

## *Seabed Classification Advice*

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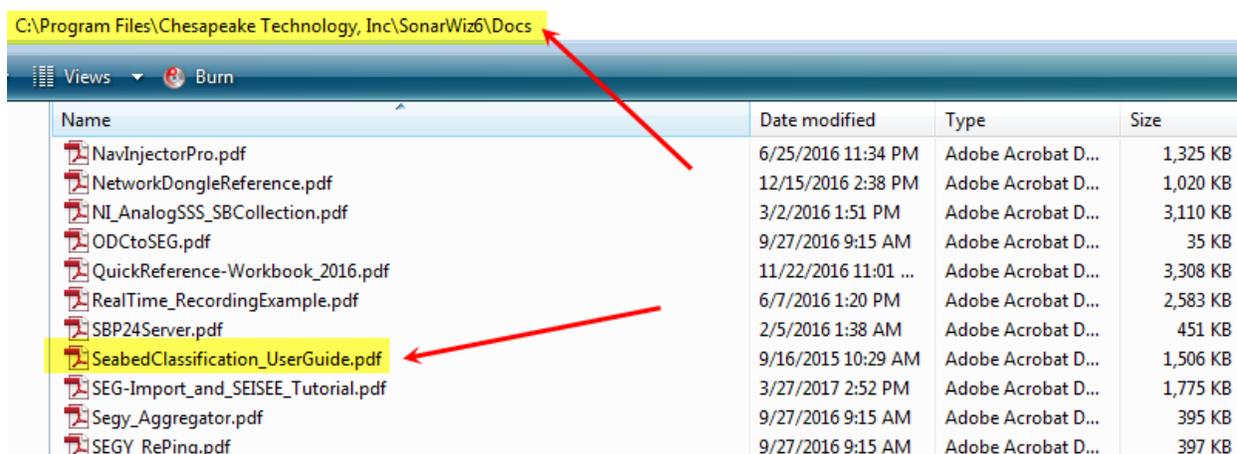
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## 1 SonarWiz Seabed Classification of a CMAX CM2 Sidescan Survey

The follow description was advice given to a user where CMAX CM2 sidescan data had been imported, mosaic'ed , then classified. It's good specific advice, which may be applied to any SS or backscatter data set (backscatter support for seabed classification added in release 6.05.0010), though the SonarWiz 6 seabed classification GUI interface is admittedly a challenge.

### 1.1.1 Main user guide for SonarWiz 6 seabed classification

In addition to the specific advice below, a more overall and general description of this feature set is included in your SonarWiz DOCS folder, here in a SonarWiz 6 64-bit installation example:



### 1.1.2 SonarWiz 7 - coming soon - seabed classification upgraded

**The release of SonarWiz 7 in Q2 2017 is imminent**, and we have revised the seabed classification within SonarWiz 7. You can access a current copy of the SonarWiz 7 seabed classification User Guide here, even prior to the July, 2017 release:

[http://www.chestech-support.com/download/ctisupport/SonarWiz\\_7/UserDocs/SeabedClassification\\_UserGuide\\_SW7.pdf](http://www.chestech-support.com/download/ctisupport/SonarWiz_7/UserDocs/SeabedClassification_UserGuide_SW7.pdf)

