



Erfahrungen digital zugänglich machen:

Das Internetportal „Grubenwasser“

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Forschungszentrum Nachbergbau

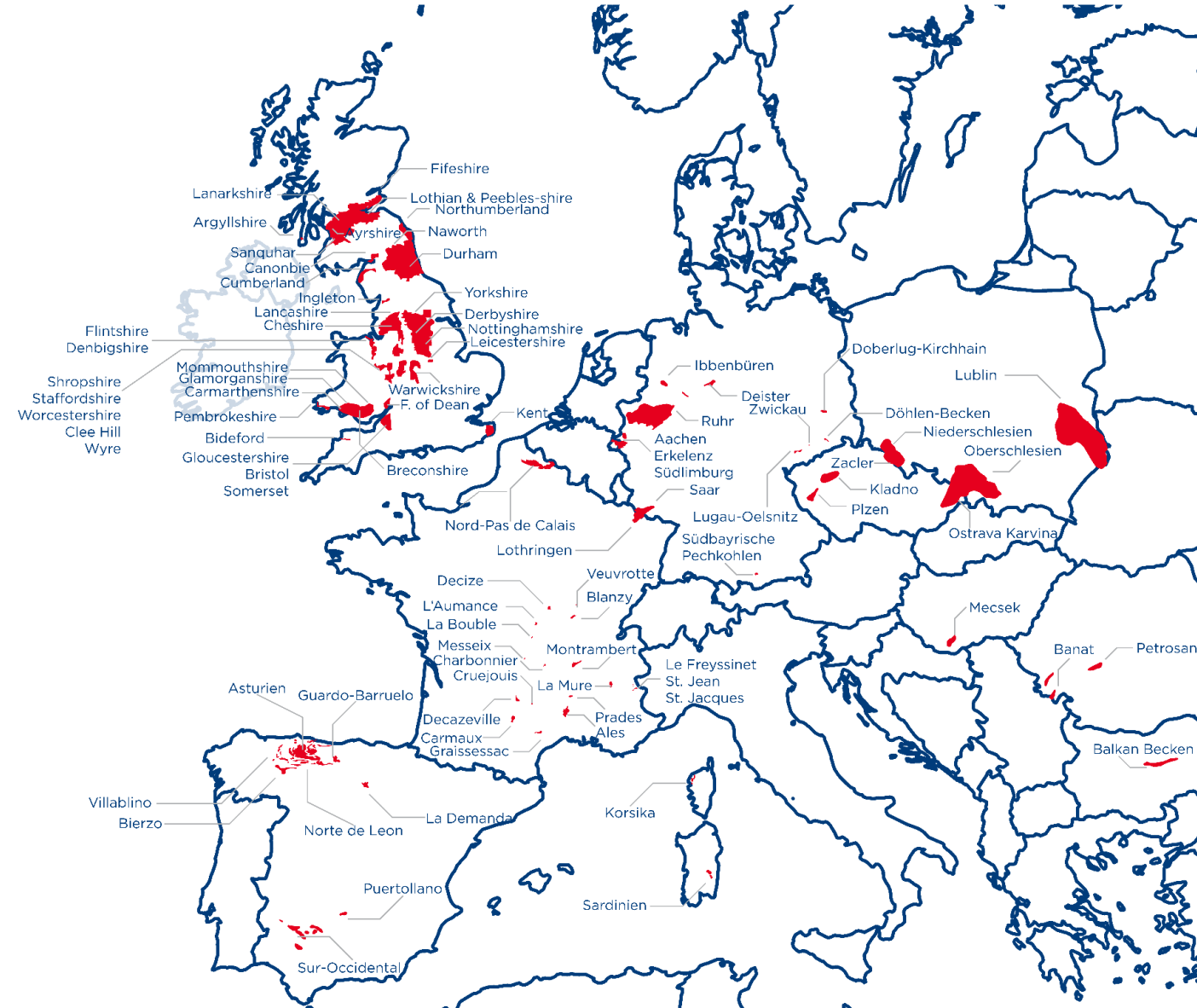
Evaluierung von Grubenwasseranstiegsprozessen 2016 - 2019



