



ESPAYS D'APRENENTATGE: AGENTS DE CANVI A LA UNIVERSITAT

The Barcelona SGA-SEG Student Chapter

New fronts for international cooperation in teaching Geology and student exchanges

Farré-de-Pablo, Júlia

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès, s/n, 08028, Barcelona, Espanya

jfarredepablo@gmail.com

Pujol-Solà, Núria

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès, s/n, 08028, Barcelona, Espanya

npujolsola@ub.edu

Melgarejo, Joan Carles

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès, s/n, 08028, Barcelona, Espanya

joan.carles.melgarejo.draper@ub.edu

Torró, Lisard

Pontificia Universidad Católica del Perú

Especialidad Ingeniería Geológica

Av. Universitaria 1809, San Miguel Lima 32, Perú

lisardtorro@hotmail.com

Campeny, Marc

Museu de Ciències Naturals de Barcelona

Parc de la Ciutadella, s/n, 08003, Barcelona, Espanya

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès, s/n, 08028, Barcelona, Espanya

mcampencycr@gmail.com

Tauler, Esperança

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès, s/n, 08028, Barcelona, Espanya

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esperancatauler@ub.edu

Villanova-de-Benavent, Cristina

University of Brighton
School of Environment and Technology
Cockroft Building, Lewes Road, Brighton BN4 2GJ, United Kingdom

cvillanovadb@gmail.com

Castillo-Oliver, Montgarri

Macquarie University
ARC Centre of Excellence for Core to Crust Fluid Systems and GEMOC, Department of
Earth and Planetary Sciences
NSW 2019, Australia

montgarri.castillo-oliver@mq.edu.au

Sanz-Mont, Daniel

Universitat de Barcelona
Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la
Terra
C./ Martí i Franquès s/n, 08028 Barcelona, Spain

danielsanzmont@gmail.com

Vilanova-Pagès, Oriol

Universitat de Barcelona
Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la
Terra
C./ Martí i Franquès s/n, 08028 Barcelona, Spain

oriolvilanovapages@gmail.com

Casas-Sagristà, Mercè

Universitat de Barcelona
Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la
Terra
C./ Martí i Franquès s/n, 08028 Barcelona, Spain

mcasass1996@gmail.com

Lluch, Joana

Universitat de Barcelona
Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la
Terra
C./ Martí i Franquès s/n, 08028 Barcelona, Spain

joanalluch@hotmail.com

Cazorla-Martínez, Malena

Universitat de Barcelona
Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la
Terra



ESPAIS D'APRENTATGE: AGENTS DE CANVI A LA UNIVERSITAT

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

malecama.97@gmail.com

Poll-Barrera, Laura

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

laurapollbarrera@gmail.com

Andreazini, Aleu

Universidad de Granada

Centro de Instrumentación Científica

Campus Universitario de Fuentenueva, Paseo Prof. Juan Ossorio, s/n, 18003, Granada, Spain

aleuan@gmail.com

Pastor, Míriam

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

mpaol22@gmail.com

Amores-Casals, Sandra

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

sandra.amores.casals@gmail.com

Carrazana, Ariana

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

ariana.carrazana@ub.edu

Agut-Botines, Eva

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

evaagut@gmail.com

Xu, Jingyao

Universitat de Barcelona



ESPAYS D'APRENTATGE: AGENTS DE CANVI A LA UNIVERSITAT

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

moiraxj@hotmail.com

Proenza, Joaquín A.

Universitat de Barcelona

Departament de Mineralogia, Petrologia i Geologia Aplicada, Facultat de Ciències de la Terra

C./ Martí i Franquès s/n, 08028 Barcelona, Spain

japroenza@ub.edu

1. RESUM:

The Barcelona SGA-SEG Student Chapter is a student organization created and organized by students from the Faculty of Earth Science (University of Barcelona; UB). It offers to students interested in Mineralogy, Mineral Deposits and Economic Geology the opportunity to participate in research projects, student exchanges, seminars and courses in an international level. The students develop capacity of self-organization, team-work and public social skills. Recent activities are international exchange of student groups and participation in the project to update and replicate the mineral collection of the UB.

