IKONOS
IMAGERY PRODUCTS
AND PRODUCT GUIDE
# Table of Contents

## Introduction

1

## Product Levels

2

- Georectified Products ........................................ 3
- Orthorectified Products ....................................... 4
- Stereo Products .................................................. 5
- Off-the-Shelf Products ......................................... 6

## Specifications

7

- Spectral Range ................................................. 7
- Clouds ..................................................................... 7
- Sun Angle .............................................................. 7
- File Sizes ............................................................. 8
- Support Data .......................................................... 8

## Options

9

- Band Combinations ............................................... 9
- Horizontal Units .................................................... 9
- Projections ............................................................ 10
- Datums .................................................................... 10
- File Format ............................................................. 10
- Bits/Pixel .................................................................. 10
- Dynamic Range Adjust ........................................... 11
- Mosaic ..................................................................... 11
- Resampling ............................................................... 11
- Media ...................................................................... 11

## Ordering and Delivery

12

- How to Order .......................................................... 12
- New Collections ..................................................... 12
- Archive ................................................................. 14
- Minimum Order Size ............................................... 14
- Delivery Times ....................................................... 14
- Order Cancellations and Modifications ...................... 15

## Licensing

16

- Permitted Activities ................................................ 16
- Prohibited Activities ............................................... 17
- License Levels ......................................................... 17

## Regional Affiliates

18

- SIGN ...................................................................... 18

## Abbreviations, Acronyms and Terms

20

## About Space Imaging

22
INTRODUCTION

When Space Imaging successfully launched the IKONOS® satellite in 1999, it made history with the world’s first one-meter commercial remote sensing satellite. Since then, Space Imaging has set the standard for quickly delivering large volumes of tonally balanced, map accurate, mosaicked images for a variety of industries and applications. To date, IKONOS has collected nearly 100 million square kilometers of imagery that is readily available in our digital archive.

Moving over the ground at approximately seven kilometers per second, IKONOS collects black-and-white and multispectral data at a rate of over 2,000 square kilometers per minute. IKONOS satellite imagery provides access to any location on the earth’s surface. Through the nearly fifteen, 98-minute journeys it makes around the globe each day, IKONOS collects vital statistics about the Earth’s ever-changing features—from fluctuations in land and water resources to the build-out of new urban areas. Commercial and governmental organizations rely on Space Imaging’s high-resolution imagery to view, map, measure, monitor and manage global activities. Applications range from national security and disaster assessment to urban planning and agricultural monitoring. Drawing on the spectacular views from IKONOS, the possibilities are endless.

IKONOS Facts at a Glance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Launch Date</td>
<td>24 September 1999</td>
</tr>
<tr>
<td></td>
<td>Vandenberg Air Force Base, California</td>
</tr>
<tr>
<td>Operational Life</td>
<td>Over 7 Years</td>
</tr>
<tr>
<td>Orbit</td>
<td>98.1 degree, sun synchronous</td>
</tr>
<tr>
<td>Speed on Orbit</td>
<td>7.5 kilometers (4.7 miles) per second</td>
</tr>
<tr>
<td>Speed Over the Ground</td>
<td>6.8 kilometers (4.2 miles) per second</td>
</tr>
<tr>
<td>Number of Revolutions Around the Earth</td>
<td>14.7 every 24 hours</td>
</tr>
<tr>
<td>Orbit Time Around the Earth</td>
<td>98 minutes</td>
</tr>
<tr>
<td>Altitude</td>
<td>681 kilometers (423 miles)</td>
</tr>
<tr>
<td>Resolution Nadir</td>
<td>0.82 meters (2.7 feet) panchromatic</td>
</tr>
<tr>
<td></td>
<td>3.2 meters (10.5 feet) multispectral</td>
</tr>
<tr>
<td>26° Off-Nadir</td>
<td>1.0 meter (3.3 feet) panchromatic</td>
</tr>
<tr>
<td></td>
<td>4.0 meters (13.1 feet) multispectral</td>
</tr>
<tr>
<td>Image Swath</td>
<td>11.3 kilometers (7.0 miles) at nadir</td>
</tr>
<tr>
<td></td>
<td>13.8 kilometers (8.6 miles at 26° off-nadir)</td>
</tr>
<tr>
<td>Equator Crossing Time</td>
<td>Nominally 10:30 a.m. solar time</td>
</tr>
<tr>
<td>Revisit Time</td>
<td>Approximately 3 days at 1-meter resolution, 40° latitude</td>
</tr>
<tr>
<td>Dynamic Range</td>
<td>11-bits per pixel</td>
</tr>
<tr>
<td>Image Bands</td>
<td>Panchromatic, blue, green, red, near infrared</td>
</tr>
</tbody>
</table>

