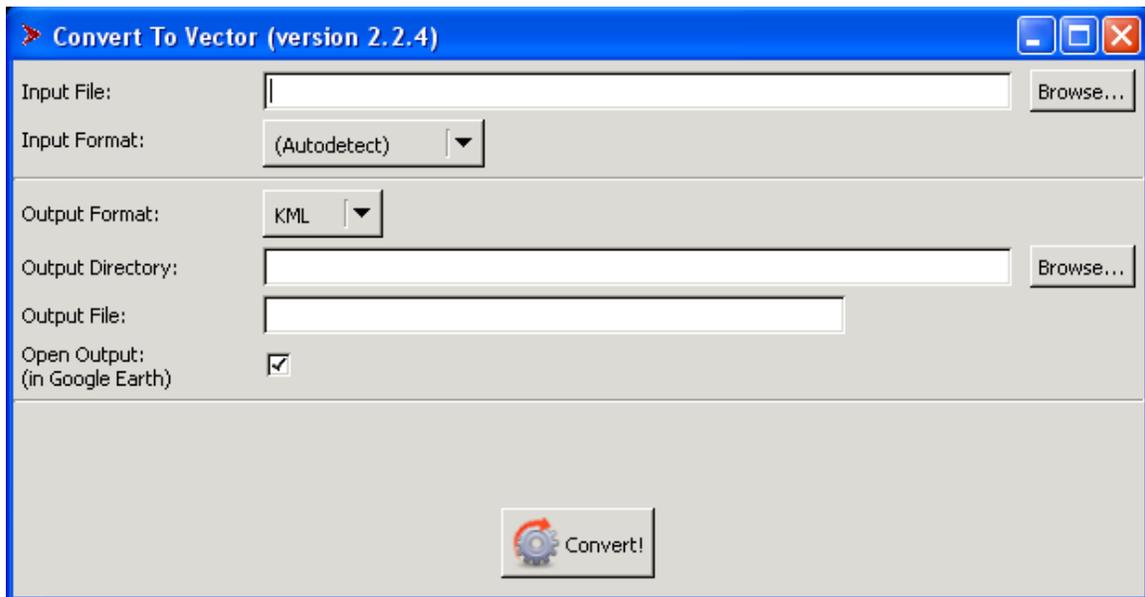# Convert To Vector

Version 2.2

This manual describes the use of the Convert To Vector tool that has been developed to transform point or scene information to various other formats that are compatible with external applications such as Google Earth™ (KML files), GIS software such as ArcGIS (shapefiles), text editors and spreadsheets (CSV files).

1. Getting Started

This section contains a simple example that will illustrate the basic operation of Convert To Vector.

1.1 Example

In this example, you have a CEOS file, such as an ERS or RADARSAT-1 .D/.L file, or an ALOS LED/IMG file, and you wish to generate a KML file that contains the bounding box of the scene for visualization with Google Earth.
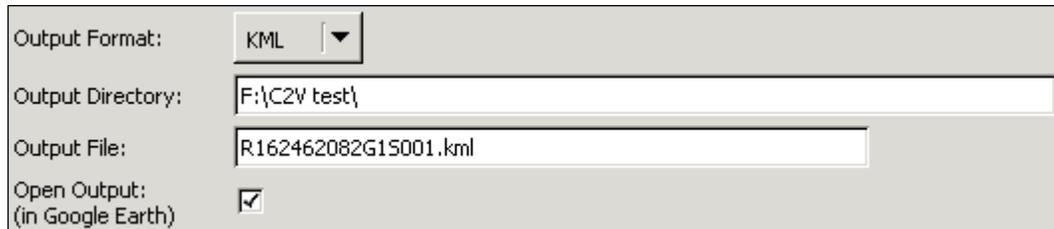

Step 1: Click the "Browse…" button and then select your leader (.L, or LED-) file. After selecting the file and clicking "OK", Convert To Vector should automatically select the "Leader" file type.