2. ABSTRACT:

The Barcelona SGA-SEG Student Chapter is a student organization created and organized by students from the Faculty of Earth Science (University of Barcelona; UB). It offers to students interested in Mineralogy, Mineral Deposits and Economic Geology the opportunity to participate in research projects, student exchanges, seminars and courses in an international level. The students develop capacity of self-organization, team-work and public social skills. Recent activities are international exchange of student groups and participation in the project to update and replicate the mineral collection of the UB.

3. PARAULES CLAU: 4-6

student association, international organizations, research, Ore Deposits, Mineralogy

4. KEYWORDS: 4-6

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5. DESENVOLUPAMENT:

Introduction

The Barcelona SGA-SEG Student Chapter (<http://www.bcn-sga-seg.cat/index.php>) is a student association based at the Faculty of Earth Sciences (formerly Faculty of Geology) of the University of Barcelona (UB; Melgarejo et al., 2014). The association is formed by undergraduate, Master and PhD students, specialized in Mineralogy, Mineral Deposits and Economic Geology, and is supported by two international societies: the SGA (Society for Geology Applied to Mineral Deposits: <https://e-sga.org>) and the SEG (Society of Economic Geologists: <http://www.segweb.org/>). Other Student Chapters from these two societies are spread worldwide. All of them submit activity proposals to annual calls in order to get fund from these organizations. The proposed activities may include support to scientific research, courses, organization of workshops, field trips, invited speakers talks and seminars. The granted amount largely depends on the degree of compliance of such activities, which must be justified every year. Therefore, by being a member of a Student Chapter, the students learn to self-organize their time beyond regular academic activities, prepare projects, organize scientific events and participate in research activities. Furthermore, the activities within the Student Chapter allow the students to establish international networks that might help them enter the professional world.

The Barcelona SGA-SEG Student Chapter was founded by a group of PhD and master students from the University of Barcelona in August 2012, and nowadays includes 25 student members at undergraduate, master and PhD levels. The first activities developed by our Student Chapter during the 2012-2015 period included mostly courses, workshops, seminars and research on Ore Deposits, which were carried out in collaboration with senior members and university lecturers. The activities were also attended by lecturers, researchers, professors and students from other countries and universities. In the recent period (2015 to present), the Student Chapter has increased its international participation in international cooperation activities, including teaching and research. Some of these new activities are the participation in the project of cloning the Mineralogy collections of the UB (see Pujol-Solà et al., this volume, for detailed information), international exchanges between student groups, and the invitation of professionals, lecturers, researchers, and professors from other countries and universities.

The aim of the present contribution is to detail the new activities developed in the last



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years by the Barcelona SGA-SEG Student Chapter. By these means, we want to show the possibilities that these student organizations may offer for the integration of students into research and teaching.

Results: activities carried out in the last years

Participation in project of the mineral collections of the University of Barcelona

The Barcelona SGA-SEG Student Chapter participates in a project promoted by the University of Barcelona which aims to improve and replicate the Mineralogy teaching collections from the Faculty of Earth Sciences. The replicated collections will be sent to universities as teaching material. Samples are carefully selected according to didactic criteria and to the necessities of modern mining industry. This is a huge project involving several universities worldwide which collaborate by contributing with samples. Further details are explained by Pujol-Solà et al. (2018) in this same issue.

A large amount of the samples that will be incorporated in the new collections have been collected during field trips organized by the Faculty of Earth Sciences of the University of Barcelona. Student members from our Student Chapter have been actively and voluntarily participating in these campaigns. The sampled localities were selected according to their potential to provide representative and high-quality teaching material. The students used their knowledge from Mineralogy lessons and from other field trips during the university studies to help find the most appropriate samples. By these means, the participating students strongly consolidate their knowledge about mineral properties and their identification in the field, which is one of the most important abilities of a geologist. Moreover, the different minerals to be sampled occur in many different types of geological settings and environments. Therefore, the field trips are also a good opportunity to improve their skills and increase their knowledge in other subjects covered during the bachelor's degree: geological mapping, ore deposits models, tectonics, stratigraphy, petrography and petrology (igneous, metamorphic and sedimentary).

