

BASE PRODUCT SERIES FAQ

What products are in the base product series?

Basic (1B) Imagery is the least processed of the Base Product Series and is corrected for radiometric distortions, internal sensor geometry, optical distortions, and sensor distortions. Basic Imagery is neither geo-referenced nor mapped to a cartographic projection. Basic Imagery is provided with the QuickBird and WorldView sensor models and is intended for sophisticated photogrammetric processing such as orthorectification. Basic Imagery is a scene-based product.

Standard (2A) Imagery products are radiometrically corrected, sensor corrected, and projected to a plane using the map projection and datum of the customer's choice. Standard Imagery also has a coarse DEM applied to it, which is used to normalize for topographic relief with respect to the reference ellipsoid. The degree of normalization is relatively small, so while this product has terrain corrections, it is not considered orthorectified. All Standard Imagery products have uniform GSD throughout the entire product.

OrthoReady (2A) Imagery contains all the characteristics of the Standard (2A) product, however, Ortho Ready Standard Imagery has no topographic relief (DEM) applied with respect to the reference ellipsoid, making it suitable for orthorectification. Ortho Ready Standard Imagery is projected to a constant base elevation, which is calculated on the average terrain elevation per order polygon or can be supplied by the customer.

Basic (1B) Stereo Imagery contains all the characteristics of the Basic 1B Product; however, two images are delivered with 100% overlap over the AOI. Stereo pairs are collected on the same satellite orbit and with specific look angles in order to attain imagery appropriate for stereo viewing. In addition to the standard metadata files of a Basic product, a .STE file is delivered to orient the stereo pairs in photogrammetric software packages for further analysis and elevation extraction.

OrthoReady (2A) Stereo Imagery products have the same physical structure as Ortho-Ready Standard Imagery products. Ortho Ready Stereo Imagery products offer 100% stereo coverage over the AOI. In addition to the standard metadata files of an Ortho Ready 2A product, a .STE file is delivered to orient the stereo pairs in photogrammetric software packages for further analysis and elevation extraction.

What is the difference between Standard Imagery (2A) and Ortho Ready Standard Imagery (OR2A)?

Standard Imagery has a coarse DEM applied to it, which is used to normalize for topographic relief with respect to the reference ellipsoid. The degree of normalization is relatively small, so while this product has terrain corrections, it is not considered orthorectified. Because Standard Imagery has terrain corrections applied, it is not suitable for orthorectification by the customer. Ortho Ready Standard Imagery has no topographic corrections. This product is

mapped to the average base elevation of the terrain covered by each individual Satellite scene. Other than the lack of terrain correction, Ortho Ready Standard Imagery products have all the same specifications as Standard Imagery products. Ortho Ready Standard Imagery can be orthorectified using COTS packages like ERDAS IMAGINE, PCI Geomatics, ENVI, and SOCET SET/GXP.

How do I know whether I need Standard Imagery (2A) or Ortho Ready Standard Imagery (OR2A)?

If you are not going to orthorectify your imagery, then a Standard Imagery product will provide a better absolute horizontal accuracy than an Ortho Ready Standard Imagery product. A coarse DEM is applied to Standard Imagery in an effort to minimize the effect of terrain distortions. Because Ortho Ready Standard Imagery is mapped to an average base elevation, the absolute horizontal accuracy may shift from its true location, especially in areas of high relief, if the user does not apply terrain corrections. This will be especially noticeable when comparing a Standard Image with an Ortho Ready Standard Image of the same area. Please note that Standard Imagery and Ortho Ready Standard Imagery both have the same absolute accuracy specification of 23 m (Quickbird Sensor) and 5m (WorldView-1 and WorldView-2 Sensors), excluding viewing angle and topographic displacement. If your goal is to orthorectify your imagery, then Ortho Ready Standard Imagery is recommended.

Is it better to orthorectify using Basic Imagery or Ortho Ready Standard Imagery?

