

Boundary-based delineation

Title Boundary-based delineation

Description

The “**Boundary-based delineation**” tool can be applied directly to bathymetric DEM and, when the general seascape is otherwise flat, it might be sufficient to isolate and correctly delineate the targeted features. However, this is often not the case, and the interference of sloping topography or other underlying large-scale landforms can distort the signal of the targets. In this case, the “Boundary-based delineation” tool can also use a LTP derivative to isolate a specific wavelength thought to best delineate the feature of interest.

Illustration



Usage

The “**Boundary-based Delineation**” tool, when using exclusively the DEM as delineation input, takes advantage of the hydrological algorithm “**Fill**”. This algorithm will fill up positive or negative enclosed relief, according to the relief of the targeted features. Then the filled output will be subtracted from the original DEM, creating a flat surface with only the potential features of interest. Then a user-defined threshold, the Vertical Cutoff, is used to define the contour line that is going to be the base of the delineation.

When an LTP layer is provided as input, the “**Boundary-based Delineation**” Tool will reclassify the derived raster according to the user-defined threshold Vertical Cutoff.

Once all the areas of confined morphologies are delineated based on the Vertical Cutoff threshold, a sequence of steps is followed and features that do not satisfy the criteria set by the user-defined thresholds will be excluded. The threshold covers aspects related to the minimum vertical relief and dimensions expected for the targeted feature. Additionally, the user can filter the features delineated using geomorphons classification layer.

The delineation of some features, especially based on some LTPs layers, may fail to include the top of positive features or the base of the negative features, by focusing on areas of change of relief – creating holes within the delineating polygons. If that occurs, the user can choose to have it automatically removed.

Syntax

Delineate_ (inputDEM, {inputDer}, in_fill_dirac, cutoffVR, minVR, minWidth, minRatio, delBuffer, workspace, outFeat, {WBTyn}, {inputGeo}, {minGeoRatio}, {delHoles}, {delTemp})

Parameter	Explanation	Data Type
inputDEM	Dialog Reference	Raster Layer

The DEM that will be used as input.
There is no python reference for this parameter.

inputDer (Optional)	Dialog Reference The LPT derivative to be used to base the delineation. There is no python reference for this parameter.	Raster Layer
in_fill_direc	Dialog Reference This defines the type of features that will be mapped by identifying the targeted features' vertical relief. The user can choose between: POSITIVE (e.g., mounds, drumlins) or NEGATIVE (e.g., pockmarks, sinkholes). There is no python reference for this parameter.	String
cutoffVR	Dialog Reference The value that will be used as the confining boundary and used to delineate the features. This value will be in meters if the delineation is fully based on the source DEM, OR on the derivative unit, if the latter is used. When the targeted features are well disconnected for other features, this value should be as low as possible, to best capture the geometry of the feature's boundary. However, the user may want to use a higher value to reduce the likelihood of adjacent features being mapped as a conjoined polygon. There is no python reference for this parameter.	Double
minVR	Dialog Reference Only features with a vertical relief greater than the Minimum Vertical Relief value will be mapped. There is no python reference for this parameter.	Double
minWidth	Dialog Reference Minimum Width threshold allows to exclude features based on their size. Only features with width greater the Minimum Width value will be mapped. There is no python reference for this parameter.	Double
minRatio	Dialog Reference The Minimum Width/Length Ratio threshold allows to exclude features based on their shape. Width and Length are defined by the features' Minimum Bounding Geometry (MBG) It should be noted that the Minimum Width/Length Ratio value can range from 1 (for a circle-shaped feature) to almost 0 (for a very elongated feature). There is no python reference for this parameter.	Double
delBuffer	Dialog Reference The Buffer Distance value is applied to the initial polygons created based on the feature's internal contour line corresponding to the Vertical Cutoff.	Double

The Buffer Distance should reflect approximately the distance, in plan view, from the reference internal contour line delineated to the actual rim/edge of the features.

There is no python reference for this parameter.

workspace	<p>Dialog Reference Geodatabases cannot be used in this version of the CoMMA Toolbox.</p> <p>There is no python reference for this parameter.</p>	Workspace
outFeat	<p>Dialog Reference The name of the output shapefile with the delineated features.</p> <p>There is no python reference for this parameter.</p>	String
WBTyn (Optional)	<p>Dialog Reference When checked, by setting a Minimum Geomorphons ratio threshold, it is possible to exclude features based on the area cover by certain geomorphons classes.</p> <p>There is no python reference for this parameter.</p>	Boolean
inputGeo (Optional)	<p>Dialog Reference The input classified landforms raster, generated directly from the DEM or from an LPT-derived raster.</p> <p>Every cell of this raster will have an integer value corresponding to a specific landform type: Flat—cell value 1, Peak—cell value 2, Ridge—cell value 3, Shoulder—cell value 4, Spur—cell value 5, Slope—cell value 6, Hollow—cell value 7, Footslope—cell value 8, Valley—cell value 9, Pit—cell value 10.</p> <p>There is no python reference for this parameter.</p>	Raster Layer
minGeoRatio (Optional)	<p>Dialog Reference Features with a ratio geomorphons area/total area smaller than Minimum Geomorphons ratio threshold will be excluded from the delineation.</p> <p>There is no python reference for this parameter.</p>	Double
delHoles (Optional)	<p>Dialog Reference When checked, holes inside a delineated feature are removed.</p> <p>The delineation of some features, especially based on some LTPs layers, may fail to include the top of positive features or the base of the negative features, by focusing on the main areas of change of relief – creating holes within the delineating polygons.</p> <p>There is no python reference for this parameter.</p>	Boolean
delTemp (Optional)	<p>Dialog Reference When checked all the files within the temp folder will be deleted.</p> <p>It should be noted that some of these “intermediate” files could be useful to understand the reason behind an unexpected output. If the tool is run multiple times the</p>	Boolean

temp files will be overwrite, to avoid excessive use of disk space. If is required to compare the temp files created with different parameters, then different workspaces should be selected.

There is no python reference for this parameter.

Code Samples

There are no code samples for this tool.

Tags

Features delineation.

Credits

Arosio, R., Gafeira, J. & De Clippele, L. (2023) CoMMa Toolbox - Version 1.0
(<https://github.com/ricarosio/CoMMa/tree/main>)

Riccardo Arosio (University College Cork) and Joana Gafeira (British Geological Survey) conceived the original idea of the new ArcGIS Pro based on a previous toolbox created by Joana Gafeira, the BGS Seabed Mapping Toolbox (Gafeira, J., 2017). Riccardo Arosio wrote the Python scripts while Joana Gafeira and Laurence De Clippele performed extensive testing.

The tools development was mainly funded by INFOMAR through the Irish Marine Institute's research grant PDOC 19/08/03. The British Geological Survey and iAtlantic have also supported the creation of the toolbox.

Use limitations

CoMMa Toolbox may be freely distributed, modified and used commercially under the terms of its GNU LGPLv3 license.

You are currently using the Item Description metadata style. Change your metadata style in the Options dialog box to see additional metadata content.