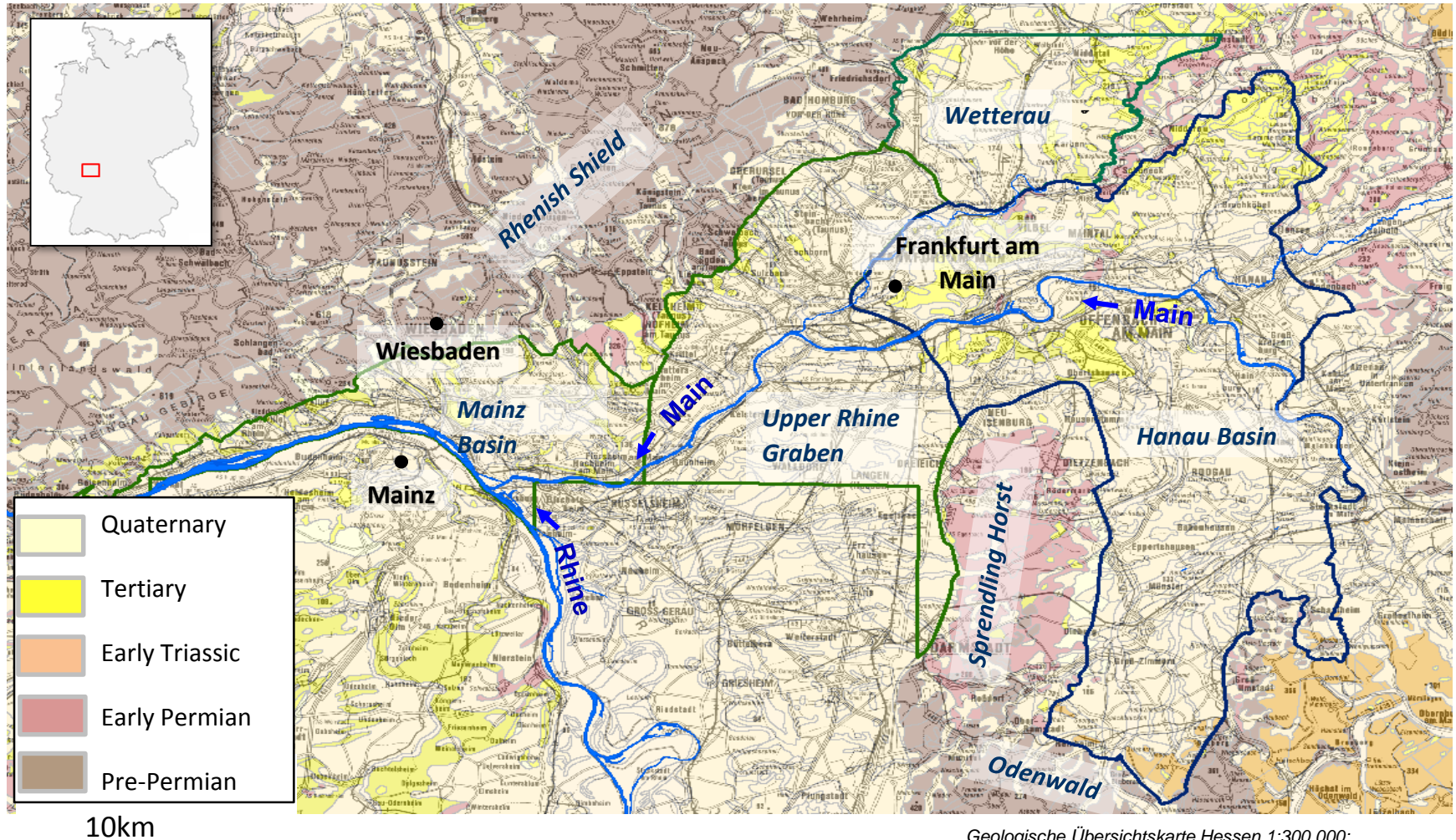
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Für eine lebenswerte Zukunft

