



# **HydrOffice Bress Manual**

***Release 2.4.0***

**2023, CCOM/JHC, UNH**

**Jan 29, 2023**



# CONTENTS

<b>1</b>	<b>In brief</b>	<b>1</b>
<b>2</b>	<b>User manual</b>	<b>3</b>
<b>3</b>	<b>Command Line Interface</b>	<b>25</b>
<b>4</b>	<b>List of references</b>	<b>27</b>
<b>5</b>	<b>Development notes</b>	<b>29</b>
<b>6</b>	<b>How to contribute</b>	<b>31</b>
<b>7</b>	<b>License</b>	<b>33</b>
<b>8</b>	<b>Credits</b>	<b>37</b>



IN BRIEF



The *Bathymetric and Reflectivity-based Estimator for Seafloor Segments* (**BRESS**) library provides tools for seafloor segmentation.

**BRESS** takes a DTM and (optionally) an acoustic backscatter mosaic to identify seafloor segments and provides statistical layers that characterize the segments.



## 2.1 Inputs/Outputs

This tab is mainly used to define the input bathymetry and acoustic backscatter, by selecting files in [ASCII grid](#) (.asc) or native formats (.bathy and .mosaic), as well as set the location for outputs.

To access these functionalities, you need to select the **BRESS** tab on top of the application, then the **Inputs/Outputs** sub-tab at the lower-left corner.

---

**Note:** The native formats (.bathy and .mosaic) are internal binary formats that have been introduced to speed up the reading in memory for gridded data of large size. The app provides a conversion tool in these native formats.

---

### 2.1.1 Data Inputs

In **Data inputs**:

- Drag-and-drop a bathymetric DTM (.asc or .bathy) in the *Bathy DTM* field. The "+" browse button may also be used.
- Optionally, drag-and-drop a flatness grid (.asc or .flatness) in the *Flatness Grid* field. The "+" browse button may also be used.
- Drag-and-drop a reflectivity grid (.asc or .mosaic) in the *Reflectivity* field. The "+" browse button may also be used.
- The directory and filename of loaded data will populate in the respective field of **Data inputs**.
- With the addition of a bathymetric DTM grid, the [Landforms](#) tab on the bottom of the interface will become available ([Fig. 2.1](#)).
- When both a bathymetric DTM and a reflectivity grid are loaded, the [Segments](#) tab on the bottom of the interface will become available ([Fig. 2.1](#)).
- The **Clear data** button may be used to remove all data inputs.
- The **Info** button provides a link to the present manual.
- Additional functionalities are available by right-clicking on the loaded DTM ([Fig. 2.2](#)) and mosaic ([Fig. 2.3](#)):
  - **Read as depths/Read as elevations** (only for DTM's ASCII grid). To be used in case that the values represent depths (positive down), not elevations (positive up, that is the default).
  - **Plot** the DTM ([Fig. 2.4](#)) or the mosaic ([Fig. 2.5](#)).
  - **Edit**. To open the DTM in the [Gridy tool](#) for editing.

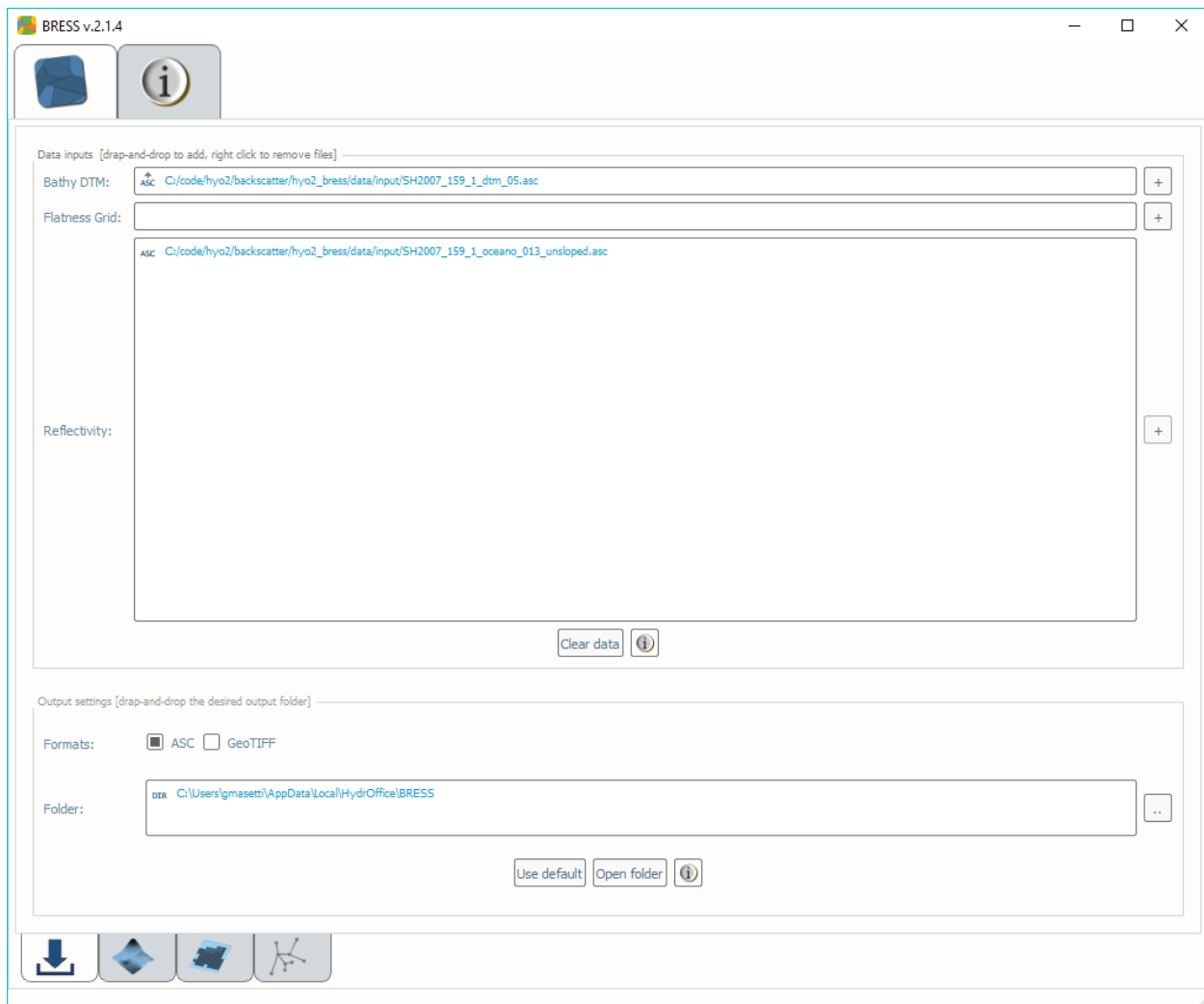


Fig. 2.1: Data Inputs tab.

- **Show mask path** (only if a DTM's mask is loaded).
- **Set mask/Unset mask** (only for DTM's ASCII grid). To pair/unpair the DTM with a landform mask.
- **Save** the DTM or the mosaic in the native binary formats (.bathy and .mosaic, respectively).
- **Remove** the selected input.

