



# KarboEx2

Project Meeting,  
02.03.2026

**AP4: Geologische und markscheiderische Neuinterpretation aller Daten im Hinblick auf eine geothermische Nutzung**

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Chair of Computational Geoscience, Geothermics and Reservoir Geophysics (CG3)



Chair of Computational  
Geoscience, Geothermics  
& Reservoir Geophysics



Kofinanziert von der  
Europäischen Union

Ministerium für Wirtschaft,  
Industrie, Klimaschutz und Energie  
des Landes Nordrhein-Westfalen



# KarboEx2 Available Data

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## 3-D Seismic Cubes

### Rheinberg:

- Depth migrated
- 17 Available Wells (Well Tops):
  - DABO 79830,
  - DABO 79974,
  - DABO 78655,
  - DABO 80022
  - DABO 79736
  - DABO 80060
  - DABO 78439
  - DABO 80059
  - DABO 78662
  - DABO 78479
  - DABO 78610
  - DABO 78440
  - DABO 78656
  - DABO 80023
  - DABO 79865
  - DABO 79864
  - DABO 79829

## Prosper Haniel:

- Time domain

## GTC ExBo Modell

- Cenoman\_Turon\_Kalkstein
- Massenkalk
- Unterkarbon

## GTC ExBo Modell (faults)

### Rheinberg:

- Alpener Sprung
- Rheinpreussen\_Sprung\_IGL

## Coal, Anhydrite and Salts layers in the wells of the project area

## Faults and Folds shapefiles

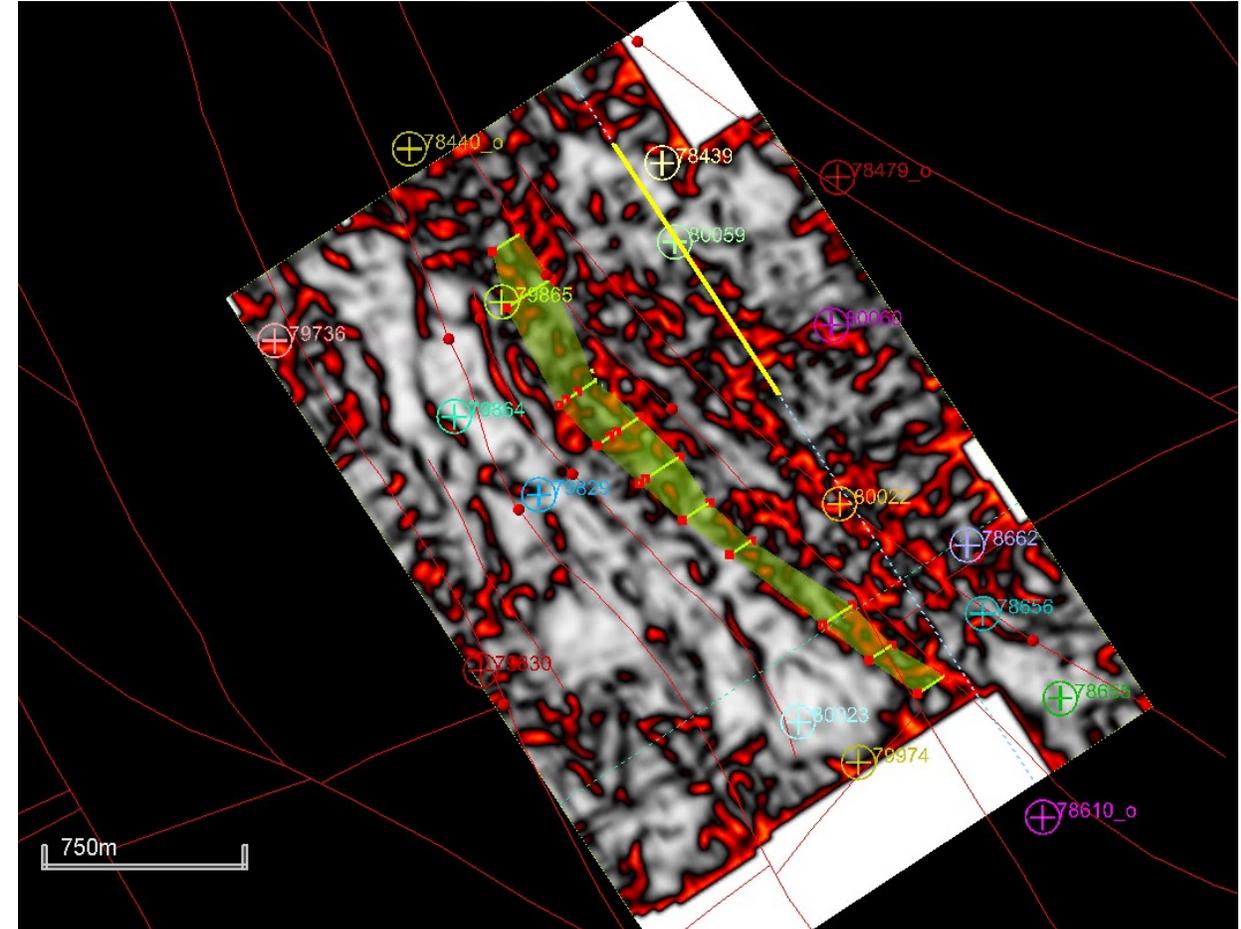
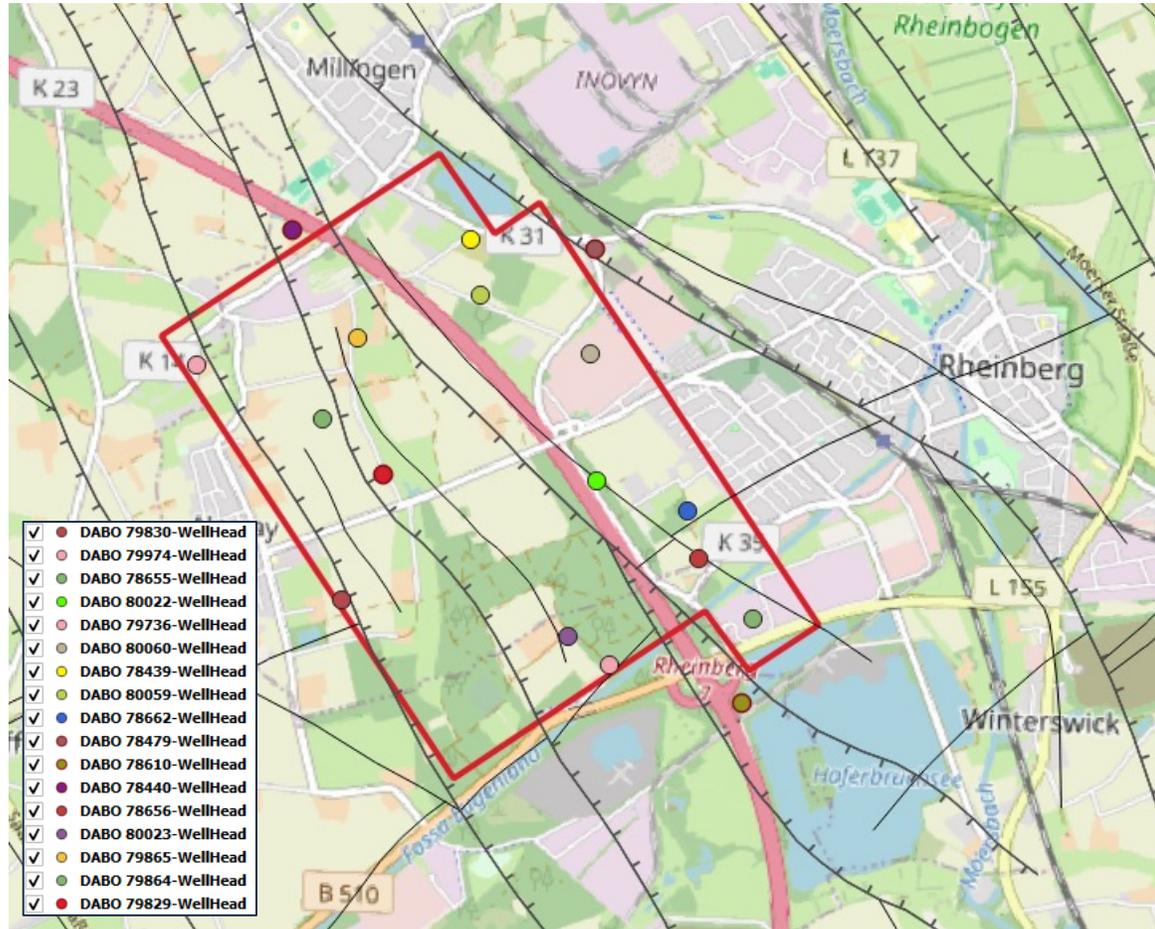
- GD\_Karbon\_Tekt\_Störungen
- GD\_Karbon\_Tekt\_Falten

