A spatial database in support to glaciological research during the International Polar Year 2007-2008

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In the framework of the international project Global Land Ice Measurements from Space (GLIMS), a glacier inventory of the Antarctic Peninsula was established. The GLIMS objectives are to monitor glaciers on the Earth using primarily satellite data. The Department of Physical Geography of the University of Freiburg is integrated in GLIMS as the Regional Center (RC) for the Antarctic Peninsula. As the Antarctic Peninsula covers a large region extending from approximately 60° S/55° W to 75° S/80° W, the RC Antarctic Peninsula cooperates with several international scientific and administrative institutions. These partners are responsible for the analysis of glaciers in specific sub-regions of the research area.

To record and manage results from satellite image analyses on glaciers on the Antarctic Peninsula and to administer metadata describing such analyses, we implemented a glacier database containing data on more than 950 glaciers. The relational database design is compatible with the GLIMS data transfer standards and was developed using free and open source software. The semantics are compliant with the GLIMS data dictionary and the Scientific Committee on Antarctic Research (SCAR) Feature Catalogue. It enables full compatibility with the GLIMS central database and the emerging Antarctic Spatial Data Infrastructure (AntSDI). Furthermore, the relational structure of the database facilitates the record of additional cryospheric data resulting from further projects.

Web access interfaces have been developed both for human interaction and for machine to machine communication. A browser-based interface allows users to query the glacier data base using text search or through interactive maps. The machine-to-machine accessibility is based on open web services implementing Open GIS Consortium (OGC) specifications and relevant ISO TC211 standards. Querying and retrieving spatial features and their attributes through an OGC Web Feature Service (WFS) interface for example enables interoperability with other OGC compliant applications such as GIS packages or spatially enabled data mining tools at the feature level.

In this paper, we describe the structure and functionality of the Antarctic Peninsula Glacier Database and its web based interfaces. In addition, we give examples of using the database to support glaciological research during the International Polar Year 2007-2008.