

# Spectral Response for DigitalGlobe Earth Imaging Instruments

## IKONOS

The IKONOS satellite carries a high resolution panchromatic band covering most of the silicon response and four lower resolution spectral bands. The four multispectral bands are roughly based on four bands used on the Landsat satellite series, including blue, green, red and near-infrared. The spectral responses of the bands are shown in Figure 1, individually normalized to the maximum value. Table 1 gives the 5% response upper and lower edges and center wavelengths for each.

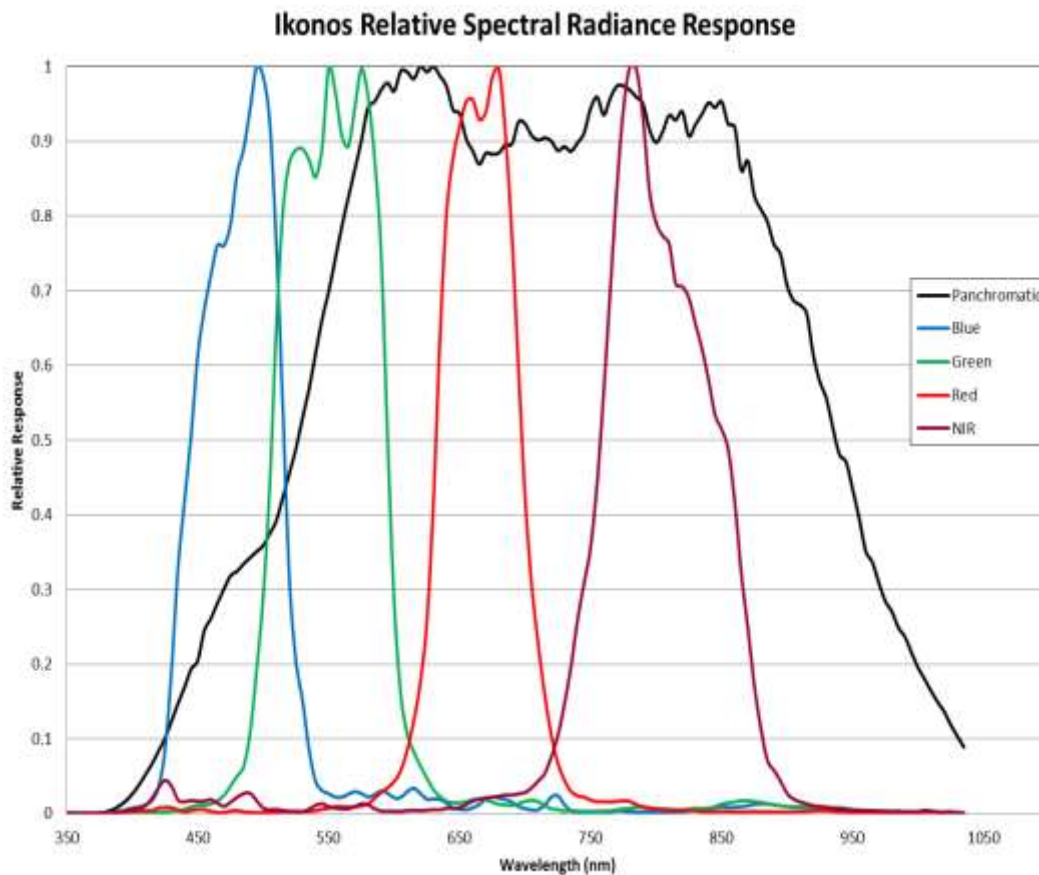


Figure1. Spectral Response of the IKONOS panchromatic and multispectral imagery.

*Table 1. IKONOS Spectral Band Edges and Center Wavelengths*

Band Name	Center Wavelength (nm)	Lower Band Edge (nm)	Upper Band Edge (nm)
Panchromatic	729	409	1048
Blue	480	421	539
Green	552	480	624
Red	666	602	729
NIR	803	713	893

## QuickBird

The QuickBird satellite also carries a high resolution panchromatic band covering most of the silicon response and four lower resolution spectral bands. The spectral responses of the bands are shown in Figure 2, individually normalized to the maximum value. Table 2 gives the 5% response upper and lower edges and center wavelengths for each.