## Geophysical Well Logging Data - Log ASCII standard (LAS) (on request)

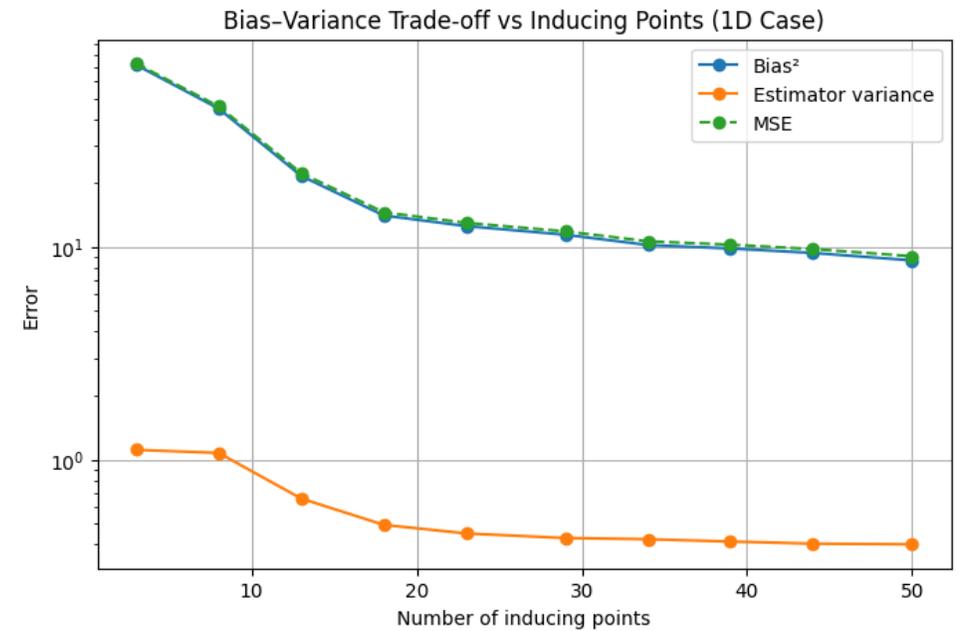
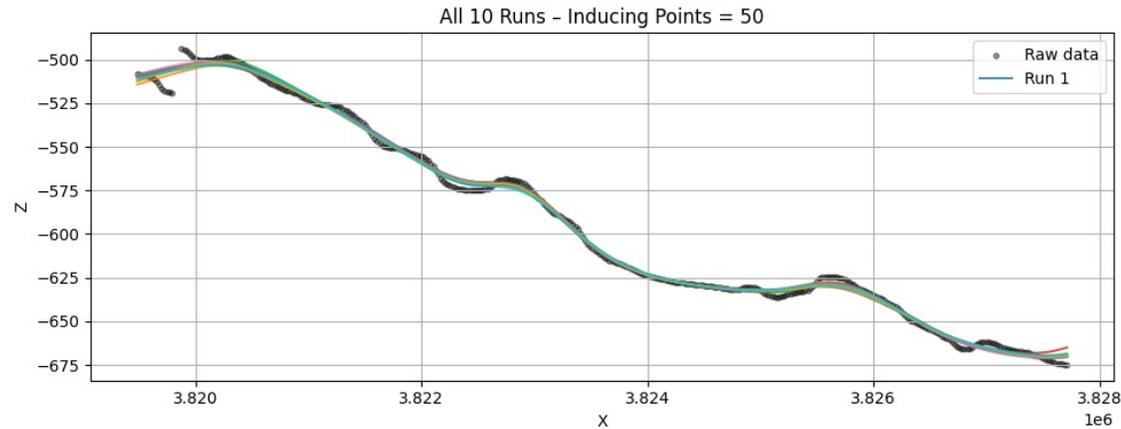
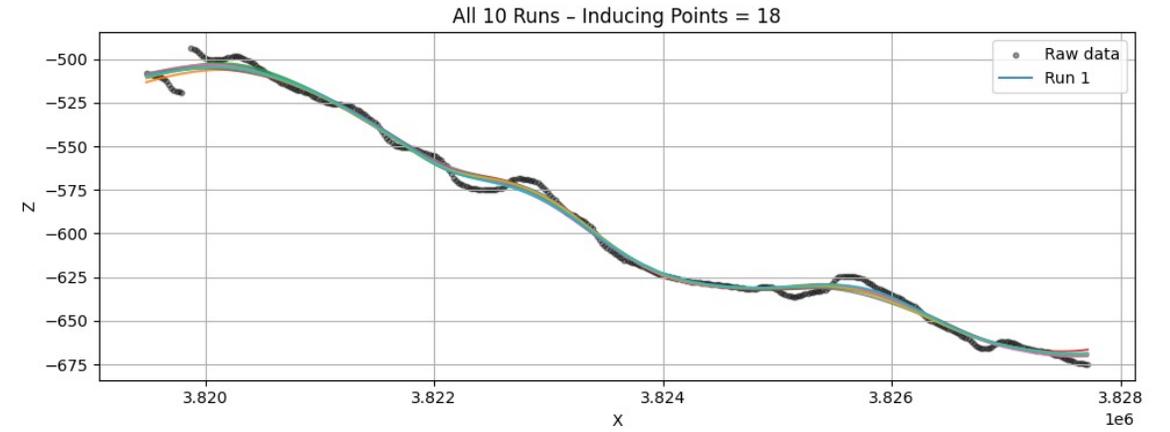
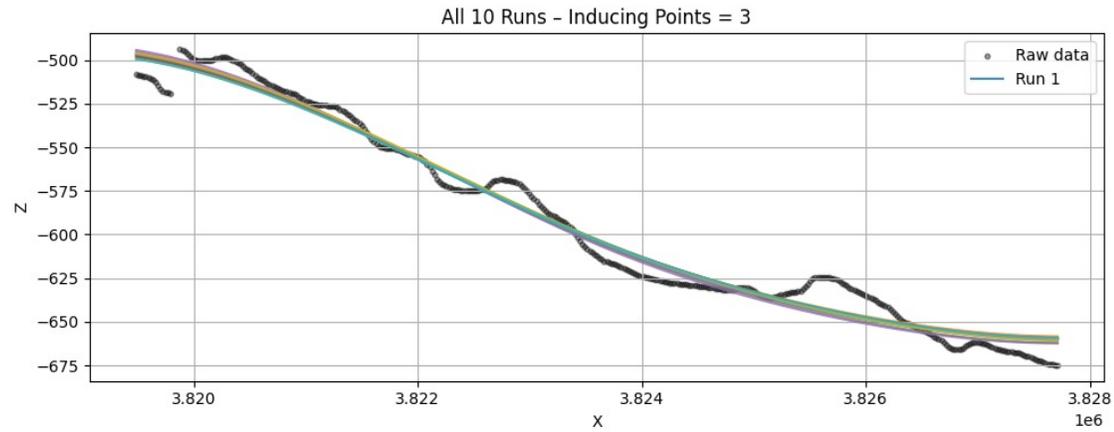
### Rheinberg:

