

# Rare Earth Elements (REEs)

## Natural Tracers in Mine Waters

Christian Wolkersdorfer

*Institute of Geology – Department of Hydrogeology*

TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG



Rare Earth Elements as Natural Tracers

Outline

- Aims
- Location
  - Straßberg/Harz
  - Brixlegg/Tyrol
- Site investigations
- Results
- Conclusions

TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG



Rare Earth Elements as Natural Tracers

Aims

- Investigation of hydrodynamic conditions in flooded underground mines
- Supplement of artificial tracer tests to proof and verify their results
- Stratification studies in flooded shafts



TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG

Introduction

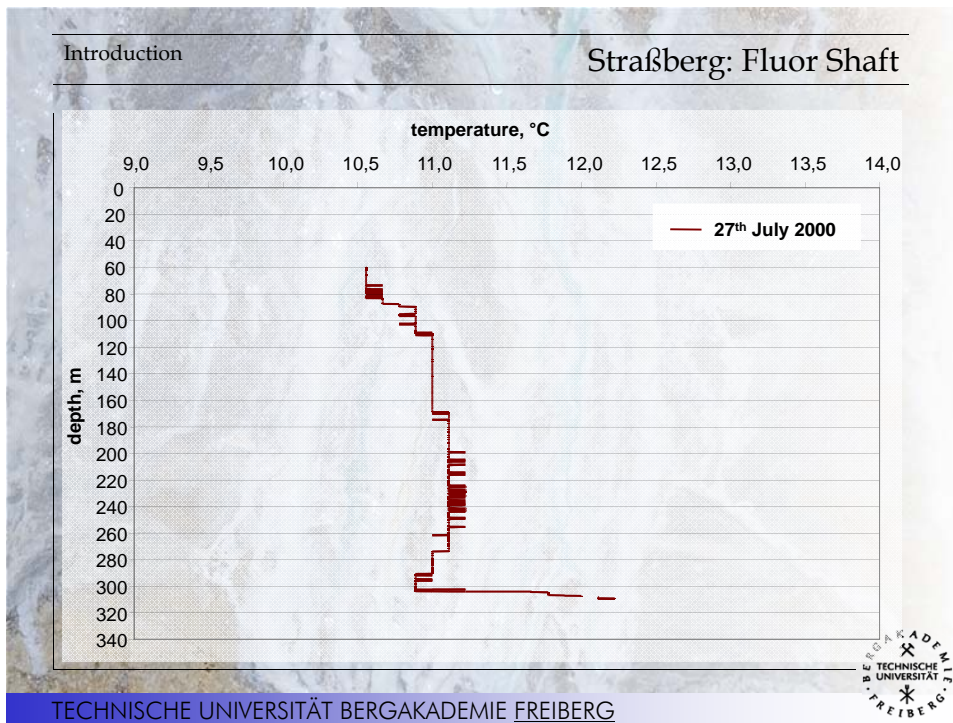
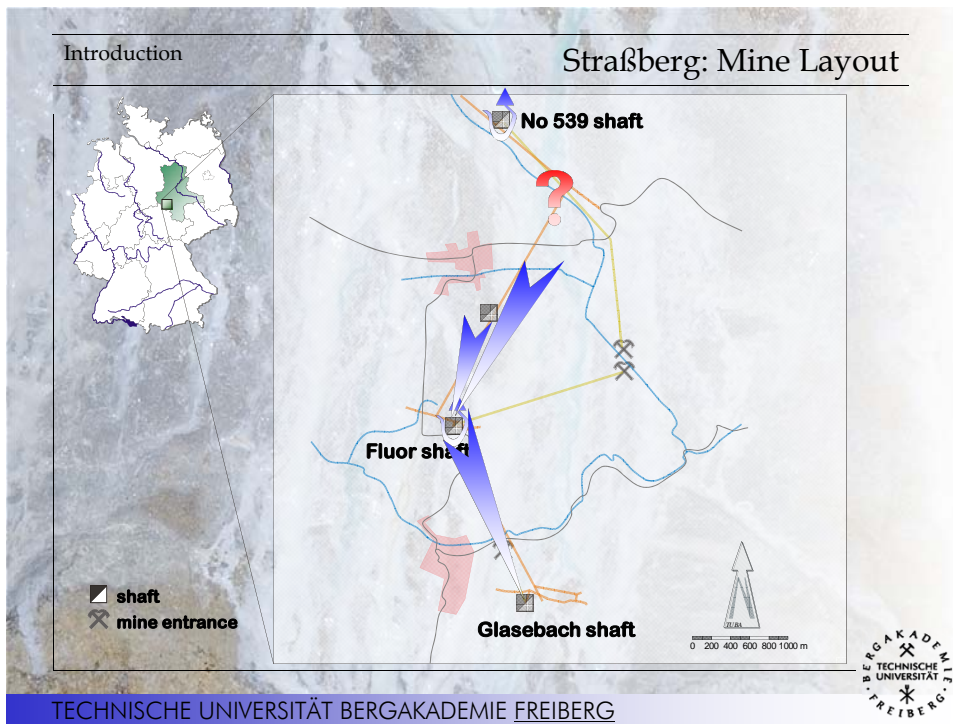
Location