Technische
Hochschule
Georg Agricola



Kostenlos verfügbar unter
www.nachbergbau.org

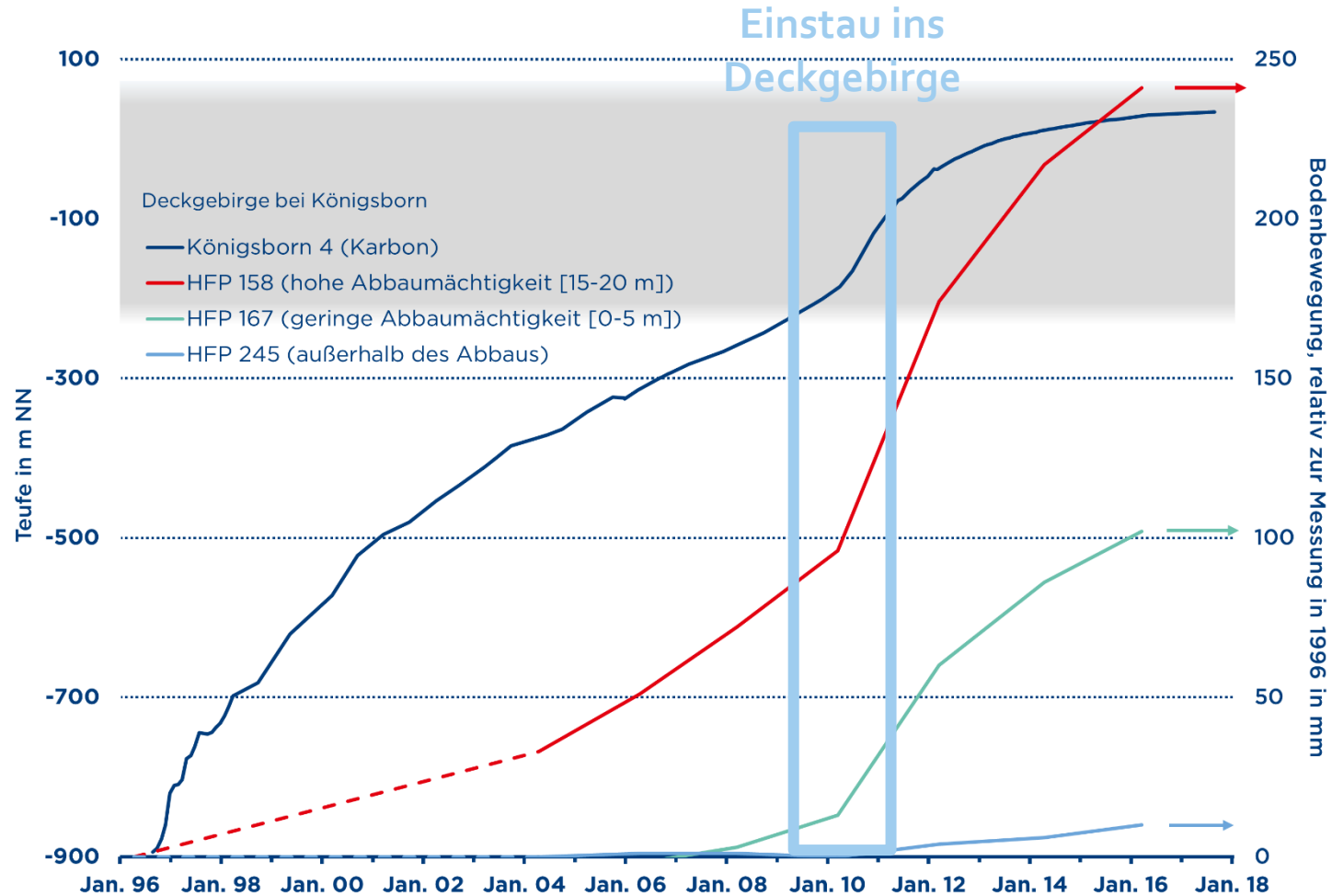


Erfahrungen: Deutschland

Bodenbewegungen

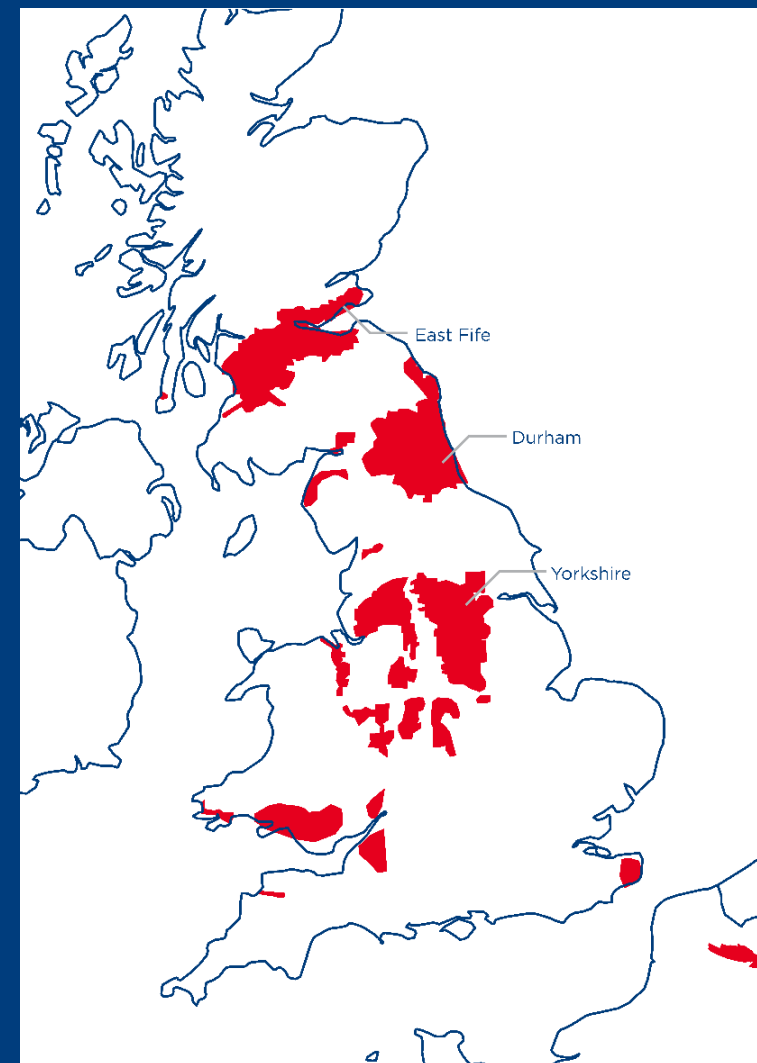


Zeche Ewald, Ruhrgebiet

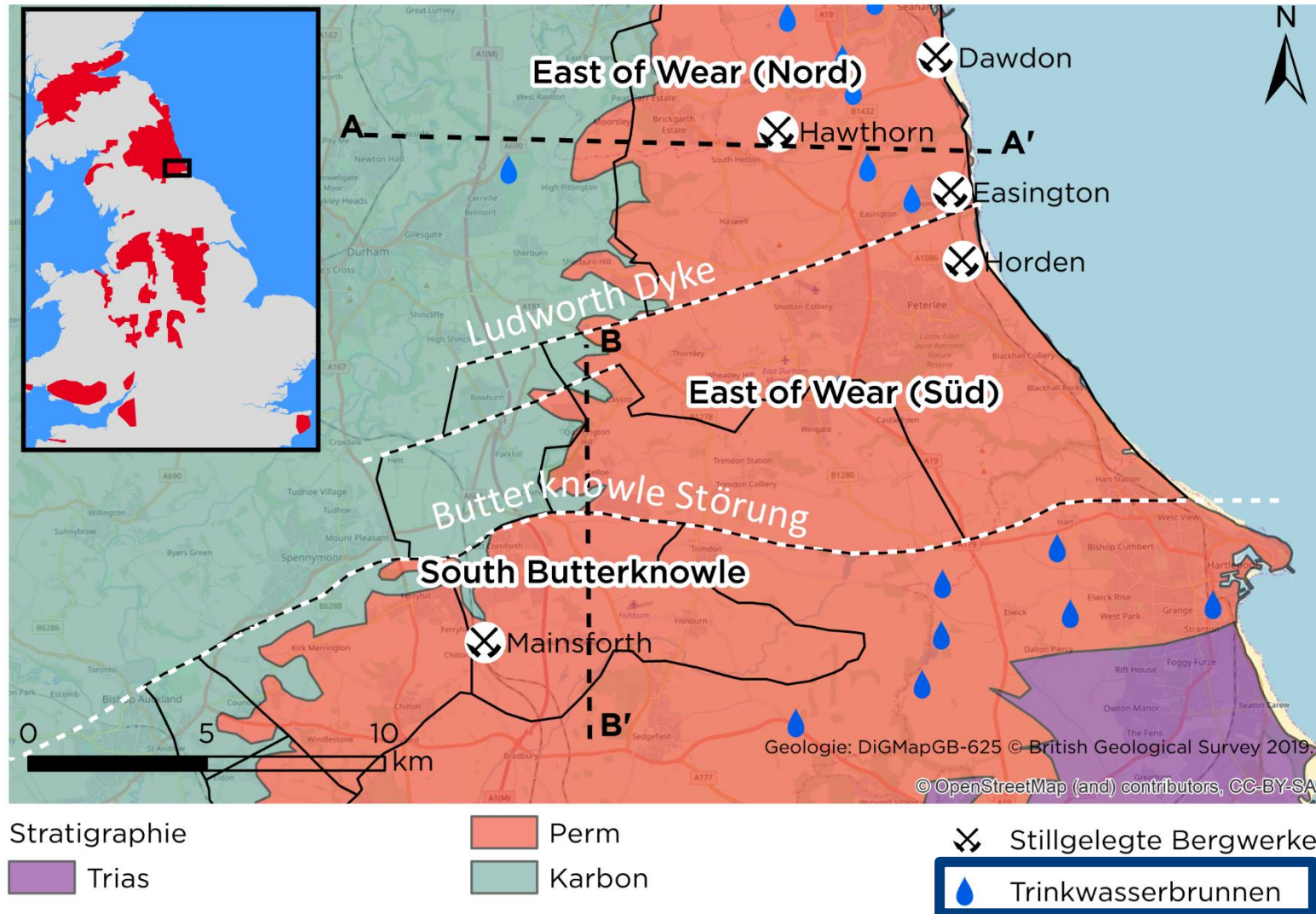