- Mitteldonk 5 → DABO 80060
- Graft 2 → DABO 80023
- Lützenhof 3
- Alspray 4
- Winterswick 1

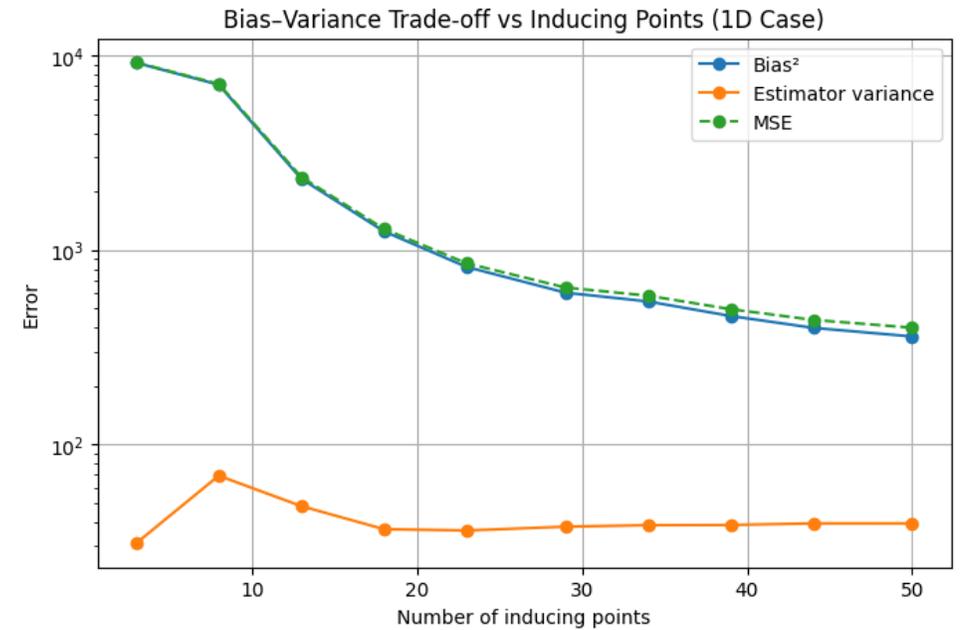
