High resolution bathymetric compilation for Potter Cove, WAP, Antarctica:

DETAILED DATA DESCRIPTION

- Authors: K. Jerosch, F. Scharf (Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research (AWI), Bremerhaven)

- Spatial extent: Top: -62.2184 DD, Left: -58.7428 DD, Right: -58.6361 DD, Bottom: -62.2649 DD
- Units: m
- Spatial Reference: WGS_1984_UTM_zone_21S

This bathymetry raster with a resolution of 5*5m is processed from unpublished single beam data from the *Argentine Antarctica Institute* (G. Tosonotto, IAA, Buenos Aires) and multibeam data from the *United Kingdom Hydrographic Office* (UKHO) with a cell size of 5*5m.

Additionally, a coastline was digitized from a WorldView2 satellite image (DigitalGlobe (2014), WorldView-2 scene 103001001F612100, © DigitalGlobe, Longmont, Colorado, 2013/03/07) supplemented the interpolation process. The 'contour type option' in the 'Topo to Raster' tool in ArcMap 10.3 was used to add this coastline representing a depth of 0m to the interpolation process.

Data collection and sources

- UKHO: the dataset was collected between the 13th and 15th January 2012, Equipment used: Multibeam system: Kongsberg EM3002.

  Spatial Reference: geographic coordinate system, WGS84

  Pitch, roll and heave corrections were examined and archived within the original rendered project. Tidal correction was carried out to a specially installed gauge, levelled to local benchmarks.

  Data have been made available by Judith Thomas (UKHO) and are restricted to the international IMCONET project (http://www.imconet.eu/)
- Tosonotto: austral summer 2010, equipment used: single beam integrated system Ecosounder-GPS Garmin, data obtained from a Zodiac, tidal correction carried out to the mean sea level

  Spatial Reference: geographic coordinate system, WGS84
- Coastline data: march 2013, manually digitized by F. Scharf (AWI) from pansharpened and orthorectified satellite image, DigitalGlobe (2014), WorldView-2 scene 103001001F612100, © DigitalGlobe, Longmont, Colorado, 2013/03/07)

  Orthorectification and Panshapening carried out by S. Lippl, Uni Erlangen

Accuracy limitation:

- no correction of pitch, roll, heave on single beam data
- no tidal correction on digitized coastline data

Data processing bathymetry

- was conducted with the 'Topo to Raster' tool in ArcMap 10.3
- The calculation was performed with the following settings:
  arcpy.TopoToRaster_3d(in_topo_features="bathy_raw_UKHO_Tos_IntNewCoastline depth PointElevation;PC_CoastineWV2_All Depth Contour", out_surface_raster="XY", cell_size="5", extent="409516.2457 3095237.2154 417125.7896 3100273.0238", Margin="20", minimum_z_value="", maximum_z_value="0", enforce="NO_ENFORCE", data_type="SPOT", maximum_iterations="20", roughness_penalty="", discrete_error_factor="1", vertical_standard_error="0", tolerance_1="0", tolerance_2="1", out_stream_features="", out_sink_features="", out_diagnostic_file="", out_parameter_file="", profile_penalty="", out_residual_feature="", out_stream_cliff_error_feature="", out_contour_error_feature="")

Data processing derivatives

- **Aspect:** processed with Tool from the Benthic Terrain Modeller (Wright et al. 2012), the aspect identifies the downslope direction of the maximum rate of change in value from each cell to its neighbors. It can be thought of as the slope direction. The values of the output raster are the compass direction of the aspect.

Input Parameters:

-- Elevation Raster: bathy_pcoast

-- Elevation Units: Meters

-- Elevation Projection: WGS_1984_UTM_Zone_21S

-- Elevation X/Y Units: Meter

- **Hillshade:** processed with Spatial Analyst Tool from ArcToolbox, with the following settings: azimuth: 315 Degrees, altitude: 45 Degrees, model_shadows: No , z_factor: 2.

Input Parameters:

-- Elevation Raster: bathy_pccoast

-- Elevation Units: Meters

-- Elevation Projection: WGS_1984_UTM_Zone_21S

-- Elevation X/Y Units: Meter

-- Z-Factor: 2

- **Ruggedness** (VRM): processed with Tool from the Benthic Terrain Modeller (Wright et al. 2012) - as the variation in three-dimensional orientation of grid cells within a neigborhood. This method effectively captures the variability in slope and aspect into a single measure. Ruggedness values for natural terrains range between 0 and about 0.4.

Input Parameters:

-- Neighborhood Size: 5

-- Input raster: bathy_pccoast

- **Slope:** processed with 'Calculate Slope' Tool from the Benthic Terrain Modeller (Wright et al. 2012), identifies the slope (gradient, or rate of maximum change in z-value) from each cell of a raster surface. Slope Units: Degrees

Input Parameters:

-- Elevation Raster: bathy_pccoast

-- Elevation Units: Meters

-- Elevation Projection: WGS_1984_UTM_Zone_21S

-- Elevation X/Y Units: Meter

- **Morphology**: processed with the Benthic Terrain Modeller (Wright et al. 2012). The Benthic Terrain Modeler (BTM) v3.0 toolbox for ArcGIS is a collection of Esri ArcGIS-based tools that coastal and marine resource managers can use in concert with bathymetric data sets to examine and classify the benthic terrain. The BTM toolbox contains a set of customized scripts that allow users to create grids of bathymetric position index (BPI), standardized BPIs, slope, and rugosity from an input bathymetric data set. Additionally, two terrain classification scripts give users the freedom to create their own zone and structure classifications and define the relationships that characterize them.

  Detailed methodology is given here (HERE WE LATER NEED A REFERENCE TO ANOTHER PUBLICATION): For each survey area it is an iterative process to define search radiuses, representing best the local geomorphic features (structures and zones). The two BPI rasters together with the slope and the basic bathymetry raster are used in a classification process to identify geomorphological structures resulting in the definition of seabed classes. For the Potter Cove the fine scale BPI raster was calculated with an inner radius of 0m and an outer radius of 15m, the broad scale BPI raster respectively with an inner radius of 15m and an outer radius of 250m. In the classification we differentiated three different slope categories, based on natural breaks classification of the slope map: 0-8, 8-20 and >20°. Further we defined three different depth categoriesbased on a quantile classification of bathymetry raster: 0 to -10m, -10 to -57m, < -57m.

<u>A set of nine bathymetry relevant or bathymetry derived is provided:</u>

1. bathy_pc: Convex hull bathymetry (raster clipped with a polygon of the convex hull of the data points)

2. bathy_pccoast: Coastline bathymetry (raster clipped with a polygon that combined the digitized coastline with the convex hull of the data points on the seaward side)

3. bathy_pccoa_a: Aspect raster of the coastline bathymetry

4. bathy_pccoa_h: Hillshade raster of the coastline bathymetry

5. bathy_pccoa_r: Ruggedness raster of the coastline bathymetry

6. bathy_pccoa_s: Slope raster of the coastline bathymetry

7. bathy_pccoa_m: Morphology raster of the coastline bathymetry

8. bathy_source: Data sources (raster providing information about the data sources)

9. coastlinePC_2013: coastline digitized from satellite image DigitalGlobe (2014), WorldView-2 scene 103001001F612100, © DigitalGlobe, Longmont, Colorado, 2013/03/07)