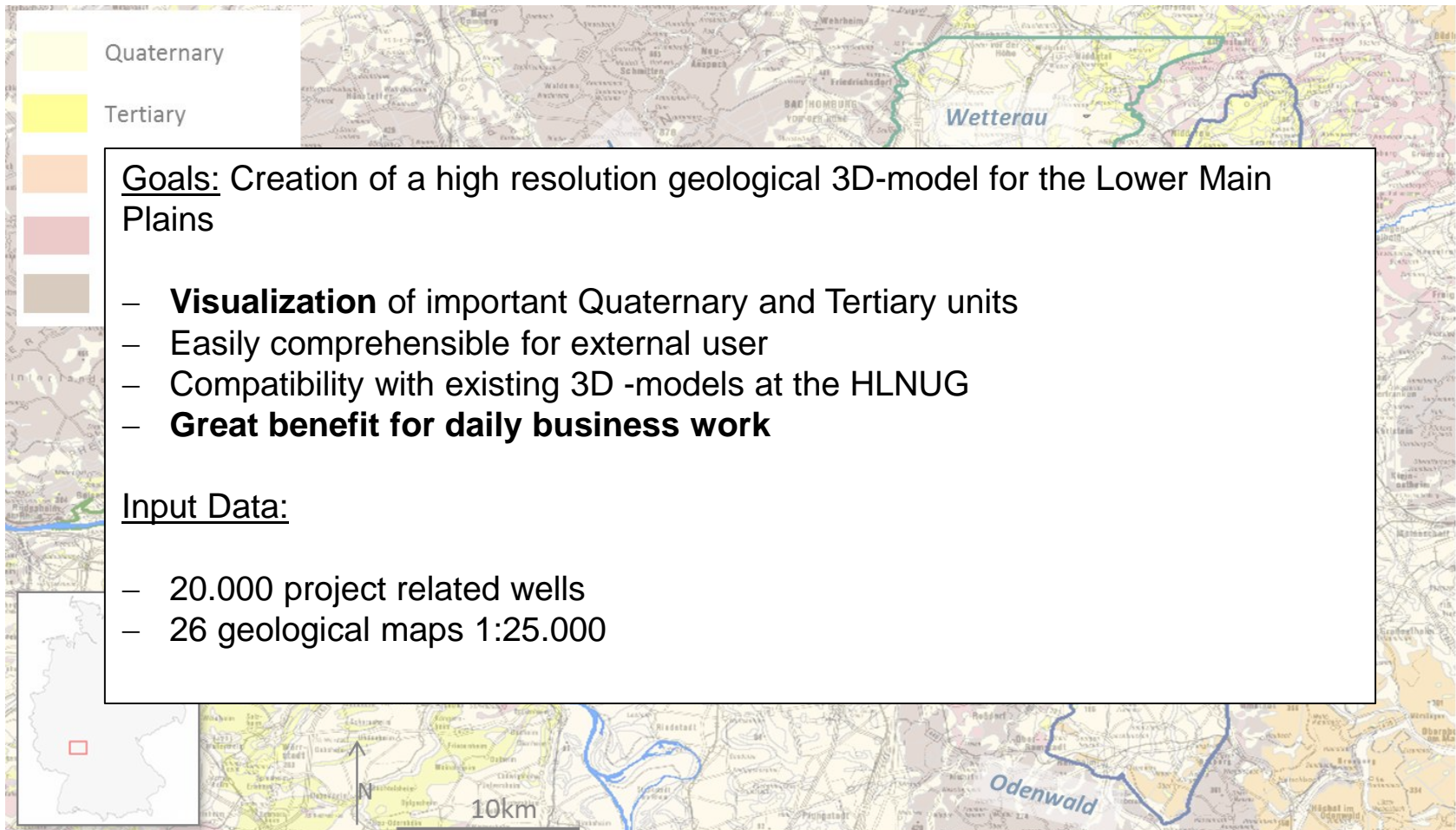


Lower Main Plains – Geologic Overview



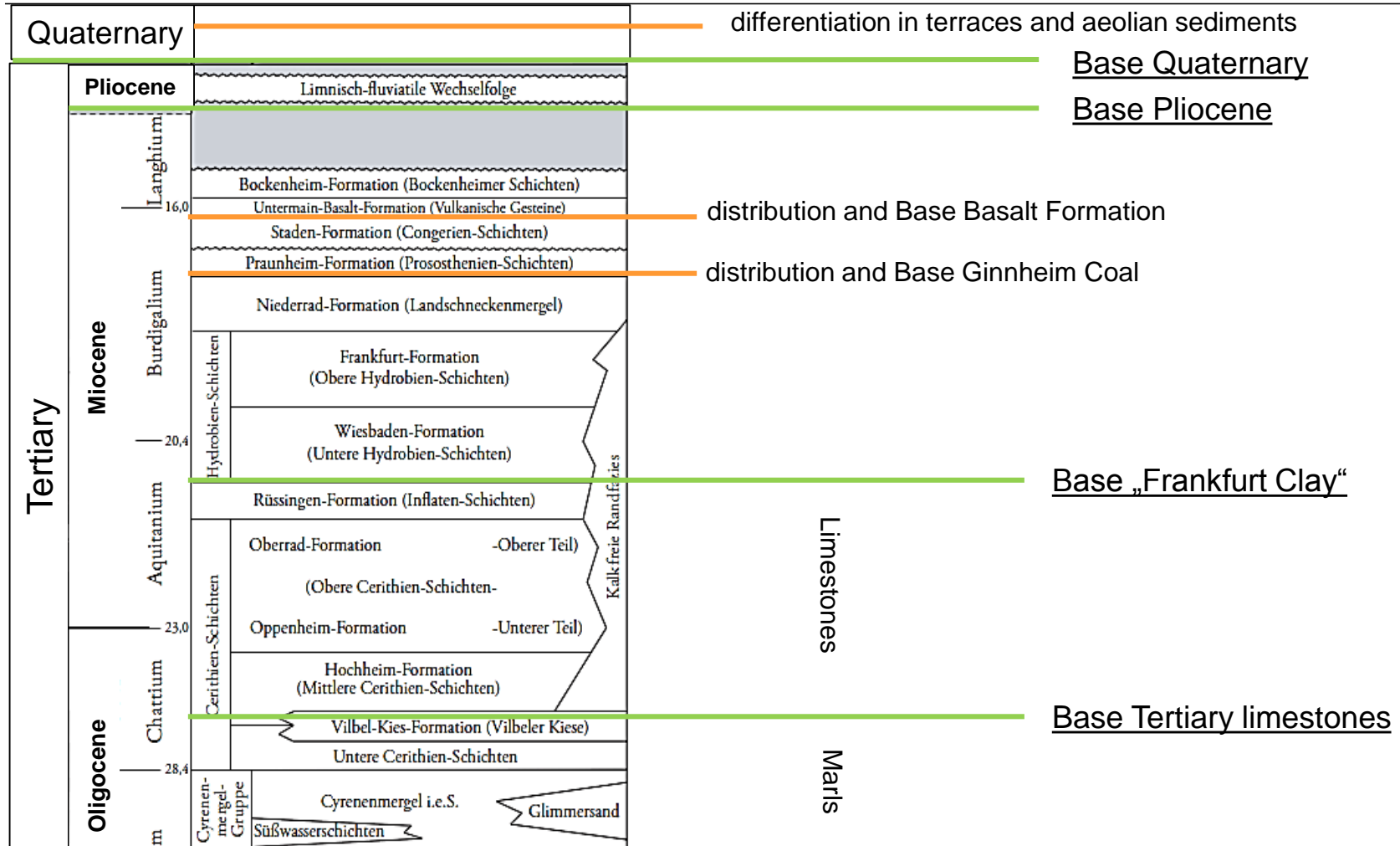
Geologische Übersichtskarte Hessen 1:300.000;
Topographische Grundkarte Hessen 1:200.000