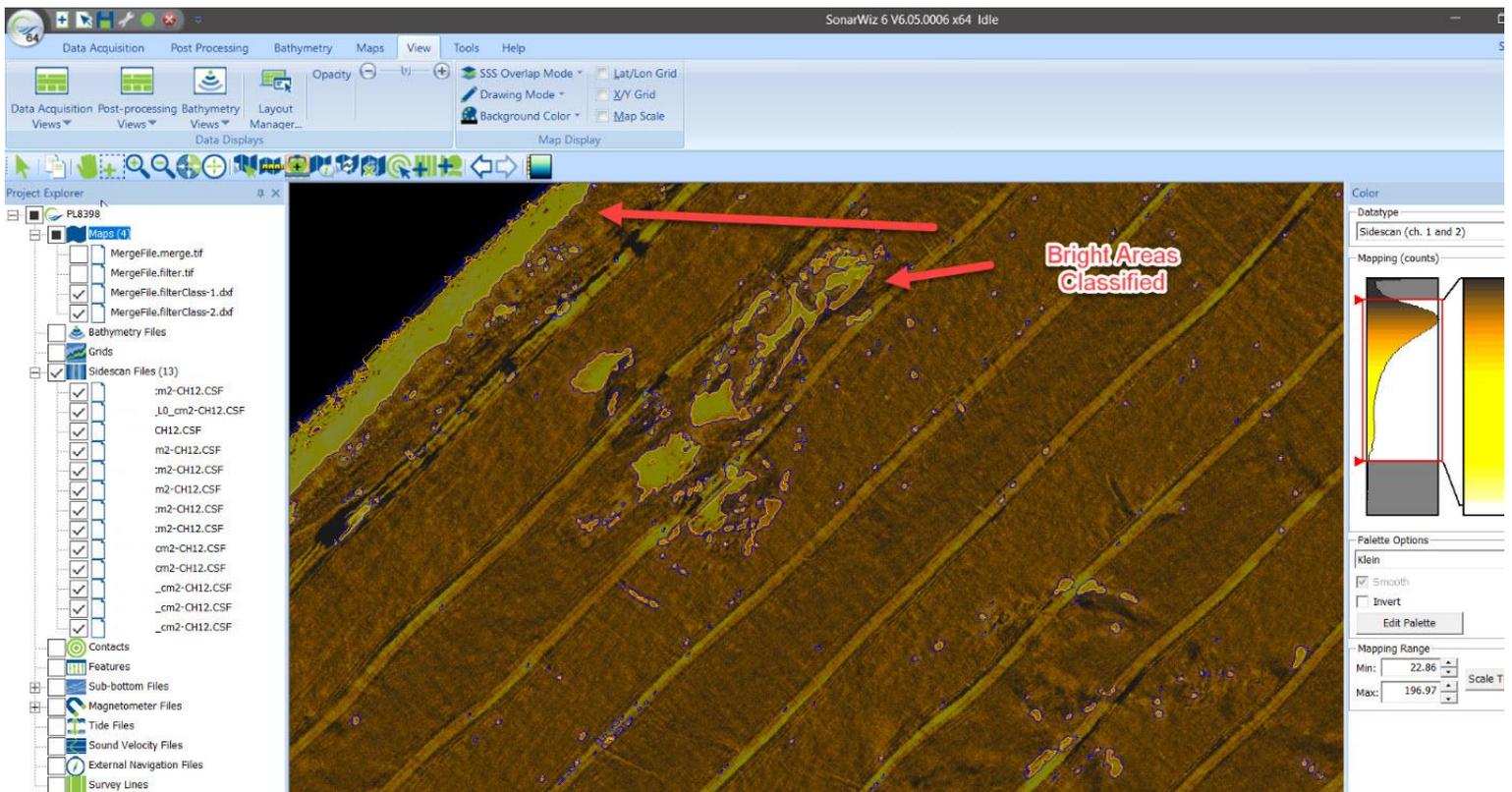
### 1.2 Example CM2 SS Classification - 2 Classes initially

Seabed classification is more art than science, especially with sidescan sonars. Still, we were able to clearly identify 2 distinct classes in this data set, mostly based on sidescan intensity:

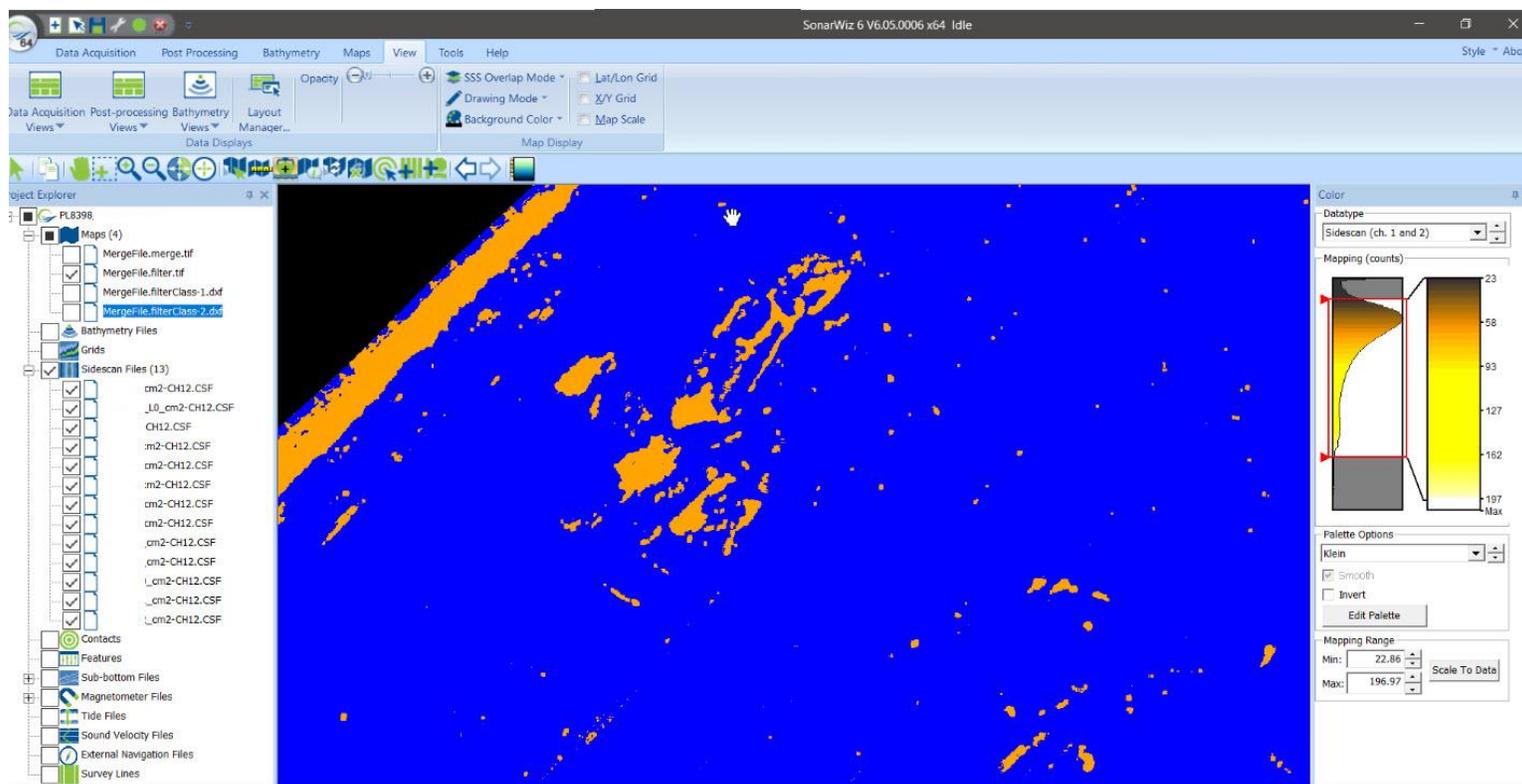
(1) Background areas were Class 1

(2) Bright areas were Class 2

You can almost see the polygons in the image below, which have highlighted the high-intensity Class 2 areas:



Here is the same scene without the sonar background:



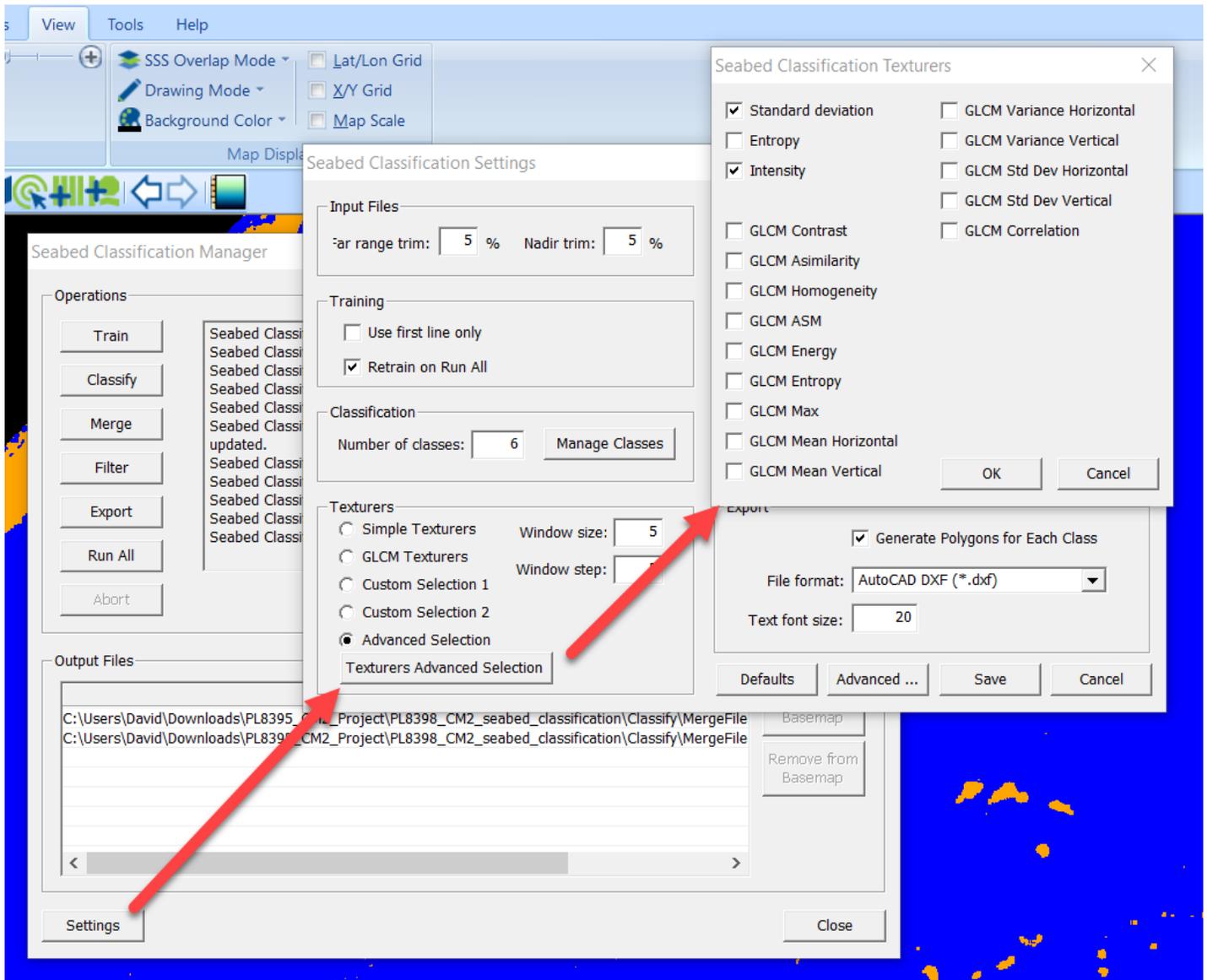
We'll show below, the settings we used, to get this classification, though segmentation may be a more apt description.

### 1.3 General Advice - Preparing to Classify

1. Be sure that you treat each ping in the data set consistently. We recommend you do not use Auto Gain on import, nor should you use BAC, AGC or AutoTVG in the settings menu, after import and before classifying. EGN IS recommended though. Nadir filter is also safe, though the classifier removes the nadir anyway, so this feature isn't that important for classification.
2. We find the default texturers sometimes don't work well on some data sets. For your data, we chose to use Standard Deviation and Intensity. We settled on those by classifying 1 track line a few times using different Texturers until we got a MergeFile we thought was representative. Then we went back and did the whole data set.