- Straßberg/Harz Mountains  
Germany: **3 main shafts**  
Fluorspar  
18<sup>th</sup> century - 1990
- Georgi Unterbau/Tyrol  
Austria: **1 main shaft**  
Fahlore; Baryte  
1887 - 1990

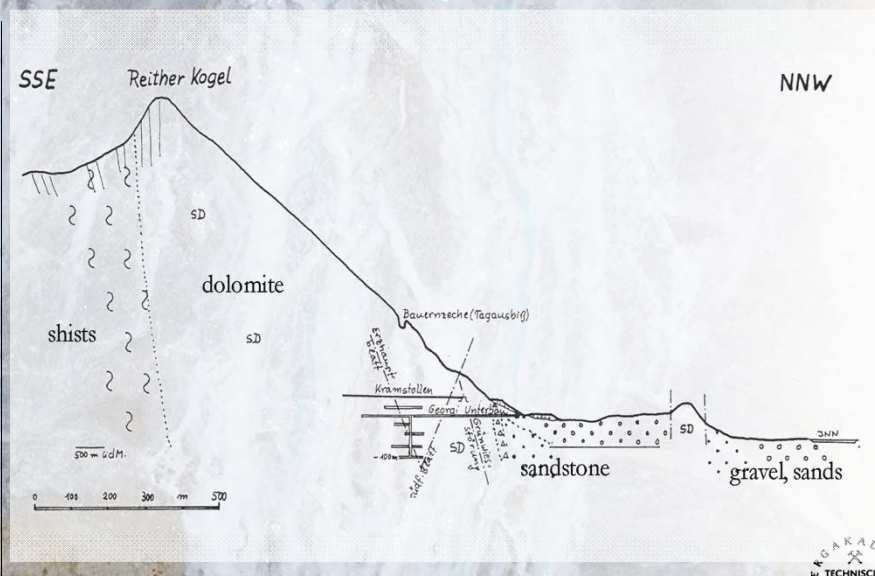


TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG



Introduction

### Georgi Unterbau Blind Shaft

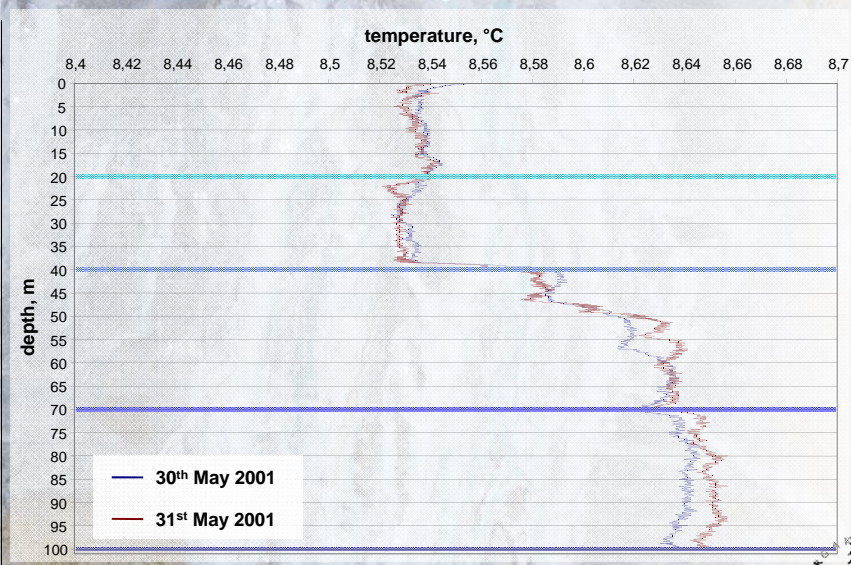


TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG



Introduction