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**PRODUCT LEVELS**

Space Imaging categorizes the imagery products gathered from IKONOS according to positional accuracy, which is determined by the reliability of an object in the image to be within the specified accuracy of the actual location of the object on the ground.

Within each IKONOS-derived product, location error is defined by a circular error at 90% confidence (CE90), which means that locations of objects are represented on the image within the stated accuracy 90% of the time. This CE90 accuracy level can be related to Root Mean Square Error (RMSE) as well as the U.S. National Map Accuracy Standards (NMAS).

There are six levels of IKONOS imagery products, determined by the level of positional accuracy: Geo, Standard Ortho, Reference, Pro, Precision and PrecisionPlus. The following chart outlines product details.

### IKONOS Product Levels at a Glance

<table>
<thead>
<tr>
<th>Positional Accuracy</th>
<th>Ortho Corrected</th>
<th>Target Elevation Angle</th>
<th>Mosaicked</th>
<th>Stereo Option</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geo</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Visual &amp; interpretive applications</td>
</tr>
<tr>
<td>CE90 15.0 meters*</td>
<td>N/A</td>
<td>N/A</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>RMS</td>
<td></td>
<td></td>
<td>60° to 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMAS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Standard Ortho</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Basic mapping projects</td>
</tr>
<tr>
<td>CE90 50.0 meters**</td>
<td>25.0 meters</td>
<td>1:100,000</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>RMS</td>
<td>25.0 meters</td>
<td>1:100,000</td>
<td>60° to 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMAS</td>
<td>1:100,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Reference</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Regional, large area mapping and general GIS applications</td>
</tr>
<tr>
<td>CE90 25.4 meters</td>
<td>25.0 meters</td>
<td>1:50,000</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>RMS</td>
<td>25.0 meters</td>
<td>1:100,000</td>
<td>60° to 90°</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>NMAS</td>
<td>1:50,000</td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>Pro</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Transportation, infrastructure, utilities planning, economic development</td>
</tr>
<tr>
<td>CE90 10.2 meters</td>
<td>25.0 meters</td>
<td>1:12,000</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>RMS</td>
<td>25.0 meters</td>
<td>1:12,000</td>
<td>66° to 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMAS</td>
<td>1:12,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Precision</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High positional accuracy for urban applications</td>
</tr>
<tr>
<td>CE90 4.1 meters</td>
<td>25.0 meters</td>
<td>1:4,800</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>RMS</td>
<td>25.0 meters</td>
<td>1:4,800</td>
<td>72° to 90°</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>NMAS</td>
<td>1:4,800</td>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td><strong>PrecisionPlus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Detailed urban analysis, cadastral &amp; infrastructure mapping</td>
</tr>
<tr>
<td>CE90 2.0 meters</td>
<td>25.0 meters</td>
<td>1:2,400</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>RMS</td>
<td>25.0 meters</td>
<td>1:2,400</td>
<td>75° to 90°</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NMAS</td>
<td>1:2,400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Exclusive of terrain effects
** May be up to 75 meters CE90 in undeveloped areas with high terrain relief (e.g., Andes or Himalayan mountain ranges)
GEORECTIFIED PRODUCTS

GEO PRODUCT SUITE

Space Imaging’s line of 1m and 4m Geo products are ideal for visual and interpretive applications such as intelligence or visualization that do not require high positional accuracy.

