Field Trip Report 2016-2017

SEG Student Chapter TU Bergakademie Freiberg

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Institute of Mineralogy
Department of Economic Geology and Petrology
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Field Trip 1

Radioactive Waste Repository Morsleben

*Guide:* Dr. Hartmut Blanke (DBE – German Society for the construction and operation of waste repositories)

*Date:* April 26, 2017

*Participants:* 15 (6 SC members)

*Schedule:*  
Start: 5.30 am  
Stop 1 – Introduction to the underground mine in Morsleben  
Stop 2 – Visit of the mine area  
Stop 3 – Talk in the information building of the mining complex  
End: 6.00 pm

The field trip to the former potash and salt mine Bartensleben, now the radioactive waste repository Morsleben (Saxony-Anhalt, Germany), is a regular field trip of the SEG SC Freiberg. Mining of salt and potash began at the end of the 19th century and ended in 1969. From 1978-1991 and 1994-1998 weak and intermediate radioactive waste was stocked piled in the salt caverns. The waste is stored in about 400-600 meters thick Zechstein (Permian) salt, which was deposited 260 million years ago in an oceanic basin (Germanic Basin). The Germanic Basin was a very large region of sedimentation ranging from the west of England to the east of Poland during the Permian and Triassic. Several important commodities were deposited in this time. For example large economic salt, potash and copper shale occurrences in Germany and Poland. The structure of the Morsleben deposit is very complex due to active salt tectonics. Therefore, work for final closure and commissioning of the radioactive waste repository is not finished yet. Deposition of radioactive waste is an important topic in Germany and the DBE is a possible employer for geology students. Consequently, the annual field trip is a relevant must-do for undergraduate, master and PhD students.

![Figure 1: Participants in the former underground mine Bartensleben.](image-url)
Field Trip 2

Tectonic & structural setting of metamorphic units of the Eastern Erzgebirge

Guide: M. Sc. Peter Hallas (TU Bergakademie Freiberg, Department of Geology, Division of Tectonophysics)

Date: May 6, 2017

Participants: 6 (5 SC members)

Schedule:

Start: 9.30 am
Stop 1 – Holzau: tow-mica paragneiss and migmatites
Stop 2 – Dorf Chemnitz: Augen gneiss
Stop 3 – Dorf Chemnitz: Paragneiss
Stop 4 – Freiberg: Orthogneiss
Stop 5 – Nossen: Phyllite
End: 4.00 pm

This field trip was arranged for the undergraduate and new master students to get a first insight into the complex geology of the metamorphic units of the Erzgebirge and, furthermore, to understand the tectonic environment, the variety and distribution of various Sn-W and polymetallic (Ag-Cu-Zn-Pb) mineralization within this area. Based on the field trip of the last year about the tectonic and structural setting the Western Erzgebirge, this field trip focused on the Eastern part of the Erzgebirge. Investigations and discussions of several outcrops comprising different metamorphic rocks promoted the understanding of the evolution and structural development of the orogeny. The link between Variscan metamorphism, late Variscan granitic magmatism and their associated ore deposits was discussed at several locations.

Figure 2: Field trip leader Peter Hallas explaining and pointing out tectonic characteristics of the Erzgebirge at a roadside outcrop.
Field Trip 3

Lignite Mine Jänschwalde & Muskau Fold Belt

Guides: Dipl.-Geol. Ralf Kühner (Lausitz Energie AG), Hannes Lippke
Date: May 19, 2017
Participants: 10 (4 SC members)
Schedule:

- Start: 7.00 am
- Stop 1 – Open Pit Lignite Mine Jänschwalde
- Stop 2 – Muskau Fold Belt
- Stop 3 – Observation Tower at Open Pit Lignite Mine Welzow Süd
- Stop 4 – Visit of rehabilitated post mining landscape at Bärwald Lake
- End: 6.00 pm

This field trip was organized to get a better understanding of the quaternary geology and its impact on lignite mining in southern Brandenburg. In the Lausitz district 33% of German lignite is produced mainly to run three power plants within the area, which cover a large amount of the East German energy demand. Lignite mining and associated industries are the most important employer in the region. Mining started in the late 18th century in small scaled underground mines. Since the late 19th century the lignite was only extracted from open pit mines. From 17 active mines in 1990 four are still active today, including the visited mines Jänschwalde and Welzow Süd. Jänschwalde’s chief geologist Ralf Kühner gave an overview about the mine structure as well as the geology (including covering glacial material) and various geotechnical and economical aspects. The participants visited the Muskau fold belt during the second part of the field trip, where glacial movement deformed quaternary and tertiary sediments. The fold belt is the biggest example of glaciogenic tectonics in Europe. On the way back to Freiberg the participants stopped at the Lake Bärwald near the Boxberg power plant. Most of the lakes in that area are relicts of the mining activity. Nowadays, they are used as a foundation for developing tourism in that area.