Erfahrungen: Großbritannien

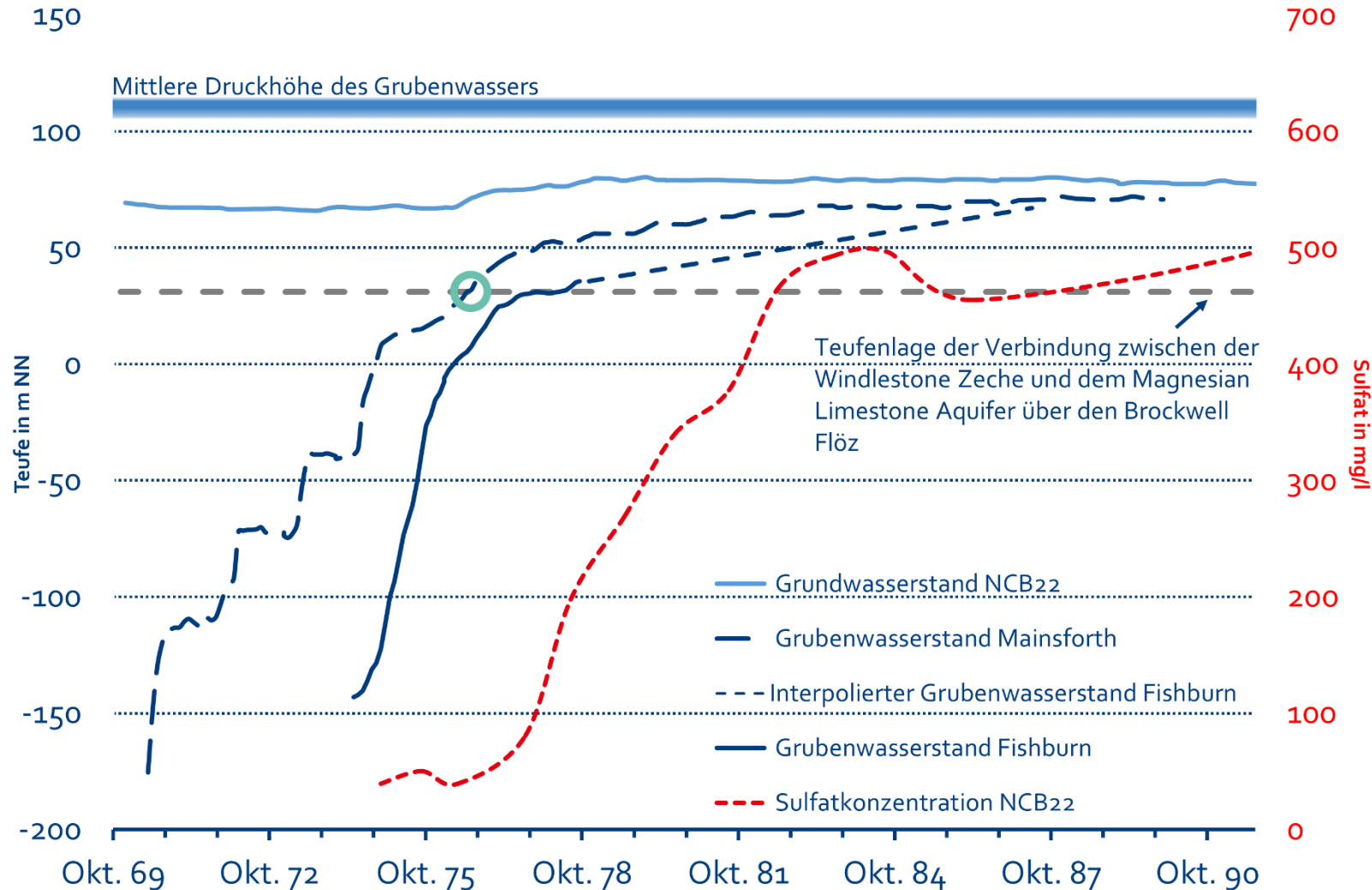
Grundwasser-
beeinflussung



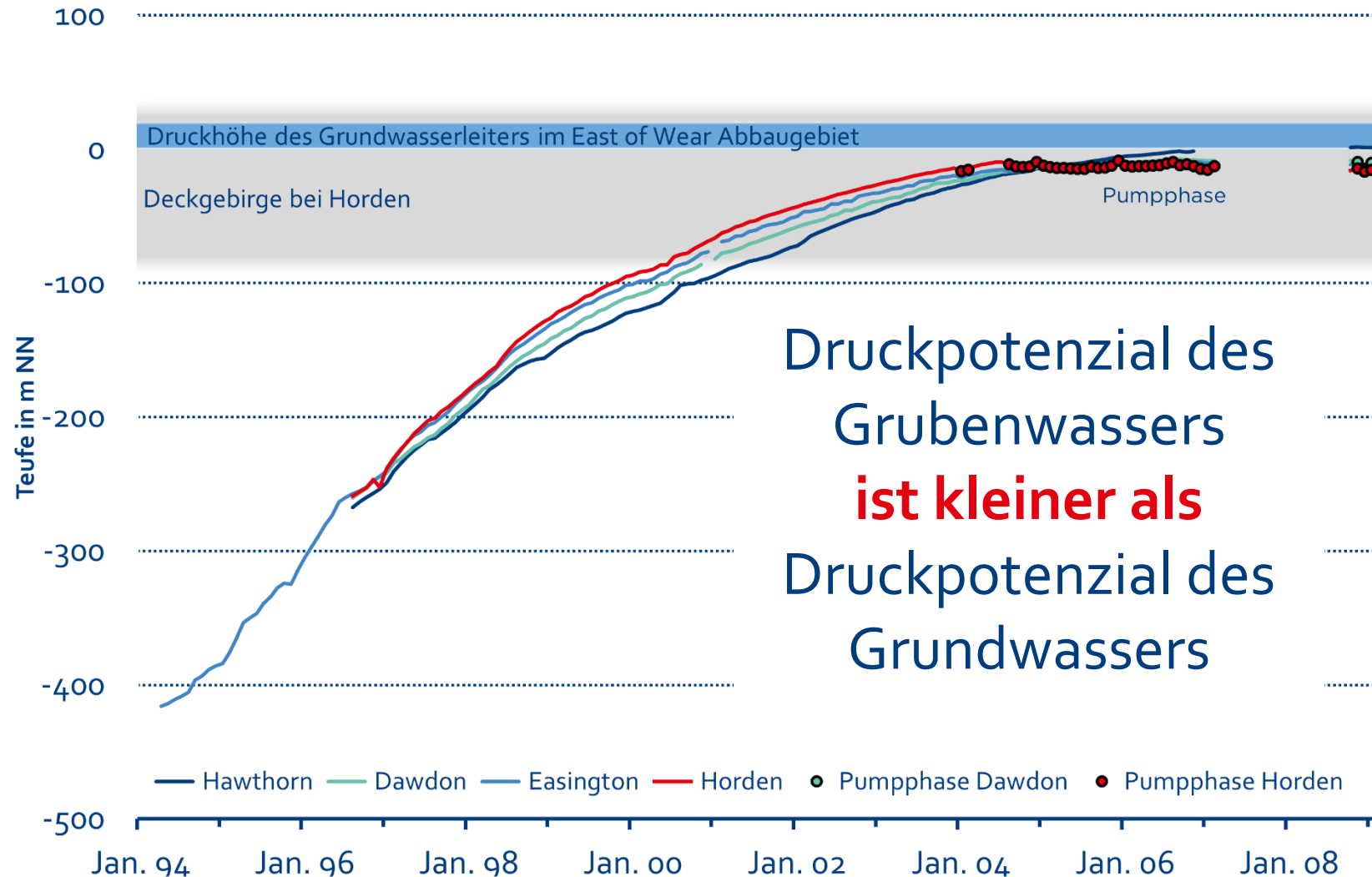
Durham: Geographische Übersicht



South Butterknowle: Beeinträchtigung eines GWL durch ansteigendes Grubenwasser - Sulfat