During the year 2017, our student members have joined many collective field trips to several localities and targets in Catalonia and abroad. Some of them are listed and described below:

- Two-day field trip to several localities along the Catalan Pyrenees in which a total of 2



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university lecturers and 5 students participated to collect samples (Figure 1). The visited areas included: the Surroca outcrop, consisting of an altered ophite; the Malpàs diabase quarry, hosted in a low-grade metamorphosed ophite rock; the Eureka Mine, near the village of Castell-Estaó, which contains mineralization of uranium mineralizations; the Cierco Mine dumps, where it is possible to find low-temperature Pb-Zn-Ba veins hosted by skarn deposits; and finally, the Victoria Mine and related medium-grade metapelitic outcrops (Bossòst type) near Arres de Sus.

- One-day field trip to the old mining area of Bellmunt del Priorat – El Molar, one of the most important mining areas of Catalonia. In this case, the participants were 3 professors and 4 students. The field trip included visits to the Regia and Regia Antigua mines near Bellmunt del Priorat which are low temperature Pb-Zn-Ba-Cu veins with carbonate gangue; la Serrana Mine, near El Molar, which is a good example of a Mn sedex deposit, and the Linda Mariquita Mine, consisting of a Cu-Ba-Ag low temperature vein. Finally, some evaporitic outcrops with diagenetic gypsum roses were sampled.

Four-day field trip across Murcia, Andalucia and Valencia. During this field trip, 2 professors and 7 students were able to visit Jumilla (in Murcia), Níjar, Huércal-Overa, Herrerías, Carboneras and Sierra Almagrera (in Almeria), and Chella (in Valencia) to collect samples characteristic of each locality. La Celia Mines, in Jumilla, are located in an interesting lamproite affected by late hydrothermal processes. In Níjar, metapelitic xenoliths in calc-alkaline andesite rock were visited, whereas in Sierra Almagrera several ancient mine dumps were sampled (Figure 2). Finally, it was possible to sample red gypsum of Keuper facies outcrops with ferruginous quartz crystals of the variety *jacinto de Compostela* in Chella.

Additionally, students carried out personal field trips in their free time to collect further samples. Some of them collected metamorphic minerals in the Mirabel Castle, in Extremadura, with large euhedral poikiloblastic chiastolite andalusite. Another student supplied minerals from granitic pegmatites from the Austrian Alps.

More than 3000 samples, with a total weight exceeding 600 kg, have been collected so far. This amount can already supply mineral species for all the universities participating in the project and may cover future demands from other universities. In addition, some of the samples can be used to improve and renew the collection used for practical lessons of



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different subjects at the University of Barcelona (Mineralogy, Igneous Petrology, Metamorphic Petrology, and Sedimentary Petrology).

Nowadays, a total of 10 undergraduated, master and PhD students are involved in this activity. However, as the project develops, the interest among students is increasing and more of them want to collaborate in order to use this opportunity to complement their studies. Besides joining the field trips and sampling material for the collections, the students also organize the collected samples by labelling and selecting the specimens for each individual collection and prepare them for shipping. Furthermore, they help in the preparation of guidebooks to be used as supporting material to the mineral collection during hands-on lectures, and in the translation of these guidebooks from Catalan to the language of the receiving universities (*e.g.*: Spanish, English, French, Portuguese). All these tasks are developed in collaboration with several museums of Mineralogy in Catalonia and hence, the students are instructed on museum labors such as cataloguing and management of museum samples.

Organization of international workshops

This is the main activity organized by the Barcelona SGA-SEG Student Chapter. Every year, our Student Chapter organizes a workshop on a topic that complements the regular teaching of the Geology degree at the University of Barcelona. The topics are selected according to the scientific relevance at the time. In the past two years, the workshops were focused in skarn deposits and platinum group elements mineralizations in chromite deposits. The workshops are completely organized by the students. They usually last two days. Generally, the first day consists of an introductory class related to the workshop topic, given by a specialist on the topic (Figure 3). The class is usually divided into a theoretical and a practical part, using regular teaching material existing at the Faculty. The aim of the introductory class is to provide a good basis on the workshop topic to all the students. This is important because the students attending the workshop present different levels of knowledge on the subject (they are undergraduate, master and PhD students from different fields). The second day consists of several lectures given by invited international specialists (Figure 4). Finally, the workshop is complemented with a field trip to a geological locality which is representative for the workshop topic (Figure 5).