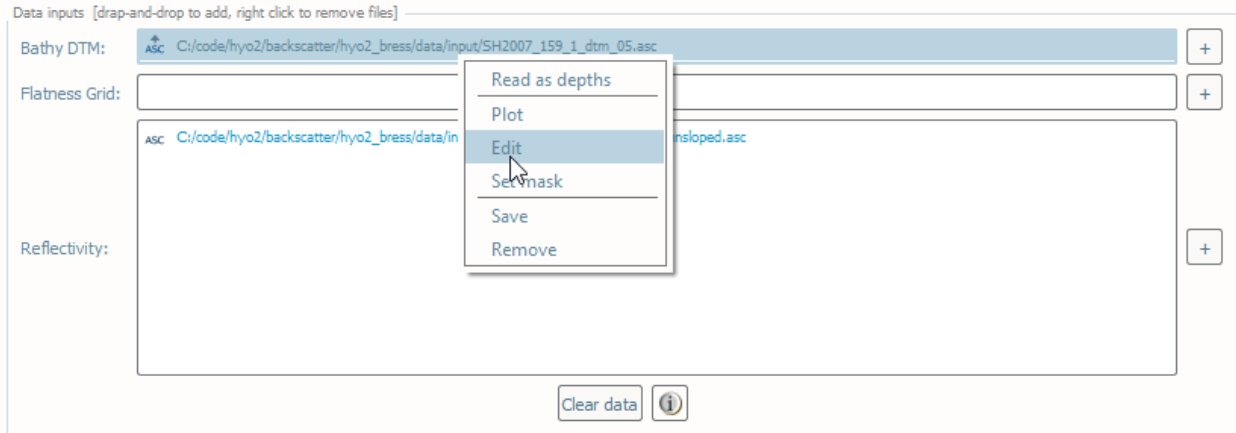


Fig. 2.2: Context menu accessible by right-clicking on a loaded DTM input.

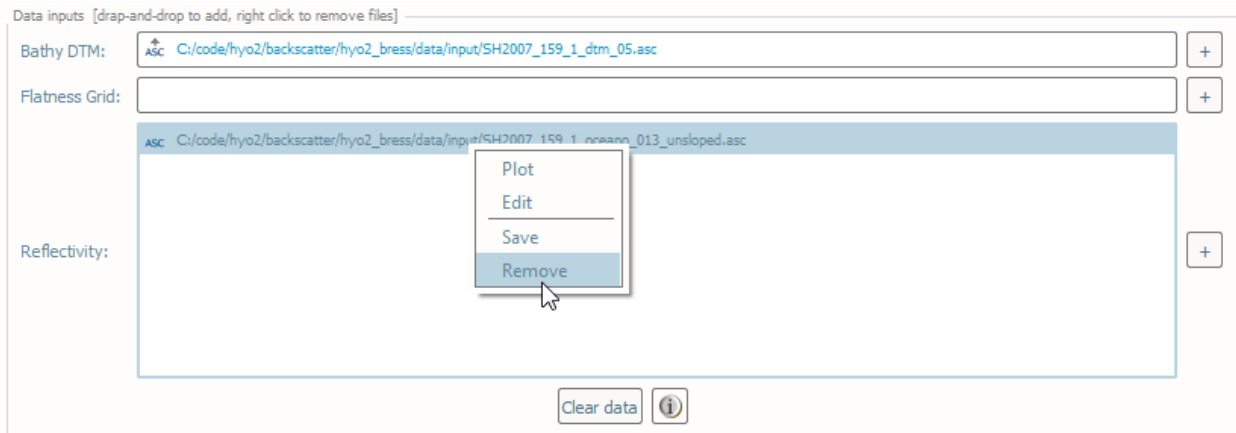


Fig. 2.3: Context menu accessible by right-clicking on a loaded mosaic input.

## 2.1.2 Data Outputs

### In Data outputs:

- The output **Formats** currently available are **ASCII grid** (.asc) and floating-point **GeoTiff** (.tiff).
- The default output **Folder** location is listed; however, this may be modified via drag-and-drop (or browse to) a user-specified output folder. To return to the default output folder location, click **Use default**.
- The ensuing functions will open the output folder automatically upon execution; however, if needed, the specified output folder may be accessed by clicking the **Open folder** button.
- The **Info** button provides a link to the present manual.

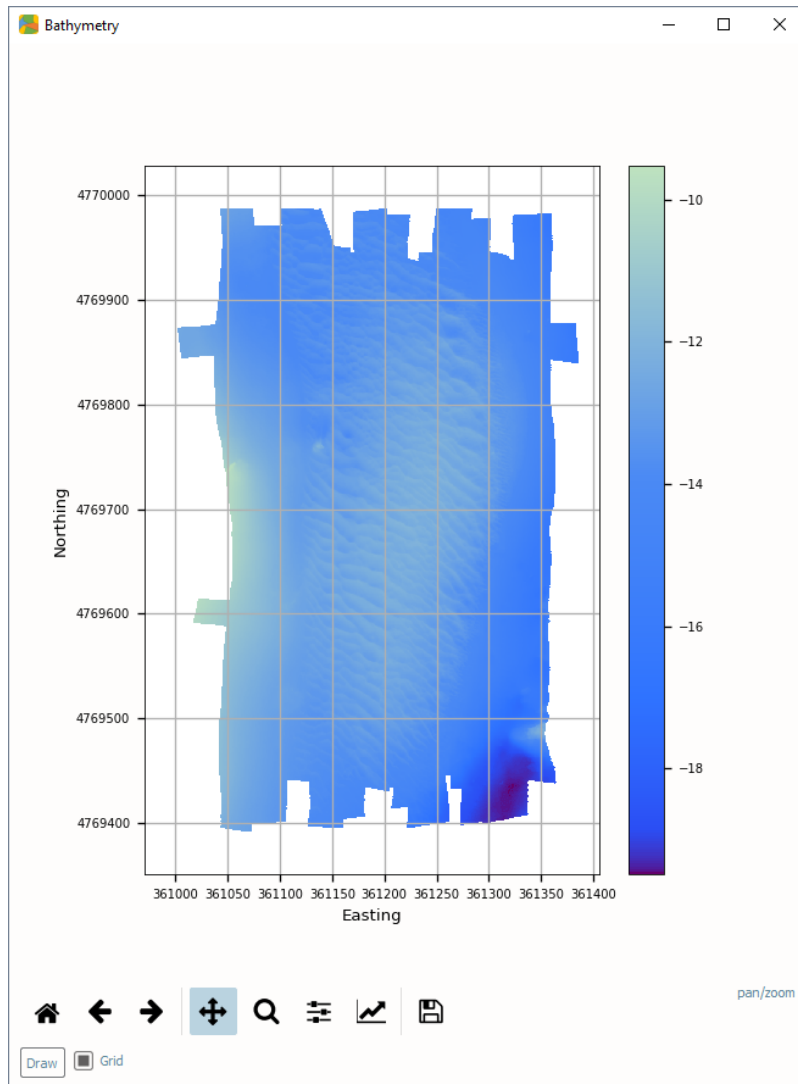


Fig. 2.4: Plot showing the loaded DTM.

