

Hyperspectral Unmixing

Advanced Remote Sensing

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The *enmap_berlin.bsq* raster file is a 177 band hyperspectral image and 30m spatial resolution, ranging from 460 to 2400 nm, as shown in Figure 1. With this information, it is possible to perform a regression based unmixing.

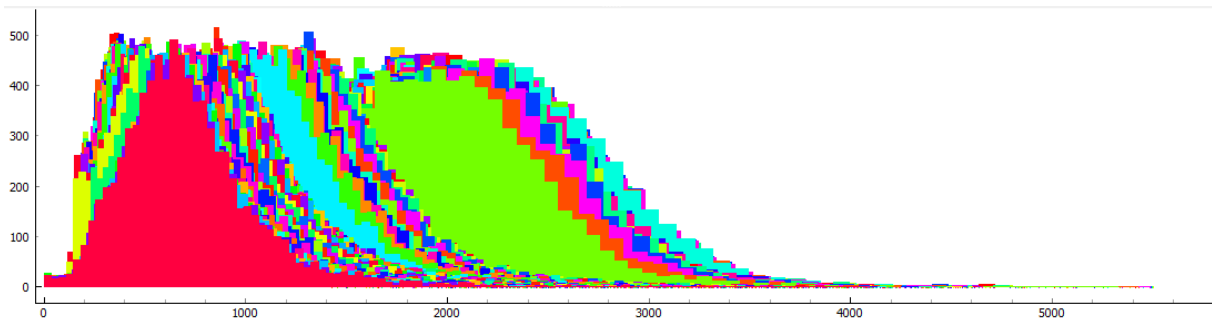


Figure 1: Histogram of hyperspectral bands.

In Figure 3, there are three rasters: the first one is the satellite image from Berlin with 3 bands. In the second line, to the left, there is the unmixing output, and to the right the classification of each pixel. For this last image, there are five classes: unclassified, impervious, soil, vegetation and water (Figure 2)

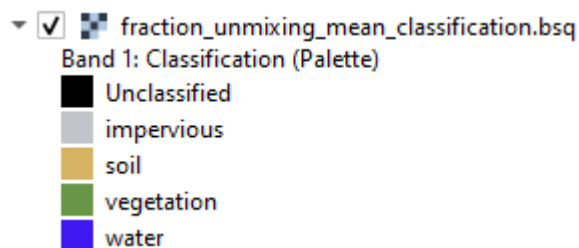


Figure 2: Unmixing identification classes.

For the unmixing output, the bands were set as Band 2 (Soil), Band 3 (Vegetation) and Band 4 (water) in the RGB channels. With this setting, water pixels would have a blue color, vegetation would be green and soil would be red – making it easier to identify and compare to the main image.

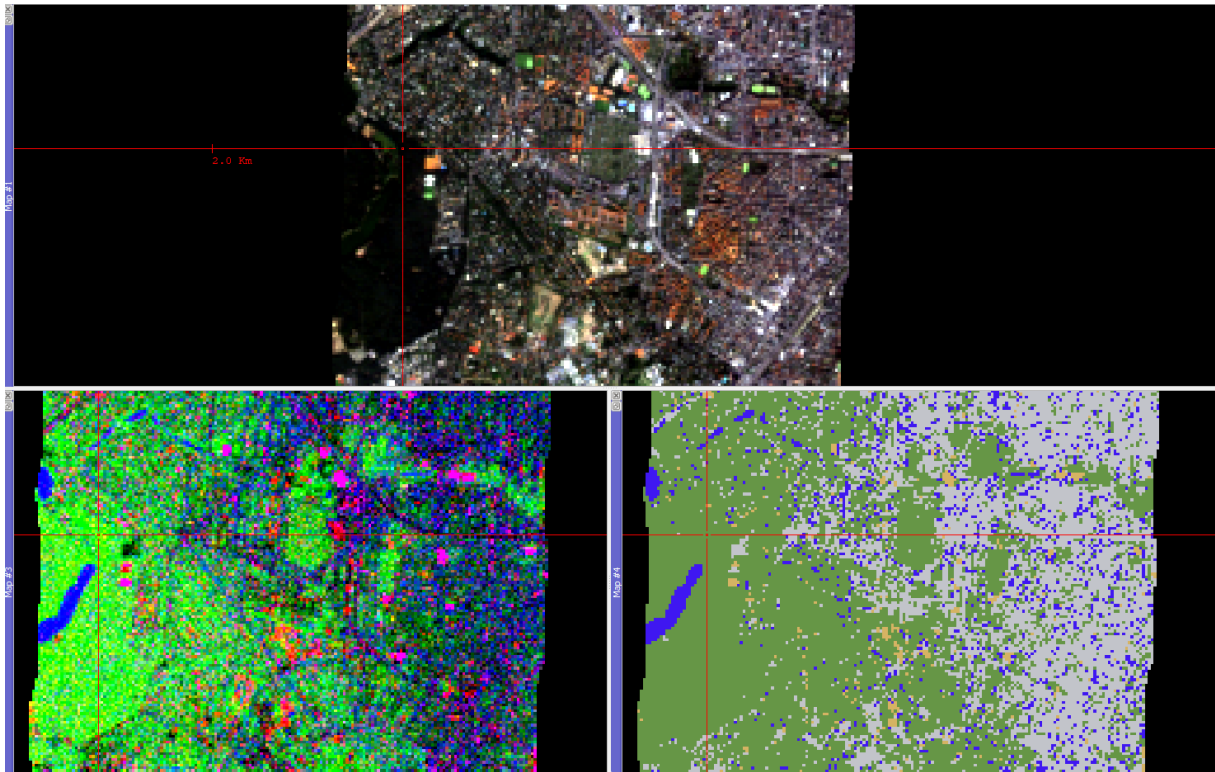


Figure 3: Overview among the RGB, unmixing output and classification rasters.

The unmixing output had a very good response regarding vegetation pixels – probably related to the spectral red shift.

Some water bodies are well delimited, however, due to the low reflectance of water surface, there are a lot of noise, especially near pixels that have spectral values not too defined. Also, this might be related to the image resolution, since it has 20m per pixel.

In urban areas, the classification unmixing image gets a bit intricate, nonetheless the image classification predicts mostly of it correctly as impervious. Features such as asphalt and roofs are the main ones that contribute to this class. In a few locations, the different roof colors are mixed with soil classification, generating a misleading labeling. Also, the salt and pepper texture is a consequence of this misclassification.

Overall, the unmixing processing was reasonable in creating the final classification. Perhaps with some processing attributes adjustment or a more detailed point samples it is possible to achieve a better result.