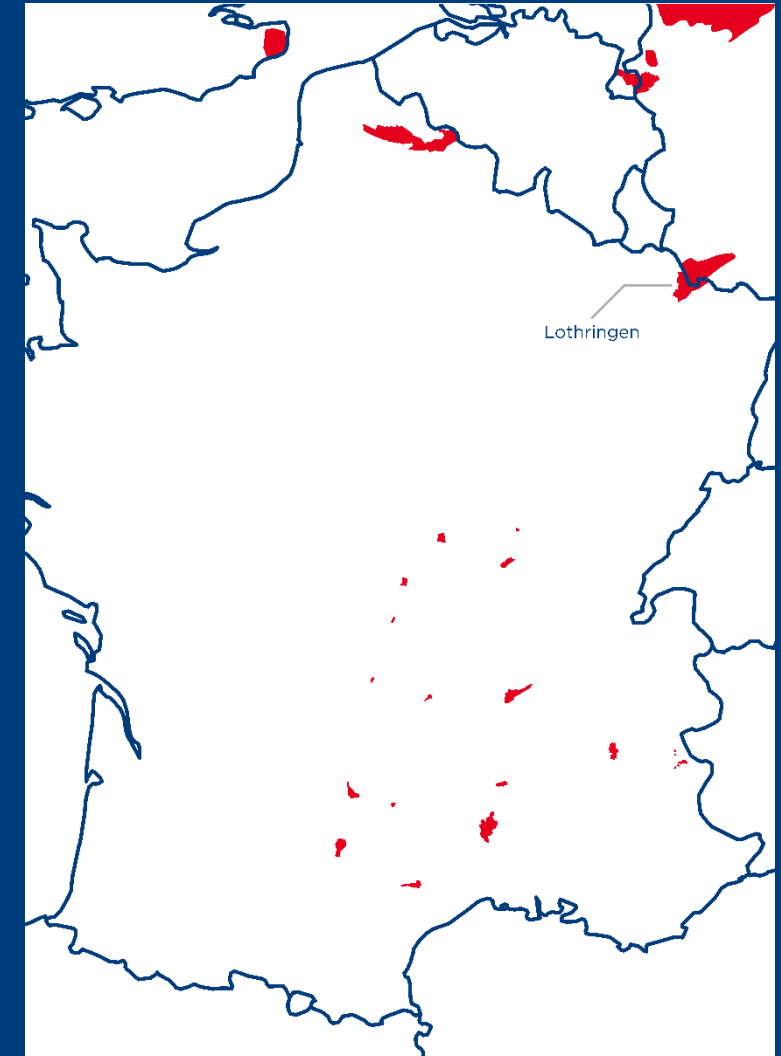


South Butterknowle: Schutz eines GWL durch Pumpmaßnahmen

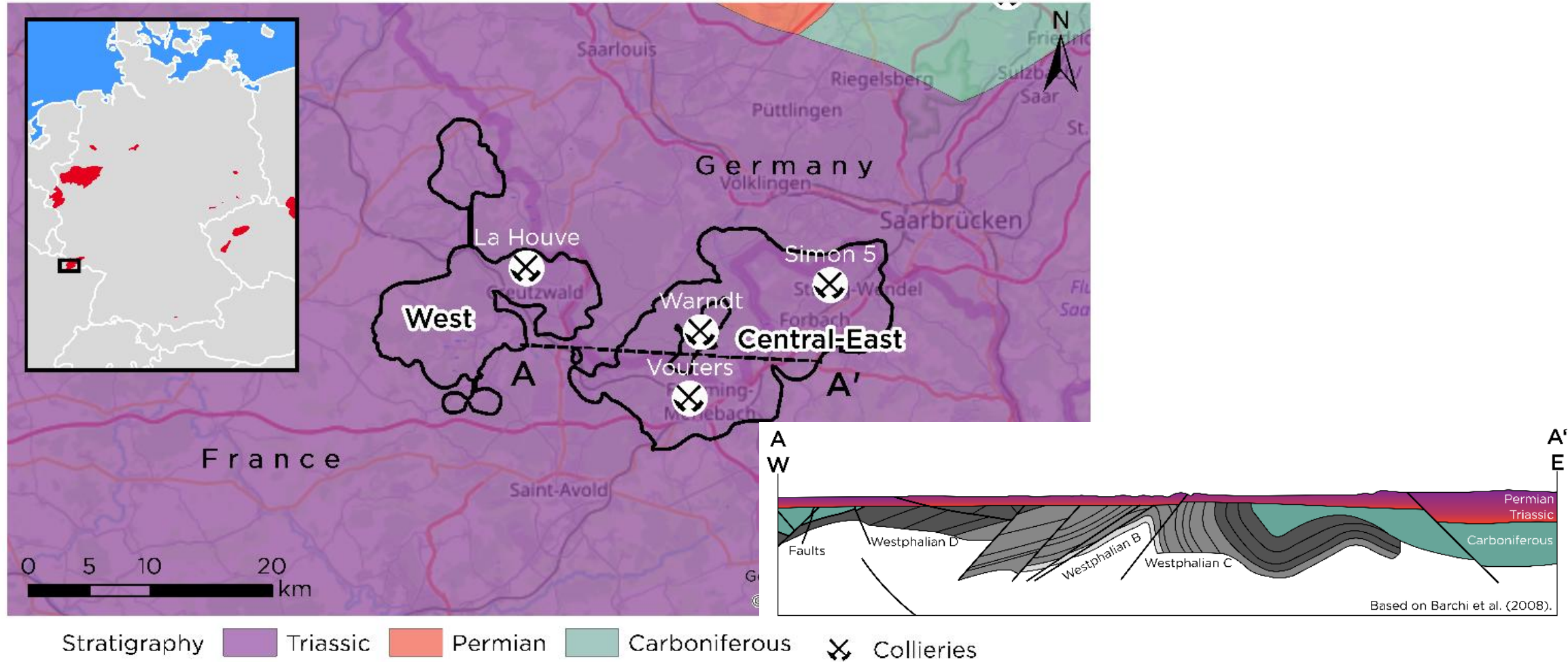


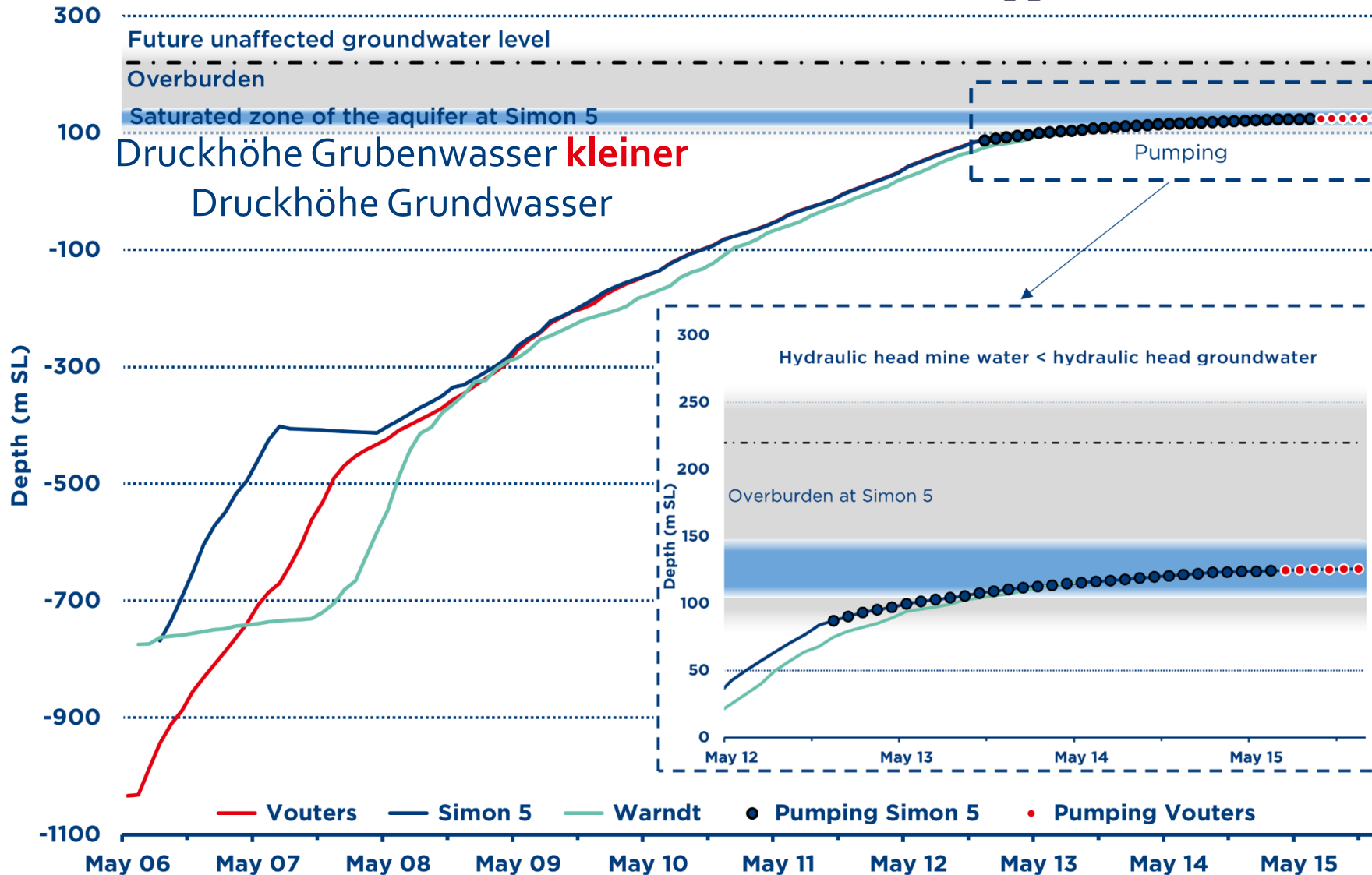
Erfahrungen: Frankreich

Druckpotentiale

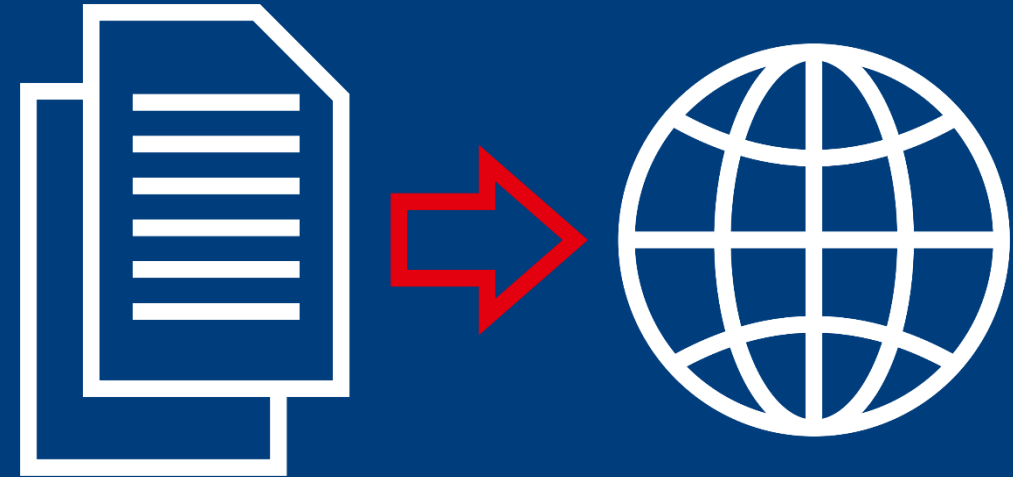


Lothringen: Schutz eines GWL durch Pumpmaßnahmen

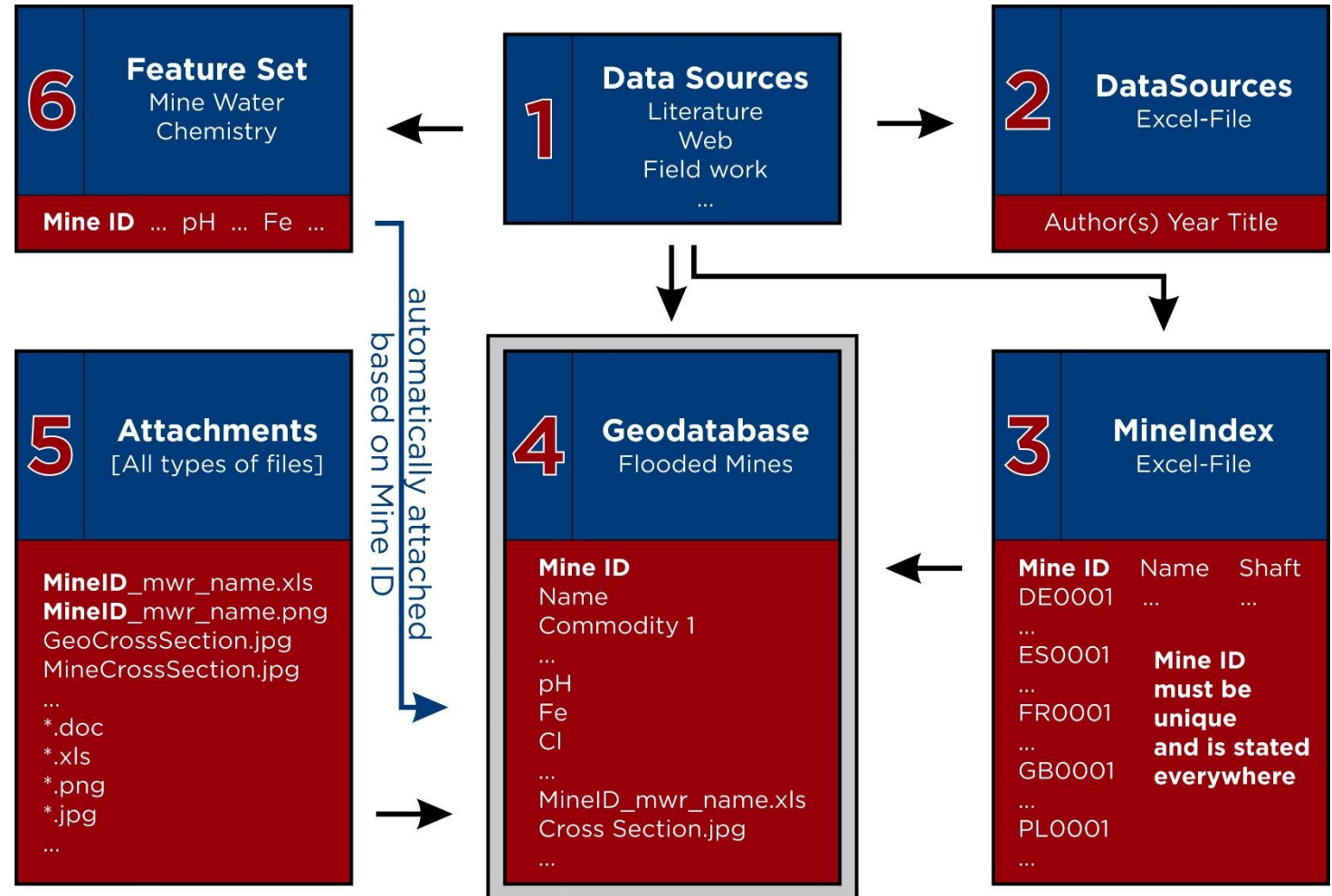




Digitalisierung: Erfahrungen im Nachbergbau



FlowChart Geodatabase Internetportal „Grubenwasser“



Sämtliche Informationen aus Literatur und Feldarbeit können in die Datenbank integriert werden.

Jede Eintragung erhält einen eindeutigen Index (MineID) in einer separaten Datei.

Chemische Analysen können zusammen mit der MineID in einem separaten Shapefile, das mit der Datenbank verknüpft ist, hinterlegt werden.

Dateianhänge (Grafiken, Office-Dateien etc.) können der Datenbank beigelegt werden.

Aufbau der Datenbank



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Additional notes	MineRemarks	Remarks [free text]
Literature	MineLiterature	Free text (must be noted in „literature_data“)
Chemistry	MineWaterChemistry	Not available see attachment (→ Feature)
Chemistry Water Type Discharge	MineChemistryType	Discharge chemistry, Furtak and Langguth
Chemistry Depth Related	MineChemistryDepth	Were depth dependant samples taken? y/n
Flooding Scenario	MineFloodingImage	Not available see attachment
Flooding Scenario Literature	MineFloodingLiterature	Free text (must be noted in „literature_data“)
Stratification Data	StratificationImage	Not available see attachment
Stratification Parameters measured	StratificationParameter	temperature electrical conductivity pH
Hydrogeological Description	MineHydrogeology	Free text
Mining History	MineHistory	Free text
Geological Profile	MineGeologyProfileImage	Not available see attachment
Flooding History	MineHistoryFlooding	Free text
Treatment	MineTreatment	Neutralisation Low density sludge LDS Electrochemical Electrocoagulation Electrodialysis Membrane Ultrafiltration Nanofiltration Forward osmosis Ettringite precipitation Bioreactors fermenters Ion exchange Flotation liquid-liquid extraction Freeze crystallisation Carbonate channels and flumes anoxic limestone drain ALD oxic limestone drain OLD open limestone channel OLC aerobic wetland, reed bed anaerobic wetland, compost wetland RAPS, SAPS settlement lagoon Permeable reactive walls Vertical flow reactor VFR Passive oxidation ARUM Acid Reduction Using Microbiology In situ Passive general Active general