Lower Main Plains - Goals



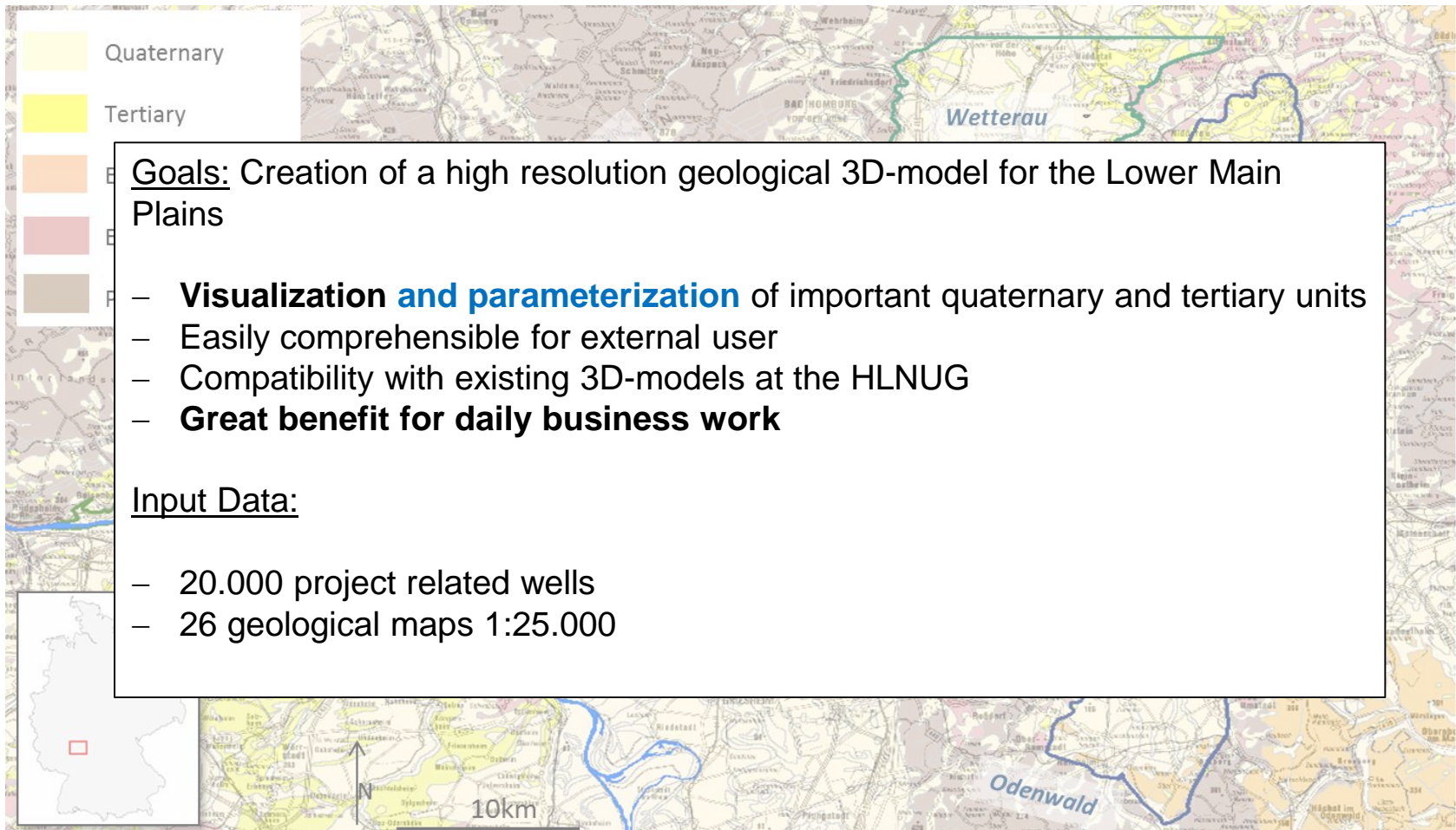
Geologische Übersichtskarte Hessen 1:300.000;
Topographische Grundkarte Hessen 1:200.000