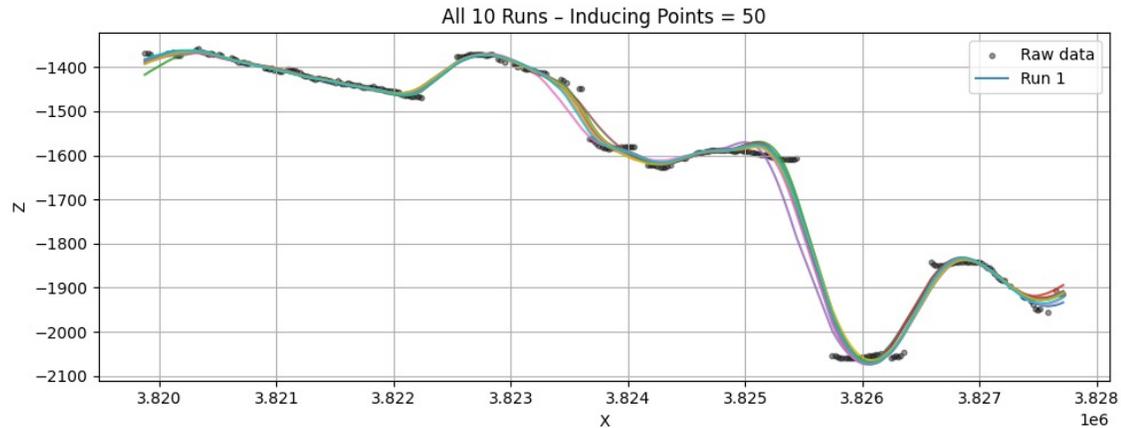
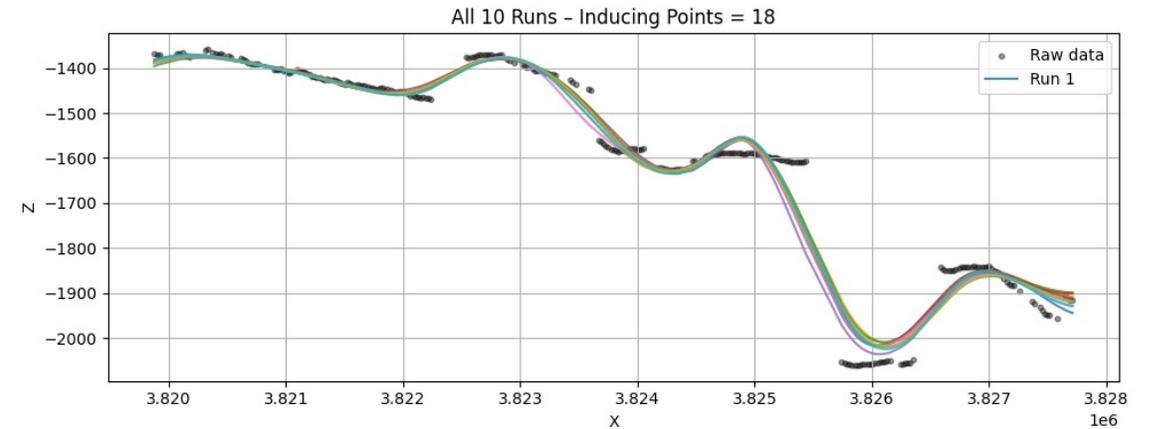
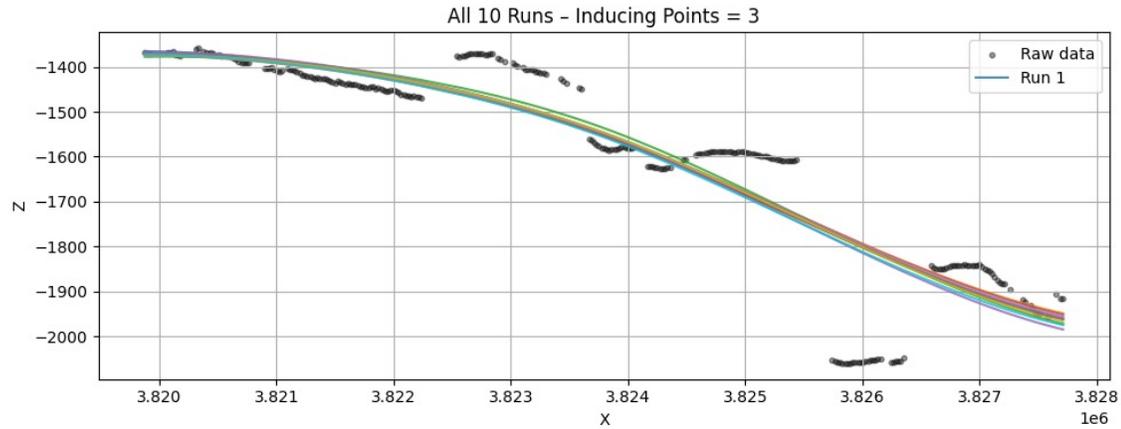
# KarboEx2 Available Data



