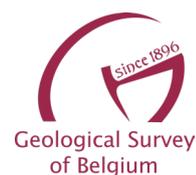


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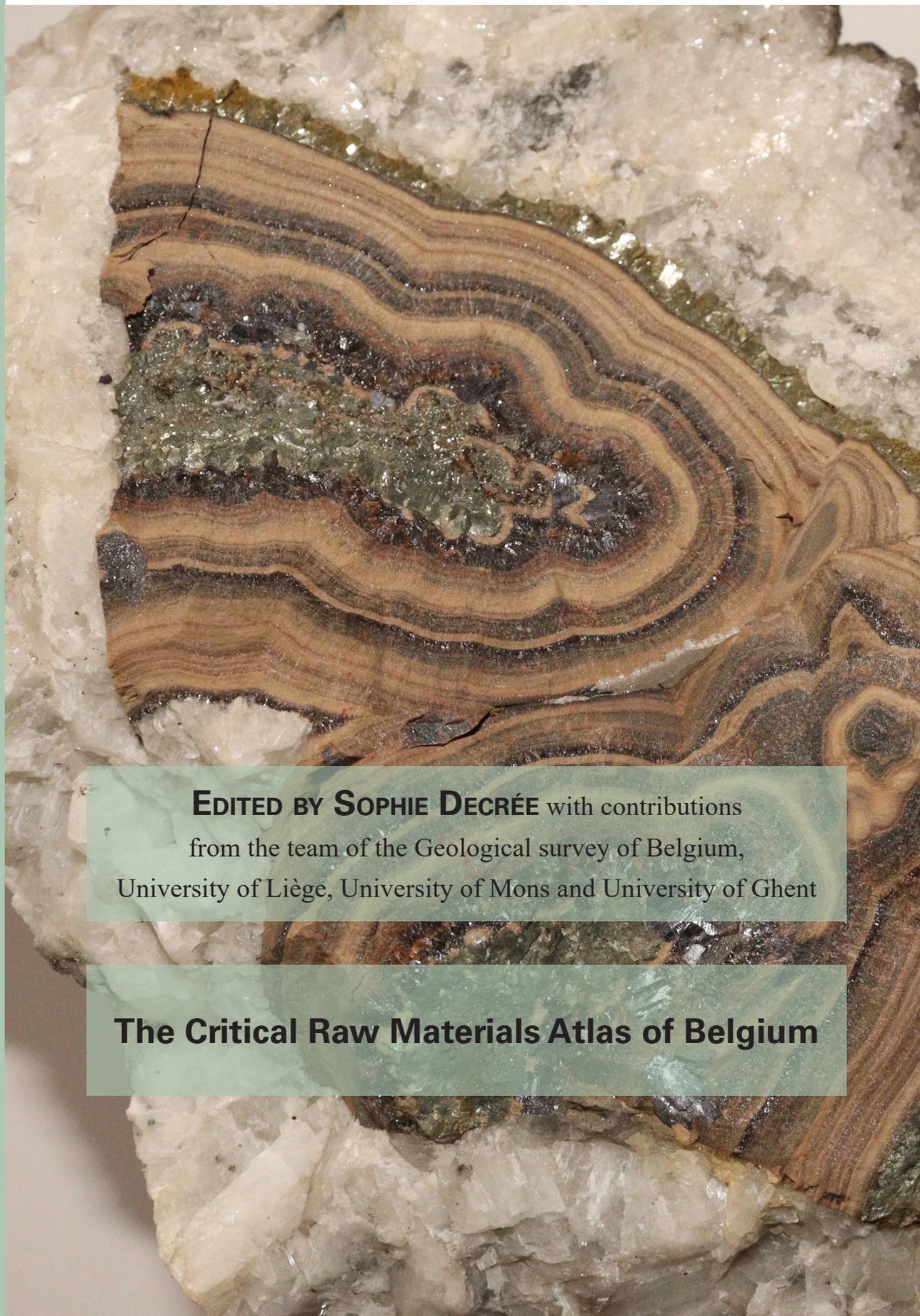
VOL. 66

# MEMOIRS

of the Geological Survey of Belgium



SCIENTIFIC REPORTS SERIES



**EDITED BY SOPHIE DECRÉE** with contributions  
from the team of the Geological survey of Belgium,  
University of Liège, University of Mons and University of Ghent

**The Critical Raw Materials Atlas of Belgium**

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2024  
VOL. 66

## THE CRITICAL RAW MATERIALS ATLAS OF BELGIUM

Edited by Sophie **DECRÉE**

with contributions from the team of the Geological Survey of Belgium,  
University of Liège, University of Mons, University of Ghent



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## INTRODUCTION

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### 1. The CRM atlas- a foundational resource for future CRM Act initiatives