International exchange between student groups

The SGA and SEG promote the international exchange of student groups and their



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participation in activities organized by Student Chapters from other countries. These activities include workshops, courses and field trips to mineral deposits. For example, seven students of the Barcelona SGA-SEG Student Chapter were granted to attend a workshop and a field trip organized by the Siberian SGA Student Chapter in Novosibirsk in 2016 (Figure 6), and five more students visited the Co-Ni-PGE ophiolite district in Bou Azzer (Morocco) in 2017, in collaboration with the Moroccan SGA Student Chapter. In return, seven students from the Siberian SGA Student Chapter and seven from the Prague SGA Student Chapter attended a one-week field trip organized by the Barcelona SGA-SEG Student Chapter in September 2017, in which different styles of mineral deposits around Catalonia were visited (Figure 7). In addition, the annual workshops organized by our Student Chapter are an occasion in which students from other Student Chapters around the world can visit us. During the last workshop, in 2017, five students from Casablanca (Morocco) and three from the Thessaloniki (Greece) SEG Student Chapters attended both the course and the conferences. The visits were organized by the students themselves, were assessed by the professors and had the support from local mining companies.

Development of research “micro-projects”

Student members from the Barcelona SGA-SEG Student Chapter are able to develop research “micro-projects” during their studies. The projects are funded by the SGA or SEG and partially by the Mineral Resources group of the University of Barcelona and other institutions. By these means, the students have the opportunity to participate from the beginning, and often for the first time, in a research project. They are able to use analytical techniques and interpret the resulting data by themselves, improving their capacities and gaining experience. The results have been published in Science Citation Index (SCI) journals and presented as communications in international conferences and meetings. When possible, the students involved in the research attended these congresses.

Organization of regular seminars and talks

As part of the annual activities, the Barcelona SGA-SEG Student Chapter organized seminars in which professionals and professors from universities and companies from other countries were invited to give talks and seminars related to their field of work. These activities offer our members the opportunity to complement and improve the teaching content covered at the Faculty of Earth Sciences at the University of Barcelona.



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In these seminars, student members were also invited to give some talks about a geological topic they might find interesting, about some research project or collaboration they had been developing or even about their experiences during field trips (Figure 8). This is used as a tool for students to disclose their work and to enhance their presentation and communication skills.

Formational courses in professional software tools

Last year our Student Chapter organized, in collaboration with the SEG, a course on the Leapfrog software (Figure 9; *Leapfrog Geo, 3D modelling software developed by Seequent, www.leapfrog3D.com*). This software is one of the most used internationally by mining companies to elaborate 3D models of geological resources. In fact, mining companies encourage students from universities to learn how to use this kind of tools. However, the software can be used for a wide variety of geological fields: oil and water reservoirs, environmental care, residue management, geotechnics, ore deposits, etc. Therefore, it is a useful tool for any professional working in the industry. The course was given by a trainer from London and it was free of charge for the attendees. The licenses had been lent by the software company Seequent for the students and the Faculty to use.

Visit to museums

The Student Chapter has been collaborating with several Geology museums in Catalonia: the Natural History Museum of Barcelona, the Geology Museum of the Polytechnic University of Catalonia, the Mollfuleda Mineralogical Museum of Arenys de Mar, the museum of the Neolithic mines of Gavà, and the museum of the Bellmunt del Priorat Mines. All these museums offer free visits to members of the Student Chapter. The visits are made in groups and count with the guidance and support of the responsables of the facilities (Figure 10). Some of these museums also offered their facilities to organize conferences and workshops.