All Geo products are map projected—rectified to a datum and map projection system. To produce a Geo product, Space Imaging uses a correction process that removes image distortions introduced by the collection geometry and then resamples the imagery to a uniform ground sample distance (GSD) and a specified map projection. Because Geo images are not orthorectified, their accuracy is limited by terrain displacement.

Typically, Geo products are developed from IKONOS images captured at an elevation angle between 60 and 90 degrees from the Earth’s horizon. Because multiple Geo images in a single order are not mosaicked, tonal variations may be evident among images.

GEO ORTHO KIT

A subset of the Geo product line, the Geo Ortho Kit is tailored for sophisticated users such as photogrammetrists who want to control the orthorectification process.

Geo Ortho Kit images include the camera geometry obtained at the time of image collection. Applying Geo Ortho Kit imagery, customers can produce their own highly accurate orthorectified products by using commercial off the shelf (COTS) software, digital elevation models (DEMs) and optional ground control.

IKONOS collects 1m and 4m Geo Ortho Kit imagery at an elevation angle between 60 and 90 degrees. To increase the positional accuracy of the final orthorectified imagery, customers can upgrade IKONOS’ elevation angle to be between 72 and 90 degrees.

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ORTHORECTIFIED PRODUCTS

STANDARD ORTHO PRODUCT SUITE

Standard Ortho is Space Imaging’s entry-level orthorectified product. It is designed for basic mapping projects that are on a tight budget and need to meet the 1:100,000 National Map Accuracy Standard.

Positional accuracy of the Standard Ortho products are superior to Geo products, offered worldwide, and can be delivered in a shorter timeframe and at a lower cost to you than other orthorectified imagery.

Standard Ortho products are orthocorrected and have an accuracy of 50-meter CE90 in most locations but may be up to 75-meters in undeveloped areas with high terrain relief (e.g., Andes or Himalayan mountain ranges).

REFERENCE PRODUCT SUITE

Space Imaging designed 1m and 4m Reference products to be suitable for regional mapping, in addition to projects requiring an orthorectified image product with accuracy suitable for 1:50,000 mapping applications.

IKONOS collects Reference imagery at an elevation angle between 60 and 90 degrees. Space Imaging orthocorrects and mosaicks all Reference-level imagery to a minimum accuracy of 25 meters CE90.

PRO PRODUCT SUITE

Pro-level products are perfect for projects requiring high-resolution imagery and medium-scale accuracy when ground control may be costly, difficult or impossible to acquire.

The 1m and 4m Pro products are the most accurate, orthorectified imagery derived from IKONOS that do not require ground control. Consistent within the 10-meter CE90 accuracy level, the Pro product line provides global access to 1:12,000 NMAS imagery.

IKONOS Pro imagery is typically collected at a slightly higher elevation angle—between 66 and 90 degrees—to ensure positional accuracy.
**PRECISION PRODUCT SUITE**

With a 1:4,800 NMAS map accuracy level, Space Imaging’s Precision products support most regional and large-scale urban planning projects. IKONOS typically collects imagery for the 1m and 4m Precision products at elevation angles between 72 and 90 degrees. To increase positional accuracy, Space Imaging uses ground control and high-quality elevation models for all Precision products.

**PRECISIONPLUS PRODUCT SUITE**

PrecisionPlus, the most positionally accurate product offered by Space Imaging, provides the spatial accuracy necessary for most urban planning applications, as well as cadastral and infrastructure mapping requirements.

With a two-meter CE90 accuracy, PrecisionPlus is only available in one-meter black-and-white and one-meter color. To meet these premier accuracy levels, Space Imaging uses high-precision ground control and precise terrain models to create PrecisionPlus products.

**STEREO PRODUCTS**

Stereo imagery is available at one-meter resolution for the Reference and Precision accuracy levels. Space Imaging provides the stereo imagery pairs with a rational polynomial coefficient (RPC) camera model file. The RPC file provides camera model data to popular software packages for photogrammetric extraction of 3D feature coordinates, digital elevation models (DEMs) and orthorectified imagery.

Each stereo pair contains an image collected at a low elevation angle (above 60 degrees) as well as an image collected at a higher elevation angle (above 72 degrees) with 30°-45° convergence (0.54 to 0.83 base-to-height ratio).