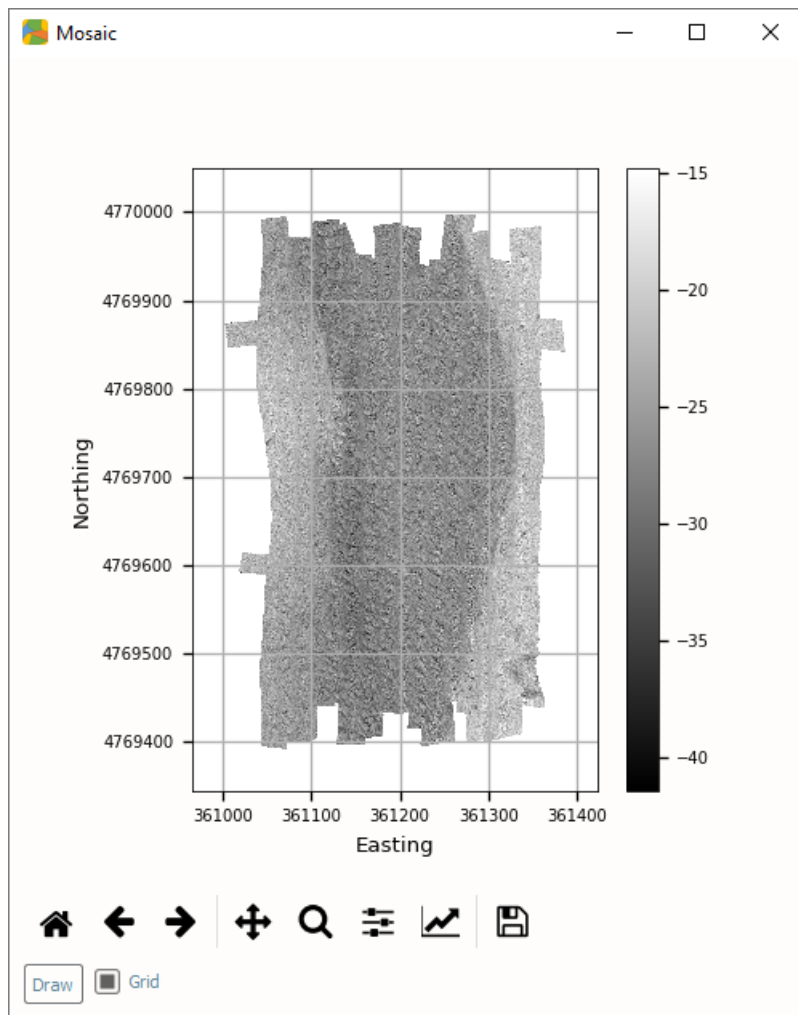


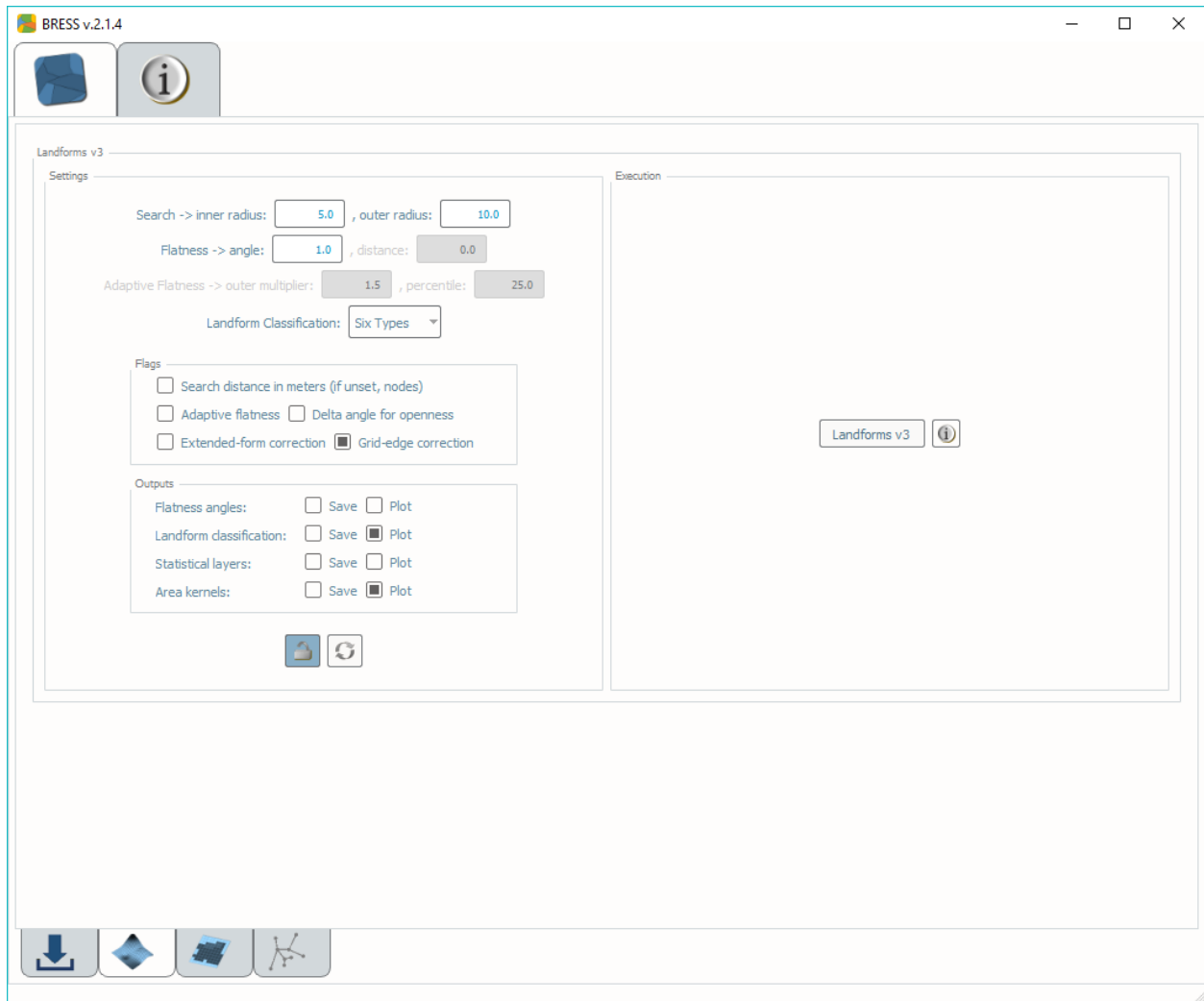
Fig. 2.5: Plot showing the loaded mosaic.

## 2.2 Landforms

This tool mainly classifies bathymetric DTM based on landform type, (optionally) calculates pattern-based statistics, and creates area kernels (connected grid nodes with the same landform type).

### 2.2.1 How To Use?

- Select the **Landforms** tab (Fig. 2.6) on the bottom of the BRESS interface.
- To change the **Settings** for **Landforms v3**:
  - Click the **Unlock** button, and click **OK** to the dialogue.
  - **Set:**
    - \* The inner and outer radii of the search annulus.
    - \* The flatness angle and (if the **Apply correction for extended forms** is flagged) the flatness distance.
    - \* When the **Adaptive flatness** is flagged, the **Outer multiplier** for the outer radius and the adopted **Percentile** (in ascending order) to estimate the flatness angle.
    - \* The kind of landform classification in the **Landform classification** list. The default is a 6-type look-up table (Fig. 2.12).
  - **If required, select the following optional flags:**
    - \* **Search distance in meters:** When flagged, the values in the search annulus are evaluated as meters. Otherwise, number of nodes.
    - \* **Adaptive flatness:** When flagged, the flatness angle is estimated node by node, using the **Outer multiplier** and the **Percentile** fields.
    - \* **Delta angle for openness:** When flagged, a pattern direction is evaluated positive (or negative) when the delta between the zenith and nadir angles is larger than the selected flatness angle.
    - \* **Extended-form correction:** When flagged, the flatness distance is used as the limit at which to increase the threshold height to evaluate a positive (or negative) direction.
    - \* **Grid-edge correction:** When activated, all the nodes with less than eight valid directions are ignored.
  - **The tool can provide the following kinds of outputs (and they can be both saved as ASCII grids or plotted):**
    - \* **Flatness angles** used to calculate the landforms.
    - \* **Landform classification** (see *Landforms*).
    - \* **Statistical layers** (see *Statistical layers*).
    - \* **Area kernels** (see *Area kernels*).
- To reset the **Parameters** to the default initial values, click the **Reset** button.
- In **Execution**, click **Landforms v2**.

Fig. 2.6: The **Landforms** tab.

## 2.2.2 How Does It Work?

### Local Ternary Patterns

The first step of this tool is to calculate the Local Ternary Pattern (LTP) for each node and in the eight surrounding major directions (Fig. 2.7). The openness of each direction is evaluated by comparing the zenith and nadir angles against the flatness angle (Fig. 2.8).