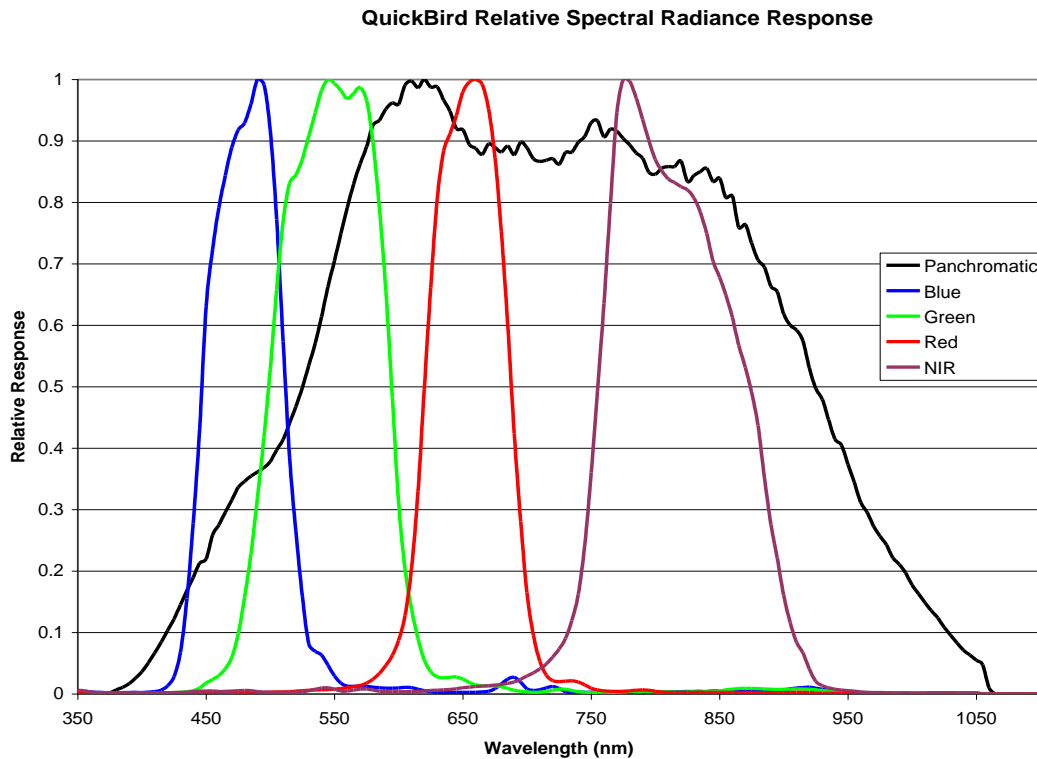


Figure 2. Spectral Response of the QuickBird panchromatic and multispectral imagery.

Table 2. QuickBird Spectral Band Edges and Center Wavelengths

Band Name	Center Wavelength (nm)	Lower Band Edge (nm)	Upper Band Edge (nm)
Panchromatic	729	405	1053
Blue	488	430	545
Green	543	466	620
Red	650	590	710
NIR	817	715	918

## WorldView-1

The WorldView-1 satellite carries a panchromatic only instrument to produce basic black and white imagery for users who do not require color information. The spectral response band includes both visible and near infrared light for maximum sensitivity. The estimated spectral radiance response, expressed as output counts per unit radiance as a function of wavelength, normalized to unity at the peak response wavelength is shown in figure 3. Table 3 gives the 5% response upper and lower edges and center wavelengths for each.

