

8 Image Processing

8.1 Introduction

8.2 Data Storage

A 24 bit image (known as *true color image*) then requires three times the memory needed to store an 8 bit image, or $1,559,331 \text{ bytes} = 1,559,331 / 1,024 \text{ kilobytes (kB)} \approx 1,523 \text{ kB} \approx 1,559,331 / 1,024^2 = 1.487 \text{ megabytes (MB)}$. **1,559,331 Bytes»1,523 Kilobyte (kB)»1.487 Megabyte (MB)**

Portable Network Graphics (PNG)—Developed in 1994, this image format is used as an alternative to the GIF. **Like GIF, PNG can use indexed 8-bit color palettes with up to 256 colors. However, PNG also supports grayscale images as well as 24-bit and 48-bit RGB images.**

8.3 Importing, Processing, and Exporting Images

8.4 Importing, Processing, and Exporting Landsat Images

These two sensors provide coverage of the global landmass at spatial resolutions of 30 meters (**VNIR**, SWIR), 100 meters (**THIR**), and 15 meters (panchromatic) (Ochs et al. 2009, Irons et al. 2011).

8.5 Importing and Georeferencing Terra ASTER Images

8.6 Processing and Exporting EO-1 Hyperion Images

```
 tiledlayout(1,3)
 nexttile, histogram(double(HYP1(:)),100), title('Band 29')
 nexttile, histogram(double(HYP2(:)),100), title('Band 23')
 nexttile, histogram(double(HYP3(:)),100), title('Band 16')
```

8.7 The Normalized Difference Vegetation Index NDVI

8.8 Image Enhancement, Correction, and Rectification

8.9 Removing Periodic Noise from Images

8.10 Grain Size Analysis from Microscopic Images

```
graindata = regionprops(labeled,'basic');
```

```

grainareas= [graindata(:).Area];
objectareas = 3^2*grainareas*367^(-2);

max_area =
    0.0909
min_area =
    6.6821e-05
mean_area =
    0.0069

```

8.11 Quantifying Charcoal in Microscopic Images

8.12 Shape-Based Object Detection in Images

8.13 Digitizing from the Screen

8.14 Color Intensity Transects Across Varved Sediments

Recommended Reading

Irons J, Riebeek H, Loveland T (2011) Landsat Data Continuity Mission – Continuously Observing Your World. [NASA and USGS \(available online\)](#)

Lein JK (2012) Environmental Sensing–Analytical Techniques for Earth Observation. Springer, Berlin Heidelberg New York

MathWorks (2026) Image Processing Toolbox–User's Guide. The MathWorks, Natick, MA

Ochs B., Hair D, Irons J, Loveland T (2009) Landsat Data Continuity Mission, NASA and USGS ([available online](#))

Zuiderveld K (1994) Contrast Limited Adaptive [Histogram](#) Equalization. Graphic Gems IV. San Diego: Academic Press Professional, 474–485

Figure Captions