When using RPCs for orthorectification, both Basic Imagery and Ortho Ready Standard Imagery produce comparable results. When processed using commercial photogrammetric software, RPCs, high quality DEM (e.g. DTED Level 2), and submeter GCPs, accuracies up to 3 meter RMSE can be expected with QuickBird and WorldView 1&2 data. Slightly better results, up to 2 meter RMSE, may be obtained using Basic Imagery and the QuickBird and WorldView Sensor Models with high quality DEMs and submeter GCPs. Ortho Ready Standard Imagery enables area-based orthorectification. Basic Imagery, with a minimum order of 1 scene (297km² Quickbird and 245km² WorldView 1&2), requires that an entire scene be orthorectified. Note: Ortho Ready Standard Imagery products that are tiled must be mosaicked back together prior to orthorectification because the metadata files are associated with the entire delivered image.

What is a RPC?

RPC's or Rational Polynomial Coefficients are simpler empirical mathematical models relating image space (line and column position) to latitude, longitude, and surface elevation. Using the Ortho Ready 2A image, its rational polynomial coefficients, and a DEM to supply the elevation values end users can produce an orthorectified image using commercial photogrammetric software like ENVI, ERDAS IMAGINE, PCI GEOMATICS, SOCETGXP.

What are the geolocational accuracies of the Base Product Series?

Basic Imagery Product accuracy is 5 meters* CE90 for WorldView 1&2 and 23 meters CE90 for Quickbird.

Basic Stereo Product accuracy is 5 meters* CE90 (WorldView-1 and WorldView-2 only)

Ortho Ready Standard accuracy is 5 meters* CE90 for WorldView 1&2 and 23 meters CE90 for Quickbird.

Ortho Ready Stereo accuracy is 5 meters* CE90 (WorldView-1 and WorldView-2 only)

*Excluding the effects of terrain and up to 30 degrees off-nadir angle

Why is the Base Product accuracy better than Ortho Image accuracy?

Absolute geolocation accuracy is a measure of the location of an object, as it appears in a product, with respect to its true location on the Earth. It is determined by comparing a known, surveyed location (typically a ground control point), to the corresponding photo-identifiable feature in an image product. DigitalGlobe specifies geolocation accuracy using the CE90 and LE90 standards. Basic, Standard and Ortho Ready Standard products are not corrected for terrain-induced offsets, and therefore exclude terrain-induced offsets when calculating horizontal accuracy, as depicted in Figure 1. However, Ortho products are terrain corrected and therefore the accuracy assessment does include terrain-induced offsets, depicted in Figure 1. The geolocation error for orthos is higher because it is calculated by summing the pixel error and the error introduced by the terrain model while the accuracy of Basic and Standard products only uses the pixel error.

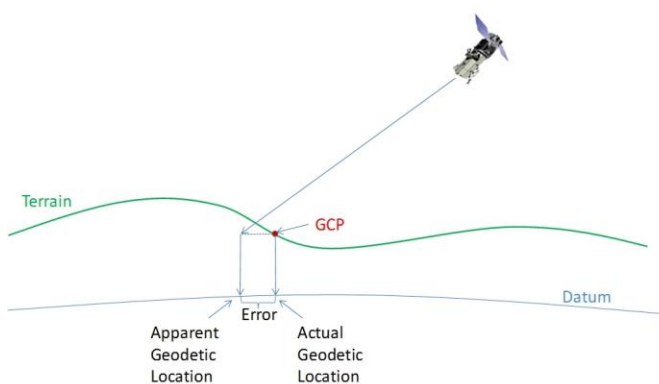


Figure 1. Accuracy without Terrain Correction

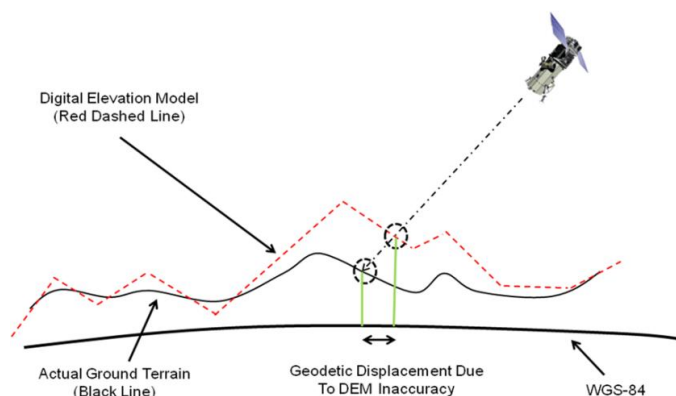


Figure 2. Accuracy with Terrain Correction

What are the different color options that I can purchase from DigitalGlobe?

