Looking back to the roots of INHIGEO: The inaugural and 50th anniversary meetings held in Yerevan in 1967 and 2017

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The International Commission on the History of Geological Sciences (INHIGEO) celebrated its 50th anniversary in 2017 in Yerevan (Armenia) with a focus on its foundation in 1967. Since 1967 a meeting has been organised, with few exceptions, yearly and the 50th anniversary was located in the same venue as the first. The following article focuses on these meetings of the Commission from the perspective of the celebrations and field trips in 2017. From the very beginning of INHIGEO, field trips have played a key role in meetings. We will focus on this practice and how it was implemented in 2017.

Introduction

The 42nd meeting of the International Commission on the History of Geological Sciences (INHIGEO) took place in 2017 when it returned to its roots in Yerevan, the capital of Armenia. The meeting notably marked the 50th anniversary of INHIGEO's foundation during the International Symposium on the History of Geology in 1967. The venue was aptly the same room as the inaugural one, the Round Hall of National Academy of Sciences of Armenia. This handsome building, in keeping with many of the buildings in the capital and its environs, is of a locally quarried ignimbrite. Headed by Dr Khachatur Meliksetian, Director of Institute of Geological Sciences of the National Academy of Sciences, the organising committee superbly looked after the participants and an excellent interpreting service was provided. On arrival delegates were presented with a comprehensive, lavishly illustrated, volume that included a useful introduction to Armenia and its varied geology, along with fieldtrip guides and abstracts. Also included was a volume entitled "The origin and development of geological thought in Armenia (5th century BC -17th century AD)". In addition, each attendee received a magnificent plaque of coloured local obsidian inscribed with the INHIGEO motif and appropriate wording recognising the 50th anniversary.

The meeting also celebrated the launch of the Geological Society of London Special Publication titled "History of Geoscience: Celebrating 50 Years of INHIGEO" (Mayer *et al.*, 2017), edited by a team of

INHIGEO members and with 39 different contributions. To give added significance to the 50th anniversary, the publication features topics that offer an insight into the development of the Commission as well as into the strengthening progress of the history of this field of science.

As well as acknowledging "50 years of INHIGEO", the meeting themes were the "Development of geological ideas and concepts", "History of geology in Armenia", "Ancient knowledge of stone and metals", "Studies of historic and prehistoric evidences of seismic and volcanic activity" and "General contributions and biographies of famous geologists".

INHIGEO comes into being

In 2017 INHIGEO celebrated its 50th anniversary. Although its establishment was due to a set of factors, much of the credit goes to Vladimir Vladimirovich Tikhomirov (1915-1994), head of the Geological Institute in Moscow and "a brilliant organizer of major scientific projects" (Grigelis & Czarniecki, 2017). He also became an eminent and prominent historian of geosciences and, between 1961 and 1992, he played a leading role in the publication of 52 volumes containing 1050 articles about the history of geosciences in the USSR. Today Tikhomirov is recognised by IUGS and INHIGEO in the "Vladimir V. Tikhomirov History of Geology Award".

Despite being the height of the Cold War, Tikhomirov pursued a goal of establishing an international organisation devoted to the history of geosciences. As early as 1960 a draft for this committee was approved by the USSR Academy of Sciences, the National Committee of Geologists of the USSR and the Soviet National Union of Historians of Science and Technology (Malakhova, 2017). However, at the 21st International Geological Congress (IGC) in Copenhagen, in 1960, Tikhomirov was unsuccessful in bringing about an international body encompassing the history of geology. As Malakhova suggests, Tikhomirov had "learnt a lesson" (Malakhova, 2017) so that in the time before the next IGC he had increased his connections with geologists outside of the Soviet Union thereby ensuring more internationality for what was proposed. This resulted in a milieu of acceptance, which culminated in approval by the "General Assembly" of the IGC, meet-

Figure 1. Participants at the 42nd INHIGEO Meeting on the steps of the National Academy of Sciences of Armenia building where the inaugural meeting took place in 1967. Dr Khachatur Meliksetian, Director of Institute of Geological Sciences, in the front row fourth from the left. Photo: Institute of Geological Sciences, Armenian National Academy of Sciences.

ing in New Delhi, on 22 December 1964.