Discussion

All the above described activities are organized and managed by the students themselves. They have to contact directly the invited speakers and professionals and also be able to ask for additional funding from new external sources (private companies, foundations, etc.) when the original amount planned for an activity does not cover the expenses. Therefore, their participation in the Student Chapter contributes to develop



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their public relationship abilities, as well to improve their capacity to adapt to changing situations. They also learn self-organization and to work under pressure.

In general, the student members show motivation and are satisfied with the opportunities that arise from the projects. Unfortunately, the limited resources of our Student Chapter makes impossible for all the student members to take advantage of all the opportunities. In that sense we prioritize the participation of those members who prove more constancy and interest, regular attendance to the activities and even the academic qualifications. This last criterion is important because the participation in the Student Chapter should not be an excuse to disregard the academic responsibilities and obligations of the students.

Considering the previously mentioned activities in which the Student Chapter takes part, several opportunities for students, and even for the professors, are evident. These opportunities are, for instance:

- a) The consolidation of the student's knowledge in a wide range of geological fields, in particular Mineralogy, Crystallography, Geological mapping, Stratigraphy, Structural Geology, Geochemistry, Petrology, and Ore Deposits. In addition, to have access to some professional tools which are necessary for the modern demands of the mining industry.
- b) To work as a team with projects that count with international cooperation.
- c) To be introduced in managing mineral collections in Geology museums, and direct collaboration with these institutions.
- d) The possibility to collaborate with many different institutions and individuals.
- e) The possibility to know other geological and social realities through the international exchange between students worldwide.
- f) For the students, to get to know the mineral collections of the University of Barcelona from another point of view, and for the professors, to acquire new perspectives about what material is best to teach.
- g) The practical development of humanistic values.

Concluding remarks

The success of the aforementioned activities since the foundation of the Barcelona SGA-SEG Student Chapter demonstrates that the students are able to participate in all the stages of quality research projects and that they are keen to be involved in the



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improvement of the teaching material of their institutions. The explained activities facilitate the students to be strongly prepared to develop their research in a professional environment and, with the worldwide networking, help them unfold an international agenda.

Finally, the participation of the students in international cooperation activities favors the creation of solidarity bonds with other students and professionals from all over the world, and stimulates the friendship and welfare between international geologists.



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5.1. FIGURA O IMATGE 1



Figure 1. Sample collected during the field trip across the Catalan Pyrenees.

5.2. FIGURA O IMATGE 2



Figure 2. Students collecting samples in the ancient mine dumps of Sierra Almagrera (Almeria) during the four-day field trip.



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5.3. FIGURA O IMATGE 3



Figure 3. Students attending the introductory lesson of the workshop organized by the Barcelona SGA-SEG Student Chapter in November 2017.

5.4. FIGURA O IMATGE 4



Figure 4. Lectures during the second day of the workshop in 2017, organized by the Barcelona SGA-SEG Student Chapter held at the Museu Blau (Natural History Museum of Barcelona).



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5.5. FIGURA O IMATGE 5



Figure 5. Students in Morocco, as part of the field trip organized in occasion of a workshop, in collaboration with the Morocco SGA Student Chapter.

5.6. FIGURA O IMATGE 6



Figure 6. Student members from the Barcelona SGA-SEG Student Chapter together with students from the Siberian SGA Student Chapter during a field trip in Siberia in 2016.



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5.7. FIGURA O IMATGE 7



Figure 7. Students from the Siberian SGA Student Chapter, Prague SGA Student Chapter and Barcelona SGA-SEG Student Chapter in Bellmunt del Priorat during a field trip across Catalonia in September 2017.

5.8. FIGURA O IMATGE 8



Figure 8. Ungraduated student giving a talk about his research during a seminar.



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5.9. FIGURA O IMATGE 9



Figure 9. Leapfrog course given at the Faculty of Earth Sciences of the University of Barcelona.

5.10. FIGURA O IMATGE 10



Figure 10. Visit of the Barcelona SGA-SEG Student Chapter members to Museu Blau of the Natural Science Museum in Barcelona during the 2017 workshop in 2017, accompanied by the curator of Mineralogy of the museum, Dr Marc Campeny.



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