Reference Stereo products have a horizontal accuracy of 25 meters CE90 and a vertical accuracy of 22 meters LE90. Precision Stereo products have a horizontal accuracy of four meters CE90 and a vertical accuracy of five meters LE90.
Off-The-Shelf Products

1m USA

Space Imaging offers a 1-meter, off-the-shelf imagery product of selected cities within the United States. 1m USA products are created from the highest-quality, true color IKONOS imagery, and are orthorectified to 10.2 meter CE90, mosaicked and tonally balanced. The best images for each city have already been selected, eliminating the need to search through multiple images of the same Area of Interest (AOI) to find the best image.

Using our online ordering and delivery tool, CARTERRA Online, 1m USA products can be ordered using a credit card and delivered online. 1m USA product orders of less than 250 megabytes are readily available and can be purchased and downloaded online. After placing an order online for 1m USA, you will receive instructions by email within 24 hours (usually within 1 hour) on how to download your completed order. 1m USA products larger than 250 megabytes can be purchased online, then shipped to you on CD, DVD or hard disk. These orders will be shipped within 5 business days after an order is placed.

Because 1m USA products are already processed, they can only be ordered as 8-bit, true color GeoTIFF format files in a Geographic projection. Existing off-the-shelf products are also available for some selected cities outside of the United States.
SPECIFICATIONS

SPECTRAL RANGE

<table>
<thead>
<tr>
<th>Spectral Range</th>
<th>Band(s)</th>
<th>Wavelength Range (μm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-meter Black-and-White</td>
<td>Panchromatic</td>
<td>0.45 – 0.90</td>
</tr>
<tr>
<td>4-meter Multispectral or 1-meter Color</td>
<td>Band 1 (blue)</td>
<td>0.45 – 0.52</td>
</tr>
<tr>
<td></td>
<td>Band 2 (green)</td>
<td>0.51 – 0.60</td>
</tr>
<tr>
<td></td>
<td>Band 3 (red)</td>
<td>0.63 – 0.70</td>
</tr>
<tr>
<td></td>
<td>Band 4 (near infrared)</td>
<td>0.76 – 0.85</td>
</tr>
</tbody>
</table>

For more information about the absolute radiometric calibration of the multispectral sensor, contact a Space Imaging Customer Service Representative at 1.800.232.9037 (within the U.S.) or +1.301.552.0537 (internationally).

CLOUDS

All IKONOS imagery contains less than 20% cloud cover. Customers can designate a single coordinate within the image that must be cloud free.

SUN ANGLE

IKONOS collects imagery at an elevation angle (measured from the Earth’s surface to the sun) of greater than 15 degrees, azimuth unrestricted. Because the orbit is sun synchronous, all imagery is collected at approximately 10:30 a.m. local solar time. Therefore, all imagery has consistent sun angles.
FILE SIZES

Use the following table to determine the file size for an IKONOS product order, according to specific color, bit, band and resolution requirements.

<table>
<thead>
<tr>
<th></th>
<th>Bits per Pixel</th>
<th>Number of Bands</th>
<th>Resolution</th>
<th>File Size per Square Kilometer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black &amp; White</td>
<td>8</td>
<td>1</td>
<td>1-meter</td>
<td>1 megabyte</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>1</td>
<td>1-meter</td>
<td>2 megabyte</td>
</tr>
<tr>
<td>Multispectral (true or false color)</td>
<td>8</td>
<td>3</td>
<td>4-meter</td>
<td>.1875 megabyte</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>3</td>
<td>4-meter</td>
<td>.375 megabyte</td>
</tr>
<tr>
<td>Multispectral (4-band)</td>
<td>8</td>
<td>4</td>
<td>4-meter</td>
<td>.25 megabyte</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>4</td>
<td>4-meter</td>
<td>.5 megabyte</td>
</tr>
<tr>
<td>Color (true or false color)</td>
<td>8</td>
<td>3</td>
<td>1-meter</td>
<td>3 megabytes</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>3</td>
<td>1-meter</td>
<td>6 megabytes</td>
</tr>
<tr>
<td>Color (4-band)</td>
<td>8</td>
<td>4</td>
<td>1-meter</td>
<td>4 megabytes</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>4</td>
<td>1-meter</td>
<td>8 megabytes</td>
</tr>
<tr>
<td>Bundle (true or false color)</td>
<td>8</td>
<td>4</td>
<td>1-meter + 4-meter</td>
<td>1.1875 megabytes</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>4</td>
<td>1-meter + 4-meter</td>
<td>2.375 megabytes</td>
</tr>
<tr>
<td>Bundle (4-band)</td>
<td>8</td>
<td>5</td>
<td>1-meter + 4-meter</td>
<td>1.25 megabytes</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>5</td>
<td>1-meter + 4-meter</td>
<td>2.5 megabytes</td>
</tr>
</tbody>
</table>