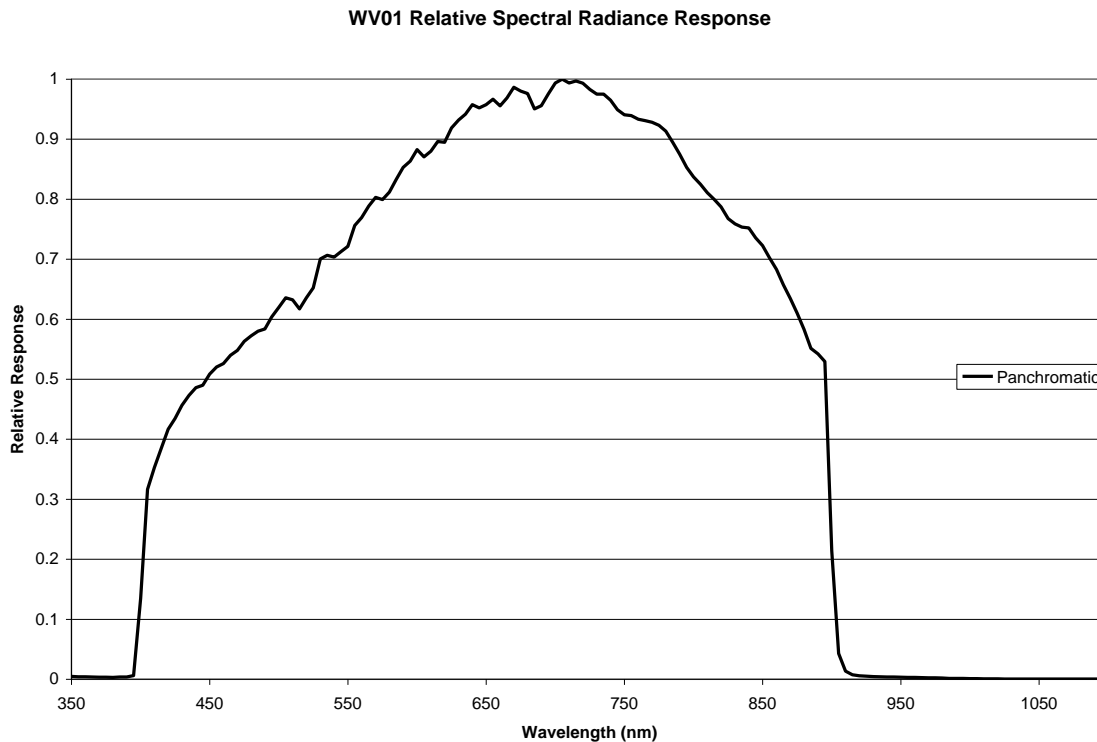


Figure 3. Spectral Response of the WorldView-1 panchromatic imagery.

Table 3. WorldView-1 Spectral Band Edges and Center Wavelengths

Band Name	Center Wavelength (nm)	Lower Band Edge (nm)	Upper Band Edge (nm)
Panchromatic	651	397	905

## GeoEye-1

The GeoEye-1 satellite also carries a high resolution panchromatic band with reduced infrared and blue response and four lower resolution spectral bands similar but not identical to the IKONOS multispectral bands. The spectral responses of the bands are shown in Figure 4, individually normalized to the maximum value. Table 4 gives the 5% response upper and lower edges and center wavelengths for each.