Cross section	MineCrossSectionImage	Not available see attachment
Mining Method	MiningMethod	longwall mining, cross-cut mining shrinkage stoping cut-and-fill mining cross working sub level stoping room-and-pillar room-and-pillar caving cross working bell pit mining sublevel caving pillar mining block caving

Depth to raw material	MineRawMaterialDepth	thickness of rock above raw material deposit
Depth of mine	MineDepth	Maximum depth of mine
Shaft Name	MineShaftName	Name of the measured shaft
Shaft Depth	MineShaftDepth	Depth of measured shaft
Shaft Diameter	MineShaftDiameter	Diameter of measured shaft
Shaft Geometry	MineShaftGeometry	Geometry of measured shaft (e.g. oval round square unknown)
Shaft lining	MineShaftLining	Shaft lining (e.g. brick wood concrete unknown)
Shaft Remarks	MineShaftRemarks	Remarks, e.g. number of branches
Mine Shafts	MineShaftType	single shaft mine multiple shaft mine unknown
Stratification First Observed	StratificationDate	First occurrence of stratification
Stratification First Literature	StratificationLiterature	Literature to first occurrence of stratification
Stratification Location	StratificationLocation	onsetting station shaft lining various lithology unknown
Stratification Count	StratificationCount	Number of water bodies
Start of flooding	MineFloodingStart	Field type: Date (if just year is known, take 1.1.XXXX)
End of flooding	MineFloodingEnd	Field type: Date (if just year is known, take 31.12.XXXX)
Flooding Type	MineFloodingType	active passive unknown
Mine water make	MineWaterMake	Flow into or pumping rate
Flooding development	MineFloodingData	Data of water levels during flooding
Receiving Water Course	DischargeReceiving	into which stream/river dose the water discharge
River Catchment	DischargeCatchment	River catchment based on EU Water Framework Directive
Shaft Stratification Class	ShaftStratificationClass	Free text
URL	URL	Free text (Weblink to recent Website of mine etc.)
Mining Area Local Name	MiningAreaLocName	Free text
Mining Area English Name	MiningAreaEngName	Free text