SUPPORT DATA

All Space Imaging products are shipped with a metadata file, license file and shape files. The metadata includes order parameters as well as source image and product file descriptions.

Order parameters include area of interest (AOI), spectral bands and coordinate system. Source image descriptions include acquisition date, sun angles and viewing geometry. Product file descriptions include geocoding, spectral bands and coverage area.

Metadata is provided in an ASCII text file. Shape files show order AOI, delivery component layout, and source image footprints with acquisition geometry.
OPTIONS

BAND COMBINATIONS

BLACK-AND-WHITE
One-meter IKONOS panchromatic imagery delivered as a single band.

MULTISPECTRAL
Four-meter IKONOS imagery delivered as one file with three bands in true color (red, green, blue) or false color (near infrared, red, green); or four files of one band each (near infrared, red, green, blue).

COLOR
IKONOS imagery created using a pan-sharpening process that combines one-meter spatial resolution of the panchromatic image with the spectral resolution of the multispectral bands to create a one-meter color product.

Space Imaging delivers one-meter color imagery as either one file with three bands in true color (red, green, blue) or false color (near infrared, red, green); or four files of one band each (near infrared, red, green, blue).

BUNDLE
When the bundle order option is selected, customers receive both one-meter black-and-white and four-meter multispectral IKONOS imagery. Space Imaging delivers one-meter black-and-white imagery as a single band file. Multispectral imagery is delivered as either one file with three bands in true color (red, green, blue) or false color (near infrared, red, green); or four files of one band each (near infrared, red, green, blue).

IKONOS collects the images for a bundle order simultaneously to ensure radiometric and temporal consistency.

HORIZONTAL UNITS

Meters, International Feet, or U.S. Survey Feet.
PROJECTIONS

Choice of UTM, State Plane, Albers Conic Equal Area, Lambert Conformal Conic, or Transverse Mercator. Stereo products are also available in an epi-polar projection to facilitate stereo feature extraction applications.

DATUMS

Choice of:

- WGS84 (available worldwide)
- NAD83 (available in North America only)
- NAD27 (available in conterminous United States only)

FILE FORMAT

Space Imaging delivers monoscopic IKONOS imagery in electronic format as an untiled GeoTIFF file or as an uncompressed NITF 2.0 file. Geo products in NITF format have a limited distribution.

Stereo imagery is available in TIFF format for epi-polar projected imagery and GeoTIFF for map-projected imagery.

BITS/PIXEL

Space Imaging produces IKONOS imagery at either 8 or 11-bits per pixel.

- Customers interested in small, easy to use images for visual interpretation should select 8-bit images. In an 8-bit image, each pixel is represented by 256 shades of gray per band.

- Customers interested in full, dynamic range should select 11-bit images. When viewing an IKONOS 11-bit image, use an application that is capable of reading 16-bit file formats and adjusting both image brightness and contrast. In an 11-bit image, each pixel is represented by 2,048 shades of gray, which provides more information to discern subtle differences among objects.
**DYNAMIC RANGE ADJUST**

When ordering an IKONOS imagery product, specify whether Dynamic Range Adjust (DRA) should be “on” or “off.” If “on” is selected, Space Imaging will apply DRA to enhance the visual interpretability of the image. If “off” is selected, Space Imaging will maintain absolute radiometric accuracy and full dynamic range for scientific applications. The DRA option is not available for NITF file formats.