The location for the first “Constituent Assembly” for the new organization was in the Soviet Union but not at its heart. Instead it was in Armenia, one of the smallest of the 15 Soviet republics, which had a uniqueness with respect to its relationship with the rest of the world, including strong cultural ties to France, Lebanon and the United States. It was helpful, too, that the Vice-President of the International Union of History and Philosophy of Science was A. T. Grigorian, a native of Armenia. For the first meeting thirty-five geoscientists from 15 countries came to Yerevan and Tikhomirov became INHIGEO’s first President. Despite the group being notably international, the first newsletter, published in 1967 (see www.inhigeo.com), reflected on a small scale the political bipolarity of the Cold War. It was in two languages: Russian at the front and English at the back, a practice that lasted until 1978, when only English was adopted. The proceedings of the 1967 meeting appeared in Russian with English summaries only.

In 1968 the ‘Constituent Assembly’ was to be approved by the IGC, in Prague, but the meeting was abandoned because of the Soviet invasion of Czechoslovakia on 20–21 August. Although the IGC and INHIGEO meetings did not take place, INHIGEO membership of IUGC was approved by the IUGC Council, without a regular business meeting. In 1969 and 1970 the annual INHIGEO meetings remained within the Russian political sphere of influence, in Freiberg (DDR) and Leningrad (USSR), although some members from the West urged greater flexibility in the venues, and meetings are now held all around the world, including every four years in conjunction with IGC.

The two pillars of INHIGEO: Geology and History of Science

At the same time that Tikhomirov was active in the late 1960s in the Soviet Union, Victor Ambrose Eyles of the United Kingdom and Cecil Schneer of the United States were successful in their networking with representatives of the International Union for History and Philosophy of Science, and INHIGEO was subsequently affiliated with this international organisation. Since then INHIGEO has enjoyed the support of both these two international organisations. It is an important fact that the history of geology not only needs skills in geology but also the awareness of an historian of science, and vice versa. The history of science has existed since the Enlightenment and became significant in the 19th century, but its professionalization took place only in the latter half of the 20th century.

When Tikhomirov was elected INHIGEO President in 1967 he, and several other scholars, wanted to bring together as many historians of geology as possible. These historians had largely first trained as geologists, not as historians. This group, which Rudwick called the “insiders”, formed the majority of the membership in the first years of INHIGEO but there were also professional historians of science, “the outsiders” (Rudwick, 2017). From the point of view of the professional historians of science, as Rudwick has pointed out, the historians of science could also be seen as “insiders” (Rudwick, 2017). It all depends on one’s perspective. It was clear that an ideal situation would be a balance between the two. The net outcome was that both groups were

accepted within INHIGEO and have learnt from each other. Nevertheless, it was the historians of geology trained in geology who played the key role in the Commission.

The two groups have different reasons for undertaking history. For the geologists, history confirms the successful route to the results that are valid today. For the others, it is important to reconstruct knowledge on the level of the context of time. Whereas the one group follows the structure of 'presentism' (Bachelard, 1938), the historians often argue very abstractly and in connection with general questions of scientific studies. Whereas the scientists understand history as an overture to the main programme of science, historians with a background in the history or philosophy of science underline its importance in its own right. The former play the role of judging about what is right and what was wrong in older theories, while historians want to understand why and how these past results were acquired and conveyed. Theory and practice were seen by scientists as in oppositional terms, but by historians more in terms of reciprocal relations. Needless to say, the understanding between these two groups was difficult. Conversations between geologists and historians of science have provided a stimulus for both sides to benefit from each other. Such a fruitful exchange happened not only as a result of the presentation of the papers and the subsequent debates, but also during field trips that have been an integral part of INHIGEO meetings that have engendered even closer relationships between the two groups. For this reason we will focus our paper on this kind of activity in 1967 and 2017.