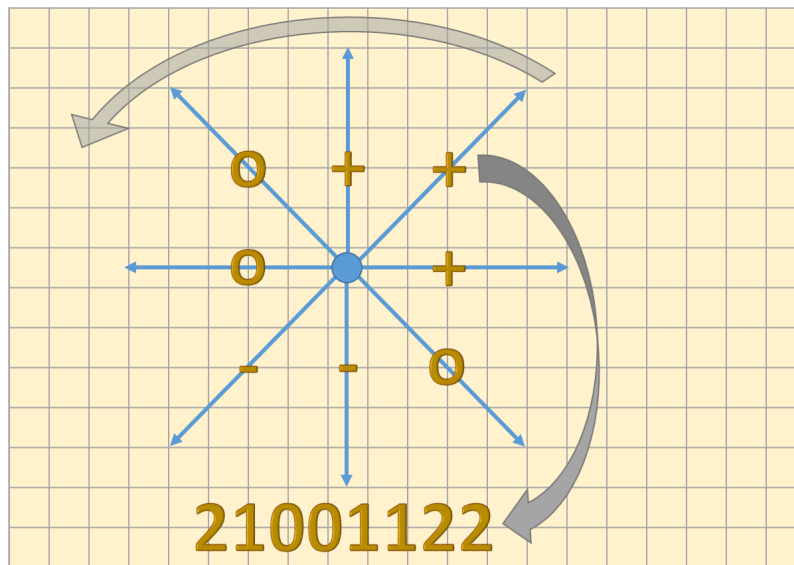


Fig. 2.7: Example of a LTP of a given node.

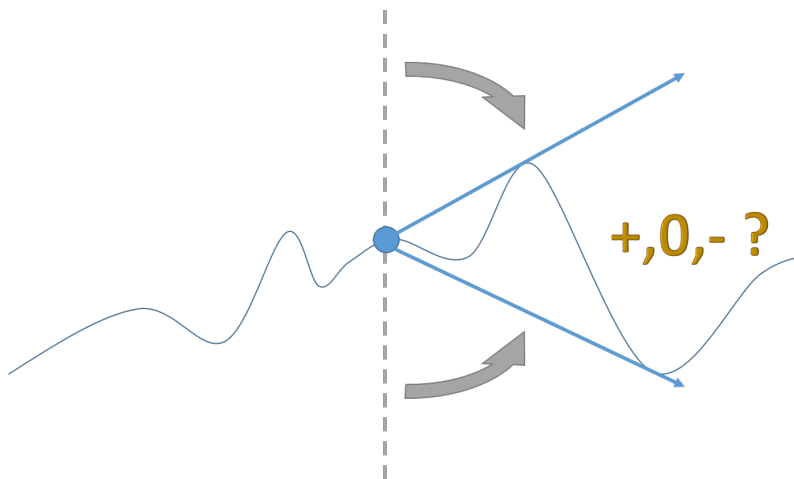


Fig. 2.8: Example of a profile looking at just one of the eight directions.

## Bathymorphons

The possible 6,561 values of LTP are reduced to 498 bathymorphons by removing the duplications after rotating and mirroring the patterns.

## Landforms

The landform classification is obtained by counting the number of positive and negative directions. The number of positive and negative directions are then used to look up in one of the four following tables:

- a 10-type landform-classification table (FL: Flat, PK: Peak, RI: Ridge, SH: Shoulder, CV: Convex Slope, SL: Slope, CN: Concave Slope, FS: Footslope, VL: Valley, PT: Pit) (Fig. 2.9).

$\backslash +$	0	1	2	3	4	5	6	7	8
0	FL	FL	FL	FS	FS	VL	VL	VL	PT
1	FL	FL	FS	FS	FS	VL	VL	VL	
2	FL	SH	SL	SL	CN	CN	VL		
3	SH	SH	SL	SL	SL	CN			
4	SH	SH	CV	SL	SL				
5	RI	RI	CV	CV					
6	RI	RI	RI						
7	RI	RI							
8	PK								

Fig. 2.9: The 10-type landform classification table. For more details, see (*Jasiewicz et al., 2013*).

- a simplified 6-type landform-classification table (FL, RI, SH, SL, FS, VL) (Fig. 2.10).
- a simplified 5-type landform-classification table (PK, FL, RI, SL, VL) (Fig. 2.11).
- a simplified 4-type landform-classification table (FL, RI, SL, VL) (Fig. 2.12).

-/+	0	1	2	3	4	5	6	7	8
0	FL	FL	FL	FS	FS	VL	VL	VL	VL
1	FL	FL	FS	FS	FS	VL	VL	VL	
2	FL	SH	SL	SL	SL	VL	VL		
3	SH	SH	SL	SL	SL	SL			
4	SH	SH	SL	SL	SL				
5	RI	RI	RI	SL					
6	RI	RI	RI						
7	RI	RI							
8	RI								

Fig. 2.10: The 6-type landform classification table. For more details, see ([Masetti et al., 2018](#)).

-/+	0	1	2	3	4	5	6	7	8
0	FL	FL	FL	SL	VL	VL	VL	VL	VL
1	FL	FL	SL	SL	VL	VL	VL	VL	
2	FL	SL	SL	SL	SL	VL	VL		
3	SL	SL	SL	SL	SL	SL			
4	RI	RI	SL	SL	SL				
5	RI	RI	RI	SL					
6	RI	RI	RI						
7	RI	RI							
8	PK								

Fig. 2.11: The 5-type landform classification table.

-/+	0	1	2	3	4	5	6	7	8
0	FL	FL	FL	SL	VL	VL	VL	VL	VL
1	FL	FL	SL	SL	VL	VL	VL	VL	
2	FL	SL	SL	SL	SL	VL	VL		
3	SL	SL	SL	SL	SL	SL			
4	RI	RI	SL	SL	SL				
5	RI	RI	RI	SL					
6	RI	RI	RI						
7	RI	RI							
8	RI								

Fig. 2.12: The 4-type landform classification table.

## Statistical layers

During the calculation of the local ternary patterns, the neighborhood of each grid node is analyzed in the main eight surrounding directions. The analysis requires the calculation of the local **height**, that is the relative elevation of the neighborhood nodes compared to the node being analyzed.

In each direction, the analysis identifies a node (within the *search annulus*) that is used to evaluate the openness of the visible neighborhood. The **patterns polygon** is constructed by connecting these nodes.

During the analysis, a number of statistics are calculated for each grid node:

- **Local Ternary Pattern** (see *Local Ternary Patterns*).
- **Bathymorphon** (see *Bathymorphons*).
- **Valid Patterns**: the number of valid *LTPs* (that is, number of directions along which the openness can be evaluated).
- **Positives**: the number of directions with zenith angle larger than the selected *flatness threshold*.
- **Negatives**: the number of directions with nadir angle larger than the selected *flatness threshold*.
- **Average Height**: the average *height* of the visible neighborhood.
- **Maximum Delta**: the maximum elevation delta (that is, the absolute value of the *height*) of the visible neighborhood.
- **Height Range**: the *height* range of the visible neighborhood.
- **Height Variance**: the *height* variance (calculated using the *Average Height* as mean value) of the visible neighborhood.
- **Average Azimuth**: the average orientation of the *patterns polygon*.
- **Elongation Ratio**: the ratio between the maximum and the minimum dimensions of the *patterns polygon*.
- **Maximum Width**: the maximum dimension (x- vs. y-direction) of the *patterns polygon*.
- **Area Ratio**: the ratio between the area of the *patterns polygon* and its maximum possible extension (based on the *outer search radius*).

## Area kernels

An **area kernel** is created by connecting all the adjacent nodes (Fig. 2.13) that have the same landform classification.

## 2.3 Segments

This tool segments the seafloor based on elevation and reflectivity values. It extends the functionalities provided by the **Landforms** tool (see *Landforms*) by analyzing the reflectivity values co-located with the elevation nodes that belong to each area kernel.