Flooding Process Status	MineFloodingProcess	
Water level	WaterLevel	
Water level date	WaterLevelDate	
Altitude top of shaft	AltitudeTopOfShaft	
Access to the water	WaterAccess	
Discharge Type	WaterDischargeType	
Discharge Pumped	WaterPumped	
Geological Info	MineGeology	
Ore type	MineOreType	Exhalative-diagenetic Hydrothermal epigenetic Magmatic Marine-sedimentary Metasomatic Placers Residual and supergene
Deposit type	MineDepositType	e.g. Sedimentary manganese deposits coal
Company	Owner	current owner (free text)
Contact	OwnerContact	Free text
Country	MineCountry	English name
Latitude	MineLat	Geographic coordinates WGS 84
Longitude	MineLon	Geographic coordinates WGS 84
Site type	MineSiteType	quarry open pit placer surface mine underground facility
Site size	MineSize	< 2 km² 2 – 10 km² > 10 km²
Activity status	MineActivity	operating, active abandoned, orphaned closed
Activity level	MineActivityLevel	continuous intermittent seasonal not available
Year of Opening	MineYearOpening	Commonly accepted year of first production
Year of closure	MineYearClosure	Commonly accepted year of last production
Reason for closure	MineClosureReason	bankruptcy exhaustion of mineral resources accident flooding war politics decease
Legal access restriction	MineAreaLegal	nature protection geopark heritage site tourism ba general residential area sports and leisure activities n scheme waste land wilderness

Parameter	Feldname in Datenbank	Mögliche Auswahl / Freitext / Bemerkungen
ID	ID	Database ID, integer
Mine Index	Index	Running ID; ISO 2 letter code country, running number; e.g. PT0001 (must be stated in "MineIndex.xlsx" !)
Name Local	NameLocal	Common name of the mine in local language
Name translated	NameTranslated	Common name in English
Mining Info Type	MineType	Individual Mine Mining District Concession Area
Metallic/Non-metallic mine	RawMaterialType	Metallic Non-Metallic
Main Commodity 1	CommodityMain1	aluminium amber anthracite antimony arsenic asbestos barium baryte bauxite beryllium black coal lignite calcite chert chromium cobalt copper feldspar fluorite garnet gold graphite gypsum hematite Industrial material iron kaolin kyanite lead lithium REE magnesite magnesium manganese marble mercury mica molybdenum nickel niobium ochre oil palladium phosphorous platinum potash potassium pyrite salt silver slate strontium sulphur talcum tin titanium tungsten uranium vanadium zinc
Main Commodity 2	CommodityMain2	See above
Main Commodity 3	CommodityMain3	See above
Main Commodity 4	CommodityMain4	See above
Secondary Commodity 1	CommoditySecond1	See above
Secondary Commodity 2	CommoditySecond2	See above
Secondary Commodity 3	CommoditySecond3	See above
Secondary Commodity 4	CommoditySecond4	See above
Access to the mine	MineAccess	Road Path
Classification Access	MineAccessClassification	Tar gravel ...
Distance to Road	MineAccessDistance	In meters
Section	MineInformation	Data or information source availability
Flooding Status	MineFloodingStatus	fully flooded partially flooded potentially flooded not flooded

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Geodatabase
Flooded Mines

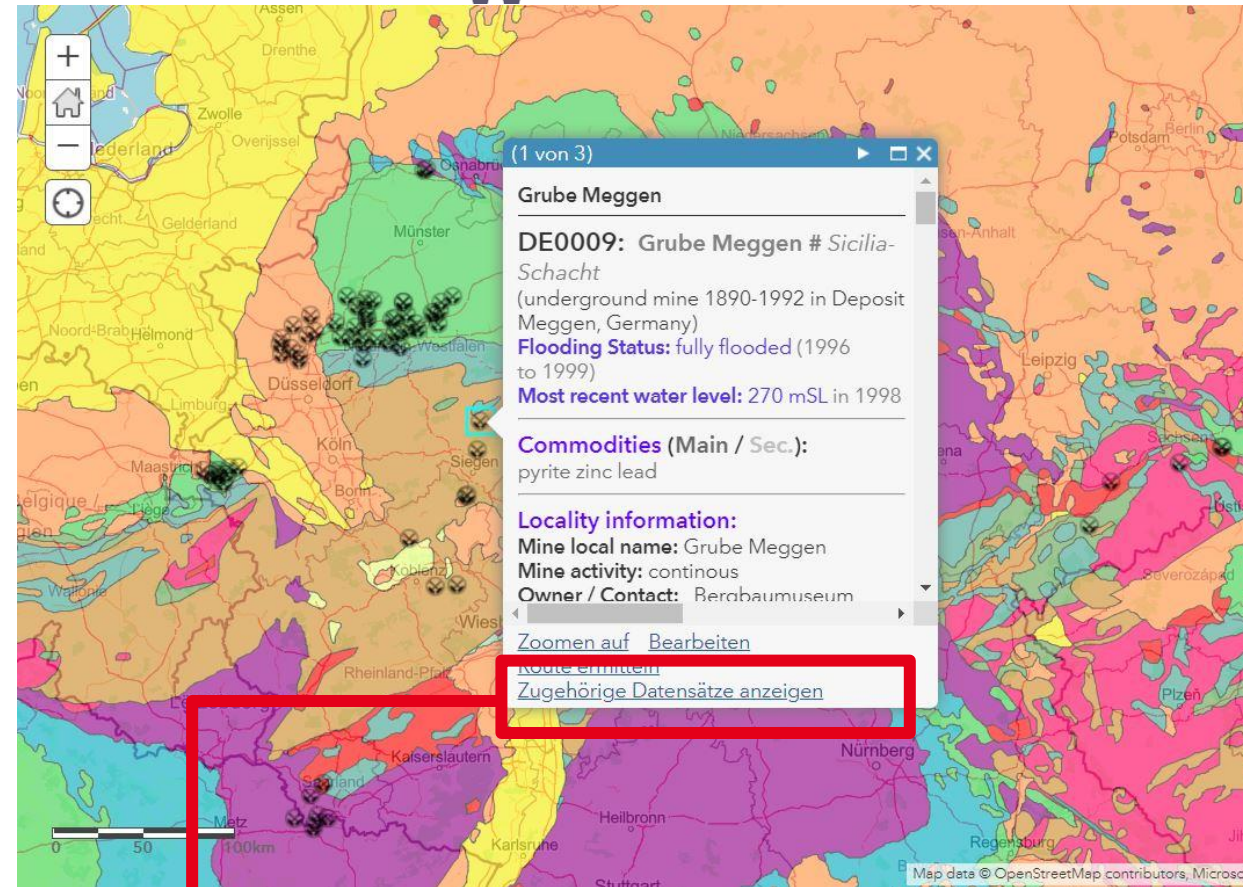
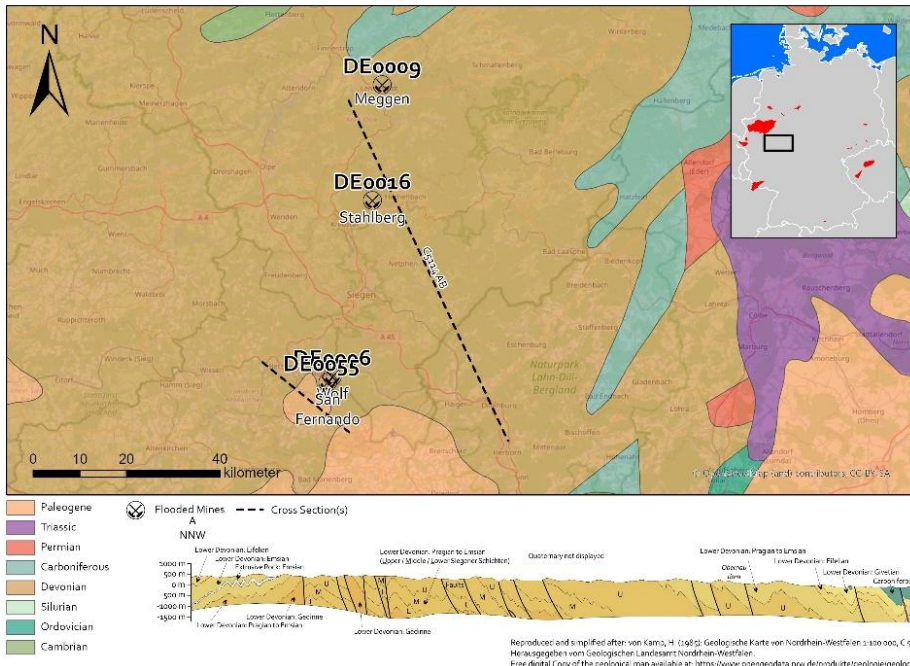
Mine ID
Name
Commodity 1