Field Trips as an Essential Habit of Both Geologists and Historians of Geology

According to the tradition of geological excursions, the annual meetings of INHIGEO have, with rare exceptions, included field trips. Basically geologists have to travel to observe rocks, and the relationships between them, as part of their profession. The international meetings of the ICHST (International Congress of History of Science and Technology), on the other hand, do not offer such fieldtrips, but only visits or excursions to museums, collections and university departments: in other words, sites where knowledge is acquired and the instruments and tools are preserved.

For many years fieldwork did not earn the same recognition in the history of science, as laboratory experimentation. Consequently, historical research concerning institutions and experimentation is well developed, particularly during the twentieth century, whereas fieldwork received less attention until the last two decades. The new attraction of fieldwork in the history of science has arisen from the fact that practices¹ (Nyhart, 2016) have been emphasized which allows us to examine the question of how workplaces functioned and how in par-

ticular knowledge was acquired². Today we are more interested in the process than in the product of science. This broadens our analytical perspectives.

The modern fascination with fieldwork as the object of research is due to its complexity (Withers & Finnegan, 2003), and to the multiple meanings of the term 'field', as Nielsen and co-authors have pointed out: "the field as an area of action, operation, play, and investigation; as a range of opportunities, or of objects; as a sphere for labour, study or contemplation; and as a department or subject of activity or speculation" (Nielsen *et al.*, 2012). The field does not only exist outdoors, and fieldwork does not exclusively refer to working in the field, but also to a distinct way of doing research (Gavin, 2001); according to Kohler a 'placed activity' (Kohler, 2002). Fieldwork entails a special way of being mobile and a particular experience. A range of different practices constituted fieldwork. Historians of science generally characterise fieldwork as a practice lacking control over nature compared with the laboratory (1), the many modes of behaviour and practical activities (2) and the heterogeneity of identities of fieldworkers and their status within scientific communities (3).

In the last decade historians of science have focused much more on this activity than in the past. That the world should be its own laboratory, and this is the best way to study some aspect of nature. This point is as obvious today as it was rejected in 19th century. The case of George Cuvier and his critiques of the scientific travels of Alexander von Humboldt in the early 19th century is widely known. He sharply contrasted the styles of scientific travellers and 'sedentary naturalists' who traversed many territories in sequence, and their observations seemed to him 'broken and fleeting'. The bench-tied scholar of nature had in contrast much more time to select, collate and analyse, and his or her conclusion was much more based on reflections and patient comparison that led to better conclusions. As the historian of science Livingstone pointed out: the "Laboratory naturalist occupied a kind of hyperspace: because creation in all its dazzling diversity passed across the workbench, it afforded the opportunity to rearrange the natural order and grasp it as a whole [...] the armchair naturalists could easily triumph over the fragmentary and precarious claims of the fieldworker" (Livingstone, 2003).

In general, fieldwork was seen as controversial on the one hand and, on the other hand, it was essential for the establishment of geology as a discipline at the end of the 18th century. This was especially so in the 19th century, in the initial heyday of stratigraphy, when famous geologists visited each other and compared their insights at the sites that were of significance for them and where they obtained their results. This visiting of a locality was more important than a conference itself. We can speak of an activity giving geology "its distinctive character in the extent of its reliance on field studies" (Johnston & Taylor 2017). There were thus two reasons why excursions became an integral part of the annual meetings of the INHIGEO. Geologists wanted to maintain their values and traditions and they adopted the opportunities the meetings provided to become familiar with sites of geological importance that they had not previously seen. Historians, by replicating earlier observations, are forced to meet new challenges far from the documents and written narratives alone.

¹It was Pierre Bourdieu who arguably popularized the term "practice": Pierre Bourdieu, P., 1977, *Outline of a Theory of Practice*. Cambridge: Cambridge Univ. Press.

²Very important and the earliest studies in history of natural history: Porter, R., 1978, *Gentleman and Geology: The Emergence of a Scientific Career*. *Historical Journal*, v. 21, pp. 809–836; Rudwick, M., 1985, *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists*. Univ. Chicago Press.