**MOSAIC**

Reference, Pro, Precision & PrecisionPlus orthorectified products ordered with DRA “on” may be mosaicked with tonal balancing. Mosaic seams will be positioned to reduce visibility. Geo, Geo Ortho Kit, and Standard Ortho products as well as products ordered with DRA “off” will not be mosaicked.

**RESAMPLING**

Cubic convolution (also called bi-cubic) is used by default. Nearest neighbor resampling is available on request.

**MEDIA**

Space Imaging can deliver imagery on CD-ROM, DVD, hard drive or electronically. Electronic delivery requires system set-up and client software installation prior to delivery.

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ORDERING AND DELIVERY

HOW TO ORDER

To order IKONOS products, contact a Space Imaging North America Customer Service Representative at 1.800.232.9037 (within the U.S.) or +1.301.552.0537 (internationally).

Customers can purchase imagery from Space Imaging North America for any areas of interest in the world. Customers can also purchase imagery directly from Space Imaging Regional Affiliates for areas of interest within their specific communication cones. For more information on Space Imaging Regional Affiliates, see Regional Affiliates on page 18 of this product guide.

NEW COLLECTIONS

New collections are orders for imagery that are not being fulfilled from Space Imaging’s imagery archive and require scheduling and tasking of the IKONOS satellite. For new collections, customers can request either a standard collection or a restricted collection window.

STANDARD COLLECTION

For standard collection orders, no tasking or additional fees are charged.

RESTRICTED COLLECTION WINDOW

For restricted collection window orders, customers must define:

1. **The length of the collection window.** The collection window can be of any length from 7 to 59 days. Keep in mind that fewer opportunities are available for successful collection with shorter, restricted collection windows.

2. **The start date of the collection window.** This can be any date from the date of order to any point in the future. If the customer selects a start date in the future but does not restrict the collection window (from 7 to 59 days), the additional fees stated below do not apply.
Additional Fees For Restricted Collection Window
Customers will be charged an additional, non-refundable, processing fee for prioritizing an order. In addition, customers will be charged a premium on prioritized imagery orders. This premium will only be charged on imagery delivered successfully.

Notes
- Standard delivery times apply for restricted collection window orders.
- Imagery delivered to the customer that was collected outside of the collection window is not subject to the premium charge.
- A restricted collection window is available for Geo 1m and 4m products. For Geo Ortho Kit, Standard Ortho, Reference, Pro, Precision or PrecisionPlus products, a non-standard quote (NSQ) and collection feasibility analysis are required.

**Average Revisit Time for Point Targets**

![Graph showing average revisit time for point targets with different target latitudes and average revisit times in days.](image)

Target Latitude (deg) vs. Average Revisit Time (days)

- 75.0 elev, 13.5 obliq, 0.86 GSD
- 72.0 elev, 16.2 obliq, 0.88 GSD
- 60.0 elev, 26.9 obliq, 1.00 GSD
- 50.0 elev, 35.5 obliq, 1.18 GSD
- 45.0 elev, 39.7 obliq, 1.32 GSD
- 30.0 elev, 51.5 obliq, 2.05 GSD
ARCHIVE

Space Imaging maintains an extensive archive of IKONOS imagery that has been collected since the launch of IKONOS in September 1999. Two tools are available from the Space Imaging web site (www.spaceimaging.com) to determine if archive imagery is available for any area of interest.

- To use Space Imaging’s advanced, full featured online search tool, visit: http://carreraonline.spaceimaging.com

MINIMUM ORDER SIZE

The minimum order for new collections is 100 square kilometers. For archive Geo, Geo Ortho Kit, Standard Ortho and Reference Stereo products, the minimum order size is 49 square kilometers. All other archive products have a 100-square kilometer minimum.

All orders must be a minimum of five kilometers wide in any direction.