Step 2: Choose the output format "KML" (it is the default, so just leave it unchanged).

If you have Google Earth installed, you can check "Open Output (in Google Earth)" to open the generated KML file in Google Earth after processing (this is also the default).

Step 3: Change the output directory or filename, if needed. By default, the output file is placed in the same directory as the input file, and has the same basename but with a ".kml" extension.

Step 4: Click "Convert". The conversion is usually very quick, and you should see a "Processing Successful!" message. If you chose to "Open Output", Google Earth should start, and zoom in to a blue region containing your CEOS scene.

If you didn't choose "Open Output", then you can either:
- Browse to the Output Directory that you selected, and double-click the .kml file to start Google Earth.
- Run Google Earth, select "Open", and select the .kml file that was generated.

Most of the conversions supported by Convert To Vector will be done like this.

In most cases, the correct input format should be selected after you choose the file. You may override the input format if you choose, though usually the processing will fail if you've selected an input format that doesn't match the file. An exception is the "Generic CSV" format— for example, you might choose process an AUIG or URSA file as Generic CSV (e.g., to include attributes not normally included).

1.2 Autodetection of the Input format
When Convert To Vector starts, the Input Fromat that is selected is "(Autodetect)". This means that the appropriate format will be determined automatically after you select the file. If, after selecting your file, the Input Format selection still says "(Autodetect)", it means that Convert To Vector couldn't figure out what type of file you selected. In this situation, you may still be able to process the file by selecting the Input Format manually.

You may also override the detected input format. For example, you might prefer to process an AUIG file as Generic CSV.

1.3 If An Error Occurs

If you get an error during processing, Convert To Vector will usually show some of the error message in the main window. Full details on the nature of the failure are available in the "Console Window" of Convert To Vector. This Console Window is often hidden behind the main Convert To Vector window, so you might have to move the main window to see the error messages.

2. Supported Conversions

This section describes which of the possible combinations of Input and Output Formats are actually supported by the tool.

		Output			
		KML	Shape	Text	AUIG
Input	Metadata	Yes	Yes	Yes	No
	Leader	Yes	Yes	Yes	No
	Point	Yes	Yes	Yes	No
	Polygon	Yes	Yes	Yes	No
	Shape	Yes	-	Yes	No
	KML	-	Yes	Yes	Yes
	Geotiff	Yes	Yes	Yes	No
	AUIG	Yes	Yes	-	-
	URSA	Yes	Yes	-	-
	Generic CSV	Yes	Yes	-	-
	Terrasar	Yes	Yes	Yes	No
	STF	Yes	Yes	Yes	No

The table has a dash where the conversion is not applicable. For example, converting a Generic CSV to Text or AUIG is not necessary because the Text and AUIG formats are both CSV files as well.

Also, most formats do not support the AUIG output type – this is because the AUIG format is a specialized format, generally you will want to use Text instead.

3. Input Formats

This section goes through each of the input formats available in Convert To Vector, and describes each in detail.

3.1 Metadata
This refers to the metadata files used in the ASF Internal format.

The MapReady tool will, in most cases, output a metadata file in addition to the output image (such as a JPEG or a GeoTIFF), in the same directory.

Metadata files have the extension ".meta". For example:
> E122590290G1U014.meta

3.2 Leader
This is a CEOS metadata file. For ERS and RADARSAT-1 data from ASF, it usually has a .L extension, and for ALOS data (such as PALSAR) it uses a "LED-" prefix. For example:
> E122590290G1U014.L
> LED-ALPSRP042631270-H1.5_UA

If your CEOS data came from a facility other than ASF, your files may have another extension, such as ".sarl", and/or come with a trailer file (a ".sart" file, for example) in addition to the leader file. Most of these other conventions are accepted by Convert To Vector, and should be understood as leader files. If, after selecting the leader file, the "Leader" input format is not automatically selected, it means Convert To Vector did not recognize that naming convention. Often, when in this situation, renaming the file to use a ".L" extension will allow it to work. You'll need to rename the data file to match, as well.

