Acid Mine Drainage from open pit lignite mines and its impact on the regional water quality in the Lausitz mining district (Germany)

Dr. Bastian Graupner

University of Kiel

Institute of Geosciences

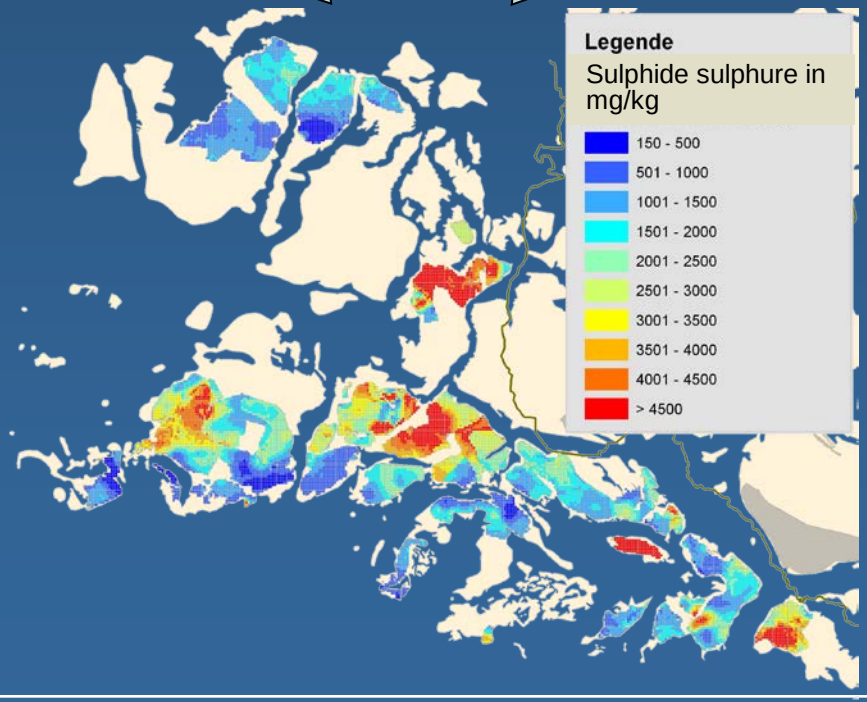
The Lausitz mining district

Inventory of the mining dumps

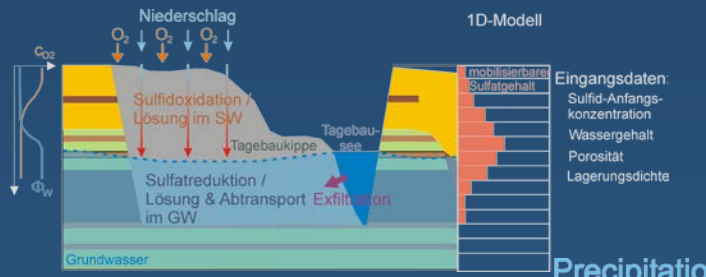
- Geological model

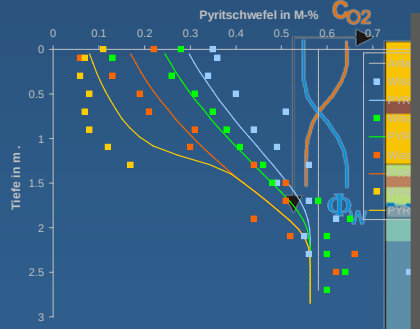
Inventory of the mining dumps

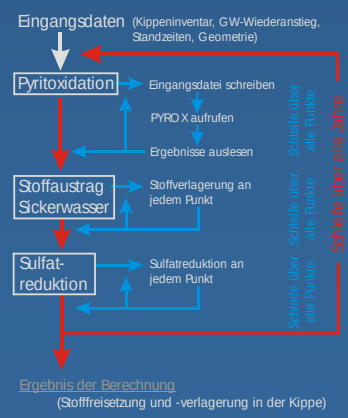
- Sulphide content of the mining dumps (grid based)
  - Originally 66 Mio. t of sulphide sulphur
- Primary pyrite oxidation
  - 4,6 Mio. t sulphate sulphur released during mine operation