Figure 2. In the Geological Museum, Yerevan. INHIGEO Secretary-General Dr Marianne Klemun (Austria) on left. Photo: Mike Johnston.

The Anniversary Meeting in 2017 and the Field Trips

From the beginning of INHIGEO the Committee explicitly defined, in Article 7, the intention that excursions were an integral part of the annual meetings:

“Scientific symposia on separate problems of the history of geological sciences and excursions to historical places and ancient centres of development in mining, sciences and culture are held at the same time as the meetings of the Committee (INHIGEO Newsletter 1967).

Excursions have thus become an indispensable and essential element of the meetings of INHIGEO. The Board of the INHIGEO delegates the organisation of meetings to members of the host country who choose the sites to be visited. From its inception up to 2018, INHIGEO has held 42 official meetings, with relevant and interesting fieldtrips. At the Yerevan meeting in 2017 the organizers repeated many of the activities that had taken place in 1967. This included the annual business meeting and a visit to the nearby Institute of Geological Sciences Museum, construction of which commenced in 1937. Named after its initial benefactor Professor H. T. Karapetyan, this small museum has a comprehensive display of Armenian rocks, minerals and fossils, including a large collection of the huge range of the country’s different varieties of obsidian.

The three field trips, two of one day duration and the other of four days, were led by Khachatur Meliksetian who was joined at various stops by other experts. All of the trips benefited from warm sunny weather.

16 September 2017 – Mid-conference Field Trip (Day 1)

As in 1967 the field trip fifty years later included a visit to the Mesrop Mashtots Institute of Ancient Manuscripts, more commonly known as the Matenadaran (“repository of manuscripts”). The building, completed in 1957 on a commanding site overlooking Yerevan, contains around 17,000 manuscripts and 30,000 other documents, including

Figure 3. A sample of the many priceless volumes in the Mesrop Mashtots Institute of Ancient Manuscripts (“the Matenadaran”). Photo: Mike Johnston.

one of the largest collections of medieval manuscripts and books in the world. The material ranges over a wide variety of topics and a fascinating selection of these exquisite objects was on display in the many rooms open to the public and through which we were assisted by knowledgeable guides.

Following the Matenadaran visit, the trip continued to the Garni Fortress some 40 km east of Yerevan. The fortress is on a narrow ridge, overlooking the Azat River, within the large Gregham shield volcano that commenced erupting in the Late Miocene. The Azat River valley was partly filled, 127,000 years ago, by a large trachy-basaltic andesite flow. A meander of the river has almost isolated part of the flow’s surface, making an ideal defensive site that was utilised by the fortress. The first known occupation of the site was in the 3rd millennium BC. In the 1st century AD a Hellenistic temple was built and is gener-

Figure 4. INHIGEO field trippers pose in front of the 1st century AD Hellenistic temple at the Garni Fortress. Photo: Institute of Geological Sciences, Armenian National Academy of Sciences.

Figure 5. Columnar jointing in trachy-basaltic andesite in the canyon of the Azat River. Photo: Mike Johnston.

ally considered to have been dedicated to Mithra (Mihra in Armenian), god of the sun. The temple was all but destroyed in a 17th century earthquake but has subsequently been restored. Beside the temple are the remains of a palace, the most significant part being a bathhouse with a stone mosaic floor, and other rooms display remnants of coloured plaster work. The Azat canyon is flanked by some of the most spectacular exposures of columnar jointing to be seen anywhere in the world.

Not far from the fortress is the Geghard, or more correctly Geghardavank, Monastery, a UNESCO World Heritage Site. The monastery, takes its name from the most famous of a number of relicts it was formerly custodian of, which was a spear that had reputedly wounded Christ on the Cross whose acquisition is attributed to the Apostle Thaddeus. The monastery is partly dug into cliffs of volcanic breccia, much of it probably of ignimbritic origin, with layers of paler coloured tuff of the Late Miocene-Early Pliocene Vokhcaberd volcanoclastic suite. Carved in the cliffs and the walls of underground chapels, cells for the monks and tombs are crosses or khachkars. The monastery dates back to the 4th century AD, when Christianity was adopted as Armenia's state religion, but following its destruction most of the present day complex was completed during the 12 and 13th centuries.