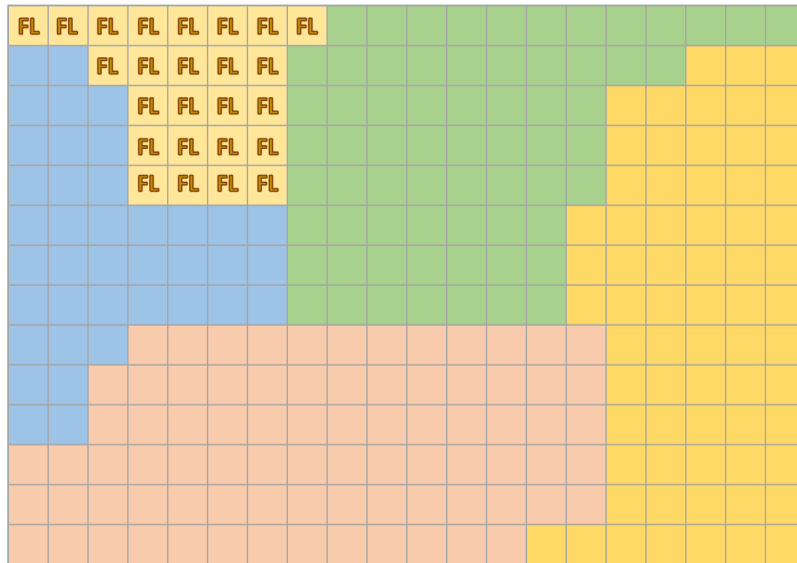
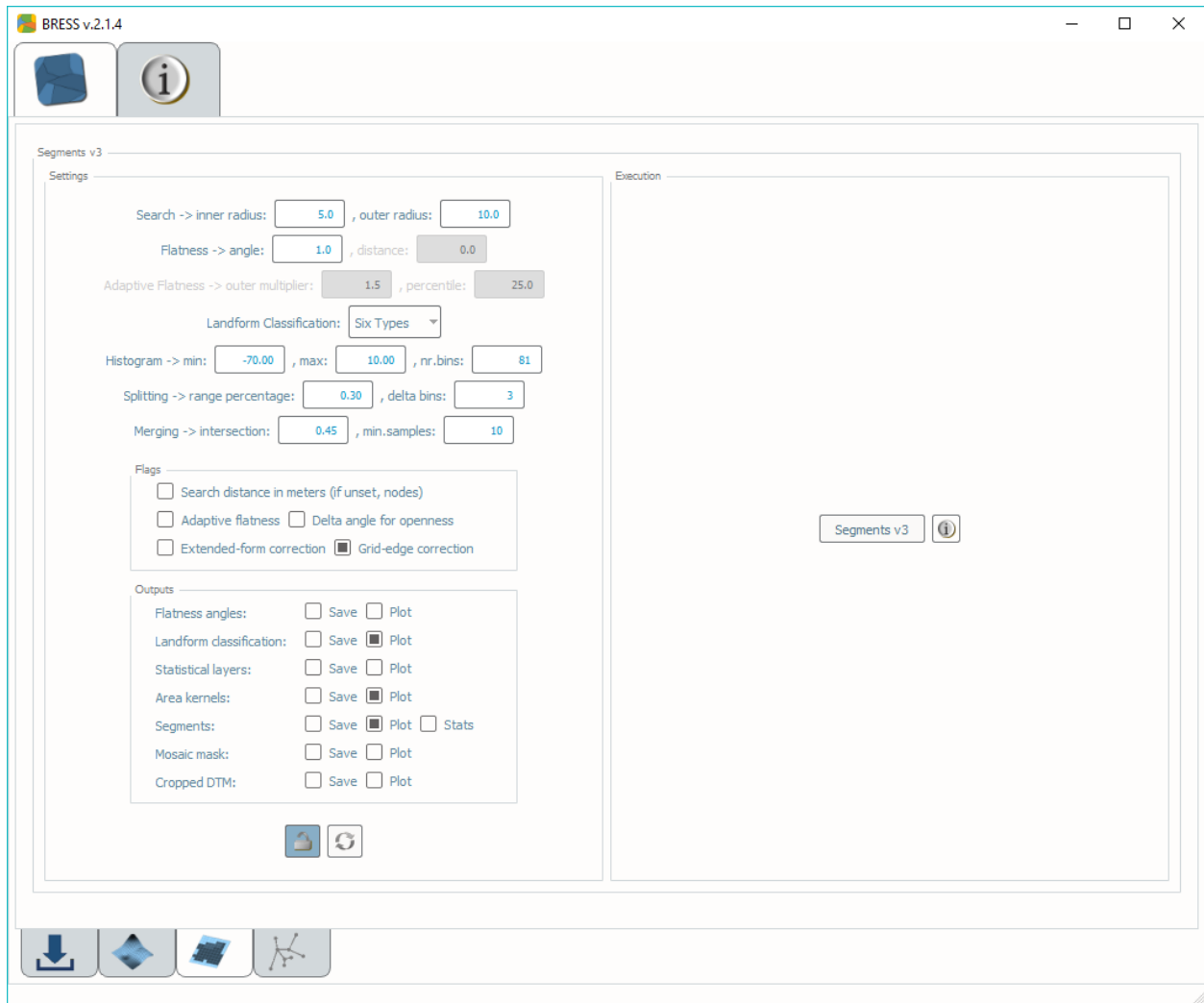


Fig. 2.13: An example of adjacent nodes classified as “FL” (flat) and thus clustered into the same area kernel.

### 2.3.1 How To Use?

- Select the **Segments** tab (Fig. 2.14) on the bottom of the BRESS interface.
- In **Setting**, check the settings of your choice.
- To change the **Settings** for **Segments v2**:
  - Click the **Unlock** button, and click **OK** to the dialogue.
  - The parameters in common with the **Landforms** tool are described in *Landforms*.
  - **The reflectivity Histogram (see *Reflectivity Histogram*) can be customized by modifying:**
    - \* The **min** and the **max** fields that represent the minimum and the maximum values for the histogram’s bins.
    - \* The **nr.bins** field sets the number of bins in which the range between the minimum and the maximum values on the histogram are split.
  - The **range percentage** and the **delta bins** fields are used in the **Splitting** processing step (see *Area Kernels Splitting*) to identify peaks in the reflectivity histogram of each area kernel.
  - The **intersection** and the **min.samples** fields are used during the **Merging** processing step (see *Area Kernels Merging*) to identify the area kernels that can be merged together due to similarity in the reflectivity texture.
  - **In addition to the Landforms products, the tool can provide the following three kinds of outputs (and they can be saved):**
    - \* **Segments** (see *Segments*).
    - \* **Segments Statistics** (see *Segments Statistics*).
    - \* **Mosaic mask** (see *Mosaic Mask*).
    - \* **Cropped DTM** (see *Cropped DTM*).
- To reset the **Parameters** to the default, initial values, click the **Reset** button.
- In **Execution**, click **Segments v2**.

Fig. 2.14: The **Segments** tab.

## 2.3.2 How Does It Work?

### Reflectivity Histogram

The **Reflectivity Histogram** is used to characterize the texture in each *area kernel*.

### Area Kernels Splitting

The **splitting** step evaluates the *reflectivity histogram* of each *area kernel* to identify multi-modality (that is, multiple peaks) (see Fig. 2.15).

The **range percentage** value is used to identify a threshold density (as a percentage of the dynamic range of each histogram) for classifying potential peaks (and, thus, multi-modality) in an area kernel.

The **delta bins** value represents a filter that removes peaks that have an higher peak in the surrounding histogram bins.