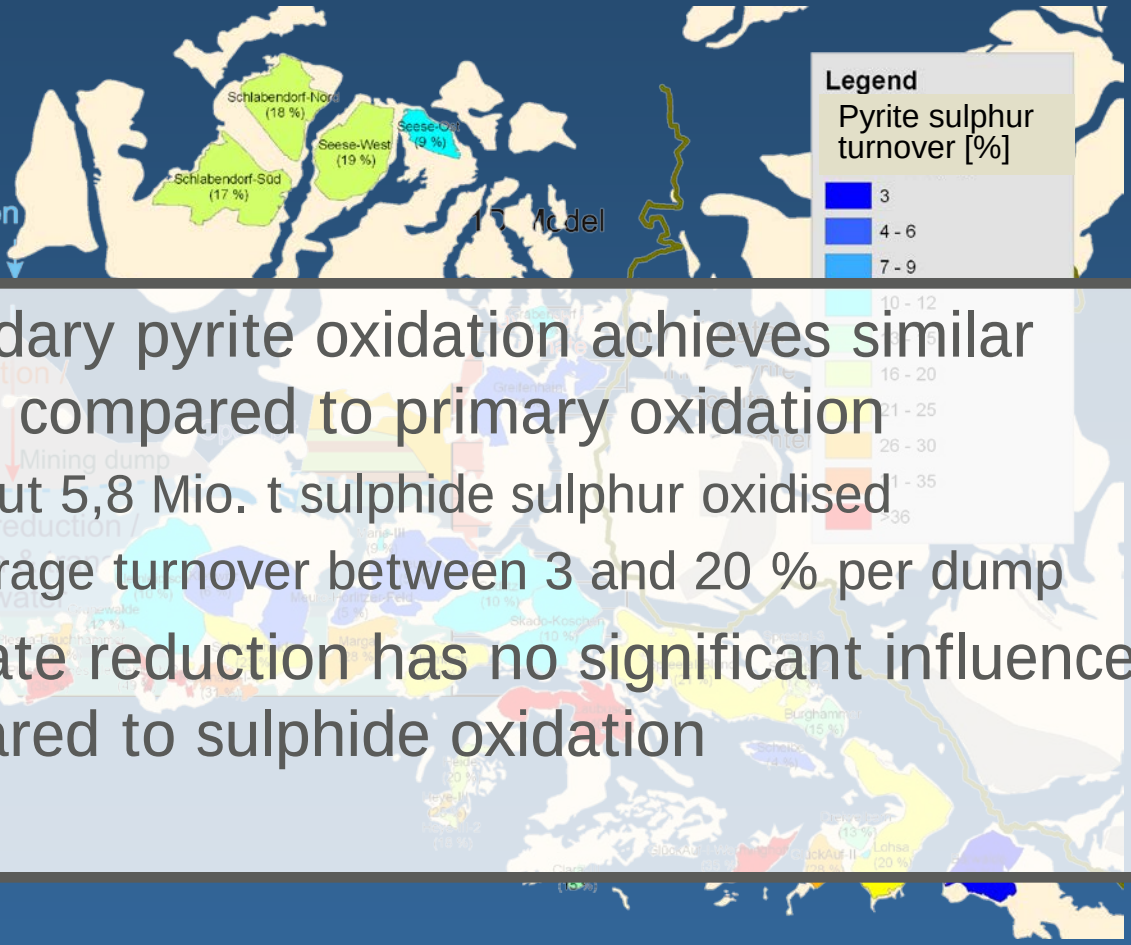


Alteration of the pollutant source



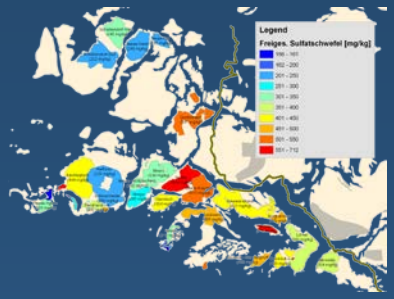


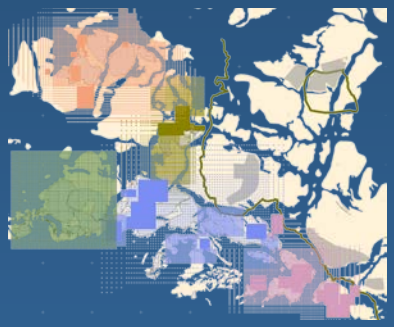


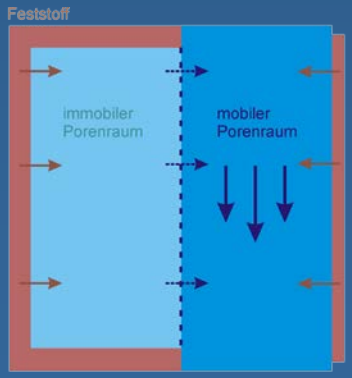


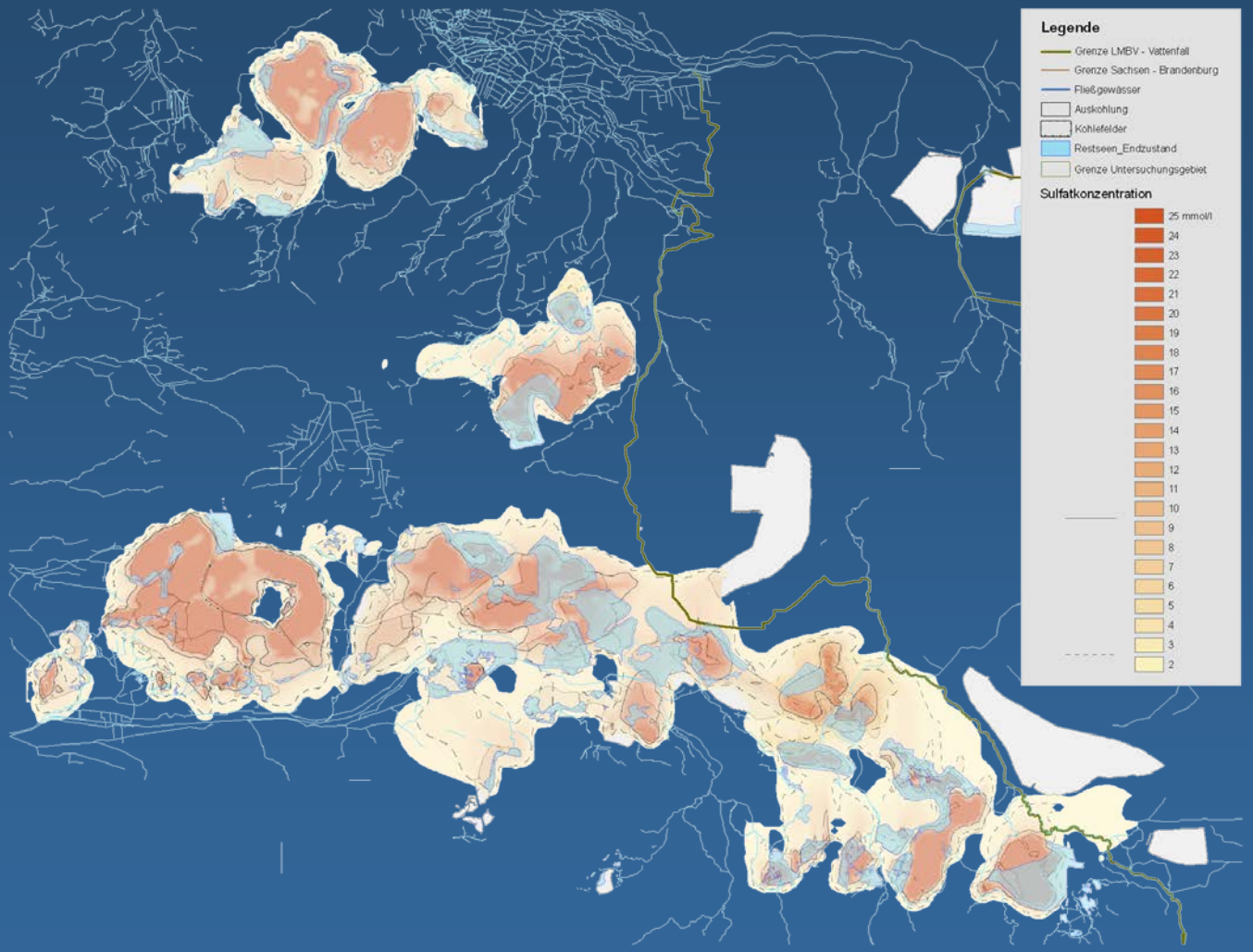
- Secondary pyrite oxidation achieves similar extent compared to primary oxidation
  - About 5,8 Mio. t sulphide sulphur oxidised
  - Average turnover between 3 and 20 % per dump
- Sulphate reduction has no significant influence compared to sulphide oxidation