DELIVERY TIMES

<table>
<thead>
<tr>
<th>Product</th>
<th>Size</th>
<th>Delivery Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geo</td>
<td>Space Imaging North America Archive</td>
<td>5 business days</td>
</tr>
<tr>
<td></td>
<td>Space Imaging Regional Affiliate Archive</td>
<td>10 business days</td>
</tr>
<tr>
<td>Geo Ortho Kit</td>
<td>Less than 500 square kilometers (New Collection)</td>
<td>60 days</td>
</tr>
<tr>
<td>Standard Ortho</td>
<td>500 – 5,000 square kilometers (New Collection)</td>
<td>90 days</td>
</tr>
<tr>
<td>Reference Stereo</td>
<td>5,000 – 10,000 square kilometers (New Collection)</td>
<td>120 days</td>
</tr>
<tr>
<td></td>
<td>More than 10,000 square kilometers (New Collection)</td>
<td>Custom quote</td>
</tr>
<tr>
<td>Reference &amp; Pro</td>
<td>Less than 5,000 square kilometers</td>
<td>90 days</td>
</tr>
<tr>
<td></td>
<td>5,000 – 10,000 square kilometers</td>
<td>150 days</td>
</tr>
<tr>
<td></td>
<td>More than 10,000 square kilometers</td>
<td>Custom quote</td>
</tr>
<tr>
<td>Precision</td>
<td>Less than 5,000 square kilometers</td>
<td>120 days</td>
</tr>
<tr>
<td>PrecisionPlus</td>
<td>5,000 – 10,000 square kilometers</td>
<td>150 days</td>
</tr>
<tr>
<td>Precision Stereo</td>
<td>More than 10,000 square kilometers</td>
<td>Custom quote</td>
</tr>
</tbody>
</table>
# Order Cancellations and Modifications

## Cancellations

<table>
<thead>
<tr>
<th>Days Since the Order Date</th>
<th>Order Conditions</th>
<th>Cancellation Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 3</td>
<td>N/A</td>
<td>0%</td>
</tr>
<tr>
<td>3 – 30 days</td>
<td>N/A</td>
<td>25% of the order</td>
</tr>
<tr>
<td>30+ days</td>
<td>N/A</td>
<td>50% of the order</td>
</tr>
<tr>
<td>N/A</td>
<td>Late Delivery</td>
<td>0%</td>
</tr>
<tr>
<td>N/A</td>
<td>Error by Space Imaging</td>
<td>0%</td>
</tr>
</tbody>
</table>

## Modifications

<table>
<thead>
<tr>
<th>Imagery Collected?</th>
<th>Order Conditions</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>Error by Space Imaging</td>
<td>0%</td>
</tr>
<tr>
<td>No</td>
<td>Order falls under cancellation policy</td>
<td>Ordered less than 3 days: No Fee</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ordered 3 – 30 days: 25% of order</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ordered 30+ days: 50% of order</td>
</tr>
<tr>
<td>Yes</td>
<td>Cancel and reorder as desired</td>
<td>Invoice for percent of collection completed, but if over 30 days since order date, assess a minimum of 50%</td>
</tr>
</tbody>
</table>
** LICENSING **

Space Imaging retains all ownership rights to IKONOS products. Space Imaging grants its customers a non-transferable, non-exclusive license to use the products.

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Under Space Imaging licenses, customers may do the following.

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- Distribute derivative works. Derived data is data extracted from imagery to produce vector information (e.g., street centerlines) and/or classification, and is irreversible and uncoupled from the source imagery. Extracted data is the property of the customer.
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Permits internal use of the product, within a legal commercial business entity at multiple locations or by a limited number of related civil governmental agencies identified at the time of original purchase, in the original medium, within the scope of a project for which the product is procured.

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Permits sharing of the product for internal use among Federal Civil Agencies within the scope of a project for which the product is procured.
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REGIONAL AFFILIATES
The Space Imaging Global Network (SIGN) is an association of Space Imaging Regional Affiliates (RAs) who are involved in collecting, processing, marketing and distributing imagery products based on Space Imaging’s IKONOS satellite constellation.

SIGN
SIGN provides the operating framework for streamlining commercial operations and procedures on a worldwide basis. It also standardizes order management processes across all RAs, to ensure the best customer service experience in the industry. The SIGN program maximizes direct access to the IKONOS satellite, thereby increasing commercial order fulfillment capacity.