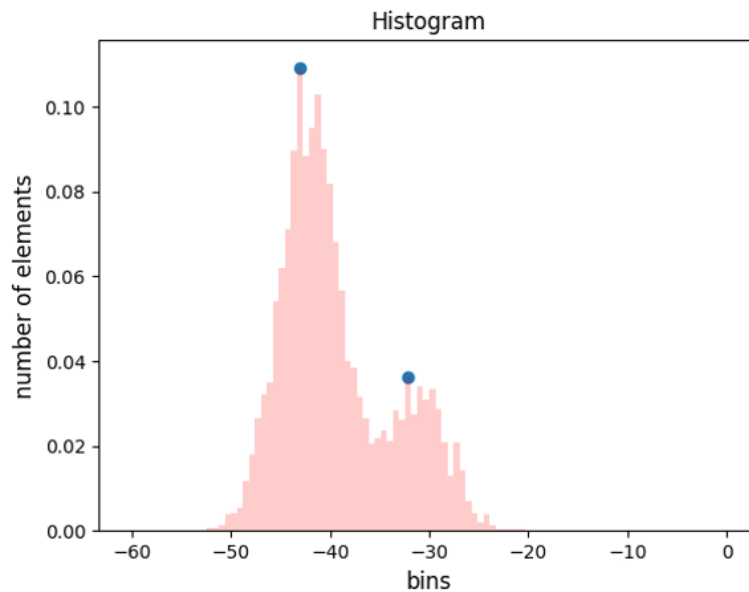


Fig. 2.15: An example of reflectivity histogram with two detected peaks.

### Area Kernels Merging

The **merging** step compares pairs of *reflectivity histograms* to detect similarity in reflectivity textures (see Fig. 2.16).

The **intersection** value provides the criterion used to evaluate if a pair of reflectivity histograms are similar enough to be classified as part of the same segment.

The **min.samples** value is used to ignore the area kernels that are too small in size to have a reliable reflectivity histogram.

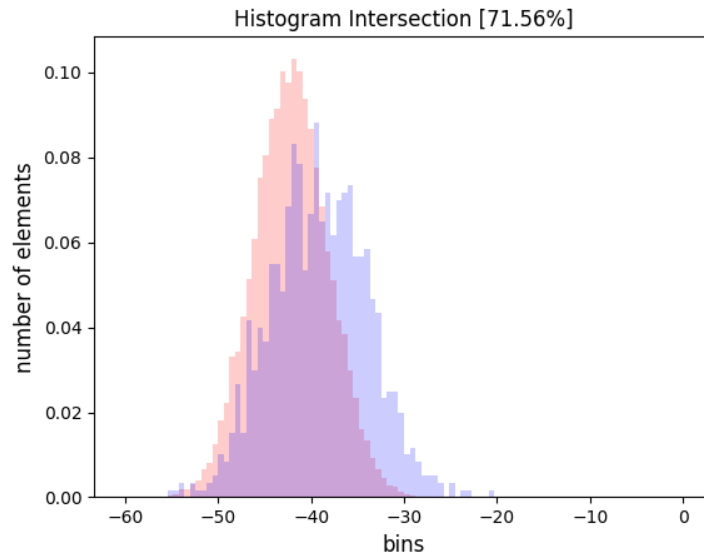


Fig. 2.16: An example of histogram comparison. The pair of reflectivity histograms has an intersection value of 71.56%.

## Segments

A **segment** represents an area that has been classified with the same landform type and similar reflectivity texture.

### Segments Statistics

The **statistics** for each segment are optionally calculated and stored in a .csv file.

The statistical values (i.e., median, mean, and standard deviation) are based on the mosaic values and the *Statistical layers* of all the valid nodes in a segment.

### Mosaic Mask

The **mosaic mask** has the same information as *segments*, but resampled at the resolution of the input reflectivity grid. It is usually used for theme-based seafloor characterization.

### Cropped DTM

The **cropped DTM** is obtained by removing all the unclassified nodes from the input elevation grid.

## 2.4 Info Tab

The *Info* tab (Fig. 2.17) contains numerous helpful links and utilities:

- The application home page
- The Online User Manual (it requires an Internet connection)
- The Offline User Manual (in PDF format, it does *not* require an Internet connection)
- A Bug Report form (it is the suggested mean to submit a possible bug in the application)
- The HydrOffice home page
- The Center for Coastal and Ocean Mapping home page
- The University of New Hampshire home page
- The License information
- The Contacts information and the Authors List
- An About dialog (with details on the local environment where the application is running)

## 2.5 Gridy tool

**Gridy** is a simple tool to visualize and edit grid files (Fig. 2.18).

### 2.5.1 Input toolbar

The Input toolbar (Fig. 2.19) is mainly used to load/unload input files, and retrieve general information about them (Fig. 2.20).

### 2.5.2 Edit toolbar

The Edit toolbar (Fig. 2.21) provides access to several editing tools:

- **Colormap** tool.
- **Shift** tool.
- **Modify** tool.
- **Erase** tool.
- **Mask** tool.

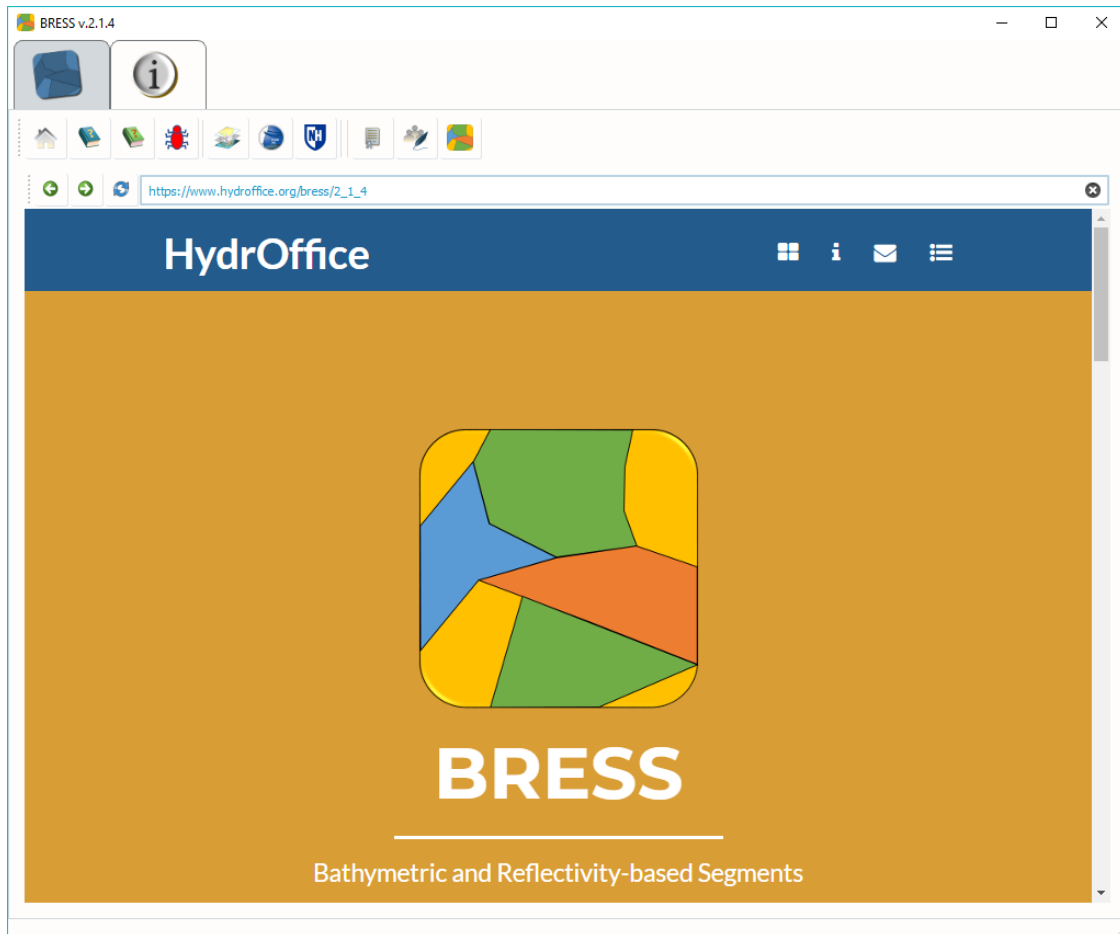


Fig. 2.17: The BRESS's *Info* tab.

