Understanding Electron Backscatter Diffraction (EBSD) Background Corrections

Understanding how different background corrections work on EBSD is an important concept to learn. A raw EBSD pattern is low contrast and noisy, making Kikuchi patterns hard for both the human eye to see and the computer to index. A basic background correction will make the Kikuchi pattern stand out to both, but understanding the different kinds of background corrections in the TEAM™ software can increase the quality of both band detection through the Hough transform and indexing.
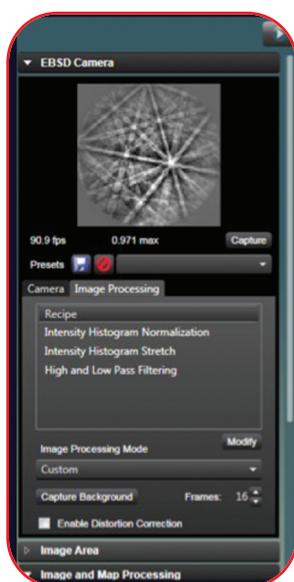

Figure 1. The current recipe, in this case a customer recipe made in the recipe builder, is shown on the image processing tab under the EBSD Camera settings. The modify button leads to the recipe builder.

The two basic backgrounds for EBSD are the Smart Background and the Scanning Electron Microscope (SEM) Area. The Smart Background changes the magnification of the microscope by a factor of four (1000x to 250x). The purpose of this is to average out the background of many grains and patterns compared to the magnification the user is working at. Issues with this background can arise. The biggest issue is grain size. If the grain size of the sample is relatively large compared with the magnification being used, the background will be skewed towards the orientation of the large grain. The other issue is that at low magnifications the automatic zoom out can cause the field of view to include either the sample holder or free air.

The SEM Area background can be useful in situations when the Smart Background may not be the best choice. The SEM Area background uses the current field of view as the background. This is useful when the user is trying to avoid a texture present in the sample or when the large grain size may require a background to be collected at lower magnifications.

Both of the above methods use EDAX's standard image processing recipe of static background correction and intensity histogram normalization. While these routines are sufficient for most samples, there are times when other methods of background correction may be more appropriate. This commonly occurs when running single grain samples. A static background in the case of single grain samples is the actual signal. Removing this as the background would give the user a reduced pattern or remove it completely. This kind of sample is perfect for Dynamic Background Subtraction, which runs a blur filter on the background, smoothing out the background instead of removing it entirely. The amount of blur can be controlled by increasing the number of passes.
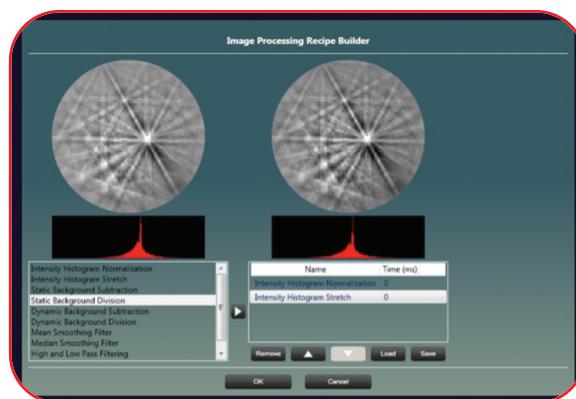

Figure 2. The built in recipe builder allows the user to customize any background to suit his or her needs.

The new Atom Probe Assist mode has added a background recipe, which incorporates the Dynamic Background Subtraction with a Median Smoothing Filter to help increase the contrast of processed patterns on Atom Probe tips.

While the above mentioned backgrounds are sufficient for most samples, the TEAM™ software includes a total of 10 different types of backgrounds that can be combined in nearly limitless ways and orders to help increase the pattern contrast and improve indexing success.

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