In addition to Space Imaging, the current members of SIGN are:

| Japan Space Imaging       | Space Imaging Eurasia          |
| Tokyo, Japan              | Ankara, Turkey                |
| Space Imaging Asia        | Space Imaging Middle East     |
| Seoul, Korea              | Dubai, United Arab Emirates   |
| European Space Imaging    | Space Imaging Southeast Asia  |
| Munich, Germany           | Bangkok, Thailand             |
Space Imaging’s CARTERRA® Online (http://carterraonline.spaceimaging.com) allows customers worldwide to have instant access to all SIGN members’ IKONOS data archives.

Customers located within any of the RAs’ communications cones are encouraged to deal directly with the RA closest to their location or an authorized local Space Imaging Reseller. Customers outside of any of the communications cones may deal directly with any RA or Reseller. Space Imaging’s exclusive sales territory includes Canada, the United States, Mexico and the Caribbean.

SIGN members’ communications cones are shown in the diagram below.
ABBREVIATIONS, ACRONYMS AND TERMS

AOI
Area of Interest.

B/H
Base-to-height ratio of a stereo pair.

Black-and-white
Single band, black-and-white imagery. Also referred to as panchromatic.

CE90
Circular Error 90. Indicates that the actual location of an object is represented on the image within the stated accuracy 90% of the time.

color
Imagery derived by fusing black-and-white and multispectral imagery.

COTS
Commercial Off The Shelf.

DEM
Digital Elevation Model.

DRA
Dynamic Range Adjust. An optional post-processing feature that enhances the visual interpretability of the image.

DTM
Digital Terrain Model.

false color
Viewing multispectral or color imagery in a specific combination of bands (near infrared, red, green). When viewing false color imagery, colors appear “abnormal” (e.g., healthy, green vegetation appears in red on a false color image). False color imagery is commonly used in vegetation analysis.

GSD
Ground Sample Distance. The size of a single pixel as measured on the ground.

IGM
Image Geometry Model. Also referred to as Rational Polynomial Coefficients (RPC).

LE90
Linear Error 90. Indicates that the actual elevation of an object is represented on the image within the stated accuracy 90% of the time.

monoscopic
The collection of a single image, as opposed to a stereo collection.

mosaic
The process of digitally assembling images to create contiguous large-area coverage.
MULTISPECTRAL IMAGERY collected by IKONOS in two or more ranges of wavelengths in the electromagnetic spectrum.

NADIR The point on the ground vertically beneath the sensor.

NMAS United States National Map Accuracy Standards.

ORTHORECTIFICATION The process of removing image distortions introduced by the collection geometry and variable terrain, and re-sampling the imagery to a specified map projection. Also referred to as orthocorrection.

RA Space Imaging Regional Affiliate. The current Space Imaging Regional Affiliates are Japan Space Imaging, Space Imaging Asia, European Space Imaging, Space Imaging Eurasia, Space Imaging Middle East, and Space Imaging Southeast Asia.

RMSE Root Mean Square Error.

RPC Rational Polynomial Coefficient camera model. RPCs provide the camera geometry obtained at the time of the image collection. Commercial Off the Shelf (COTS) software can utilize RPC to allow photogrammetric processing.

STEREO The collection of two or more images of the same Area of Interest (AOI) from different viewing angles.

TRUE COLOR Viewing multispectral or color imagery in a specific band combination (red, green, blue). When viewing true color imagery, colors appear “normal” (e.g., vegetation is green).
ABOUT SPACE IMAGING

Space Imaging is the leading supplier of visual and geographic information products and related services. Solutions from the company’s key technology suppliers—Lockheed Martin Space Systems, Raytheon Systems Company and Eastman Kodak—represent the most advanced, successful achievements in satellite imaging, image processing and related digital technology development.

For detailed product information, or to learn more about how Space Imaging can add value to your organization, visit our website at www.spaceimaging.com; or call us at 1.800.232.9037 or +1.301.552.0537.

Space Imaging, LLC
12076 Grant Street
Thornton, Colorado 80241
www.spaceimaging.com
U.S.A.: 800.232.9037
International: +1.301.552.0537