

SCAR Environmental Code of Conduct for Geosciences Field Research Activities in Antarctica

Voluntary Guidelines

Background

1. This SCAR Code of Conduct provides guidance when planning or undertaking geosciences field research activities in the Antarctic Treaty Area.
2. This Code of Conduct was prepared by the SCAR Action Group on Geological Heritage and Geoconservation, building on the SCAR Geological Sampling Code of Conduct (GeoReach Newsletter, SCAR GSSG Vol. 7 May, 2008), and with input from the SCAR geological community. The guidelines have been finalised through broad consultation, including with the Council of Managers of National Antarctic Programs (COMNAP).
3. The [*SCAR Environmental Code of Conduct for Terrestrial Scientific Research in Antarctica \(2018\)*](#) continues to provide guidance on practical measures to minimize impacts by scientists undertaking fieldwork in terrestrial environments, generally applicable across all of Antarctica. The [*SCAR Code of Conduct for Activity within Terrestrial Geothermal Environments in Antarctica \(2016\)*](#) provides guidance for scientists working in geothermal areas.
4. This *SCAR Environmental Code of Conduct for Geosciences Field Research Activities in Antarctica* was developed in recognition of a specific need for guidelines for scientific activities beyond those generally applicable guidelines, since geological field researchers may operate under unique conditions and circumstances where more specific and customized guidance may be needed to safeguard the values of geological sites.
5. This Code of Conduct will be updated and refined as new scientific results and environmental impact reports become available from future geosciences research.
6. A list of national repositories (museums, universities, institutes, etc.) housing Antarctic geological and palaeontological specimens is available at: <https://www.scar.org/scar-library/search/science-4/geosciences/5595-list-of-national-geosciences-repositories/file/>

Introduction

7. Antarctica contains many unique geological (i.e. petrological, mineralogical, stratigraphical, tectonic, geochronological, geomorphological, palaeontological and meteoritic) features. Many of these features may be vulnerable to disturbance, unpermitted collection, and may be easily and irreversibly damaged.
8. Geological specimens such as rocks, minerals, fossils and meteorites, are finite scientific resources and thus it is important to safeguard the scientific value of geological sites and ensure adequate material is available in the field and repositories to allow future geological research to be undertaken.

9. Some geological fieldwork employs destructive methods and techniques, resulting in environmental impacts and impact on the scientific value of an area. Cumulative impacts resulted from repetitive scientific and logistic activities can also result in a reduction in the scientific value of some geological sites.
10. Antarctica's geological heritage has not been systematically identified and its values, and risk from anthropogenic impact, have yet to be assessed. Through this CoC the community is encouraged to participate in the identification and evaluation of sites of special geological interest, including those at risk of damage.

Guiding Principles

11. Careful planning and consultation with national authorities is required prior to undertaking research within ice-free environments, and appropriate measures need to be considered to help maintain the integrity of sites. These should include:
 - careful selection of the site to be visited; and
 - coordinating planned activities with other researchers interested in the area to the maximum extent practicable.
12. The locations of sites visited and nature of activities undertaken should be documented and maintained in publicly available records, or a national data centre, which may also link to the Antarctic Master Directory (AMD) and include accurate location positions (e.g. GPS), so that visited and unvisited sites may be clearly discerned by future researchers.

Before going into the field

13. The [*SCAR Environmental Code of Conduct for Terrestrial Scientific Field Research in Antarctica*](#) provides guidelines for “before going into the field” that are generally applicable to geological science activities. Further guidelines are provided in the following points:
14. For the Environmental Impact Assessment (EIA) process, provide details such as the type and approximate quantity of geologic samples to be taken, general location of anticipated sample sites, sampling methods, type of transportation (e.g. use of vehicles), if any scientific equipment or structure (e.g. marker post, plinth) will be left and for how long, and any planned restoration of the site.
15. To minimize or avoid disturbance of wildlife incidental to the conduct of research activities, consider concentrations of wildlife and critical habitats proximal to research sites, plan to maintain adequate distances, and seek guidance on any required permits or authorizations.
16. If the proposed research site is within an Antarctic Specially Protected Area (ASP), consult the ASP Management Plan in order to ensure that the planned activity is permitted within the area.
17. If the proposed research work is within an Antarctic Specially Managed Area (ASMA), a copy of the ASMA Management Plan should be obtained and the guidelines understood. A permit is not required to enter an ASMA; however, it is recommended that the relevant national authority is made aware of any intention to undertake geological research, including sampling, within any Scientific or Restricted Zones, as described within the associated ASMA Management Plan.
18. Consider if the proposed field location is also being accessed by other geoscientists, including those from nations other than your own. At locations where geologists from different nations are operating, consideration should be given to coordinating activities to minimise environmental impacts and potential oversampling.