Target Horizons



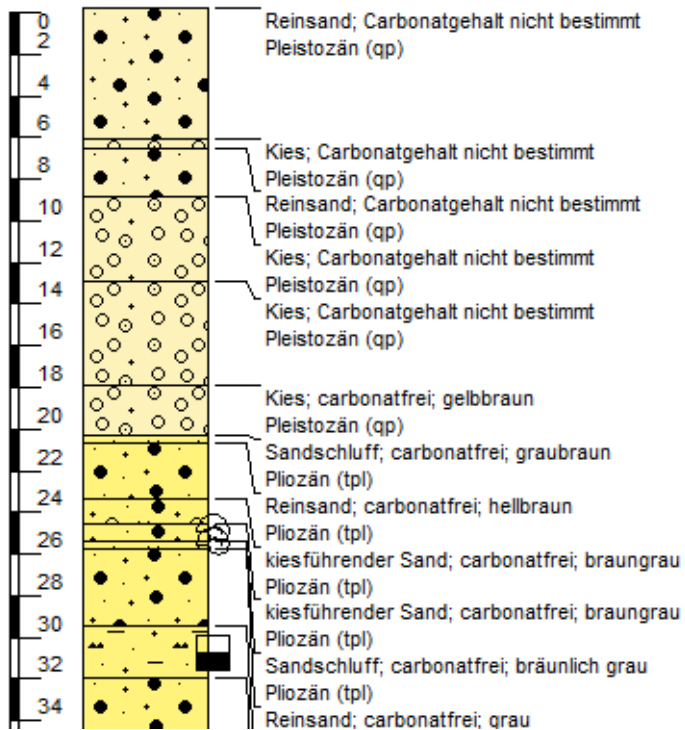
Modified after Radtke et al. 2009

Lower Main Plains - Parameterization

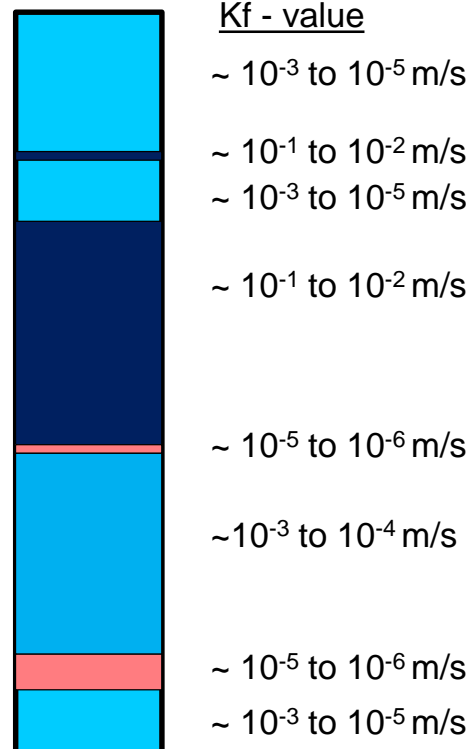


Parameterization Permeability & Lithotypes

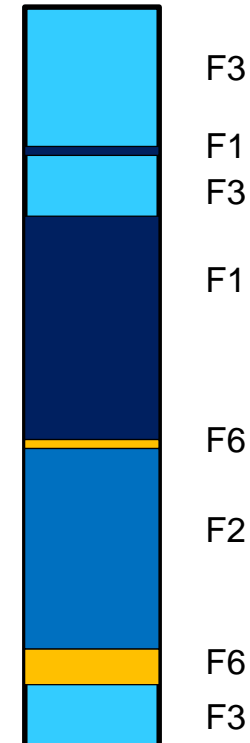
Original Well Data



Permeability



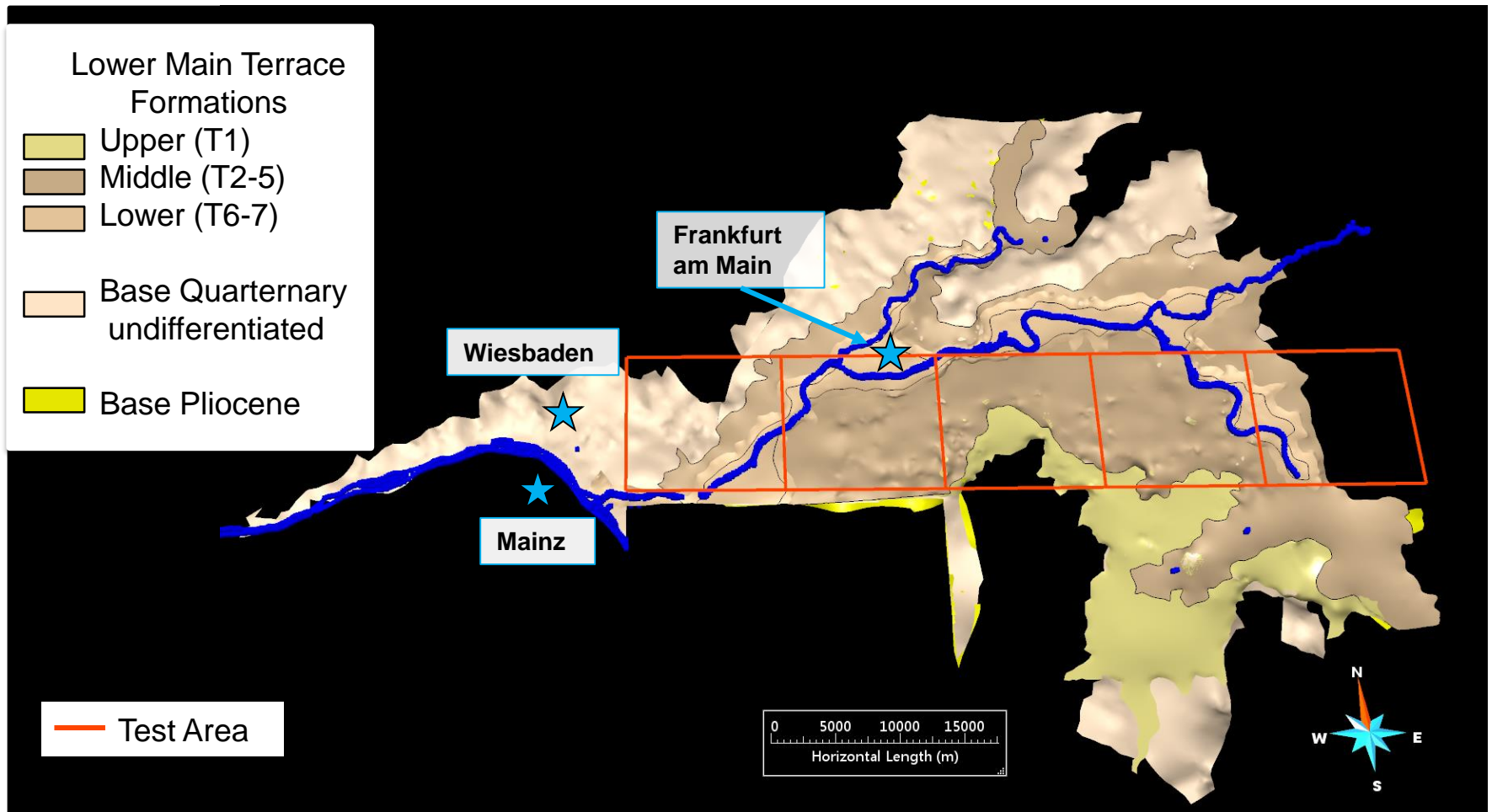
Lithotype



Parameterization

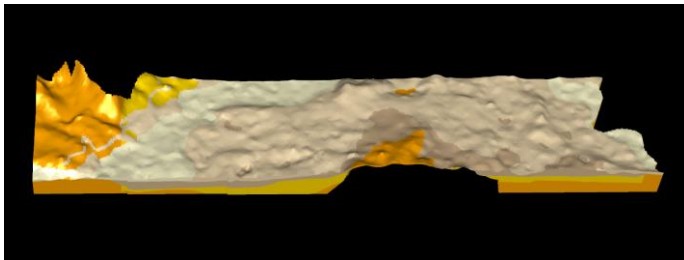
Generalization

Parameterization Surface Model & Test Area

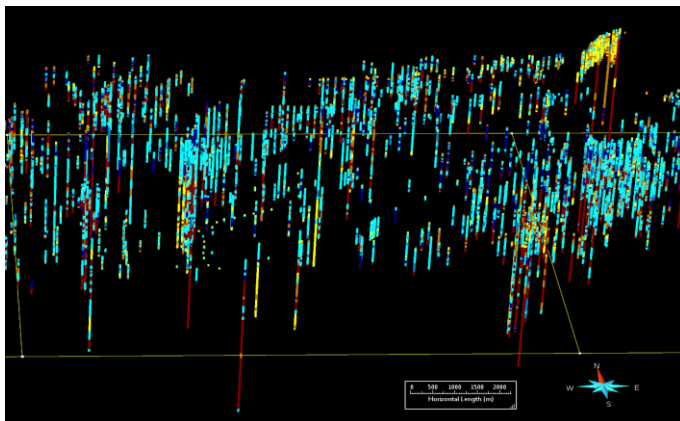