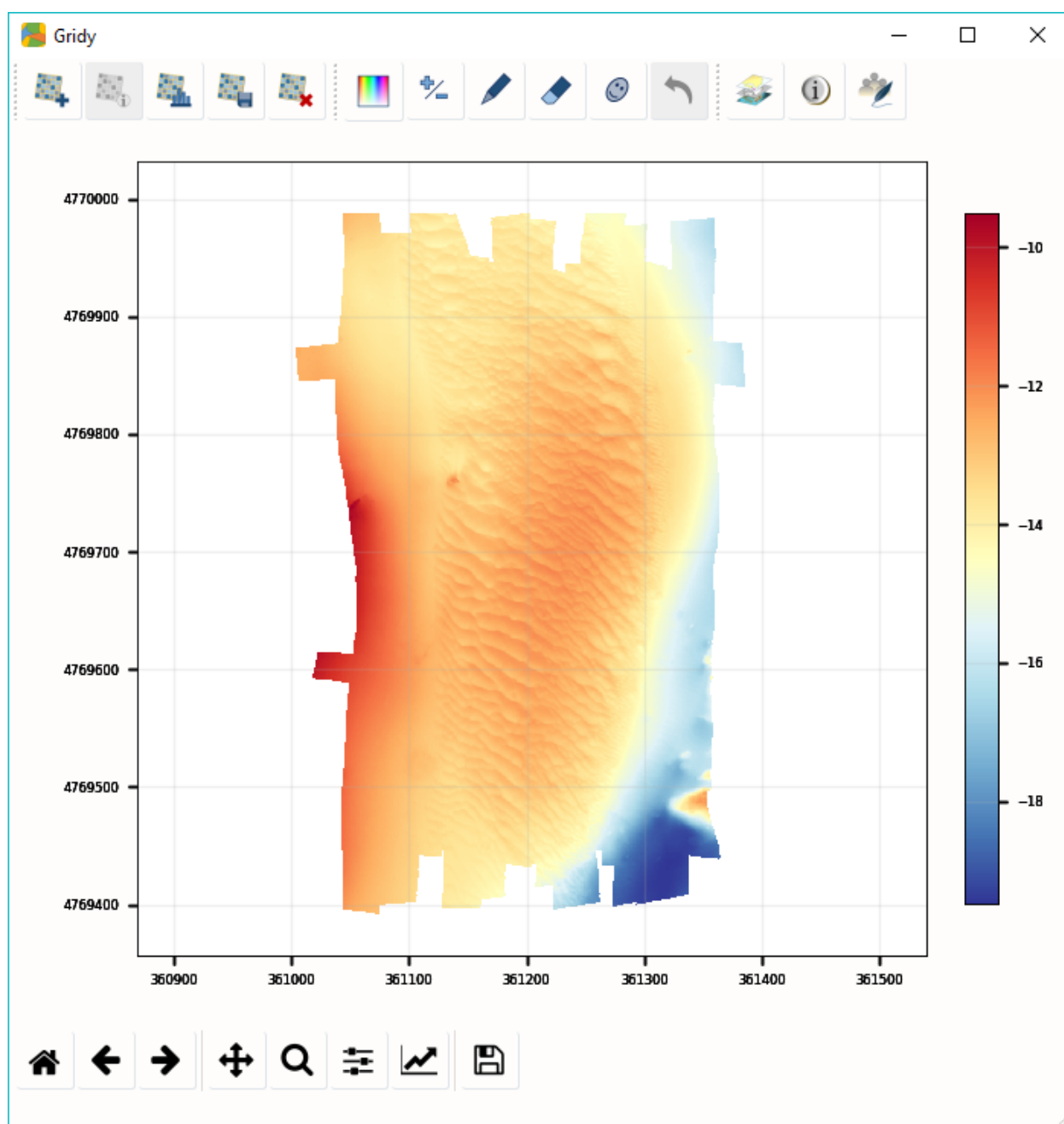


Fig. 2.18: The Gridy tool.



Fig. 2.19: The Input toolbar.

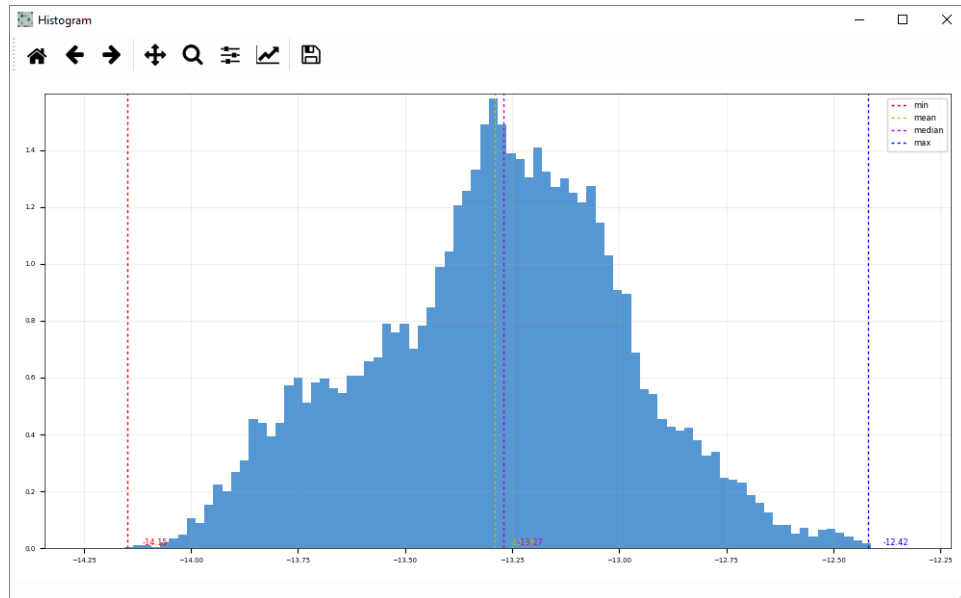


Fig. 2.20: Example of histogram created by Gridy.



Fig. 2.21: The Edit toolbar.



## COMMAND LINE INTERFACE

### 3.1 General Commands

```
usage: Bress [-h] [--version] {Landforms,Segments} ...
```

#### 3.1.1 Named Arguments

**--version**            show program's version number and exit

### 3.2 Landforms

```
usage: Bress Landforms [-h] [-i INNER_RADIUS] [-o OUTER_RADIUS] [-a FLATNESS_ANGLE]
                        [-c {FOUR_TYPES,FIVE_TYPES,SIX_TYPES,TEN_TYPES}] [--disable_edge_
↪correction] [--save_stats]
                        input_dtm output_folder
```

#### 3.2.1 Positional Arguments

**input\_dtm**            set the input DTM file  
**output\_folder**        set the output folder

#### 3.2.2 Named Arguments

**-i, --inner\_radius**    set the inner radius (in cells)  
Default: 1  
**-o, --outer\_radius**    set the outer radius (in cells)  
Default: 3  
**-a, --flatness\_angle** set the flatness angle  
Default: 1.0

**-c, --classification\_table** Possible choices: FOUR\_TYPES, FIVE\_TYPES, SIX\_TYPES, TEN\_TYPES  
select the classification table  
Default: "SIX\_TYPES"

**--disable\_edge\_correction** apply the edge correction  
Default: True

**--save\_stats** save the statistical layers  
Default: False

## LIST OF REFERENCES

- Sowers, D., Masetti, G., Mayer, L.A., Johnson, P., Gardner, J.V., and Armstrong, A.A., 2020, [Standardized Geomorphic Classification of Seafloor Within the United States Atlantic Canyons and Continental Margin](#), *Frontiers in Marine Science*, 7(9), pp. 1-9.
- Masetti, G., Mayer, L.A., Ward, L.G., 2018, [A Bathymetry- and Reflectivity-Based Approach for Seafloor Segmentation](#): *Geosciences*, 8(1), pp. 1-14.
- Jasiewicz, J., Stepinski, T.F., 2013, [Geomorphons - a pattern recognition approach to classification and mapping of landforms](#): *Geomorphology*, 182, pp. 147-156.