In the field

19. In accordance with an EIA, assessed by an appropriate national authority, researchers may remove geological samples for further scientific study. To maintain the scientific integrity of a location, do not move fossil, mineral or rock materials out of their original stratigraphic context into another stratigraphic context.
20. If geological or palaeontological samples are to be taken for the purpose of research, then do not oversample the site and minimize, if possible, the extraction of large amounts of fossils or rare minerals. Sample only the minimum amount of material required for the scientific project, and in accordance with the quantities specified in the EIA for the project. Enough material/specimens should be left to allow future workers to understand the context of the material.
21. Under exceptional circumstances, it is recognised that it may be necessary to collect a rare or fragile specimen, thus leaving no further material. Once the study is finished, this material should be deposited in an appropriate repository of geological samples.
22. If sites are at imminent risk of being destroyed by earth system processes (such as permafrost thawing driving enhanced erosion, mass movements such as landslides, lake water level changes or erosion processes) try to gather as much information as possible (e.g. photographs, samples, etc.) and inform national authorities.
23. Minimise the use of explosives, rock saws, rock drills and other mechanical equipment for sample collection.
24. In work performed in rock and unconsolidated sediment profiles (e.g. where sedimentary sequences are cleaned to permit more accurate description/sampling), after sampling leave the surface as worked on, without trying to restore the original appearance of the site. The 'clean' surface has more scientific, educational and visual value than the restored one. However, if the researcher considers that leaving the surface as worked on is likely to increase erosion, steps to minimised erosion, such as infilling, should be undertaken.
25. Take steps to minimise the potential for any spills of fuel, water for cooling drills or slurry generated from drill or saw operations. Appropriate absorbent materials to contain fuel spills should be made available and, if used, necessary arrangements should be made for fuel contaminated absorbent material to be evacuated from the site and treated in accordance with Annex III to the Protocol.
26. If, during field research, a geological site of particular interest or outstanding scientific or intrinsic value is discovered, please inform the relevant national and international authorities (e.g. the geosciences representative of the national SCAR Committee (<https://www.scar.org/members-and-officers/national-committees/>) and the SCAR Geosciences Group (<https://www.scar.org/science/gsg/about/>)). Please provide information, including the location, the spatial scale of the site, a simple description that includes details on the importance of the site, pictures and a reference bibliography. If the scientific value of a location is in jeopardy due to anthropogenic impact, report this information, as detailed above.

Fossils

27. When taking plaster casts of fossils, do not leave evidence of plaster in the field after the plaster jacket is removed.
28. If sieving for tiny fossils, do it on site and take care to avoid deposit mixing, which is often unrecognizable in sediments that are poorly sorted.

Geomorphological features

29. Some features, such as boulder belts and drop stones, overturned clasts, scuffs and scrapes, perched cobbles and compressed ground, are not be obvious to non-experts and may be easily disturbed. Care should be taken to minimise disturbance to fragile geomorphological features, including, for example, recently deglaciated environments, patterned ground (i.e. frost-sorted polygons, stone stripes), dunes, glaciofluvial terraces, proglacial environments and raised beaches. Minimize vehicle and pedestrian movement over these areas if possible.
30. Avoid disturbing ventifacts or changing their orientation.
31. When digging into marine, lacustrine or glacio-fluvial terraces, take care to minimize the size of the cut section, especially if the remaining landform is very small.

Meteorites

32. Meteorites can be found in Antarctica mainly on the ice surface or sub-surface, particularly in areas of upwelling blue ice. It is essential that candidate meteorites are not contaminated by handling, as this could compromise their use in future science (i.e. organic studies, astrobiology, halogen studies and light isotope studies).
33. Should a candidate meteorite be found, it should not be touched or removed until adequate precautions have been taken to avoid physical disturbance and chemical and biological contamination and to preserve its scientific value. Take photographs, note the GPS position, mark the location with a temporary marker (such as a flag), and contact meteorite experts for further guidance on meteorite collection.
34. If expertise is available and collection is undertaken, meteorites should be collected and curated according to accepted standards (e.g. https://www.nsf.gov/geo/opp/antarct/meteorite_regs.jsp), and should be made available for scientific purposes (see ATCM XXIV Resolution 3 (2001)).