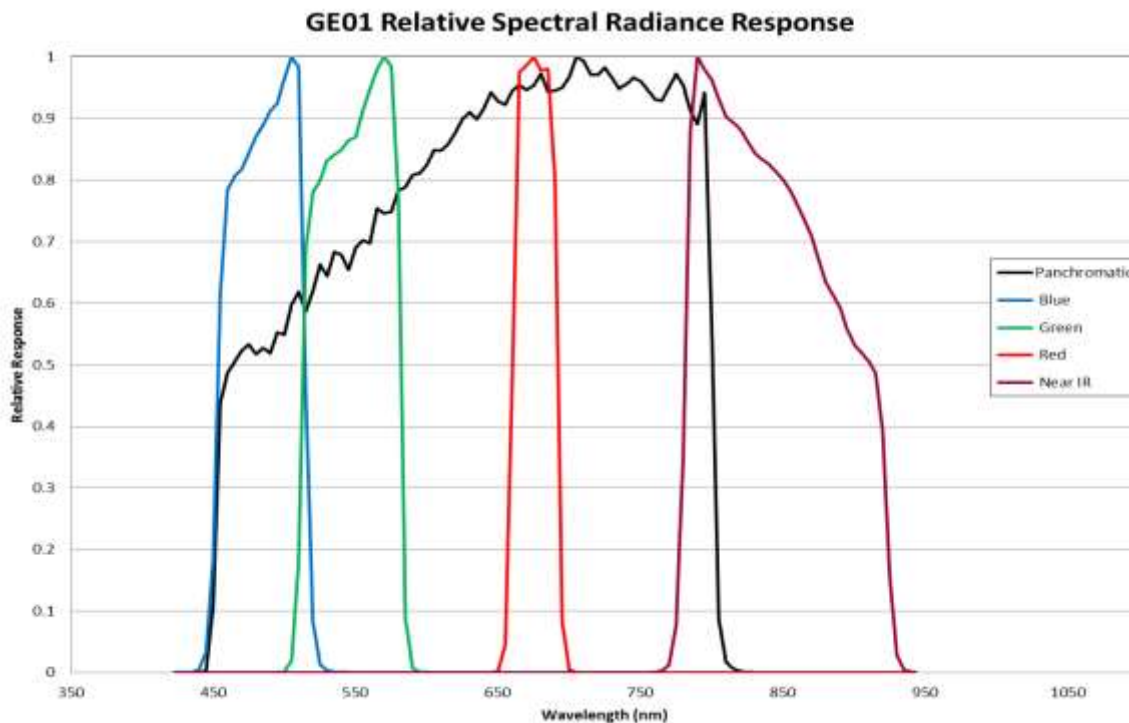


Figure 4. Spectral Response of the GeoEye-1 panchromatic and multispectral imagery.

Table 4. GeoEye-1 Spectral Band Edges and Center Wavelengths

Band Name	Center Wavelength (nm)	Lower Band Edge (nm)	Upper Band Edge (nm)
Panchromatic	627	447	808
Blue	484	446	522
Green	547	506	587
Red	676	655	697
NIR	851	773	929

## WorldView-2

The WorldView-2 satellite carries an imaging instrument containing a high-resolution panchromatic band with a reduced infrared and blue response and eight lower spatial resolution spectral bands. The multispectral bands are capable of providing excellent color accuracy and bands for a number of unique applications. The four primary multispectral bands include traditional blue, green, red and near-infrared bands, similar but not identical to the QuickBird satellite. Four additional bands include a shorter wavelength blue band, centered at approximately 427 nm, called the coastal band for its applications in water color studies; a yellow band centered at approximately 608 nm; a red edge band centered strategically at approximately 724 nm at the onset of the high reflectivity portion of vegetation response; and an additional, longer wavelength near-infrared band, centered at approximately 949 nm, which is sensitive to atmospheric water vapor. The spectral responses of the bands are shown in Figure 5, individually normalized as in Figure 5. Table 5 gives the 5% response upper and lower edges and center wavelengths for each band.

