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BOOK REVIEW

The geology and geomorphology of Seymour (Marambio) Island, Antarctica

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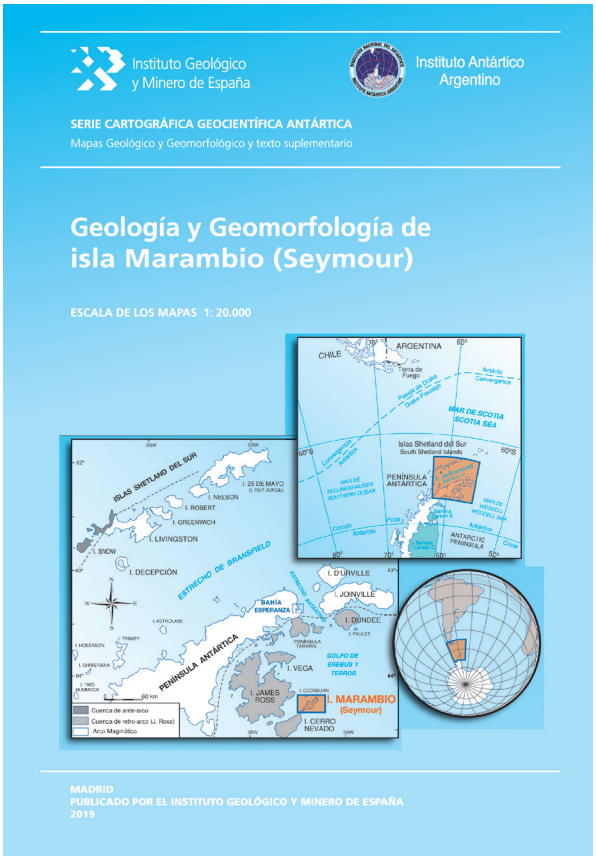

Seymour or Marambio Island is located on the northeastern of the Antarctic Peninsula, between the Weddell Sea and the Erebus and Terror Gulf. This small piece of land (approximately 18.5x9 km) constitutes a Mesozoic-Cenozoic sedimentary sequence within the James Ross Basin, that remains ice-free during the austral summer. The lack of ice on the surface allowed the identification of two incised valleys filled with Paleogene sediments on a marine platform of Cretaceous age, an extended area containing the Cretaceous/Paleogene boundary, and an almost continuous and highly fossiliferous stratigraphical sequence.

The geology of Seymour Island is comprehensively explored in an integrative contribution (Montes *et al*., 2019). This is presented in a book covering a wide range of topics, particularly the stratigraphy, fossil content, petrography, geochemistry, petrogenesis, tectonism, paleomagnetism, and geomorphology of the island. A plastic folder is provided along with the printed version of the 300-pages soft cover book, full color-illustrated, as well as two 1:20,000-scale geological (Montes *et al*., 2013) and geomorphological (Nozal *et al*., 2013) maps. The maps cover the entire surface of the island and were completely built on 1:10,000

and even 1:1,000 in some specific areas, using the topographic base produced by the United States Geological Survey (USGS) and the Instituto Antártico Argentino (IAA-DNA) (USGS, 1995). The precise photographs of the outcrops and landscapes with incorporated stratigraphic details, as well as those of sedimentary structures, trace fossils, and fossils, provide the opportunity to integrate the text with the authors' observations, substantially enriching the quality of the work. This compendium constitutes an irreplaceable tool for paleontologists and geologists interested in the Antarctic continent.

The book is written in Spanish, divided into seven chapters, each of which has its own bibliography section, and contains high-quality images, photographs, and tables. The information included in this book represents an international collaborative project coordinated by the IAA-DNA and the Instituto Geológico y Minero de España (IGME), in which researchers from different academic institutions and public research organizations participated. The inclusion of previous stratigraphical frameworks enhances the readability of this work, thus representing a leap in the geological understanding of the island. The contents of the book are presented below.

The first chapter (Introducción) presents the geographical setting of Seymour Island and outlines the geological framework of the James Ross Basin. Within this section, the topography and toponymy of the maps are explained, along with an overview of the structure of the subsequent chapters.