17 September – Mid-conference Field Trip (Day 2)

The trip began with a stop at the State History Museum of Armenia, founded in 1919, which provides an insight into the history and culture of Armenia. At Vagharshapet, or Etchmiadzin, 20 km west of the capital, Dr Armine Hayrapetyan guided the trip through the first Christian cathedral built in Armenia and which is also considered to be the oldest such structure in the world. Within its ignimbritic walls

Figure 6. Agarak Historic-Archaeological Preserve an Early Bronze Age site. Photo: Mike Johnston.

are a host of treasures beneath magnificent painted domed ceilings, all worthy of its UNESCO World Heritage Status. Nearby is the Saint Hripsime's Church, completed in 618 AD, and is the oldest in Armenia. It occupies a Hellenistic temple site and honours Hripsime and other nuns martyred three centuries before its construction.

Post-conference Field Trip – 18-21 September

This four day field trip was in two parts. The first three days involved a clockwise circuitous route centred on the huge, over 4,000 m high, stratovolcano of Mount Aragats, one of the largest in Armenia. The volcano had four major eruptive periods, the first commencing in Late Pliocene and the most recent around 500,000 years ago. Its Quaternary ignimbrites, which with other volcanic deposits cover 6,000 km², are the source of many of the building stone utilised in Yerevan and other towns peripheral to it.

The first stop was at the Agarak Historic-Archaeological Preserve, 30 km WNW of Yerevan, with its Early Bronze age excavations in a 600,000 year old ignimbrite sheet. The excavations come in a variety of sizes and shapes and include bowls for rituals, water troughs and

Figure 7. Palaeolithic flaking floor, covering about 6 hectares, overlooked by the early Pleistocene Arteni rhyolitic volcano. Basalt hammer stones were used to split and shape obsidian into tools. Photo: Mike Johnston.

graves. Nearby are the remains of primitive stone buildings from which fragments of ceramics have been recovered. Further west, on the flank of the early Pleistocene Arteni rhyolite volcano that rises sharply above a dry dusty plain, clear, black or red coloured obsidian was admired in a quarry. The sharp edges of the obsidian also meant that it had been widely used in pre-history for manufacturing knives, axes, spears, arrowheads and other tools. On the plain adjacent to the volcano is an extensive Palaeolithic flaking floor, spread over about 6 hectares. Basalt hammer stones were used to work the obsidian into the required shape and leaving behind tens of thousands of conchoidally-shaped fragments on and below the surface. The importance of the site, and how it was excavated, was explained by Boris Gaspargan of the Institute of Archaeology and Ethnography, Armenia National Academy of Sciences, Narozh. The first day ended at Gyumri, Armenia's second city with a population 125,000, which is still recovering from the devastating 1988 Spitak Earthquake. However, restoration of its historic centre with its impressive churches and other structures fronting a huge square is well underway.

Next morning was devoted to visiting the city's historic precinct and its bustling market, prior to heading east into the mountains enclosing the Spitak valley. The valley is aligned along the WNW-ESE right-lateral, strike-slip Pambak-Sevan-Syunik Fault System, part of the boundary between the Eurasian plate (folded into the Caucasus Mountains) to the northeast and the South Armenian crustal block, a small fragment of the great southern continent of Gondwana, to the southwest. This fault system is active, with a number of earthquakes recorded through Armenian history. A 37 km rupture, on 7 December 1988, resulted in the Mw 6.9 Spitak Earthquake that killed more than 25,000 people and left many more injured. Near the town of Spitak the 1-1.6 m high scarp of the 1988 rupture is still well preserved and earlier ruptures parallel to it are also easily recognisable. Dr Arkadi Karakhanyan and colleagues from the Institute of Geological Sciences, Spitak, explained the fault and also interpreted the tectonic history revealed in a trench dug across the scarp. The trench showed that this particular fault had previously ruptured around 17,500 and 25,750 years before present.

