

A geospatial database for the sub-Antarctic Prince Edward Islands



EM Rudolph, DW Hedding, PJN De Bruyn & W Nel

University of the Free State, University of South Africa, University of Pretoria & University of Fort Hare

Introduction

The sub-Antarctic Prince Edward Islands (47°S 38°E) are sentinels for terrestrial and marine research in the southern Indian Ocean due to their unique location (Figure 1). On the larger Marion Island, scientific research has been continuous for the last five decades and included a range of botanical, geological, geomorphological, and biological studies. On Prince Edward Island, access has been restricted to ~ten people every four years and research has been limited to botany and ornithology.

Scientific endeavours on the islands depend on accurate geospatial information, however, for the Prince Edward Islands such data was only available in hardcopy format, or, if available digitally, had limited spatial coverage and/or resolution. Generally, such data are shared informally among scientists or are reproduced ad-hoc from publications. Consequently, circulating data are rarely curated or updated, or sometimes lost entirely as researchers retire or move.

Aim

To address this need a geospatial database for the Prince Edward Islands was produced from a fine scale digital surface model and is available to download from an open access data repository. The naming process of the Prince Edward Islands' features also remained unfinished and we provide a more detailed frame of reference here.

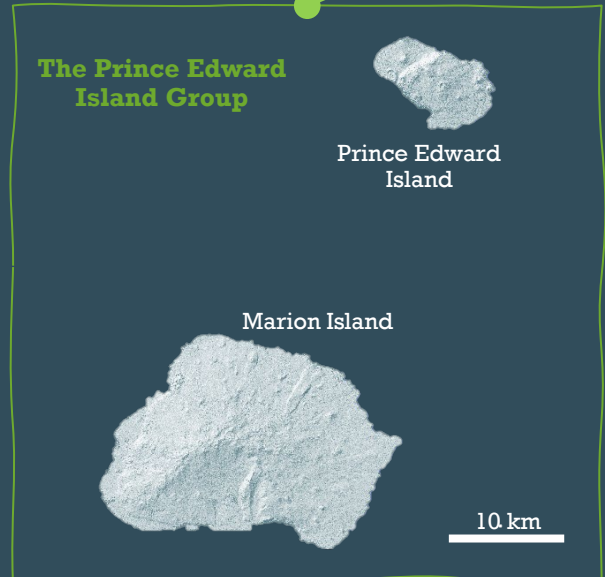


Figure 1 – Location of the Prince Edward Islands

Methods

The geospatial data was generated in Esri® ArcGIS® Desktop 10.6 using a digital surface model with a 1 m x 1 m cell size resolution and 0.7 m vertical accuracy. This DSM was produced by the Chief Directorate: National Geospatial Information of the South African Department of Agriculture, Land Reform and Rural Development. All the topographical data were generated directly from the DSM. Waterbodies or 'lakes' were mapped with the combined use of a hillshade raster and satellite imagery from Earth Observing 1 - Advanced Land Imager, QuickBird, WorldView 1 and WorldView 2. A list of documented place names were compiled from original surveys and maps, and updated from the Prince Edward Islands Management Plan. A summary of marine mammal monitoring beaches and coastal zones and their code identifiers was compiled. Using this dataset, a set of maps were constructed for both islands, each one showing their respective topographical and hydrological features, and another depicting the location of marine mammal monitoring beaches and coastal zones.

The Final Geodatabase

The contents of the final database and map series can be seen in Figure 2 & Table 1. The data layers include complete metadata according to the built-in ISO 19139 metadata standards of Esri® ArcCatalog™. Vector data can be downloaded as Esri® shapefiles or OGC® GeoPackages and maps are available in .pdf and .tif formats.

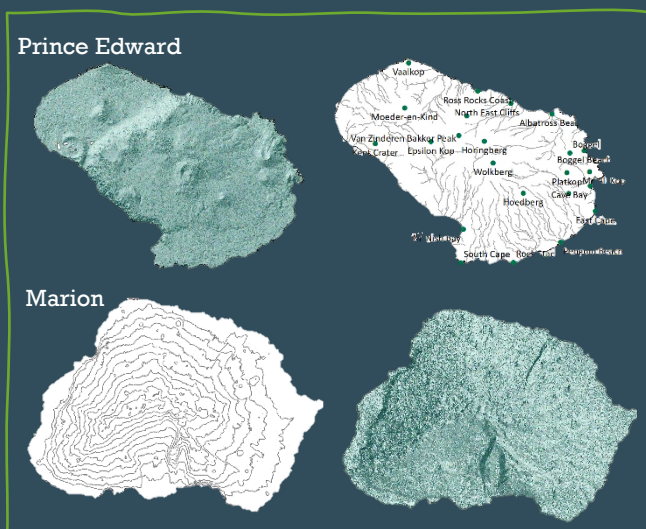


Figure 2 – A preview of the data layers

Table 1 - The contents of the geospatial database

● RASTER	hillshade, slope, aspect
● VECTOR	drainage, lakes, contours
● PLACES	peaks, ridges capes, points, marine mammal monitoring beaches
● MAPS	locality, topographical, hydrological

From: Rudolph, E.M., Hedding, D.W., de Bruyn, P.J.N. & Nel, W. (in press) An open access geospatial database for the sub-Antarctic Prince Edward Islands. *South African Journal of Science*.