Discharge of sulphate (2030)

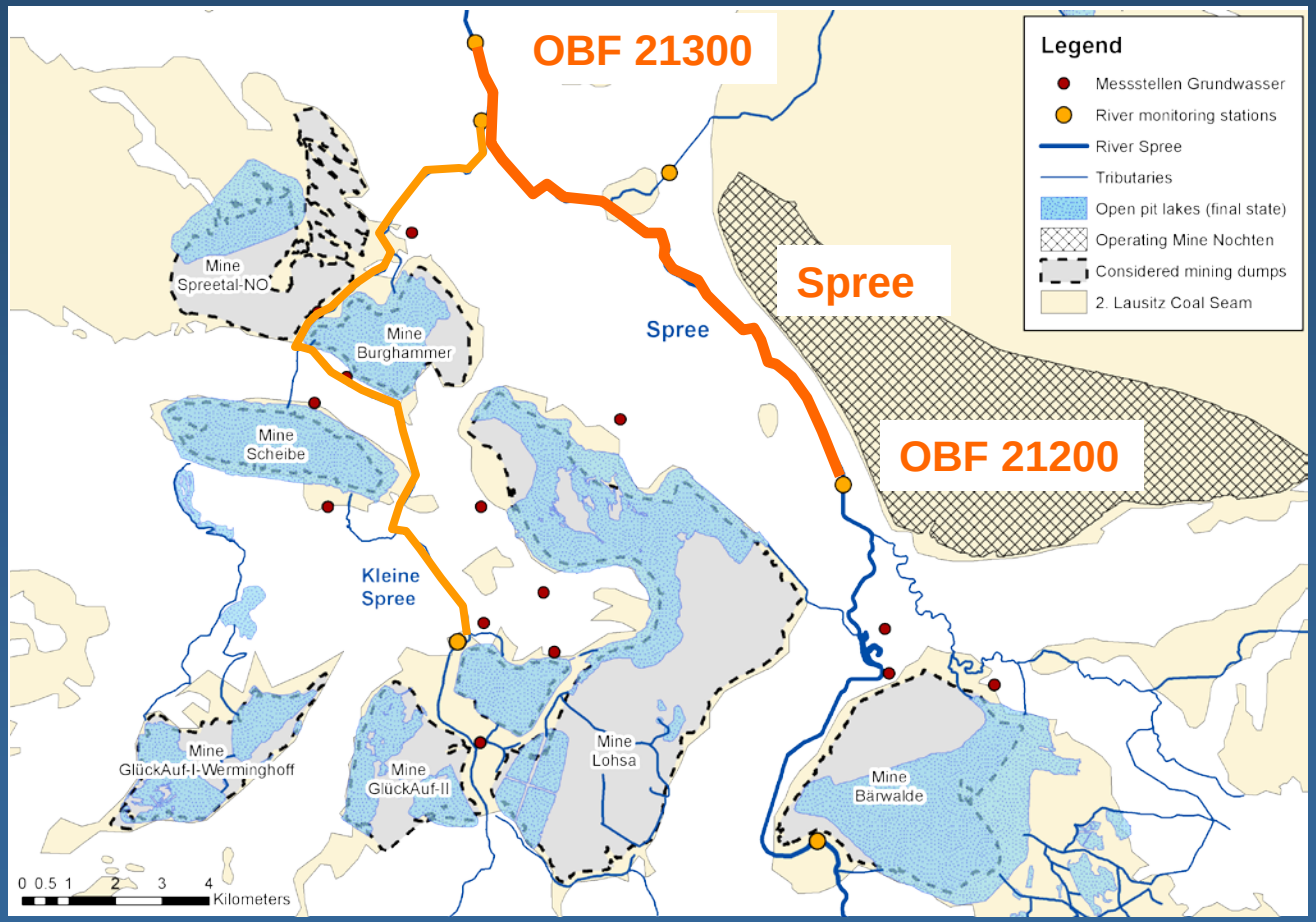






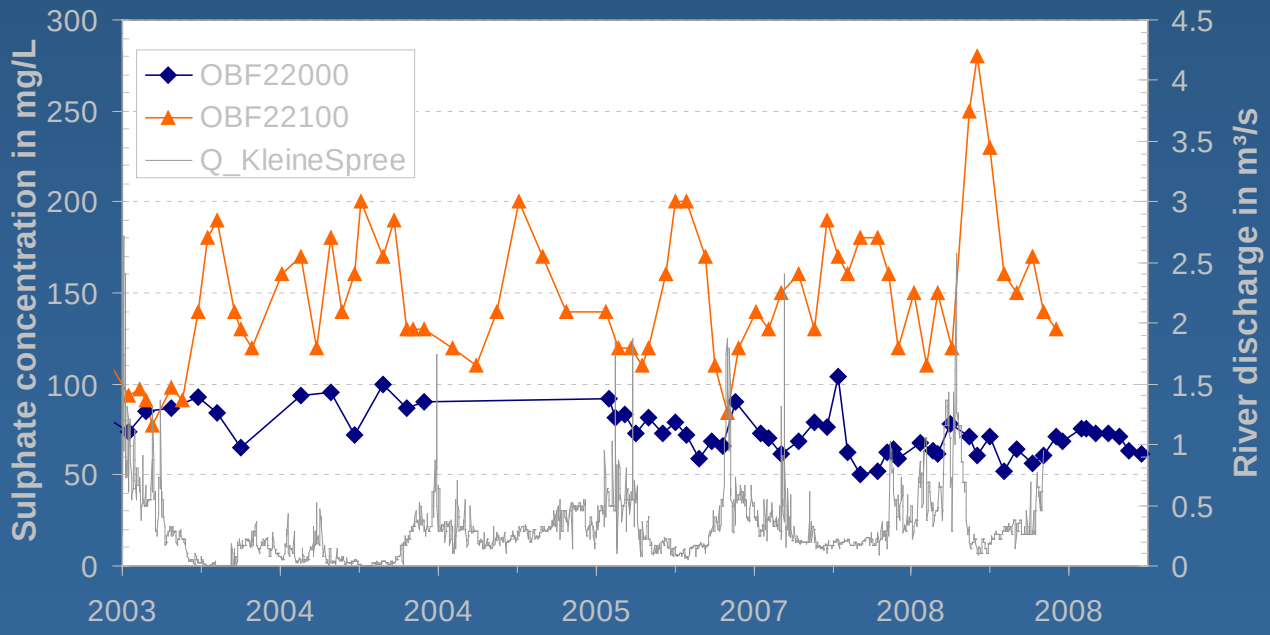


Impact on rivers



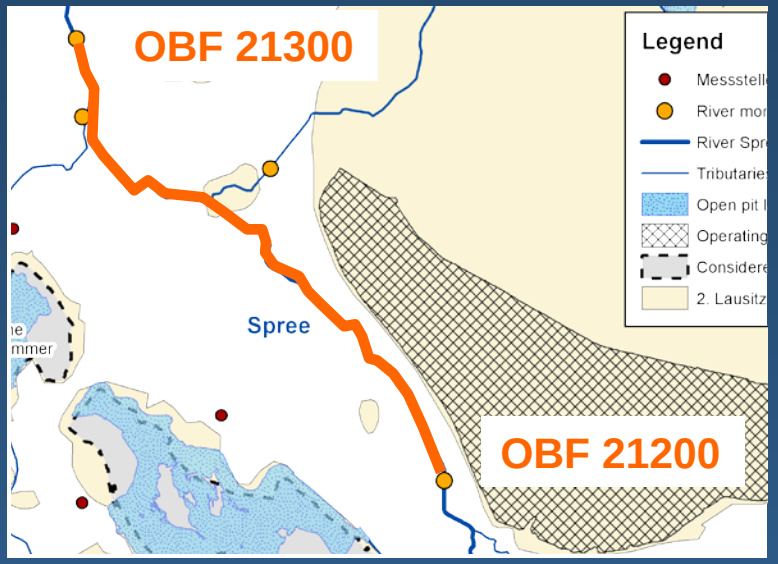
Impact on rivers

- Simulated sulphate input into the