Applied Hyperspectral Imaging Services

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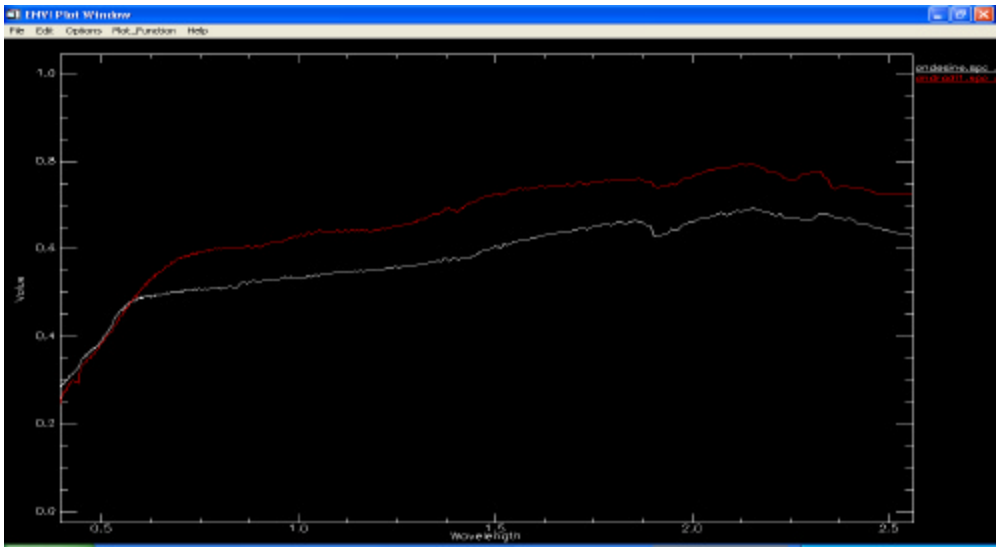
BandMax™

Hyperspectral Target Detection Utility

The Galileo BandMax program is designed to assist the spectral analyst in hyperspectral target search scenarios by locating relevant target bands in a manner that is faster, easier and more efficient than traditional manual search techniques. Thanks to BandMax's unique approach to spectral processing, targets and features once thought to be impossible to discriminate in a data cube are now easier than ever to find.

Traditional processing assumes that there is one spectral "feature" for each band of data in a hyperspectral data cube. For example, if a data set contained 420 bands, the data would contain 420 spectral features. This, however, is not necessarily true.

A spectral band does not contain a feature unless there is another band(s) to compare it to, as there must be a baseline for comparison in order to determine if there is a unique rise or fall in the spectral curve. Therefore, a spectral feature can be defined as any *pair* of bands that present a unique slope between them. The result is: ((*n*^2)-*n*)/2, where *n* = number of spectral bands. Using this method, data is no longer confined to having only one feature in each band. There are now 87,990 spectral features for each pixel rather than only 420. Take, for example, the following two spectra. The white spectrum Andesine, the red is Andradite. The two spectra appear to be almost identical:



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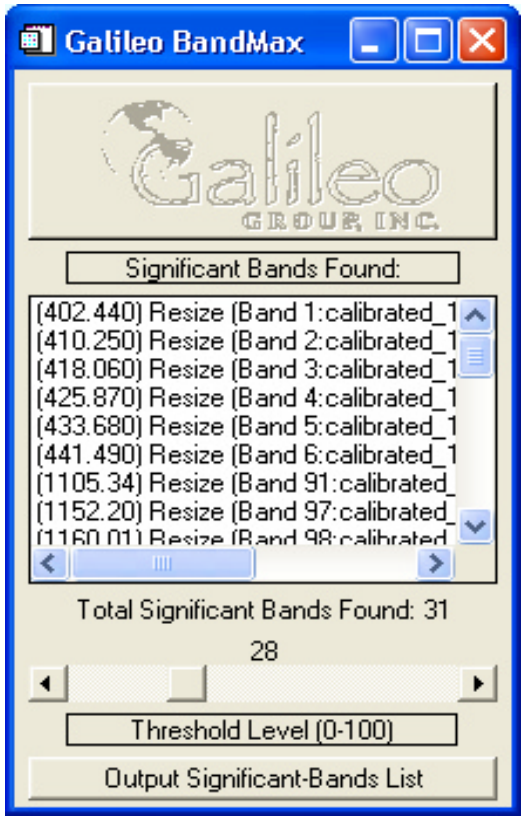
If these two mineral spectra were in a data set of their natural environment, standard processing methods (such as Spectral Angle Mapper, Matched Filer, or Mixture Tuned Matched Filter) would most likely not be able to discern one from the other. However, using Galileo's BandMax algorithm *(patent pending)*, 1,366 distinguishing features were found in over 350 unique spectral bands.

What's more, through the real-time interactive threshold adjustment, analysts can narrow down spectral subsets to only key bands with the most vital information. This information can help to eliminate cross-detection and confusion between two very similar targets.



It should come as no surprise that Galileo's BandMax routine was initially developed to help analysts eliminate false alarms. BandMax not only uses the information contained in the target's signature, it also allows the user to apply his or her knowledge of what should not be contained in the target signature.

The user can easily input the target and background signatures from either a spectral library or from in-scene materials using familiar ENVI™ windows. This allows the analyst to rapidly update to the best possible contrasting spectral features, maximizing the target / background contrast in any operational detection environment with speed and ease. By eliminating redundant identical features between target and background spectra it allows standard algorithms to give weight to the important, yet subtle, differences between target and background spectra, resulting in enhanced algorithm performance.

BandMax is powerful, yet amazingly simple to use. Proper spectral sub-setting is often considered to be the foundation of successful processing, but until now has been more of an art than a science. With the new BandMax utility, Galileo can instantly put years of experience into the hands of even the most novice users.

Call Galileo Group at 321.733.0960 for a quote. Multi-user licensing and GSA pricing are available.