Continuing ESE along the valley, the mountains of the forested Dili-

Figure 8. Inspecting the 1.6 m high scarp in the Spitak valley that ruptured during the devastating Mw 6.9 earthquake in 1988. Photo: Mike Johnston.

Figure 9. Nor Geghi archaeological site on the canyon wall of the Hrazdan River. The sediments beneath the 250,000 year old basalt flow (top) contains tools that mark the transition from Lower to Middle Palaeolithic. Photo: Mike Johnston.

jan National Park are the setting for the magnificent Haghartsin Monastery, a complex built between 10th and 14th centuries. Amongst its main buildings are several churches and a refectory. Building stones included limestone with bivalves and, most unusually, in parts of the refectory a porous travertine. Crossing the divide into the watershed of Lake Sevan, island arc volcanic rocks are exposed along with rare outcrops of sheared serpentinite, part of the Sevan Ophiolite caught up along the Pambak-Sevan-Syunik Fault System. On the southwest shore of Lake Sevan are a series of monogenetic cones of the Gegham volcanic uplands with extensively preserved outflows of Late Miocene to Holocene basalt.

The next day Lake Sevan was viewed from a small hill on which is situated the 9th century Sevanavank Monastery. The 5,000 km² shallow lake, 1,900 m above sea level occupies a tectonic depression, between the Eurasian Plate and the South Armenian Block, which has been enhanced by lava flows impeding drainage. The lake has diminished in size due to electric power generation but remedial measures have seen its level rise although it is still far below its former height. Closer to Yerevan is the Nor Geghi archaeological site on the canyon wall of the Hrazdan River, not far from Yerevan. Wedged between two basalt flows is a sedimentary sequence containing tools and other material that marks the transition from Lower to Middle Palaeolithic. The basalts have been dated, by ⁴⁰argon/³⁹argon method, at approximately 400,000 and 250,000 years. The site indicates that advances in the way tools were made occurred independently in a number of widely spaced locations and were not simply exported out of Africa.

The last day of the field trip was to the west of Yerevan at the Aknashen Neolithic Site on the Ararat Plain, a tectonic depression flanked by active faults. Dr Ruben Badalyan, of the local office of the Institute of

Figure 10. Barry Cooper proposing a toast, at the Geological Museum, to the Armenian hosts at the close of the 42nd INHIGEO meeting. On Barry's left are INHIGEO Secretary-General Marianne Klemun (Austria), Ernie Hamm (Canada), Martina Kölbl-Ebert (Germany) and Ivan Vtorov (Russia) whereas on his right is Gayane Grigoryan, Director of the museum. Photo: Institute of Geological Sciences, Armenian National Academy of Sciences.

Archaeology and Ethnography, explained that in the excavations six contiguous layers have been identified. The youngest being Early Chalcolithic and the remaining extending down through the Neolithic. Nearby, between the Metsamor and Araxes rivers, is the Metsamor Archaeological Site and Museum. The site has yielded archaeological remains indicating that discontinuous settlement in the Early Bronze age reached its full flower in the Late Bronze Age and continued into the Iron Age. Strategically sited on a volcanic hill are the remains of the Metsamor Citadel, which has been the focus of much archaeological attention. Many thousands of artefacts from the site and its environs are housed in the Metsamor Museum under the directorship of Dr Artavazd Zakian. Another fortress is at Erebuni, a hill overlooking the Hrazdan valley. Its outer wall and some of the buildings within it have been partially restored and numerous artefacts are housed in the nearby museum. Erebuni, which this year celebrated its 2,800th birthday, has given Yerevan its name. Back at the Geological Museum in Yerevan the end of an enjoyable and well run meeting and field trips, which did justice to 50 years of INHIGEO, was celebrated.

Conclusion

Ever since 1967, when INHIGEO first came into being, field trips have been seen as an integral part of the meetings. The first field trip, in 1967, took a group of geologists to Armenia. In keeping with the importance of field trips in the area of geology, this practice continues to be seen as crucial for meetings of historians of geology. Although for many years the history of science in general underestimated field trips as central practices of science, this has changed in recent decades and they are now a subject of research in the history of science.