Kleine Spree 2009: 160 t sulphate/year
  - River discharge 0.1 – 0.5 m³/s (Median: 0.22 m³/s)
  - Increase of sulphate concentration 10 – 50 mg/L
- Observations
  - Diffuse input increases sulphate concentration by 56 ± 29 mg/L (↑)

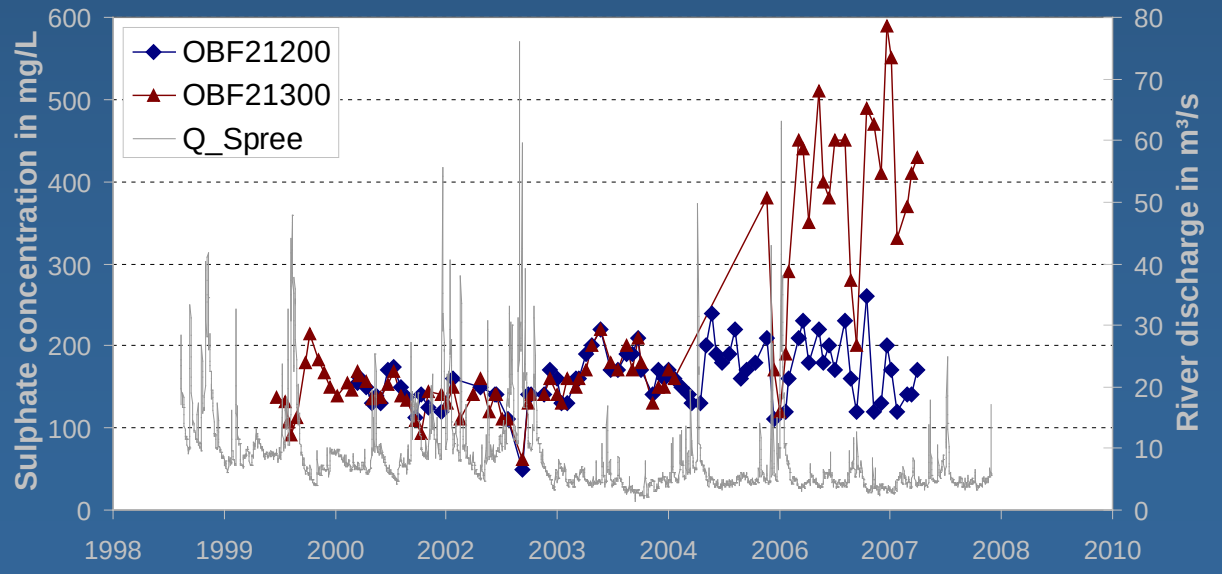


Impact on rivers

- Simulated sulphate input into the Spree 2009: 2000 t sulphate/year
  - River discharge 2 – 10 m³/s (Median: 5.65 m³/s)
  - Increase of sulphate concentration 5 – 20 mg/L



