

# Sparkling Geomagnetic Field: A platform for involving schools in active geophysical research

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## 1. What is Sparkling Science?

**The Program:**  
 The Sparkling Science Programm is an initiative of the Austrian Ministry for Science and Research (BMWFV).  
 Research projects are carried out together with schools. The students are actively involved in the research process and through the experience gain insight into the world of science.

**Our project...**  
 ... looks into the nature of geomagnetic activity. There is a maximum in solar activity expected in the year 2014, which will likely lead to a greater number of coronal mass ejections as a result, and we hope to study the temporal and spatial effects on the Earth's magnetic field. Three geomagnetic stations with the best available instrumentation were set up.

## 2. The Station Network

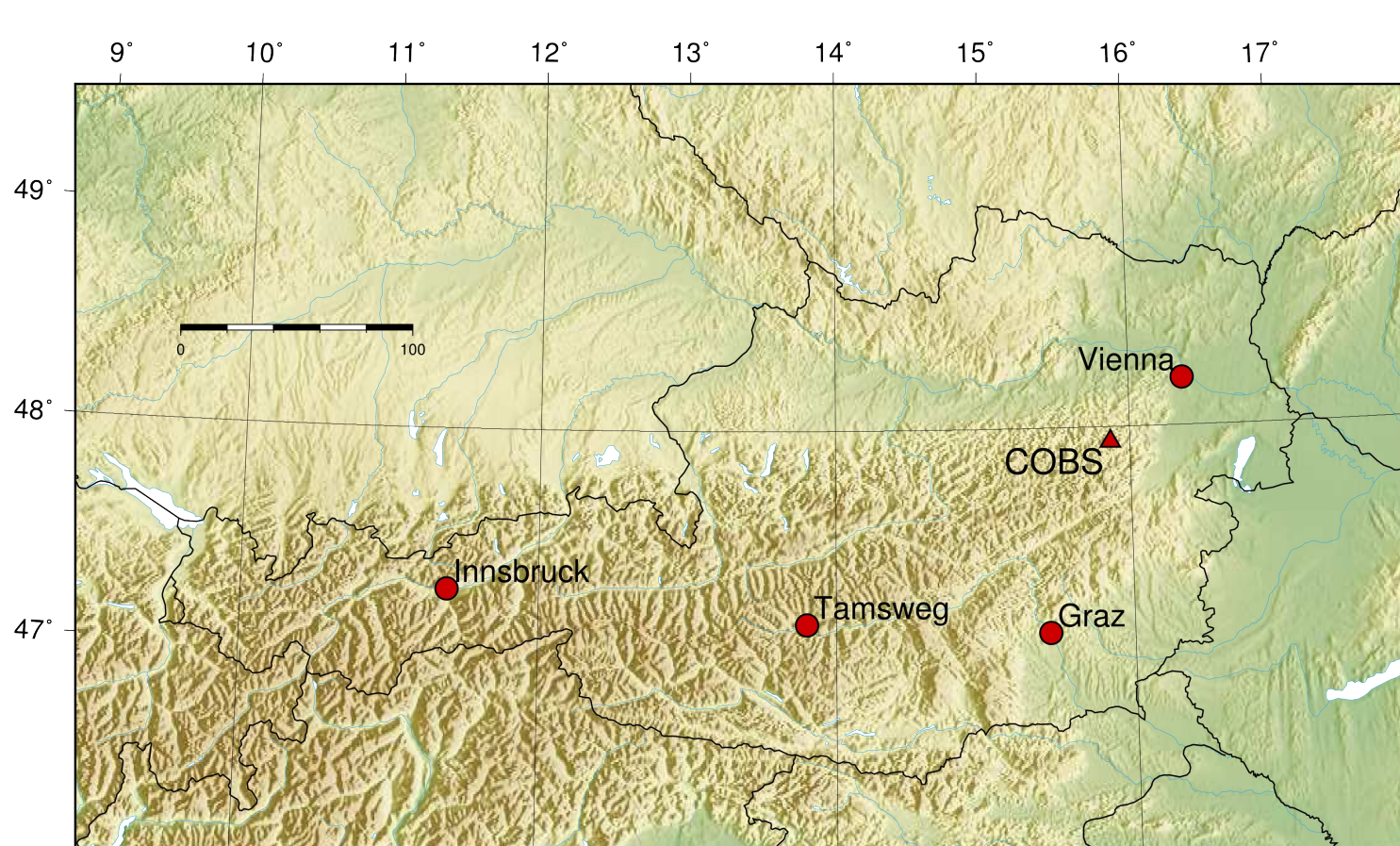


Fig. 1: The station network.

- The Stations:**
- **Innsbruck** (Gymnasium Sillgasse)
  - **Tamsweg** (Gymnasium Tamsweg)
  - **Graz** (Akademisches Gymnasium Graz)
  - **Conrad Observatory as reference station**

Geomagnetic station:



Fig. 2: Two of the stations use a scalar magnetometer (front) for measuring the total field strength and a variometer (behind), which determines the three-component variations in magnetic field orientation.



Fig. 3: Students in Innsbruck show the Minister for Science and Research how their own geomagnetic station works.



Fig. 4: A Caesium-magnetometer in Graz. The locations for each of the stations were suggested and evaluated by students. This station is in a private cellar. The station in Tamsweg was set up in the school, while the station in Innsbruck was formerly in a tunnel on the city outskirts.

