

Design and Implementation of the Brazilian Information System on Antarctic Environmental Research

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Summary. Data generated by environmental research activities in Antarctica are essential for evaluating how its biodiversity and environment are being affected by changes that are happening at a global scale and that are triggered by ever-increasing human activities. In this work, we describe the Brazilian Information System on Antarctic Environmental Research (BrISAntar), which enables the acquiring, storing and querying of research data generated by activities of the Brazilian National Institute for Science and Technology on Antarctic Environmental Research. Even though BrISAntar's data model is organized around field gathering operations, to facilitate querying, it is straightforward to export data stored in BrISAntar to standards commonly used standards in the field.

Keywords. Antarctic environmental research, scientific data management.

1. Introduction

Global environments have been extensively changed by humans, which has impacted on the biodiversity of these environments. Antarctica is no exception to this trend, having seen increases in air temperature and reduction in its glaciers. To determine more precisely the extension and rate of biodiversity change, it is essential to gather, archive, and analyze data on spatial and temporal distribution of species along with information about their surrounding environment [1–2]. It is also important to use data integration techniques in order to make these data discoverable and queryable.

In this work, the Brazilian Information System on Antarctic Environmental Research (BrISAntar) is presented; an information system that enables the acquiring, storing, and querying of research data generated by the Brazilian National Institute for Science and Technology on Antarctic Environmental Research [3].

2. BrISAntar Overview

Here, the architecture and a simplified view of the

conceptual data model of BrISAntar are presented. The architecture of BrISAntar is organized into the following layers: Presentation, Application, Persistence, and Database.

The Presentation layer contains the logic for rendering the user interface that includes, for instance, functionality for uploading data about collected samples and performed analyses. The Application layer is responsible for managing transactions related to the application logic. The Persistence layer manages data on a relational database.

The conceptual data model of BrISAntar is organized around the concepts of operations and campaigns, which are related to actual field expeditions for collecting samples and performing measurements. Figure 1 characterizes the order that must be followed when populating the database, where an Operantar represents the beginning of an annual expedition that is given by several campaigns in the Antarctic region. These campaigns are executed at a specific station; a geographical region with fixed points where sample collection is carried out.

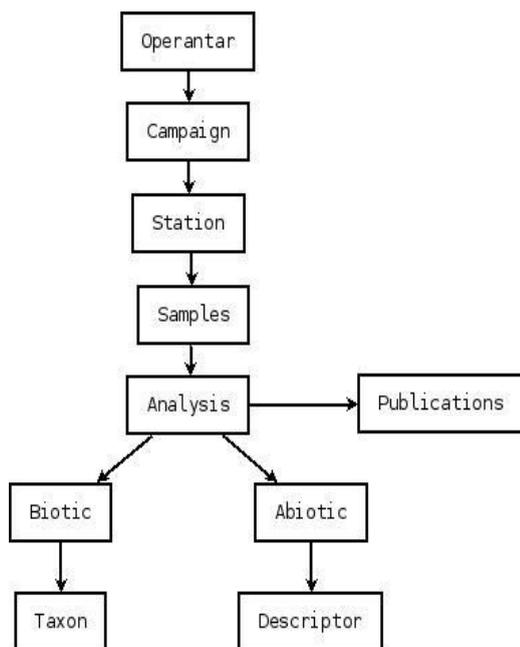


Figure 1. Proposed data model.

With these collected samples, different types of analysis are performed and the results registered. Results are classified in two types: biotic or abiotic. Biotic results are stored following the structure of a known taxonomic database, whereas abiotic results are stored as a set of descriptors and values. The results produced by an analysis may lead to a scientific publication and in this case, information about the publication should also be registered in the system.

3. Conclusions

In its current state, BrISAntar facilitates data acquisition, storage, and querying; providing a valuable tool to the Brazilian community on Antarctic environmental research. Additional functionalities currently being developed include: a data visualization and analysis module, where data can be visualized in maps or through charts;

data publication modules for exporting data using Darwin Core [4] and Ecological Metadata Language [2] data standards to enable integration of the data available in BrISAntar with those in global infrastructures such as the Global Biodiversity Information Facility [5] (in particular, the Antarctic Biodiversity Information Facility [6]) and the Data Observation Network for Earth [7]— a scientific workflow module for enabling scientists to automate their analysis routines.

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