Sampling for cosmogenic nuclide dating

35. Erratics and polished surfaces may be of scientific use to date glacial advances and retreats as well as ice thinning using a variety of cosmogenic dating procedures. This methodology requires the erratics and surfaces to remain undisturbed. In order to preserve their scientific value, researchers and other visitors should be careful not to move or overturn erratics or perched clasts or damaged bedrock surfaces.
36. Researchers should not collect all the erratics in a given area to ensure that future research using different techniques may be possible. If complete boulder samples or smaller sized samples are taken, where possible archive a portion of the sample for future research using potentially more sophisticated methodologies.
37. Consideration should be given to recording human movement within areas using GPS and making this information available, so that future researchers may more easily identify boulders likely be undisturbed by human activity in the area.
38. Collecting samples for cosmogenic dating is destructive. Do not use rock drills, rock saws or other mechanical tools of high destructive capacity. Any sample collected for cosmogenic dating should be collected by means of a hammer and chisel.
39. At times not all the collected samples are processed. Therefore, if available, deposit remaining samples and remains in repositories with public access and/or share the sample metadata through publically-accessible websites in order to optimize material-sharing within the framework of scientific cooperation.

Geophysical field research

40. When establishing autonomous instrumentation on rock, snow or ice, ensure that the site is visited and, if necessary, the equipment raised frequently enough to prevent damage or irretrievable burial. Retrieval of elements of the equipment may not be practical or feasible (e.g. deeply buried cabling). Take steps to keep this to a minimum, particularly during the planning phase of the project. The location of such equipment, and any disturbance related to its use, should be recorded and reported with a high degree of accuracy.
41. When carrying out permitted geophysical procedures, including seismic surveys, electrical resistivity tomography or radar surveys, consider proximity to local wildlife and minimise disturbance as much as possible.
42. If constructing a concrete base or plinth on which to mount geophysical research equipment, use pre-cast concrete. Where this is not possible, and concrete is to be cast on site, take appropriate steps to minimise environmental impact from wind-blown cement dust.
43. When establishing geophysical reference stations, take steps to ensure that they are demarcated and obvious so that they are not inadvertently damaged or destroyed. Remove markers and equipment when the work is complete or when they are deemed of no further scientific use. Under some circumstances, it may be important to maintain constructed reference stations plinths, bases or platforms (such as used in geodetical markers or gravimetric base stations) for future reference after the initial research is complete. In such cases, the station bases or structures should be clearly marked, details of their position and purpose submitted to an appropriate national database, and the need for their on-going presence reviewed periodically (e.g., every five years). Once deemed no longer necessary, they should be removed.

Post field work

44. If geological samples are transported through another country en route to the home nation, please ensure that any legal requirements of that country are understood in order to avoid legal problems (i.e. at the customs).
45. Information, as appropriate to the study, should be provided to a publicly available repository or database such as the National Data Centre, which may also link to the AMD after the field work. Such information should include: quantity of samples collected, location of general sample area (including GPS position (necessary metadata: latitude, longitude, geodetic datum specified (e.g. WGS84)), sampling method, type of transportation (e.g. use of vehicles), evidence of previous impacts in the area, if any artificial structure has been left and for how long it is expected to remain, if site restoration was performed, etc.
46. If during your field work you recognized that sites of geological value are in danger of being degraded by natural or anthropogenic processes, send details (potentially in the form of a post-visit report) to the national Antarctic programme and SCAR Geosciences Group.
47. In order to maximize scientific benefit and cooperation, ensure samples are made available to other researchers by placing them in an appropriate publicly-accessible geological collection, according to international agreements, national laws and repository regulations.
48. Ensure adequate information on samples likely to be of future scientific value is recorded (e.g. sample numbering, sample location, orientation, etc.) and made available to other researchers once the samples are placed in a geological or palaeontological collection.
49. Repositories should retain sample metadata and link to the Antarctic Master Directory so future workers can find the material and make samples available to future workers.
50. All publications resulting from geological fieldwork should acknowledge where the field samples and data are stored.