

AREA PRESERVING GENERALIZATION OF THE GSHHS DATA

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GSHHS (Global Self-consistent, Hierarchical, High-resolution Shoreline Database) is a database of world shorelines. The authors of the database are Dr. P. Wessel and Dr. W. H. F. Smith. The data are compiled from two publicly available datasets (<http://www.ngdc.noaa.gov/mgg/shorelines/gshhs.html>). The GSHHS data have public access and are given in geographic coordinates of WGS84.

GSHHS data are provided in the most detailed level in addition to four generalized versions, each with different level of details. Generalization was done using the Douglas-Peucker algorithm. The generalized data contain flaws due to the generalization algorithm used. The main flaws are visible angularity in lines and collapsing of small polygons into a line.

A new approach to the generalization of the GSHHS data is presented in this paper. Our own algorithm with the property of area preservation was used. A detailed description of the algorithm has already been published. Generalization was performed in equal-area map projections and the data were finally transformed into the latitude/longitude coordinate system of the original data. The control parameter of the algorithm is distance in map units. All map projections introduce linear distortions and in case of global data, these errors can increase or decrease distances a few times. Therefore, for the generalization of the global dataset, it is necessary to take into account map linear distortions and thereby treat the whole dataset in the same manner. The distances should be calculated on the spheroid. If the distances are calculated in the map projection, then they have to be corrected for map linear distortions.

The research of our algorithm application resulted in a simple relation of the algorithm's parameter value and map scale. The relation is parameter value = map scale denominator/2300. This relation was obtained from a set of island coastlines in the Adriatic Sea and in this paper it will be tested on coastlines in general.

The GSHHS data was generalized for the map scales 1:1 000 000, 1:2 000 000, 1:5 000 000, 1:10 000 000, 1:20 000 000, 1:50 000 000 and 1:100 000 000 and are available for viewing and downloading on the Internet. Islands with areas smaller than 0.4 square millimeters in map scale were filtered from the final version. The task was solved entirely using GRASS GIS, which was upgraded with user functions for line generalization based on our algorithm.