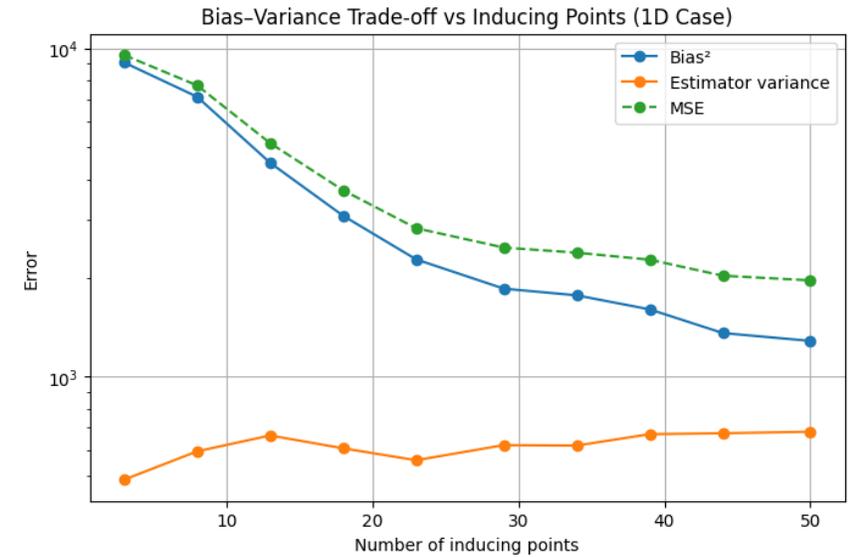
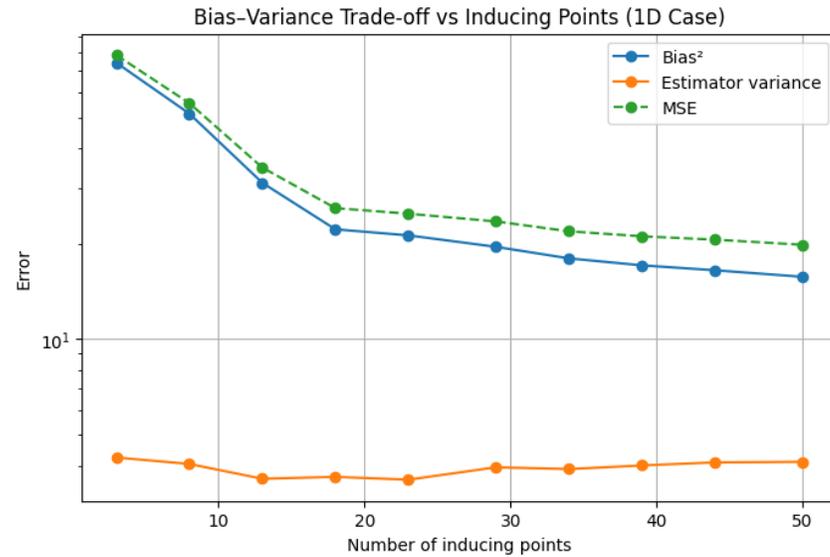
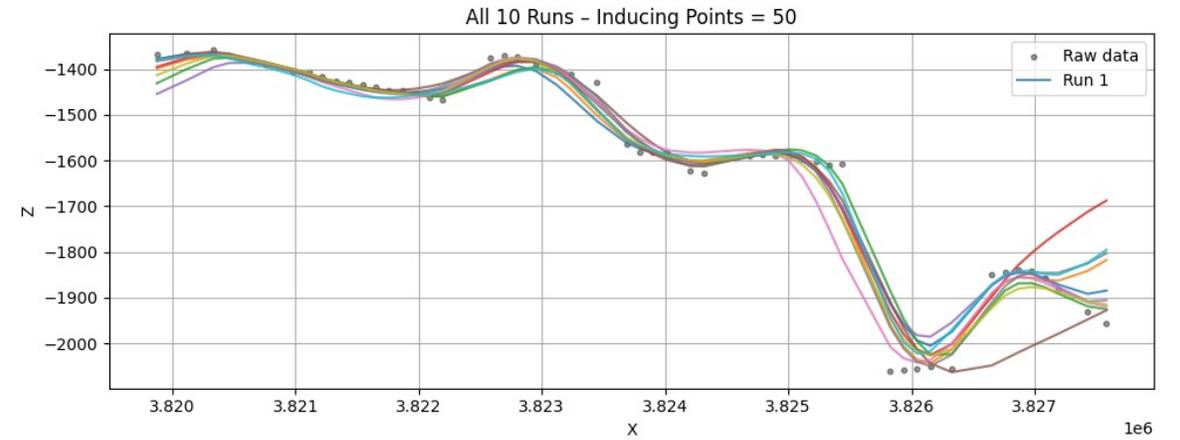
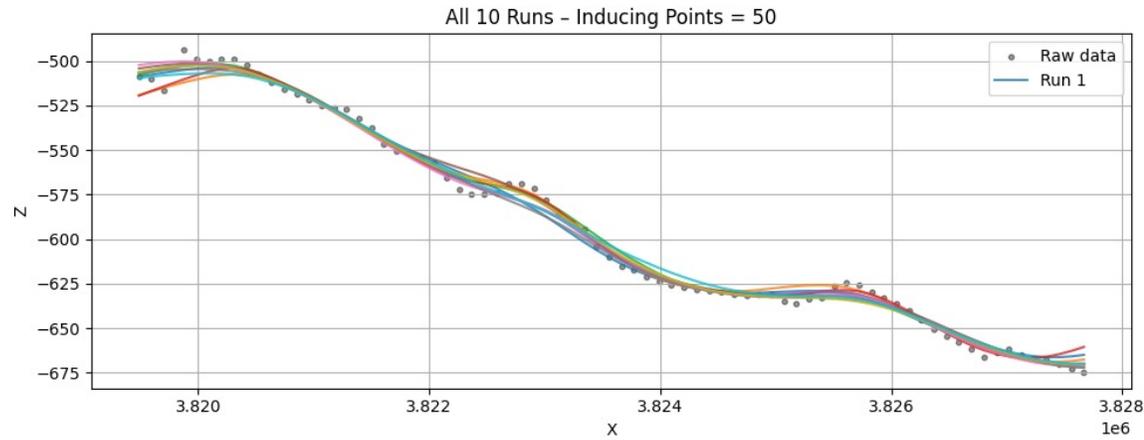
# Variational Gaussian Process (VGP) Simple case



# Variational Gaussian Process (VGP) Complex case



# VGP – Visualization with smaller datasets



# Next Steps - Conference

- Re-interpretation of 3-D Legacy Seismic Data using constrained data:
  - Top Triassic.
  - Top Permian.
  - Top Permian Salt.
  - Base Permian Salt.
  - Top Pennsylvanium.
  - Top Dinantium (\*)
  - Major faults.
  - Application of seismic attributes in fault mapping (e.g. variance, RMS Amplitude).
- Limitations with VGP in geological complex settings (faults) → Use predictions in inducing points as input data in GemPy as a probabilistic model.
- Manuscript on VGP → Uncertainty quantification on seismic data interpretation (spatial uncertainty) + geological modeling. Compression of information (reduce to the essentials).



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## 3-D Geological Modeling from Legacy Seismic Data with Consideration of Uncertainties

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## European Geothermal PhD Days 2026