The stratigraphy of the Marambio Group (Upper Cretaceous-Paleocene), composed of the Haslum Crag, López de Bertodano, and Sobral formations is described in chapter two (Estratigrafía del Grupo Marambio. Cretácico Superior-Paleoceno). The detailed descriptions include correlations of these units with adjacent islands such as Snow Hill and Cockburn, as well as their main geological features, lithologies, sedimentary structures, fossil content, and magnetostratigraphic information. The López de Bertodano Formation includes the IUGS geological heritage site 021, the most prominent high-latitude K-Pg boundary and one of the most significant and well-exposed globally (Jia *et al*., 2023), which is described and illustrated in detail in the book. The limited paleontological content recovered from the Sobral Formation, mostly restricted to palynomorphs, makes the presented synthesis highly relevant. The chapter concludes with a sedimentary interpretation of the various marine facies of the Marambio Group based on the chronostratigraphy obtained from the most recent eustatic curves, and an assessment of the new inferred ages for the group.

Chapters 3 (Estratigrafía del Grupo Seymour Island. Paleoceno-Eoceno) and 4 (Estratigrafia del Neógeno y Cuaternario) respectively deal with the Seymour Island Group (Paleocene-Eocene) and the stratigraphy of the Neogene and Quaternary. In both cases, there is a dedicated characterization of lithostratigraphic units, a complete discussion of the chronostratigraphy, and a sedimentological interpretation. Accompanying each sub-section are panoramic images of the outcrops, along with other pictures providing detailed insights into geological features, lithologies, and sedimentary structures, all of which contribute to the correct understanding of the descriptions.

The first of these chapters starts with the detailed lithostratigraphic characteristics of the Díaz, Arañado, and Bahía Pingüino allomembers, which constitute the sequence of the Cross Valley-Wiman Formation (Middle-Upper Paleocene). Two of the most important units in the vertebrate paleontology of the Antarctic continent, the La Meseta and Submeseta formations, are described and illustrated with a level of detail that not only allows to easily follow the field descriptions but also serves as valuable educational material for anyone interested in understanding the finer details of their geology. The excellent selection of the stratigraphic sections along the northern part of the island, as well as meticulous analyses, allowed the authors to present a comprehensive stratigraphic sequence. This sequence highlights both the current definition of the different allomembers and their correlation with Sadler's (1988) previous and classic stratigraphic scheme of TELMs.

The stratigraphy of the Neogene, corresponding to the Hobbs Glacier Formation (Middle-Upper Miocene) and the Weddell Formation (Upper Pliocene-Pleistocene), as well as that of the Quaternary, is equally well-developed in Chapter 4, despite its lesser exposure in the island's strata.

Chapter 5 (Rocas volcánicas y subvolcánicas) is exclusively focused on volcanic rocks, notably depicted as a network of dykes which are identified as basaltic dykes in the geological map.

The petrography, geochemistry, and petrogenesis of these rocks are also explained.

Chapter 6 (Tectónica) encompasses the geotectonic context, paleostress analyses, and the evolution of the Cenozoic stress field. The tectonism acting on this sector of the Antarctic Peninsula is established through the analysis of sedimentary structures observed in deposits from the Upper Cretaceous to the Quaternary in Seymour Island.

The last Chapter 7 (Geomorfología) is dedicated to a comprehensive analysis of the island's geological features and modeled studies. The section focused on the geomorphological analysis covers weather data, characterization of the geologic substrate, island relief, and morphostructural studies. This study examines the morphology resulting from geological structures and lithologies, portraying a static geological architecture exposed to erosion. The modeled study incorporates descriptions of various elements and shapes such as structural, volcanic, and gravitational. It also explores fluvial processes, surface runoff, glacial and periglacial-nival elements associated with permafrost presence, and dynamic frozen and unfrozen conditions. This section also includes investigations on eolian processes, lacustrine and endorreic formations, as well as littoral and polygenic processes.

The geomorphological map presented in this book is a significant contribution, based on aerial photographs captured during six flights by the Argentine Air Force in 1978, and the topographic map produced by the USGS in collaboration with the IAA-DNA and the Bird Polar Research Center at Ohio University, providing graphical support at a scale of 1:10,000.

In summary, this integrative contribution serves as a fundamental guidebook and essential roadmap for geologists, paleontologists, and researchers interested in Antarctic Earth Sciences studies.

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