## 3. Student Feedback from Graz

### General Project Feedback

"The feedback of all participants was mostly positive: In the beginning some expected to get data for analysis earlier. The project was quite a challenge because we needed to be creative and had to decide things on our own."



Fig. 5: Magnetic measurements of an area near Graz for possible station setup.



Fig. 6: Students from Graz and researchers present a poster at a DGG conference.

"This project gave us an opportunity to get an insight into scientific methods and the work of the ZAMG. We got more interested in science in general. We also got experience in teamwork. The project may also have influenced our future regarding our career choices."

### Excursions

"The excursions were seen as interesting and relaxed by all participants; for example everyone took part in the process of finding a suitable place for the instruments. In several excursions we were informed about the importance of the geomagnetic field and how it is affected by solar winds."

Fig. 7: (Right) Geologist Ingomar Fritz (Universalmuseum Joanneum) explains the geological history of the Styrian volcanic zone.



Fig. 9: (Below) Franz Pusterwallner (Montanuniversität Leoben) demonstrates use of the drill machine to a student from Graz. The machine is used to take cylindrical samples from rock.

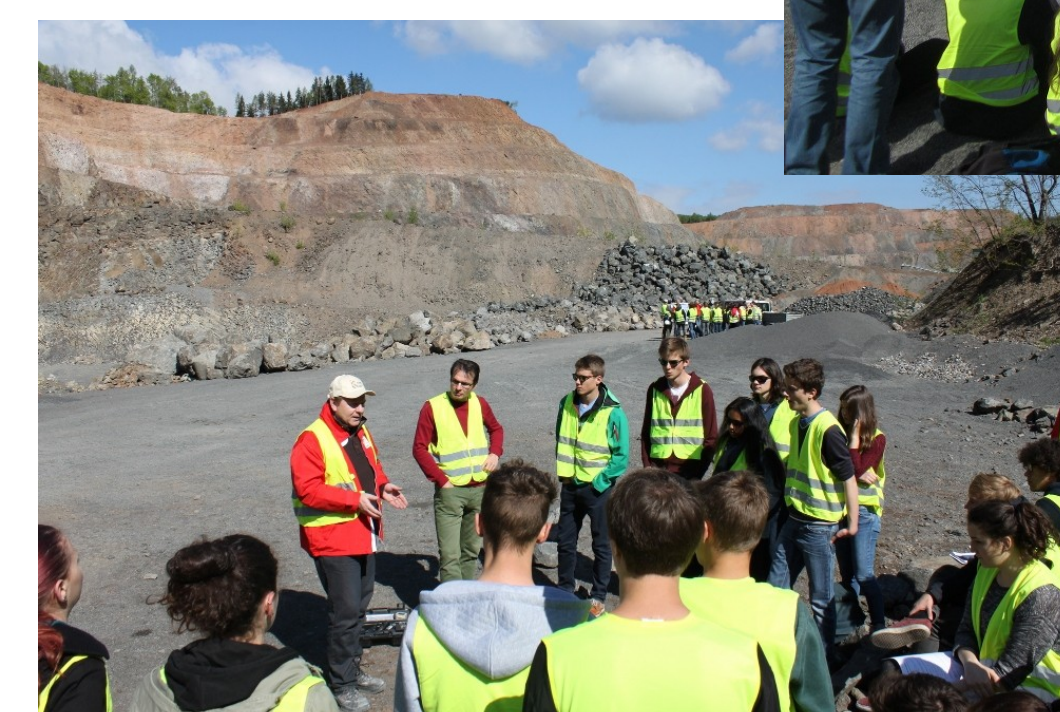


Fig. 8: (Left) Roman Leonhardt (ZAMG) showing students how to measure paleomagnetic fields of geological samples.



"Everyone was excited about the excursion to the quarry in Klöch where we learned how to take rock samples and about volcanic activity in the past in the south of Styria. Sadly we did not have enough time to go to a Buschenschank."

- Kajetan and Ruth, 7th year high school, Akademisches Gymnasium Graz

## 4. Student Feedback from Tamsweg



Fig. 10: Project Introduction, Tamsweg.



Fig. 11: Station setup, Tamsweg.

"We got a very good overview of solar storms and as the name of the project says also about the geomagnetic field of the earth. Not only did we learn something about the theory of geomagnetic phenomena, we also engaged in some practical work. For instance we tried to find an appropriate place for our measurement station, and having found it we set up the instruments. So we got the chance to learn more about scientific methods and to work in a team."

"As a result of our experiment we learned how the solar storms have an impact on the geomagnetic field of the Earth."



Fig. 12: Miljana Petrovic (Tamsweg) learning to drill for geological samples on an excursion into Styrian volcanic land.

"It was a great experience for us to have the opportunity to learn something about applied physics. At school science subjects tend to be a bit theoretical. This project provided us extraordinary insight into what practical research is about. Among other things we could study the volcanic rocks in the quarry of Klöch, which improved our perception of volcanology."

"Our trip to Klöch on April 11th was pretty interesting. We had to split into three groups and each had to go to a station. There we learned something about the history of the volcano in Klöch, how to measure the paleomagnetic field and how to drill into volcanic rocks."

"All in all it was very informative and everyone was very professional. We are sure, if we had the opportunity to do something like that again, we would go for it."

- Rachele und Miljana, 8th (final) year high school, Bundesgymnasium Tamsweg

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