DigitalGlobe offers three image band options:

Panchromatic - Products include only one band and are black and white.

Multispectral - Products include 4 or 8 multispectral bands

Pan-sharpened - Products combine the visual information of the multispectral data with the spatial information of the pan data, resulting in a higher GSD color product. DigitalGlobe offers three options for pan-sharpened products; 4-band pan-sharpened, 3-band Natural Color and 3-band False Color.

What color bands do I get with a Multispectral Product?

The band sequence for 4-band and 8-band multispectral products is in order of shortest wavelength to longest wavelength. The band order in a 4-band multispectral product is Blue, Green, Red, and NIR1. The band order in an 8-band multispectral product is Coastal, Blue, Green, Yellow, Red, Red Edge, NIR1, NIR2. See the chart below for band locations in the visible and near infrared portion of the spectrum. The graph below represents non-pansharpened base products only.

What are the different band combinations that I can order?

Product Type	Pixel Resolution	Image Bands (in order)
Pan Only	50cm, 60cm, 2m	Panchromatic
Multispectral (4-band)	2.0m, 2.4m	Blue, Green, Red, NIR1
Multispectral (8-band)	2.0m	Coastal, Blue, Green, Yellow, Red, Red Edge, NIR1, NIR2
Bundle (pan + 4-band)	50cm, 60cm 2.0m, 2.4m	Panchromatic Blue Green, Red, NIR1
Bundle (pan + 8-band)	50cm 2.0m	Panchromatic Coastal, Blue, Green, Yellow, Red, Red Edge, NIR1, NIR2
Natural Color	30cm, 50cm, 60cm	Blue, Green, Red
Color Infrared	50cm, 60cm	Green, Red, NIR1
Pan-sharpened (4-band)	50cm, 60cm	Blue, Green, Red, NIR1

What is Pan-Sharpening?

Pan-Sharpening combines the visual information of the multispectral data with the spatial information of the pan data, resulting in a higher GSD color product.

What Base Products can I get Pan-Sharpended and what bands can I get?

Pan-sharpened products are offered as 3-band and 4-band products. 3-band Color Products are available in Natural Color (Blue, Green and Red bands) and in Color Infrared (Green, Red and NIR1 bands). The 4-band pan-sharpened product uses the Blue, Green, Red, and NIR1 bands. Most pan-sharpened products are tiled due to large file sizes. Pan-sharpened products are available in both 50cm and 60cm GSD and are only available as Standard (2A) and Ortho Ready Standard (2A).

What are the minimum order sizes for the Base Product Series?

Basic (1B) minimum order size is 230 km²

Basic (1B) Stereo minimum order size is 210 km²

Standard (2A) and Ortho Ready Standard (2A) minimum order size is 25 km² (archive) (note: new collects are subject to minimum price for tasked level selected, not less than 25km²)

Ortho Ready (2A) Stereo minimum order size is 100 km² (300 km² max)

Why should I get a Tiled Product? What are the options?

Because some Imagery Products cannot fit in their entirety on all available media types or may be cumbersome to work with due to their large size, DigitalGlobe offers you the option to break up imagery into smaller pieces called tiles. Tiles may be defined by pixel based grids or by map based coordinates. Pixel based tiles may be defined by the following tiling schemes: 8k x 8k (8,192 pixels by 8,192 pixels), 14k x 14k (14,336 pixels by 14,336 pixels), or 16k x 16k (16,384 by 16,384 pixels). Map based tiles are based on map coordinates in product units (meters or feet) and are defined by tile size and tile overlap. Imagery orders that will be greater than 2 GB in file size are required to be tiled. Additionally 4-band pan-sharpened products are recommended to be tiled at 14k x 164 or smaller due to file size.

(Ortho Ready Stereo vs. Basic Stereo) what is the benefit of one over the other?

Ortho Ready Stereo provides the end user with a product that is map corrected and application ready. It also allows the customer to order a smaller area of interest (minimum 100sqkm) as compared to Basic Stereo. Basic Stereo is geared towards the end user who has a higher level of image expertise and desires a large area for stereo applications.