The 50th anniversary meeting of this Commission took place in 2017 on the same site where INHIGEO was born. The field trip schedule of 2017 again led an international group of scholars to sites that were visited in 1967. Needless to say, this field trip in 2017 hap-

pened in a completely different geopolitical situation than in 1967.

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References

- Bachelard, G., 1938 [1978], *La formation de L'esprit scientifique*, Frankfurt am Main, 288 p.
- Bourdieu, P., 1977, *Outline of a Theory of Practice*. Cambridge: Cambridge University Press, 248 p.
- Gavin, L., 2001, *Critical Approaches to Fieldwork: Contemporary and Historical Archaeological Practice*. London and New York: Routledge, 246 p.
- Grigelis, A., and Czarniecki, S., 2017, International Commission on the History of Geological Sciences: the earliest events. In: Mayer, W., Clary, R.M., Azuela, L.F., Mota, T.S., Wolkowicz, S. (Eds.), *History of Geoscience: Celebrating 50 Years of INHIGEO*, Geological Society Special Publications, no 442, London: The Geological Society London, pp. 21–27.
- Johnston, M.R., and Taylor, K.L., 2017, Historians of geology in the field: a half-century of INHIGEO excursions. In: Mayer, W., Clary, R.M., Azuela, L.F., Mota, T.S., Wolkowicz, S. (Eds.), *History of Geoscience: Celebrating 50 Years of INHIGEO*, Geological Society Special Publications, no 442, London: The Geological Society London, pp. 41–54.
- Kohler, E. 2002, *Landscapes & Labscapes: Exploring the Lab-Field Border in Biology*. Chicago: University of Chicago Press, 326 p.
- Livingstone, D.N. 2003, *Putting Science in Its Place. Geographies of Scientific Knowledge*. Chicago: University of Chicago Press, 244 p.
- Malakhova, I. 2017, The founding of INHIGEO: documents and letters, with comments. In: Mayer, W., Clary, R.M., Azuela, L.F., Mota, and T.S., Wolkowicz, S. (Eds.), *History of Geoscience: Celebrating 50 Years of INHIGEO*, Geological Society, London, Special Publications, no 442, London: The Geological Society London, pp. 9–19.
- Mayer, W., Clary, R.M., Azuela, L.F., Mota, T.S., and Wolkowicz, S. (Eds.), 2017, *History of Geoscience: Celebrating 50 Years of INHIGEO*, Geological Society, London, Special Publications, no 442, London: The Geological Society London, 436 p.
- Nielsen, K.H., Harbsmeier M., and Ries, Chr., 2012, *Studying Scientists and Scholars in the Field. An Introduction*. In: Nielsen, K.H., Harbsmeier M., and Ries, Chr., 2012 (Eds.), *Scientist and Scholars in the Field. Studies in the History of Fieldwork and Expeditions*, Aarhus and Copenhagen: Aarhus University Press, pp. 9–28.
- Nyhart L. K., 2016, *Historiography of the History of Science*. In: Lightman B. (Ed.), *A Companion to the History of Science*, John Wiley Blackell, pp. 7–22.
- Porter, R., 1978, *Gentleman and Geology: The Emergence of a Scientific Career*. *Historical Journal*, v. 21, pp. 809–836.
- Rudwick, M., 1985, *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists*. Chicago: Univ. Chicago Press, 494 p.
- Rudwick, M., 2017, *Insiders and outsiders: INHIGEO seen from the sidelines*. In: Mayer, W., Clary, R.M., Azuela, L.F., Mota, T.S., Wolkowicz, S. (Eds.), 2017, *History of Geoscience: Celebrating 50 Years of INHIGEO*, Geological Society, London, Special Publications, no 442, London: The Geological Society London, 55–62.
- Withers, C.W.J., and Finnegan, D.A., 2003, *Natural history societies, fieldwork and local knowledge in nineteenth-century Scotland: towards a historical geography of civic science*, *Cultural Geographies*, v. 10, pp. 334–353.