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Systematic identification of globally important geological sites in Antarctica

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Working Paper submitted by SCAR

Summary

SCAR has developed and tested a systematic method to identify globally-important geological sites in Antarctica (Antarctic Geosites). SCAR recommends that the CEP:

- acknowledges that the identification of globally-important geological sites in Antarctica (Antarctic Geosites) could be useful as a tool to assist Parties when conducting environmental impact assessments and, more generally, when planning and conducting activities in Antarctica;
- endorses the proposed systematic method for identification of Antarctic Geosites;
- endorses the identified Antarctic Geosite representing the Cretaceous-Paleogene (K-Pg) transition on Seymour Island; and
- considers practical approaches for the implementation of the proposed method to identify further Antarctic Geosites, including through the SCAR Expert Group on Geological Heritage and Geoconservation.

Introduction

Antarctica has many sites containing geological and geomorphological elements (geological formations and structures, landforms, minerals, rocks, meteorites, fossils, etc.) of global scientific significance. Such sites allow us to expand our knowledge of: (i) the geological history of the Earth, (ii) the processes which have modelled it, (iii) past and present climates and landscapes, and (iv) the origin and evolution of life (ATCM XXXIX IP31 *Antarctic Geoconservation: a Review of Current Systems and Practices*).

The CEP has acknowledged the importance of guaranteeing protection of geological values (CEP XVII Final Report). The issue of the 'Protection of outstanding geological values' has been placed on the CEP Five Year Work Plan to consider further mechanisms for protection of outstanding geological values, including advice from SCAR.

Organisations active in other parts of the world have developed frameworks to identify, and if necessary protect, geological values that form part of global geological heritage, e.g. UNESCO World Heritage Cultural and Natural Convention, the International Union of Geological Sciences (IUGS) and the European Association for the Conservation of Geological Heritage (ProGEO). However, so far the Antarctic Treaty Consultative Meeting has not agreed a method to identify geological sites that are both scientifically and globally important, within a systematic framework.

In recent years, there has been some progress in the development of systematic environmental-geographical frameworks for the protection of areas within Antarctica. This has been achieved through the Environmental Domains Analysis (EDA; Resolution 3 (2008)), the Antarctic Conservation Biogeographic Regions (ACBRs; Resolution 6 (2012)) and the list of Antarctic Important Bird Areas (IBAs; Resolution 5 (2015)). However, while the ACBRs and IBAs provide useful spatial frameworks for the further protection of biological values, due to the nature of the data involved in these classifications they are of limited value for identifying outstanding geological features.

In this paper SCAR:

- a) presents a systematic method to identify scientifically and globally important sites in Antarctica (Antarctic Geosites), and
- b) reports on progress for the testing of the proposed method.

Development and testing of a systematic method to identify globally important geological sites

At CEP XVII, SCAR reported the establishment of the Action Group on Geological Heritage and Geoconservation, which was charged with considering the application of a method for systematic identification of important geological values in Antarctica (ATCM XXXIX IP31 *Antarctic Geoconservation: a Review of Current Systems and Practices*).

SCAR has now developed a systematic method for identifying sites of geological value within the Treaty area. The method is based largely on existing methods used to identify geological heritage in other parts of the world, but adapted to the unique circumstances found within the Antarctic Treaty area.

Overall, there has been broad consultation in this work, engaging geoscientists from at least 17 nations, including experts on internationally accepted methods for the selection of geological heritage. SCAR Action Group meetings and workshops were held in Kuala Lumpur, Malaysia (August 2016), Davos, Switzerland (June 2018), Madrid, Spain (November 2018) and Cambridge, UK (March 2019 and March 2020).

The details of SCAR's advice can be found in Attachment A. However, the method comprises two main elements:

- i. The systematic classification of Antarctica's geological past into defined globally-important geological themes through the identification of a list of 'Geological Frameworks'.
- ii. The subsequent identification of Antarctic sites of exceptional geological value (known as 'Antarctic Geosites') within each of the identified Geological Frameworks.

To test the method, SCAR has already undertaken the systematic classification of Antarctica's geological past, with the initial identification of nine Geological Frameworks (see Attachment A). Furthermore, Antarctic Geosites have been identified for one of the nine Geological Frameworks (the Cretaceous-Palaeogene (K-Pg) Transition) (see Attachment A).

The Antarctic Geosites have and will be identified exclusively for their exceptional scientific value and have no legal status under the Antarctic Treaty System.

Application of the list of Antarctic Geosites

The identification of Antarctic Geosites would be useful as a tool to assist Parties when conducting Environmental Impact Assessments and, more generally, when planning and conducting activities in Antarctica.

In particular, the Antarctic Geosite list may help identify locations in Antarctica that represent '*examples of outstanding geological, glaciological or geomorphological features*' that might qualify for consideration as ASPAs under Article 3.2(c) of Annex V. The list of Antarctic Geosites would not be intended to be prescriptive, and may be used in conjunction with other tools designed for these purposes.

It should be noted that an aim of this work is to ensure that future scientific research is not inhibited, but rather, that the scientific and intrinsic values of geological sites are identified and preserved for future researchers, as appropriate.

SCAR notes the benefits of – and would encourage other Parties in supporting – further research that can contribute to future assessments, and to the regular update of the Antarctic Geosites list as a resource of 'best available knowledge' on the most important geological sites in Antarctica.

The recently established SCAR Expert Group on Geological Heritage and Geoconservation may be well-placed to facilitate further use of the described method.

Recommendations

SCAR recommends that the CEP:

- acknowledges that the identification of globally-important geological sites in Antarctica (Antarctic Geosites) could be useful as a tool to assist Parties when conducting environmental impact assessments and, more generally, when planning and conducting activities in Antarctica;
- endorses the proposed systematic method for identification of Antarctic Geosites;
- endorses the identified Geosite representing the Cretaceous-Paleogene (K-Pg) transition on Seymour Island; and
- considers practical approaches for the implementation of the proposed method to identify further Antarctic Geosites.