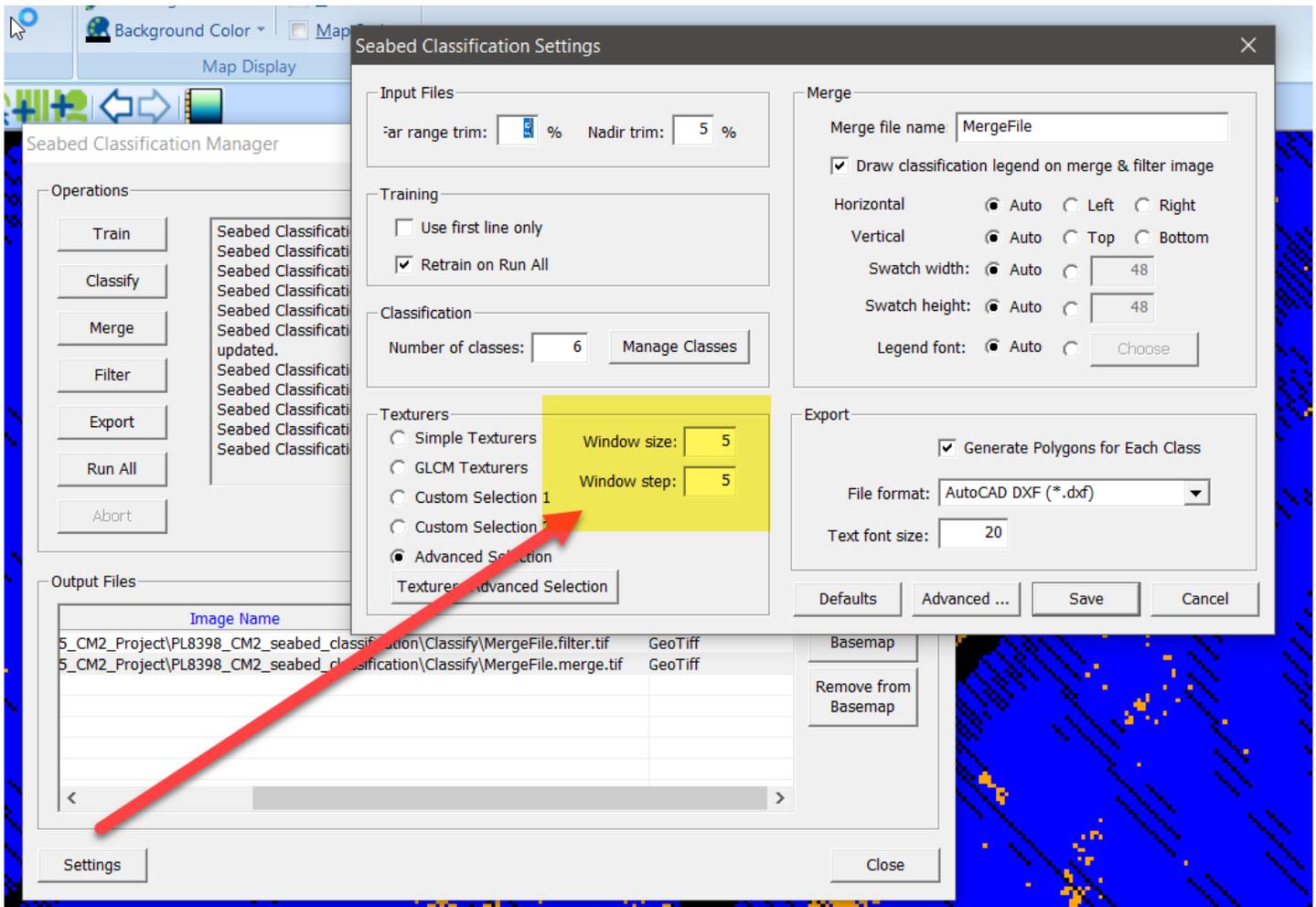
### 1.4 Texturers Advanced Selections - Selecting Texturers and Settings

Here is where you change the Texturers and the settings we used for this particular data set:

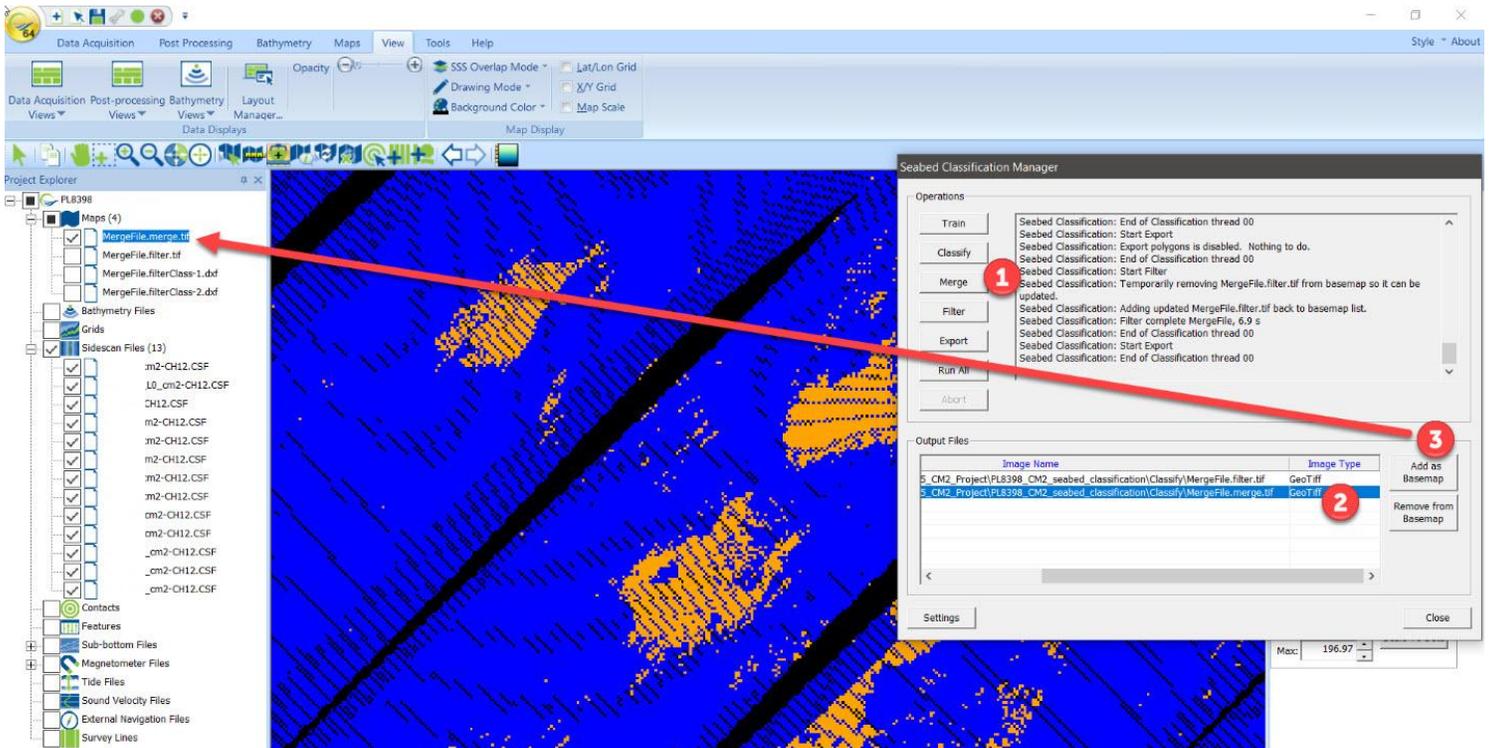


3. Often times the reason you don't see any results from the classification tool is because the Filter step is **deleting all your classified pixels**.

The classification step uses a moving window that slides across a few pings, and then it jumps forward several pings and does it again. The size of the window and the number of pings it jumps forward (rows of pixels really) is here set in the Texturers section in the Settings dialog:



If you run the classification steps through the Merge step, you should get a GeoTiff showing the results of the classification that you can display on the map:

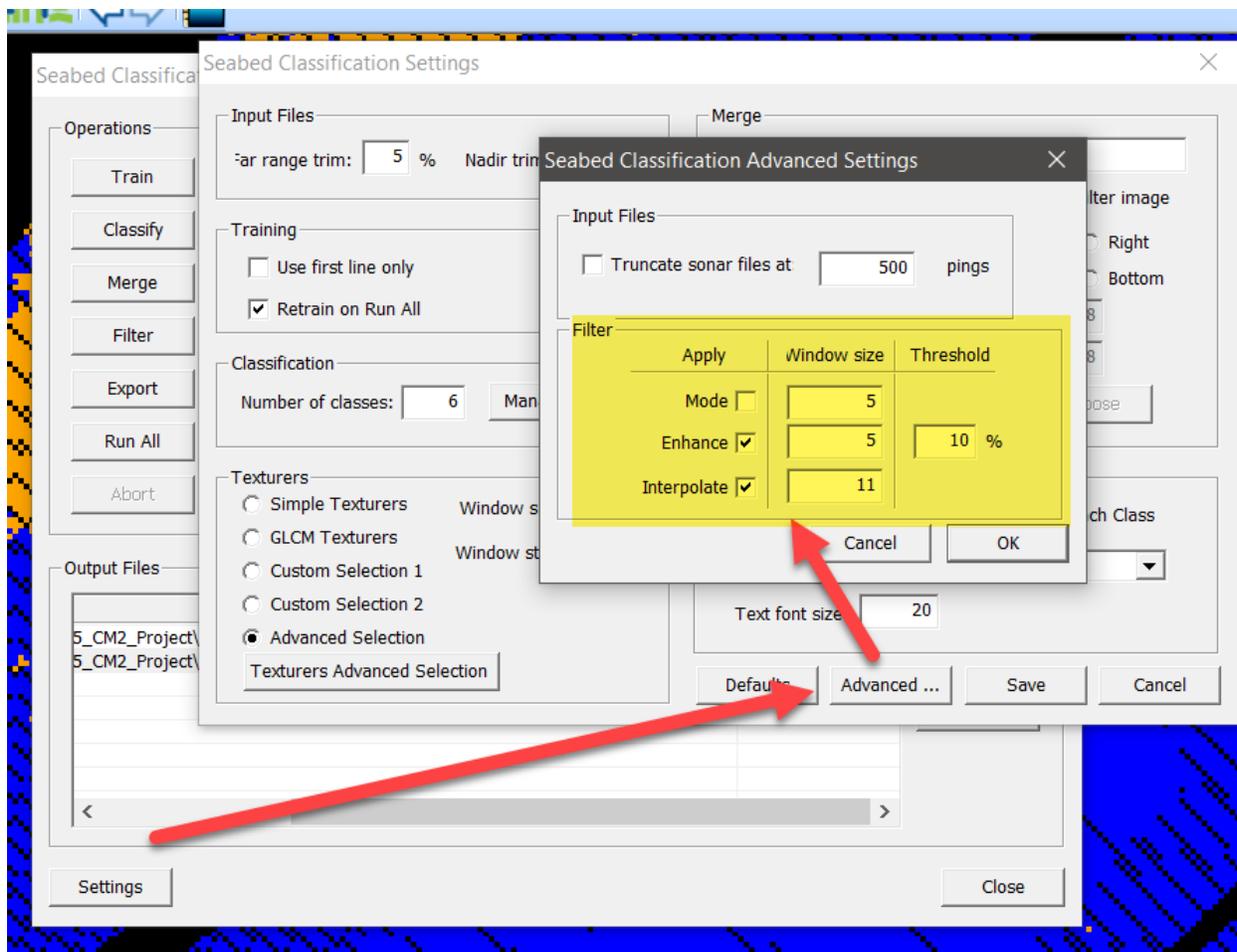


You can see in the main window that the **nadir has been trimmed out**, the far field has been trimmed and that the classification jumps forward a few pings leaving holes in the trackline.

### 1.5 Filter Step Controls - Interpolates across gaps

The critical next step is called Filtering, and it's job is to lump all the little classified patches together into a composite class and also to interpolate across all those holes. If the default settings are too aggressive at removing the little polygons, you wind up with everything being classified as background.