Belgium's extensive mining history, notably focused on lead-zinc, iron and coal, encompasses a wide range of resources (as illustrated in Figure 1). The exploitation of these resources dates back to the Bronze Age (Dejonghe, 1998), with evidence of Roman lead-zinc workings, referenced by Pliny the older, in eastern Belgium (Ladeuze *et al.*, 1991a; Dejonghe, 1998). Historical documents highlight intensive mining during the Middle Ages, with “La Calamine” mine standing out as the most important (e.g., Ladeuze *et al.*, 1991a,b). The peak of lead-zinc mining occurred during the industrial revolution between 1850 and 1870 (Dejonghe, 1998), with total metal production reaching about 1,500,000 tons from 1837 to 1945 (note: this tonnage corresponds to about 10% of the present zinc metal annual consumption in Europe; European Commission, 2020). The presence of critical raw materials in association with the Pb-Zn mineralization is known in this area since the second half of the nineteenth century. Gallium was discovered in a mix of sphalerite concentrates (originating from Belgium and France) from the Vieille Montagne by Lecoq de Boisbaudran (1875). Germanium, that is actually more abundant in Belgian sphalerite, was discovered by Winkler (1886) in Freiberg (Germany).

Coal mining dates back to the thirteenth century, but it was only thanks to significant technical advancements, particularly in addressing deposit characteristics like lowering the water table by several hundred meters, that industrial-scale extraction was possible from the eighteenth century onwards (Kurgan-van Hentenryk & Puissant, 1990; Devleeschouwer *et al.*, 2002).

Mines gradually closed throughout the twentieth century due to various factors such as geological complexity, dewatering challenges, the presence of refractory ores, and economic unviability (Dejonghe, 1998), also considering the easy access to mineral resources from the colonies at the time. Additionally, Belgium's high population density exerted pressure on land use, discouraging subsurface exploitation (Service Géologique de Wallonie, 2023a). The last iron-lead mine in Vedrin shut down in 1945, followed by the closure of the last iron oxide mine in the Meuse Valley (Couthuin) in 1946. In the late 1970s, the “Minette” iron ore mines in Musson and Halanzy ceased operations (Denayer *et al.*, 2011). The open-pit barite deposit in Fleurus was mined until 1996 (Dejonghe, 1985; Service Géologique de Wallonie, 2023a). Despite several mine closures, 252 concessions of the original 361 still exist in the Walloon Region (Figure 2), comprising 99 for coal, 65 for metallic ore, 35 for iron, 43 for gold, 5 for alum stone, 3 for graphite, and 2 for lignite. Of these, 90 are under the receivership of the “Cantons de l'Est,” while 61 entered a withdrawal process in January 2012 (Service Géologique de Wallonie, 2023b).

## **MEMOIRS of the Geological Survey of Belgium**

The series, which started in 1955, welcomes thematic papers dealing with all aspects of the Earth sciences, with a particular emphasis on the regional geology of Belgium and adjacent areas. Submitted papers should present the results of syntheses of original studies (e.g. PhD and Master theses). High scientific level is requested. Papers written in English are preferred but those in the other national languages are also accepted. Papers using the collections and databases of the Royal Belgian Institute of Natural Sciences are particularly suitable. Each paper will be peer-reviewed by two reviewers (one international and one national scientist).

### **Editorial Board**

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For the past 15 years, a major concern and challenge in Europe has been securing the supply of critical raw materials (CRMs), which are tightly linked to high technological applications and clean green technologies. These materials are indeed considered crucial for industrial megasectors and the economic development of Europe. The publication of the CRM Act intensified the pressure on these commodities, with the intention of promoting exploration in Europe..

The CRM Atlas of Belgium, coordinated by the Geological Survey of Belgium (GSB), Institute of Natural Sciences, along with contributions from Belgian universities, aims to serve as a foundational resource for future CRM Act initiatives.

It comprises current maps displaying the locations of relevant commodities (deposits and occurrences) and summarizes information on the types of mineralization, estimated resources (roughly), deposit potential, and more in Belgium.

Additionally, it highlights recent or ongoing research conducted by the Geological Survey of Belgium on mineral deposits in collaboration with universities. While this contribution offers an overview of the current state of knowledge, future large-scale exploration is necessary to gain a more comprehensive understanding of the potential resources in Belgium. The conclusion of the Atlas offers additional insights into potential future exploration endeavors that could be of interest in Belgium, given its extensive mining history, notably focused on lead-zinc, iron, and coal, and its diverse range of resources.

The commodities targeted by this Atlas include not only CRMs but also precious metals, along with commodities of significant interest for Belgium, such as lead-zinc, germanium-gallium, barium, strontium, fluorite, copper, arsenic, gold, silver-bismuth-antimony, phosphate rock, rare earth elements, manganese, lithium, graphite, and coking coal.

**The editor** of this monography, Sophie Decrée, is a senior geologist at the Institute of Natural Sciences/Geological Survey of Belgium. She started her career with the study of base metal deposits (Fe-Pb-Zn) in Tunisia. She was then interested in the world-class supergene cobalt deposits and uranium deposits of the Copperbelt, before shifting to the study of Neoproterozoic alkaline magmatic rocks and carbonatite, and related mineral deposits. Since ten years, she is focusing her works on the speciation and distribution of phosphates and REE in various phosphate deposits in Europe and worldwide.

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