### Georgi Unterbau Blind Shaft



TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG



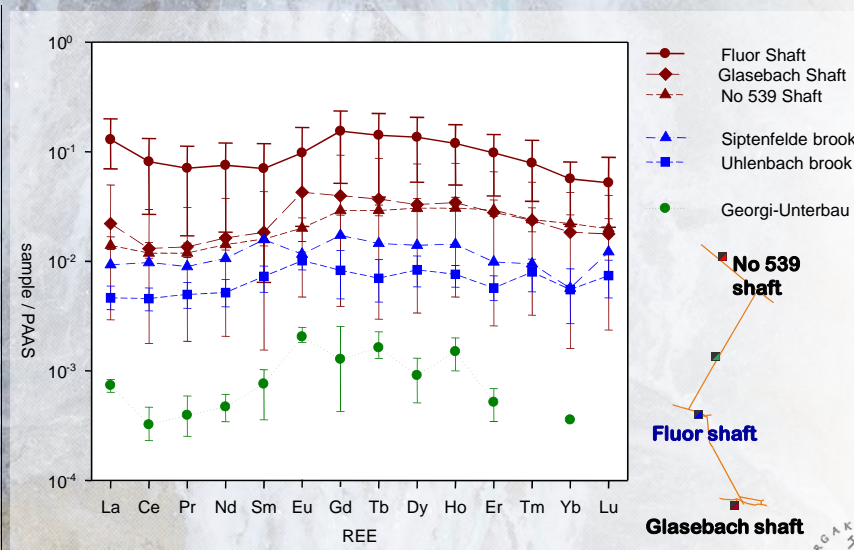
Results Samples taken

Sampling point	number of samples	$\Sigma$ REE $\mu\text{g L}^{-1}$	pH
Fluor Shaft	7	16.96	6.45
Glasebach Shaft	5	3.22	6.84
No 539 Shaft	11	2.64	6.62
Siptenfelde brook	1	1.87	–
Georgi-Unterbau 10 m	3	0.99	7.75
Uhlenbach brook	5	0.93	7.18
Georgi-Unterbau 90 m	3	0.25	7.77
Georgi-Unterbau 30 m	3	0.17	7.65
Georgi-Unterbau 55 m	3	0.15	7.69

TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG

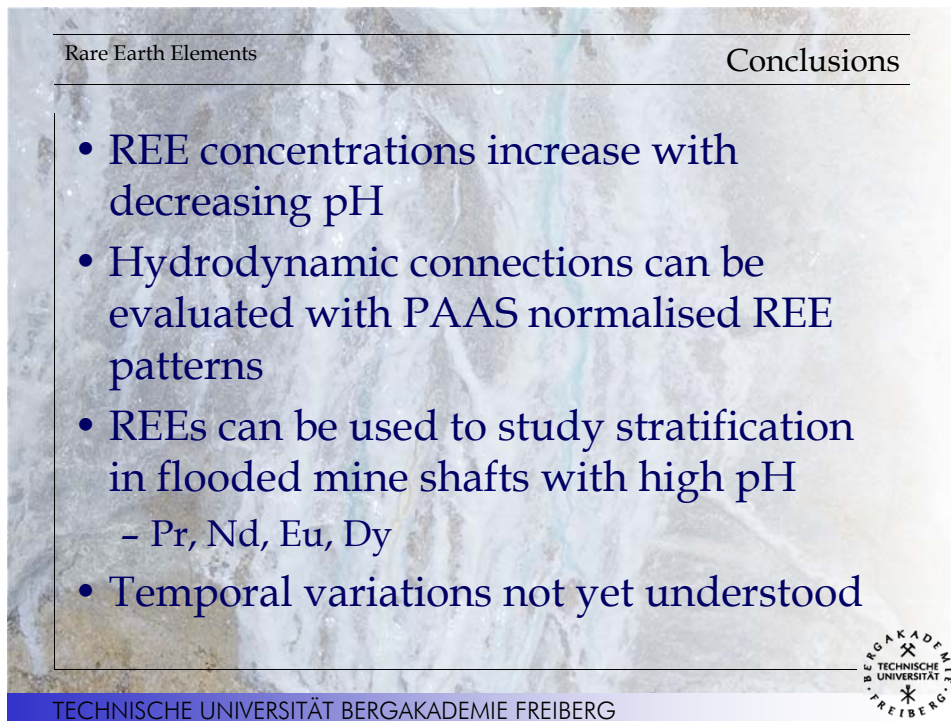
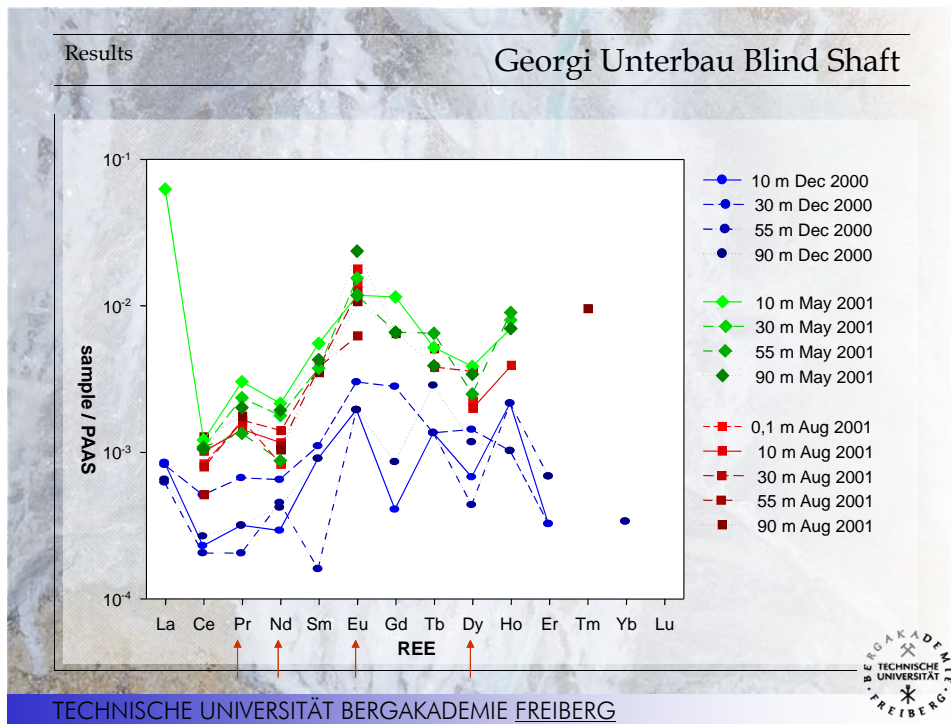


Results Straßberg: Underground and Surface



TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG





Rare Earth Elements

Thanks to everybody!

- TU Bergakademie Freiberg
- BST Mansfeld GmbH, Rottleberode
- GVV - Gesellschaft zur Verwertung und Verwahrung stillgelegter Bergwerke mbH, Sondershausen
- Montanwerke Brixlegg AG
- DFG Graduate School 262
- EU Project PIRAMID (contract no. EVK1-CT-1999-00021)
- You - for coming and listening

TECHNISCHE UNIVERSITÄT BERGAKADEMIE FREIBERG