I have ordered a Stereo product and I see a .STE file in the file folder. What is this file for?

The .STE file identifies the strip ID for both pairs in the stereo mate. It also contains the geometry for collection angles (convergence angle, BIE and Asymmetry angle) to help orient the stereo pair within commercial photogrammetry software packages. The .STE file comes with both the Basic Stereo Product and OR2A Stereo Product.

What is resampling?

When a satellite image is acquired, the pixels do not line up with any regular grid. Resampling takes those pixels from the satellite image and aligns them to the grid. When an image is resampled the coordinates of each pixel or the original image are transformed to their new corresponding location in the new regular coordinate system (grid). A pixel in the new grid will not generally overlay a pixel in the original grid. Therefore, the intensity value, or Digital Number, or DN, assigned to a cell in the output grid is determined by using the pixel values that surround its position in the original grid. This is resampling.

What are the resampling options?

Nearest Neighbor: This method selects the radiance value from the nearest pixel in the input image; does not alter the radiance values of the original image. This method can result in a blocky or disjointed image because no averaging is performed.

4X4 Cubic Convolution: This method considers nearest 16 pixels synthesizing digital numbers using a polynomial calculation; the default kernel. This method produces a smoother appearance than nearest neighbor method while providing slightly sharper edge detail than the bilinear interpolation method.

MTF: This method uses an 8 by 8 pixel window to determine the value of the destination pixel. This is a sensor specific kernel based on an empirical modeling of the optical and electronic properties of the sensors. This method produces the sharpest edge detail of all of the methods.

Pan– Sharpening: DigitalGlobe proprietary method designed for pan-sharpened products. This kernel is only available with Pan-sharpened products.

Enhanced: The Enhanced Kernel uses a high pass Laplacian filter applied to the panchromatic data as a pre-processing step before pan-sharpening. The result is an image with very fine detail and excellent color balance. This option is only available for panchromatic and pan-sharpened products.

What is the benefit of using one resampling kernel over another?

The nearest neighbor method provides the most spectral fidelity. It is the best option for scientific applications and spectral classification where the user may want the ‘most pure’ pixel.

The 4X4 Cubic Convolution method provides a good balance between smoothness and sharpness.

The MTF method provides for sharpness in detail but can result in an over-sharpening effect introducing artifacts in homogenous areas such as water bodies. Not recommended for QB.

Pan-Sharpening is for combining the low GSD of the pan band with the color from the multispectral bands to produce a low resolution color product.

The Enhanced Kernel results in very fine detail and is recommended for any user doing feature extraction or delineation. As with all sharpening kernels, it may introduce artifacts.

What is bit depth?

Bit depth refers to the amount of energy that is stored in an image. Each pixel is assigned a value; the range of these values depends on your bit depth. All of DigitalGlobe's satellites collect data using an 11 bit dynamic range. This allows 2048 possible intensity values that can be assigned to a particular pixel.

Because computers do not read 11 bit data DigitalGlobe takes the first 11 bits of data and stores it in a 16 bit file. Placeholders are added to account for the 5 bit data difference. The data still spans the 0-2048 intensity values. DigitalGlobe also offers 8 bit data. To get to 8 bit data DigitalGlobe compresses the original 11 bit data and data spanning the 2048 values of an 11 bit data is rescaled to 256 values.

8 bit data vs. 16 bit data?

8 bit data only ranges from 0-256 while 16 bit's range goes from 0-2048. 16 bit files will be larger than 8 bit and may be more cumbersome for storage; however, for multispectral analysis, 16 bit offers more information per pixel. 8 bit data can have Dynamic Range Adjustment applied to it while 16 bit data cannot.

What is Dynamic Range Adjustment or DRA?

DRA is a visual enhancement that is applied to the image to help with color correction and contrast enhancement and is stored in the Look up Tables. Generally, customers who do not have the tools to perform color stretches on imagery should opt for DRA. This allows the image to open up in an application and look tonally balanced and color corrected.

What are my options for file formats for base products?

Imagery products are available in the following formats:
GeoTiff, NITF 2.0, NITF 2.1, NITF 2.1 NCDRD and RPF