Components for the Interpolation

Volume Grid of modelled Geobodies



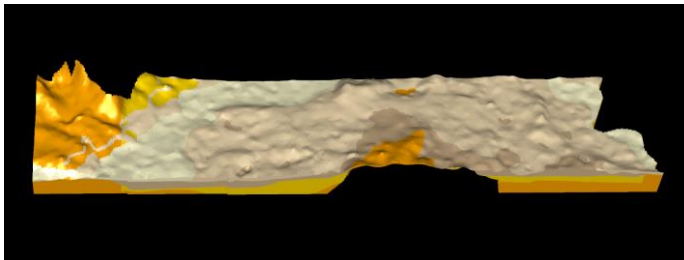
Parameterized Well Data



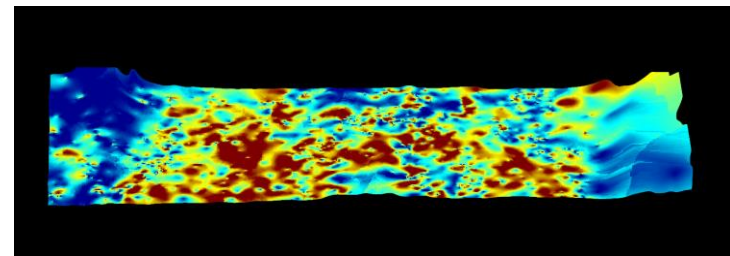
Interpolation

Components for the Simulation

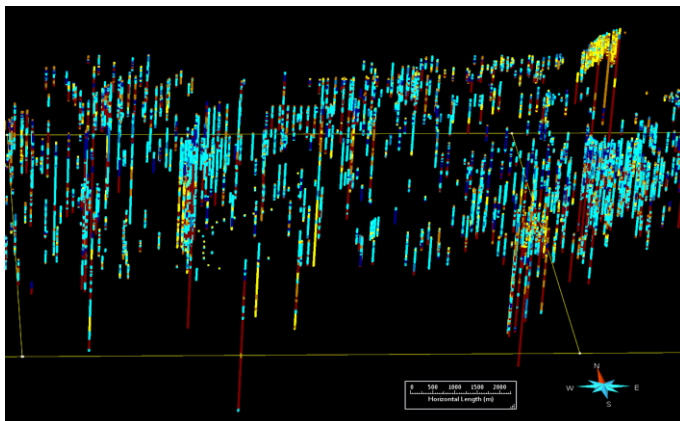
Volume Grid of modelled Geobodies



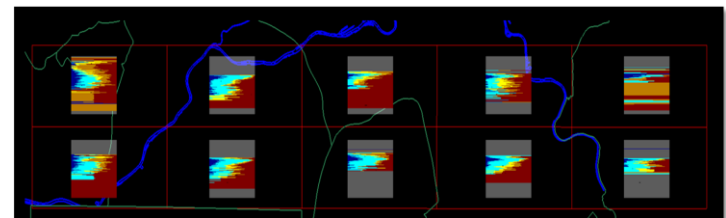
Lithotype Probability Maps



Parameterized Well Data

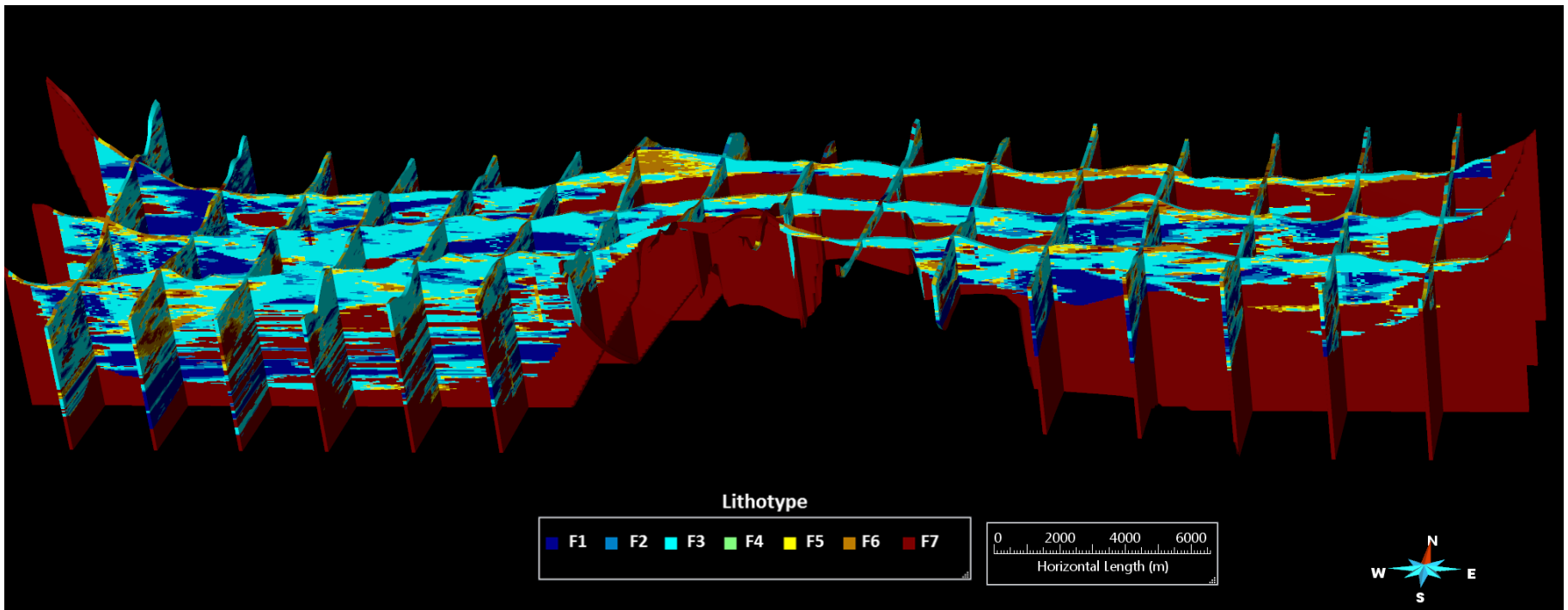


Vertical Lithotype Proportion Curves (VLPC)