You control the Filter step here: Settings -> Advanced -> Filter

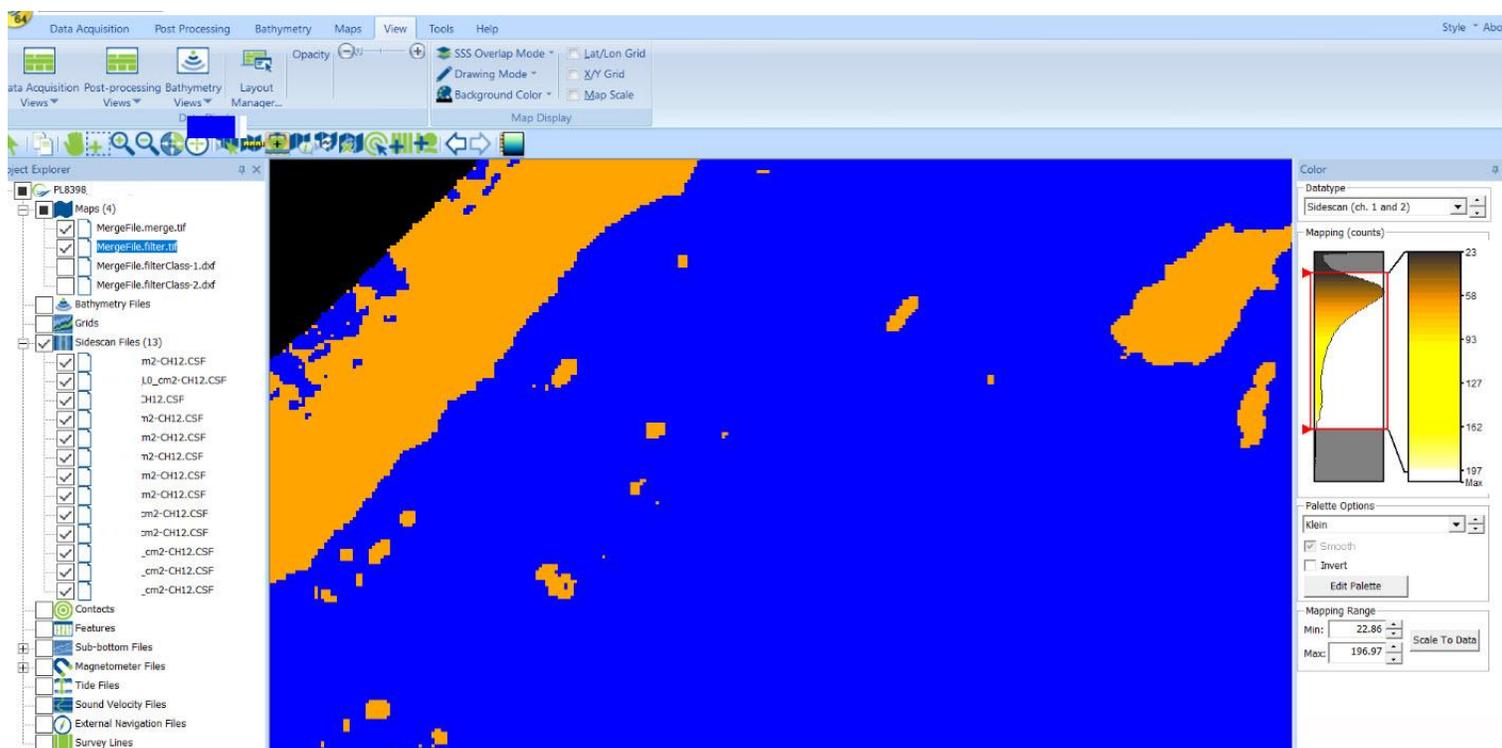


The filter runs over the merge image and creates the Filter image. There are three filters that can be run over the merge grid (in order): MODE, ENHANCE, and INTERPOLATE

- (1) MODE replaces each pixel with the mode (most common) class in the window. This helps remove 1-pixel wide classes.
- (2) ENHANCE grows small groups of classes into 1 larger class.
- (3) INTERPOLATE window size needs to be large enough to jump across all those gaps, and it fills the gaps with interpolated values.

We find it take some trial and error to get these doing what we want. You can load the Filter image into SonarWiz just like the Merge image and play around with these settings, re-run the Filter step and SonarWiz will automatically update Filter image showing you the results.

Using the settings shown above, our Filter image looks like this in SonarWiz:



The final step create the polygons using the Filter image, so you need to get that looking good before you can go on to the Export step.

We hope this specific CM2 data set example is useful to you, and you can apply some of the same ideas in your own seabed classification work. Our short-term goal is to make this tool easier to use. Right now it is a little too academic and you need to have read the same papers we used to write it, to really know what all the options mean. We are making this much easier soon, but will do it in SonarWiz 7.

## 1.6 GEOHAB Advice

We would encourage you to take a look at Chapter 5 of Backscatter measurements by seafloor-mapping sonars: Guidelines and Recommendations by the GeoHab working group. A pdf is available here:

<http://geohab.org/wp-content/uploads/2013/02/BWSG-REPORT-MAY2015.pdf>

It has some good guidelines for getting the data you want. , and it will give you a good idea of the state-of-the art.