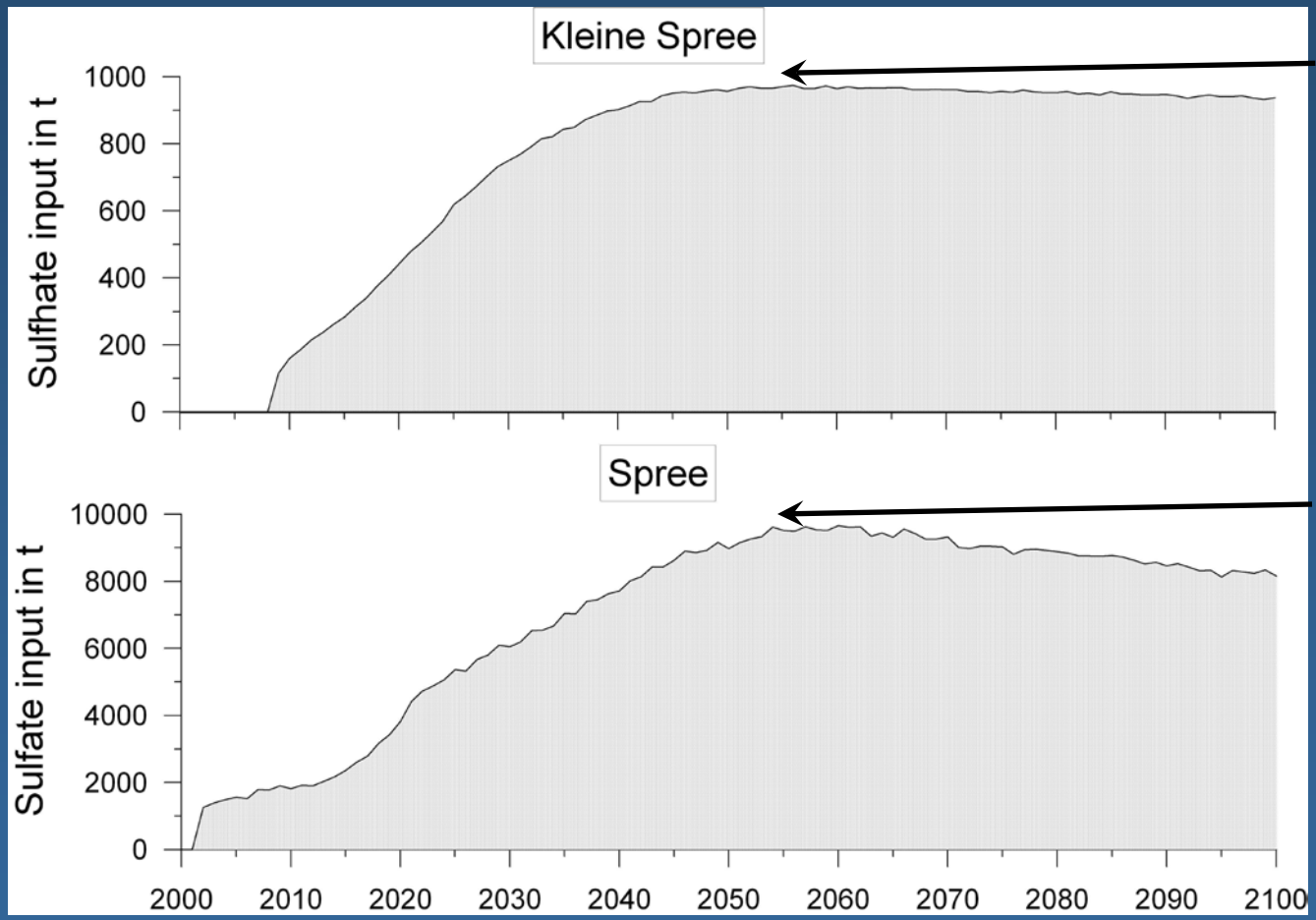
- Observations:
  - Diffuse increase of sulphate is hidden behind the direct discharge of mine drainage from operating mine



Impact on rivers

- Prediction of mine impact

Increase of sulphate concentration



≈ 150 mg/L
(60 – 300 mg/L)

≈ 100 mg/L
(30 – 150 mg/L)

Acknowledgement

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