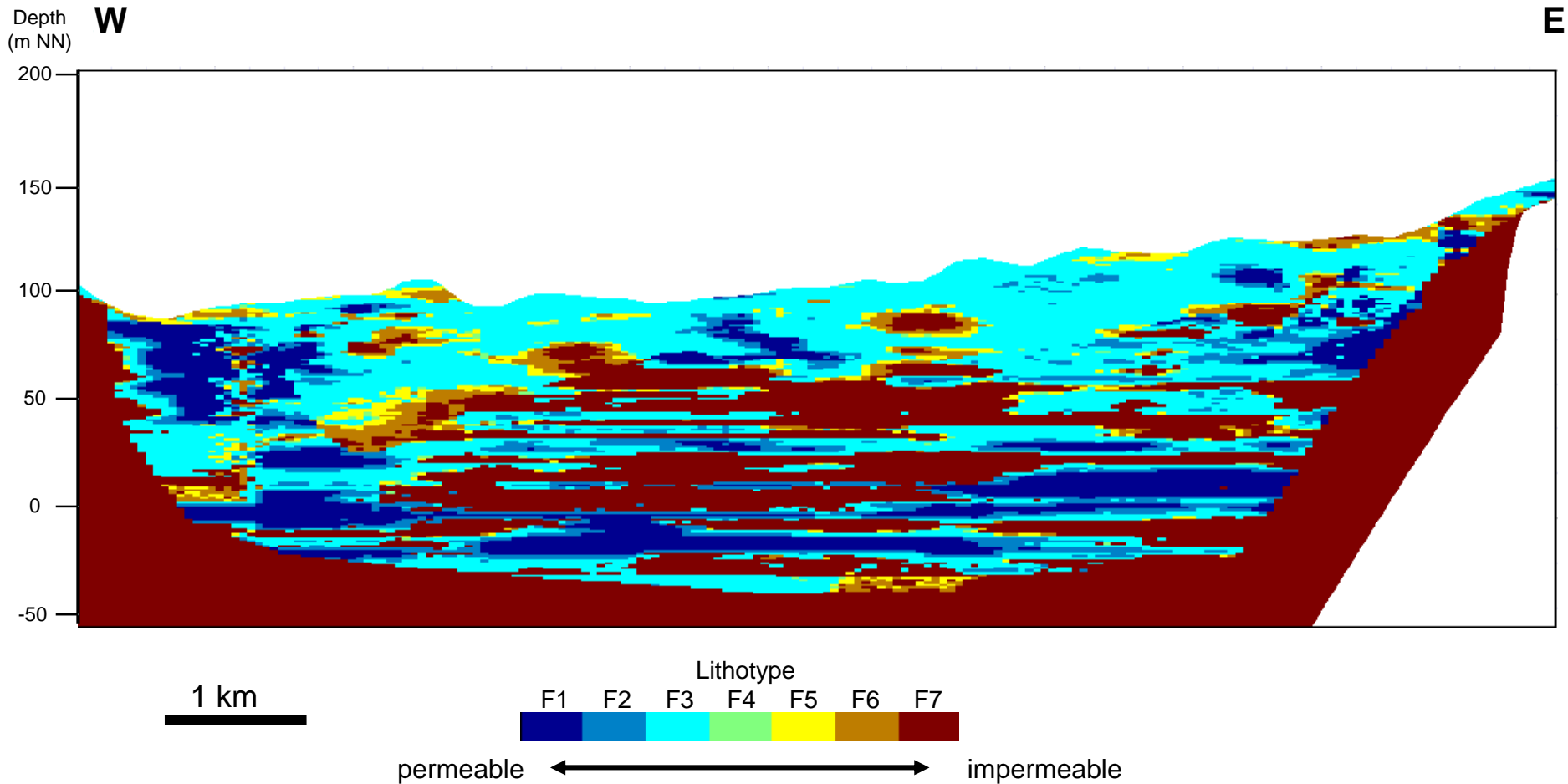


Truncated Gaussian Simulation

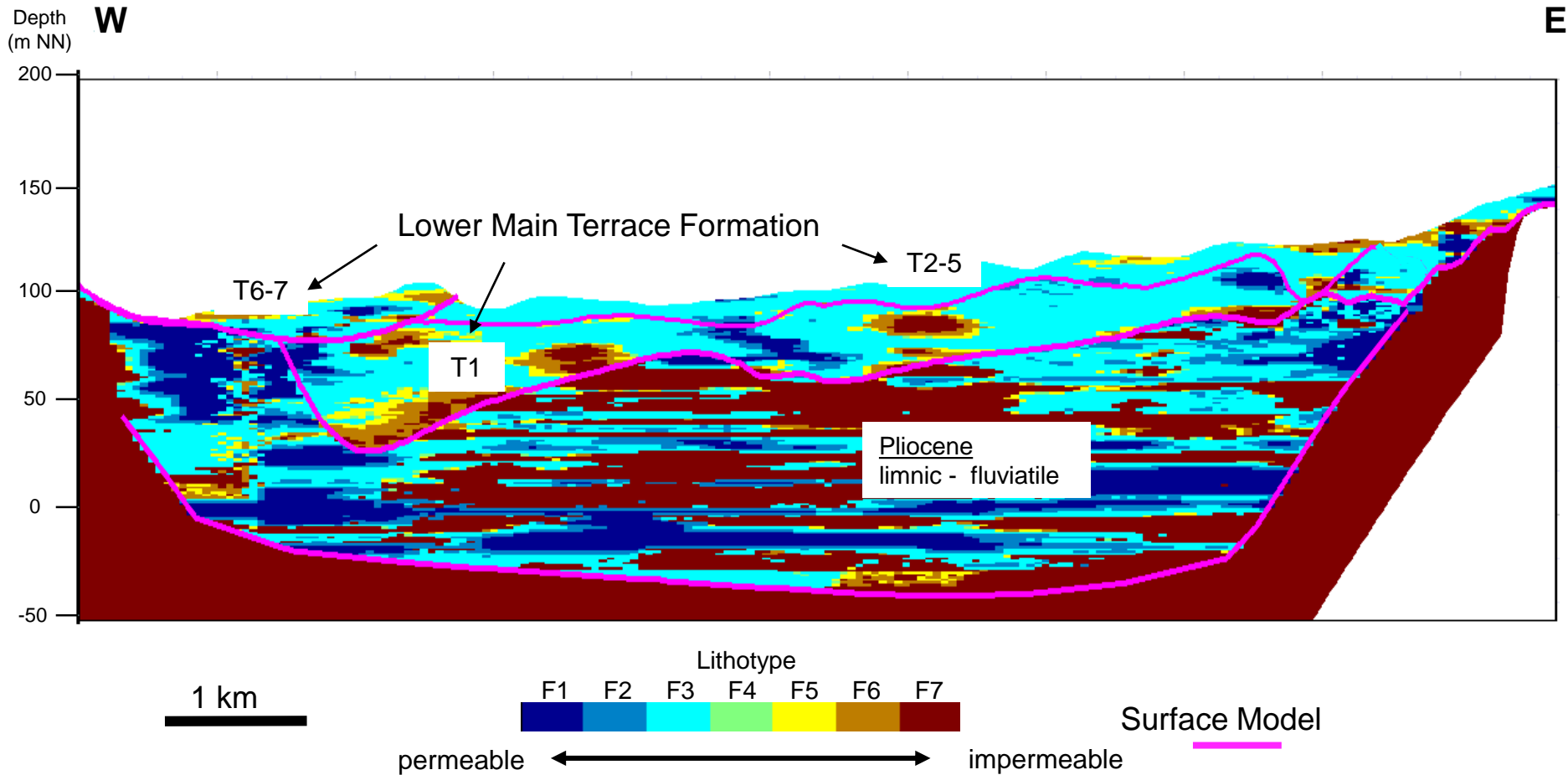
Results – Overview



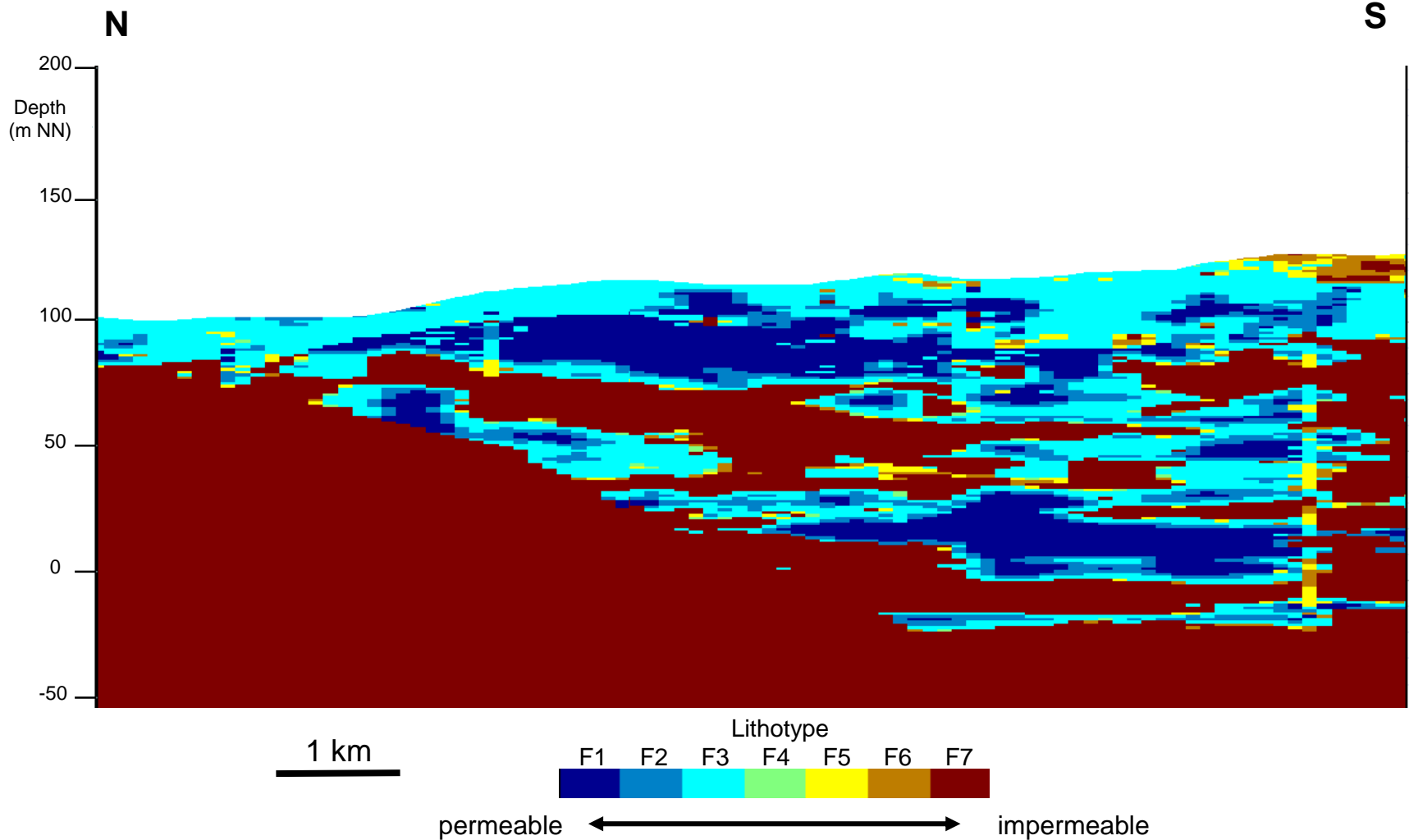
Results – Cross Section W-E



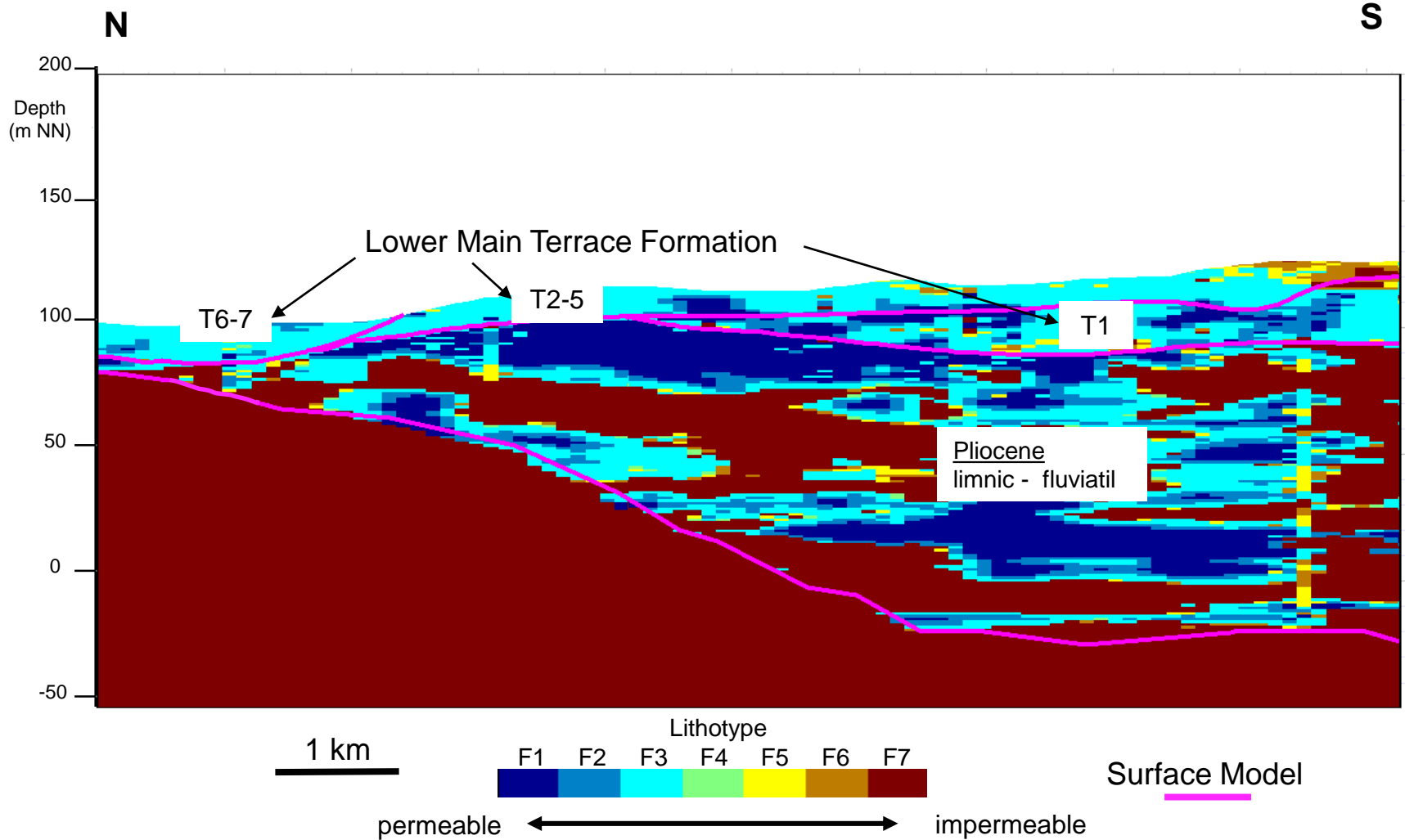
Results – Cross Section W-E



Results – Cross Section N-S



Results – Cross Section N-S



Conclusions & Outlook

- Parameterization of geobodies is a helpful tool to extend the applicability of geological 3D-models
- Trend maps and VLPC can be used as secondary data if:
 - Uneven distribution of input data leads to poor results in interpolation
 - Sharp facies boundaries can be observed in the study area
 - Geological knowledge is not sufficiently represented in the input data (e.g. more data points for unconsolidated rocks)
- Further analyses will reveal whether structures like fluvial channels become visible during parameterization
 - Better understanding of the depositional environment
 - Refinement of the conceptual model

Many thanks for your attention!

References:

- Garling, F., & Dittrich, J (1979): Hydrogeologie - Gesteinsbemusterung, VEB Deutscher Verlag für Grundstoffindustrie, Leipzig.
- Krimm, J.(2015): Methodischer Vergleich von 2D- und 3D-Modellierungswerkzeugen zur Interpolation von Lockergesteinsparametern in einem hochauflösenden geologischen 3D-Modell als Basis für eine numerische Grundwassersimulation – Fallbeispiel Babenhausen, Masterthesis, Technische Universität Darmstadt. (unpublished).
- Radtke, G. (2009):Erläuterungen zur Geologischen Karte von Hessen 1:25.000, Blatt 5817 Frankfurt a. M. West. Hess. Landesamt für Umwelt und Geologie, Wiesbaden.