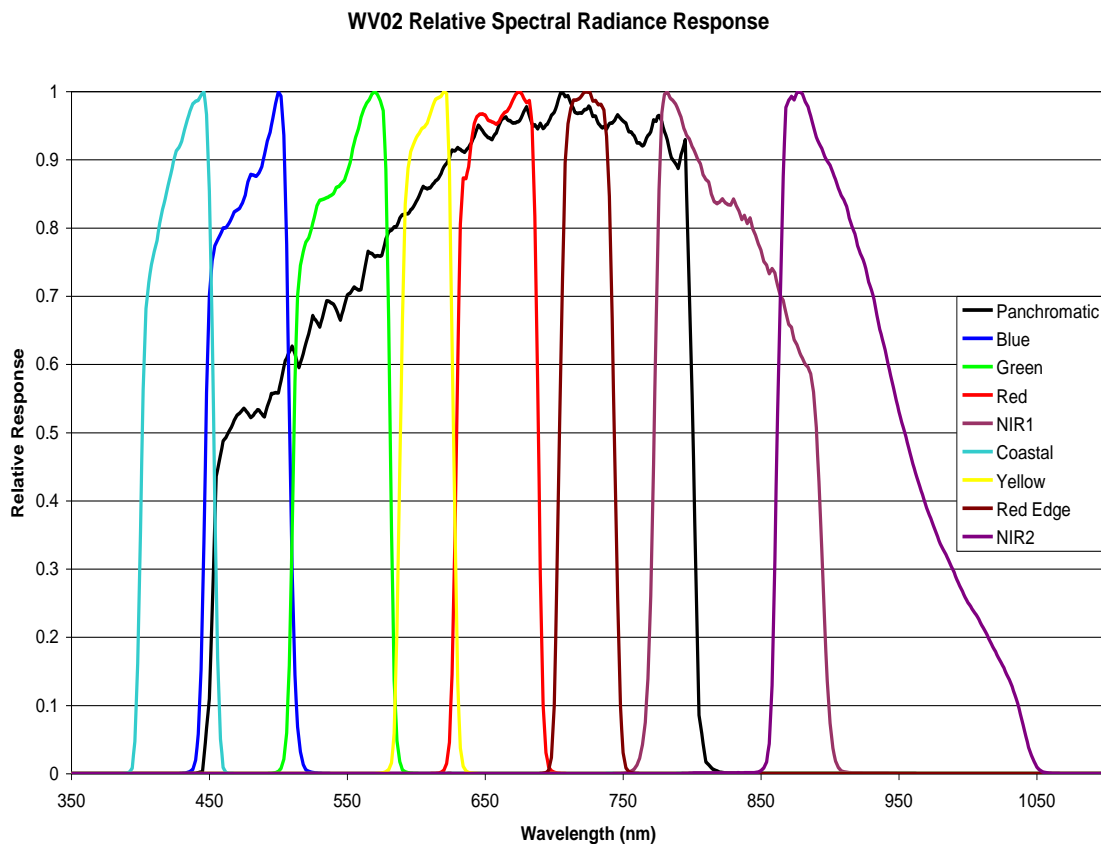


Figure 5. Spectral Response of the WorldView-2 panchromatic and multispectral imagery.

*Table 5. WorldView-2 Spectral Band Edges and Center Wavelengths*

Band Name	Center Wavelength	Lower Band Edge (nm)	Upper Band Edge (nm)
Panchromatic	627	447	808
Coastal Blue	427	396	458
Blue	478	442	515
Green	546	506	586
Yellow	608	584	632
Red	659	624	694
Red Edge	724	699	749
NIR1	833	765	901
NIR 2	949	856	1043

## WorldView-3

The WorldView-3 satellite carries an imaging instrument containing a high-resolution panchromatic band with a reduced infrared and blue response and eight lower spatial resolution spectral bands, all similar to WorldView-2. It also has an additional 8 spectral bands of Short Wave Infrared (SWIR) at yet lower spatial resolution, for material identification purposes and the ability to see through smoke and haze. The spectral responses of the visible and near infrared bands are shown in Figure 6, individually normalized. The spectral responses of the SWIR bands are shown in Figure 7. Table 6 gives the 5% response upper and lower edges and center wavelengths all WorldView-3 bands.