## DEVELOPMENT NOTES

N/A



## HOW TO CONTRIBUTE

Every open source project lives from the generous help by contributors that sacrifice their time and this is no different. To make participation as pleasant as possible, this project adheres to the [Code of Conduct](#) by the Python Software Foundation.

Here are a few hints and rules to get you started:

- Add yourself to the [AUTHORS.txt](#) file in an alphabetical fashion. Every contribution is valuable and shall be credited.
- If your change is noteworthy, add an entry to the [changelog](#).
- No contribution is too small; please submit as many fixes for typos and grammar bloopers as you can!
- Don't *ever* break backward compatibility.
- *Always* add tests and docs for your code. This is a hard rule; patches with missing tests or documentation won't be merged. If a feature is not tested or documented, it does not exist.
- Obey [PEP 8](#) and [PEP 257](#).
- Write [good commit messages](#).
- Ideally, [collapse](#) your commits, i.e. make your pull requests just one commit.

---

**Note:** If you have something great but aren't sure whether it adheres – or even can adhere – to the rules above: **please submit a pull request anyway!** In the best case, we can mold it into something, in the worst case the pull request gets politely closed. There's absolutely nothing to fear.

---

Thank you for considering to contribute! If you have any question or concerns, feel free to reach out to us.



## LICENSE

Copyright Notice and License Terms for: hyo2.bress - BRESS package for HydrOffice

Copyright (c) 2021, University of New Hampshire, Center for Coastal and Ocean Mapping

Released under a dual license:

- Community license (under LGPL v3)
- [Industrial Associate license](#)

For more info, visit: <http://www.hydrooffice.org/license/>

---

Community license:

### GNU LESSER GENERAL PUBLIC LICENSE

*Version 3, 29 June 2007*

Copyright (C) 2007 Free Software Foundation, Inc. <<http://fsf.org/>> Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

This version of the GNU Lesser General Public License incorporates the terms and conditions of version 3 of the GNU General Public License, supplemented by the additional permissions listed below.

#### *0. Additional Definitions.*

As used herein, “this License” refers to version 3 of the GNU Lesser General Public License, and the “GNU GPL” refers to version 3 of the GNU General Public License.

“The Library” refers to a covered work governed by this License, other than an Application or a Combined Work as defined below.

An “Application” is any work that makes use of an interface provided by the Library, but which is not otherwise based on the Library. Defining a subclass of a class defined by the Library is deemed a mode of using an interface provided by the Library.

A “Combined Work” is a work produced by combining or linking an Application with the Library. The particular version of the Library with which the Combined Work was made is also called the “Linked Version”.

The “Minimal Corresponding Source” for a Combined Work means the Corresponding Source for the Combined Work, excluding any source code for portions of the Combined Work that, considered in isolation, are based on the Application, and not on the Linked Version.

The “Corresponding Application Code” for a Combined Work means the object code and/or source code for the Application, including any data and utility programs needed for reproducing the Combined Work from the Application, but excluding the System Libraries of the Combined Work.

#### *1. Exception to Section 3 of the GNU GPL.*

You may convey a covered work under sections 3 and 4 of this License without being bound by section 3 of the GNU GPL.

## *2. Conveying Modified Versions.*

If you modify a copy of the Library, and, in your modifications, a facility refers to a function or data to be supplied by an Application that uses the facility (other than as an argument passed when the facility is invoked), then you may convey a copy of the modified version:

- a) under this License, provided that you make a good faith effort to ensure that, in the event an Application does not supply the function or data, the facility still operates, and performs whatever part of its purpose remains meaningful, or
- b) under the GNU GPL, with none of the additional permissions of this License applicable to that copy.

## *3. Object Code Incorporating Material from Library Header Files.*

The object code form of an Application may incorporate material from a header file that is part of the Library. You may convey such object code under terms of your choice, provided that, if the incorporated material is not limited to numerical parameters, data structure layouts and accessors, or small macros, inline functions and templates (ten or fewer lines in length), you do both of the following:

- a) Give prominent notice with each copy of the object code that the Library is used in it and that the Library and its use are covered by this License.
- b) Accompany the object code with a copy of the GNU GPL and this license document.

## *4. Combined Works.*

You may convey a Combined Work under terms of your choice that, taken together, effectively do not restrict modification of the portions of the Library contained in the Combined Work and reverse engineering for debugging such modifications, if you also do each of the following:

- a) Give prominent notice with each copy of the Combined Work that the Library is used in it and that the Library and its use are covered by this License.
- b) Accompany the Combined Work with a copy of the GNU GPL and this license document.
- c) For a Combined Work that displays copyright notices during execution, include the copyright notice for the Library among these notices, as well as a reference directing the user to the copies of the GNU GPL and this license document.
- d) Do one of the following:
  - 0) Convey the Minimal Corresponding Source under the terms of this License, and the Corresponding Application Code in a form suitable for, and under terms that permit, the user to recombine or relink the Application with a modified version of the Linked Version to produce a modified Combined Work, in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.
  - 1) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (a) uses at run time a copy of the Library already present on the user's computer system, and (b) will operate properly with a modified version of the Library that is interface-compatible with the Linked Version.
- e) Provide Installation Information, but only if you would otherwise be required to provide such information under section 6 of the GNU GPL, and only to the extent that such information is necessary to install and execute a modified version of the Combined Work produced by recombining or relinking the Application with a modified version of the Linked Version. (If you use option 4d0, the Installation Information must accompany the Minimal Corresponding Source and Corresponding Application Code. If you use option 4d1, you must provide the Installation Information in the manner specified by section 6 of the GNU GPL for conveying Corresponding Source.)

### *5. Combined Libraries.*

You may place library facilities that are a work based on the Library side by side in a single library together with other library facilities that are not Applications and are not covered by this License, and convey such a combined library under terms of your choice, if you do both of the following:

- a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities, conveyed under the terms of this License.
- b) Give prominent notice with the combined library that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

### *6. Revised Versions of the GNU Lesser General Public License.*

The Free Software Foundation may publish revised and/or new versions of the GNU Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library as you received it specifies that a certain numbered version of the GNU Lesser General Public License “or any later version” applies to it, you have the option of following the terms and conditions either of that published version or of any later version published by the Free Software Foundation. If the Library as you received it does not specify a version number of the GNU Lesser General Public License, you may choose any version of the GNU Lesser General Public License ever published by the Free Software Foundation.

If the Library as you received it specifies that a proxy can decide whether future versions of the GNU Lesser General Public License shall apply, that proxy’s public statement of acceptance of any version is permanent authorization for you to choose that version for the Library.



## CREDITS

BRESS is a project developed by the UNH's [Center for Coastal and Ocean Mapping](#).

For bugs and feature requests: [hydrooffice.oceano@ccom.unh.edu](mailto:hydrooffice.oceano@ccom.unh.edu)

Feel free to contact us for comments and suggestions:

- [Giuseppe Masetti](#)
- [Larry Mayer](#)
- [Larry Ward](#)

The following wonderful people contributed directly or indirectly to this project:

- [Laura Kracker](#)
- [Derek Sowers](#)