...
pH
Fe
Cl

...
MineID_mwr_name.xls
Cross Section.jpg

Visualisierung der Datenbank online über ArcGis

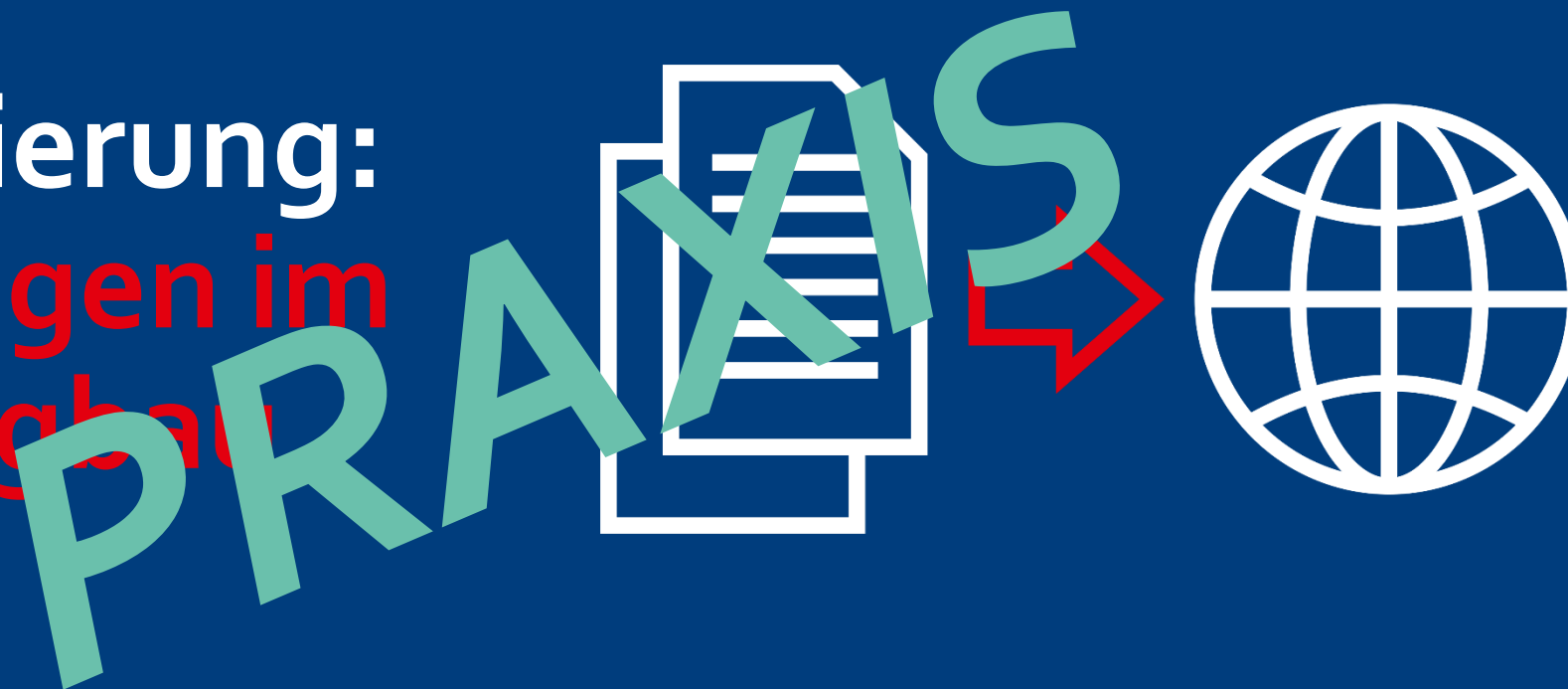
Derzeitiger Datenbestand:
124 Bergwerke in ganz Europa
mit
593 Datensätzen zu chemischen
Analysen.



Ausschnitt aus der Karte / Datenbank
mit aktivierter Geologie.

Angehängte Dateien, z.B.
Geologische Profilschnitte

Digitalisierung: Erfahrungen im Nachbergbau



Danke für Ihre Aufmerksamkeit und **Glückauf**

Dank an das Forum Bergbau und Wasser
für die Finanzierung des Projekts!

Updates zum Projekt und vieles mehr!

www.nachbergbau.org

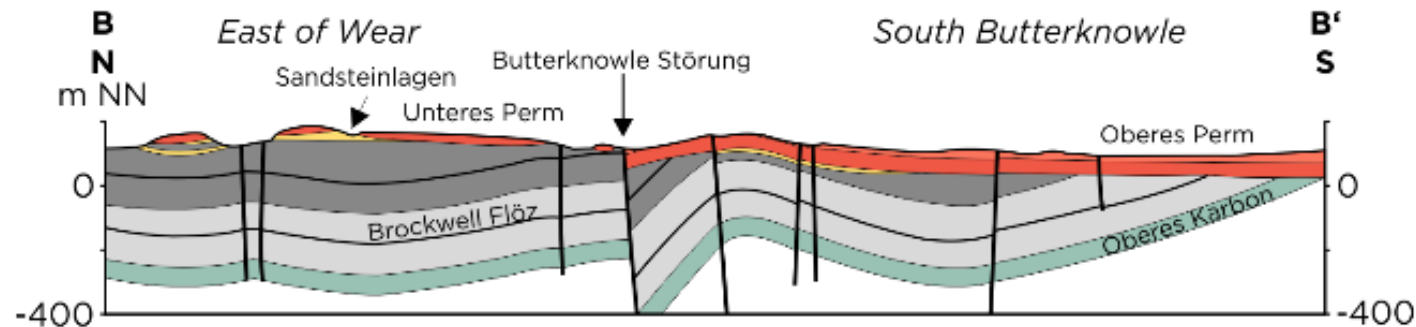
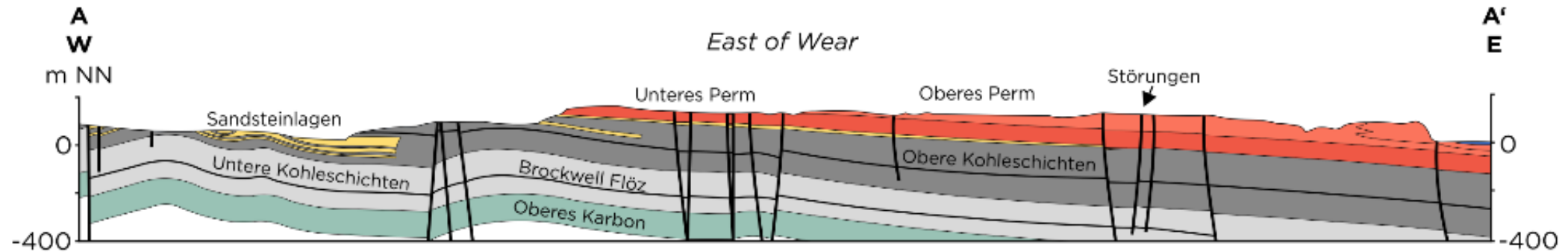
Auch zu empfehlen & interaktiv:

<https://umweltkumpel.thga.de/>

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Sebastian.Westermann@thga.de

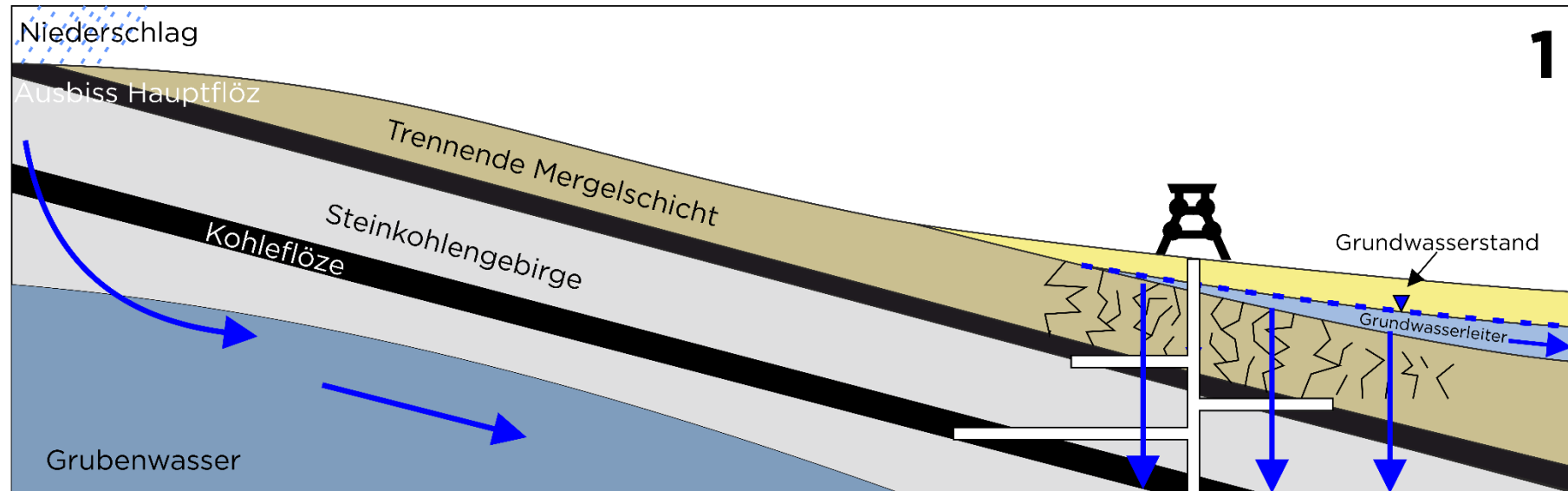
Perm: Magnesian Limestone GWL



Nach Geologischer Karte Nr. 27 (Durham), British Geological Survey 2008

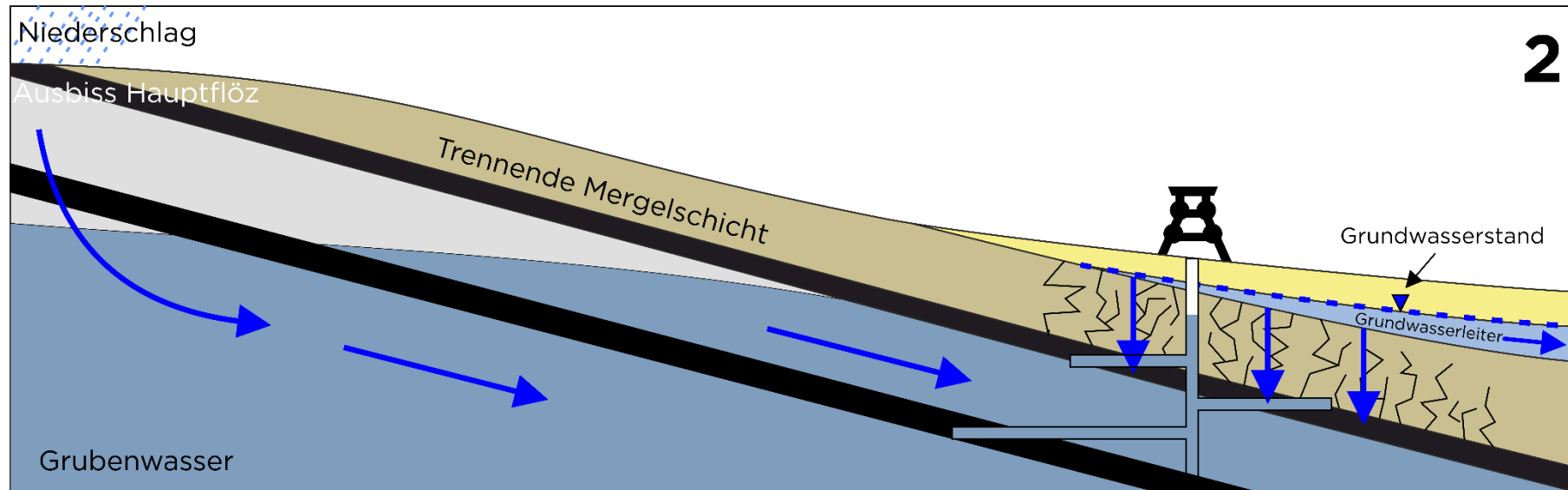
3 x überhöht

Phase 1: Abfluss des Grundwassers ins Grubenwasser



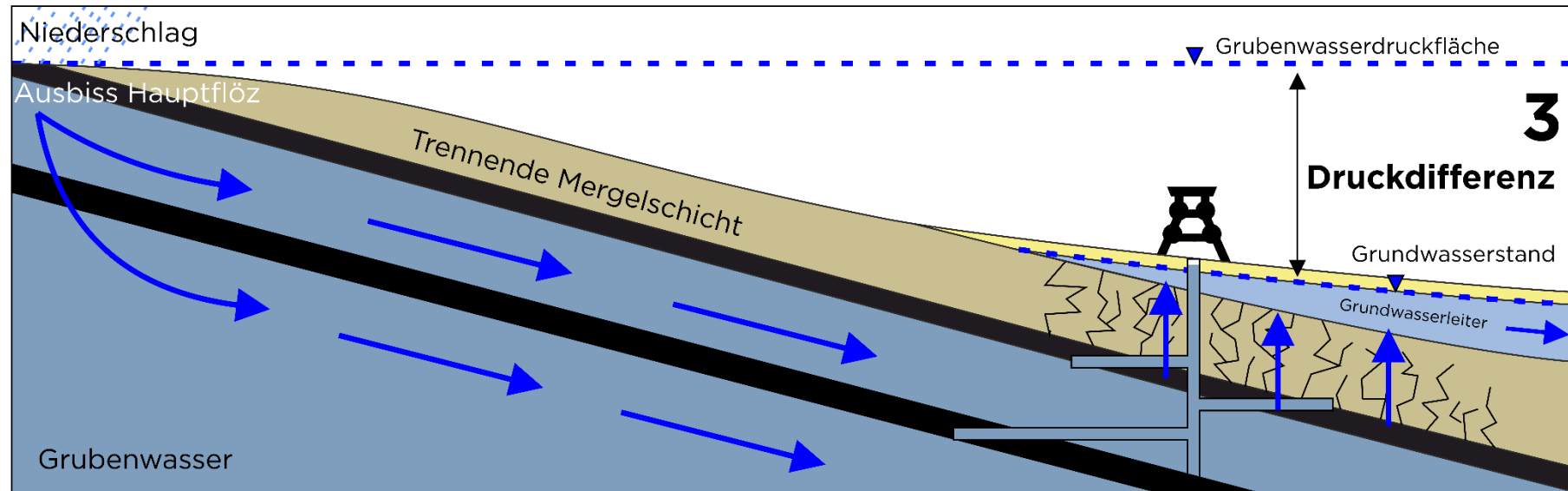
Druckhöhe Grubenwasser **kleiner** Druckhöhe Grundwasser

Phase 2: Verringerter Abfluss des Grundwassers ins Grubenwasser



Druckhöhe Grubenwasser **kleiner** Druckhöhe Grundwasser

Phase 3: Infiltration des Grubenwassers in das Grundwasser



Druckhöhe Grubenwasser **größer** Druckhöhe Grundwasser