Figure 3: Participating students in front of a bucket chain excavator (left) and in front of quaternary sediments at Jänschwalde (right). The conveyor bridge removes overburden (Jänschwalde, below).
Field Trip 4

Heavy Mineral Prospection in the Zellwald, Saxony

Guide: M. Sc. Tobias Petermann (TU Bergakademie Freiberg, Department of Mineralogy, Division of Economic Geology)

Date: June 10 and August 31, 2017

Participants: 10 (8 SC members)

Schedule:

Start: 9:00 am
Stop 1 – Pitzschebach, Zellwald
End: 15.00 pm

The one-day field trip took place in the Zellwald (Zell forest) about 20 km north of Freiberg. In a geological context, the Zellwald is located at the northern limb of the Erzgebirge and cuts the eastern border of the Saxonian granulite massif. Several creeks occur in the area. Gold mineralization is not typical for the Erzgebirge, but small gold grains do accumulate in creeks throughout Saxony and especially during the first mining rush in the 11th century gold was panned at several places in the Erzgebirge. Our target was the Pitzschebach creek, which is the major stream in the morphological depression of the Zellwald. First Tobias Petermann, an experienced gold panner, gave the students an introduction in panning techniques and the theory of placer formation. Based on the information the group sampled different spots considering indicators in the stream and the sediments. After finding a good location for further prospection activities, deep holes were dug and dams created. The heavy minerals found were rutile, hematite, magnetite, goethite, chromite, gold, zircons, garnets and sapphires. The participants recultivated the area after the prospection. This field trip provided a good opportunity for students to broaden their horizons as they learned how to separate heavy minerals in the field. This is an old but still important skill for exploration geologists.

Figure 4: Participants hoping for the big catch (left). The big catch (right).
Field Trip Report 2016-2017
SEG Student Chapter Freiberg

Field Trip 5
Bicycle Tour around Freiberg

Guide: B. Sc. Jan Schulz-Isenbeck & Hannes Lippke
Date: June 24, 2017
Participants: 4 (4 SC Members)
Schedule:

Start: 9.30 am
Stop 1 – Wasserturmstaße (Freiberg): place of first Ag-ore discovery in 1168
Stop 2 – Alte Elisabeth (Freiberg): historic ventilation shaft
Stop 3 – David Schacht and Erzwäsche (Freiberg): historic drawing shaft and processing plant
Stop 4 – Reiche Zeche: research underground mine of the TU Bergakademie Freiberg
Stop 5 – Davidsschacht dump (Freiberg): determining polymetallic Pb-Zn-Ag minerals of the “kb-Formation” (galena, sphalerite, pyrite, arsenopyrite; gangue: quartz)
Stop 6 – Ludwigsschacht dump (Freiberg): determining of polymetallic Pb-Zn-Ag minerals of the “fba-Formation” (galena, sphalerite, pyrite; gangue: fluorite, barite, quartz)
Stop 7 – Alter und Tiefer Fürstenstolln (Halsbrücke): historic adits and water management of the Freiberg district
Stop 8 – St. Lorenz Gegentrum (dump, Halsbrücke): ore and gangue minerals (barite, fluorite)
Stop 9 – Herders Ruhe (Freiberg): Monument of August von Herder, one of the most important miners of Freiberg
End: 4.30 pm

This field trip has become a regular event for all undergraduate students and new graduate economic geology students in Freiberg. The aim of this field trip is to inform the students about the geology and mineralogy of the polymetallic Pb-Zn-Ag vein deposit as well as the historical mining activities in the area of Freiberg. The more than 800 years of mining in the Erzgebirge is very important for the historical development of Freiberg and our university. Old mining remains such as shafts, dumps and processing plants are visible at many locations in and near the town. Some of these sites were the targets of our field trip. For example, the dumps are an easy way to get an overview of the ore and gangue paragenesis as well as local distribution of the different polymetallic Pb-Zn-Ag vein systems.

Figure 4: Participants in front of the adit “Fürstenstolln” and analysing ore and gangue minerals at the Ludwigsschacht dump.
Upcoming Field Trip 6

Sn-W-Li greisen of Altenberg and Zinnwald-Cinovec

Guide: Dr. Thomas Dittrich (Deutsche Lithium GmbH), M. Sc. Matthias Bauer (TU Bergakademie Freiberg, Department of Mineralogy, Division of Economic Geology)

Date: October 21, 2017

Participants: approx. 17

Schedule:

- Start: 7.30 am
- Stop 1 – Visitors mine “Vereinigt Zwitterfeld zu Zinnwald”
- Stop 2 – Drilling sites of the exploration project
- Stop 3 – Core Yard of the exploration project
- Stop 4 – Altenberg Pinge (collapsed underground mine)
- Stop 5 – Altenberg historical Sn processing facility and mining museum
- End: 5.00 pm

This field trip will take place in the first week of the new winter semester and is supposed to be a “welcome field trip” for the new graduate economic geology students. Next to getting to know each other, the participants get a chance to visit the former Sn-W-(Li) mine in Zinnwald, which closed in 1990. In Zinnwald the participants have a unique chance to see and walk through an endo- and exo-contacts of a greisen body within the granite. Furthermore, the students get an exclusive look on greisen alteration and typical greisen minerals (e.g. cassiterite, wolframite, zinnwaldite and pycnite). The greisen body is located on the German-Czech border and is currently explored for lithium and tin by Deutsche Lithium GmbH on the German side and by European Metals on the Czech side. Former SEG Student Chapter Freiberg president Dr. Thomas Dittrich (Deutsche Lithium GmbH) will give the students detailed information about the current project while guiding them around the active drilling site and the core yard. Afterwards, the participants have the chance to see the historic processing plants for tin-extraction in the local mining museum in Altenberg and learn in detail about the regional geology of the Sn-W-Li-district Zinnwald/Altenberg.