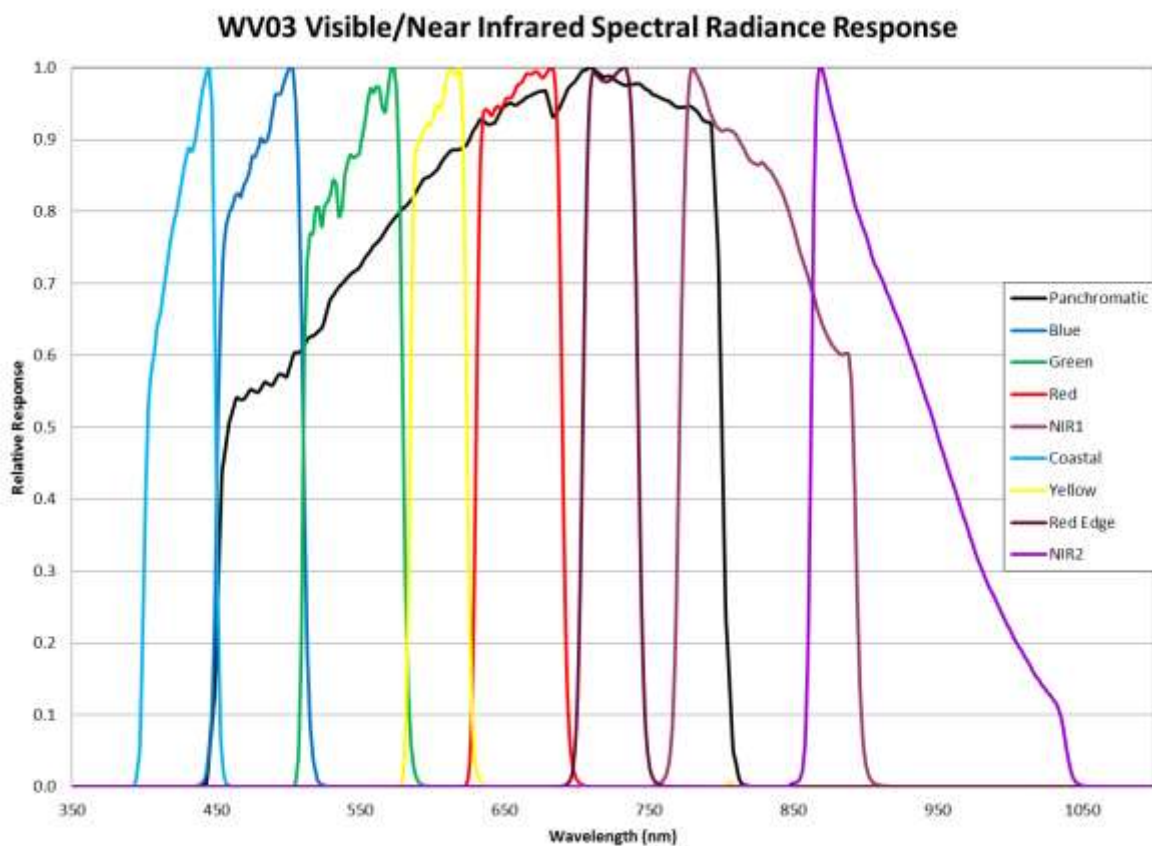


Figure 6. Spectral Response of the WorldView-3 panchromatic and multispectral imagery, visible and near infrared bands.



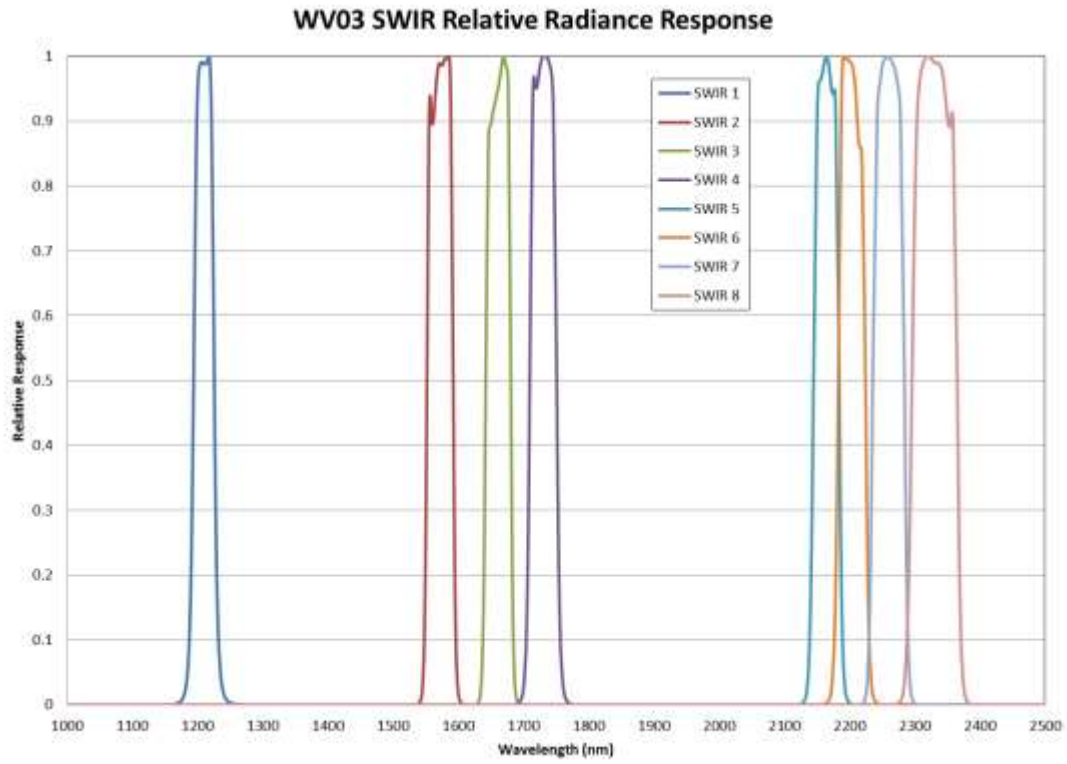


Figure 7. *Spectral Response of the WorldView-3 short wave infrared bands.*

Table 6. WorldView-3 Spectral Band Edges and Center Wavelengths

Band Name	Center Wavelength	Lower Band Edge (nm)	Upper Band Edge (nm)
Panchromatic	627	445	808
Coastal Blue	426	397	454
Blue	481	445	517
Green	547	507	586
Yellow	605	580	629
Red	661	626	696
Red Edge	724	698	749
NIR1	832	765	899
NIR 2	948	857	1039
SWIR1	1210	1184	1235
SWIR2	1572	1546	1598
SWIR3	1661	1636	1686
SWIR4	1730	1702	1759
SWIR5	2164	2137	2191
SWIR6	2203	2174	2232
SWIR7	2260	2228	2292
SWIR8	2329	2285	2373