3.3 Point & Polygon
This is a text file format that simply lists a lot of points in a simple three-column format. The three columns are: ID number, latitude, longitude.

Generally, no file obtained from another application will produce either of these formats—you use these formats if you are writing a script or a tool that you want to generate point or polygon data from, and then process with Convert To Vector.

For new scripts, the more flexible "Generic CSV" format may be more suitable for this purpose, particularly if you wish to have additional metadata associated with the points/polygons.

(Autodetect)
Metadata
Leader
Point
Polygon
Shape
KML
Geotiff
AUIG
URSA
Generic CSV
Terrasar
STF

Notes on the formatting of point and polygon files:

1. Lines beginning with the '#' character are comment lines. You may add comment lines anywhere else in the file as long as they are after the first 2 (required) comment lines.
2. The first 2 lines are comment lines, those with 'file type' and "ID" in them, and are required.
3. The required line containing "# ID, latitude, longitude" defines the columns. At this time, data must be in latitude, longitude order (not vice versa). The values should be given in decimal degrees.
4. Values and text strings shall be separated by a comma, ','
5. A line terminating in a comma is OK.
6. Only one point or coordinate may be listed per line.
7. Polygon text files do NOT need to list a closing point that is the same as the first (beginning) point. Polygons are automatically closed.
8. ID numbers will be interpreted as integers (truncated if necessary) and data values will be interpreted as floating point.
9. Blank lines and white space before/after comma characters will be ignored

Example ASF-style text file containing point data:

```
# file type,point
# ID,latitude,longitude
# Created by ASF
# 28-February-2008
1, 41.9839,  -124.263
2, 41.8375,  -120.9325
3, 41.89028, -122.79667
4, 42.29389, -112.64056
5, 41.885,   -110.49084
6, 40.98084, -110.79889
7, 38.80667, -110.76278
8, 38.07528, -111.36472
9, 36.97917, -111.73167
10, 37.00639, -112.49084
11, 34.88334, -114.48278
12, 34.22472, -114.15056
13, 32.77028, -114.48084
14, 32.53389, -114.86584
15, 32.4125,  -117.16
16, 33.09667, -117.36472
17, 33.51278, -117.84361
18, 33.69,    -118.43389
19, 33.95778, -118.97195
20, 34.19695, -119.56583
```

Example ASF-style text file containing polygon data:

```
# File type,polygon,
# ID,latitude,longitude
1,41.9839,-124.263
2,41.8375,-120.9325
```

```
3,41.89028,-122.79667
4,42.29389,-112.64056
5,41.885,-110.49084
6,40.98084,-110.79889
7,38.80667,-110.76278
8,38.07528,-111.36472
# Note: The following point is only approximate
9,36.97917,-111.73167
10,37.00639,-112.49084
11,34.88334,-114.48278
12,34.22472,-114.15056
13,32.77028,-114.48084
14,32.53389,-114.86584
15,32.4125,-117.16
16,33.09667,-117.36472
17,33.51278,-117.84361
```

3.4 Shape

These are shapefiles, and are used by GIS applications such as ArcMap. You will usually have a ".shp" file and a ".dbf" file.

At this point, the shapefile must contain coordinates in decimal degree latitude and longitude. If you have a shapefile using another coordinate system, you can usually reproject the points to lat/lon using the GIS application.

3.5 KML

Generic KML ingest is still in progress, however at this point many KML files can be correctly converted, and those that can't will fail to process.

KML generated by Convert To Vector can always be converted, and the metadata stored in the KML "description" can usually be recovered. For example, if you convert a leader file to KML, and then that KML to a shapefile, all of the metadata attributes should be preserved.

The AUIG -> KML -> AUIG conversion is used in cases where you have an AUIG file containing numerous extra entries in which you are not interested, and you want to use Google Earth to remove those extras. After doing so, Convert To Vector can convert the modified KML file back to an AUIG .csv file which contains only the entries that you are interested in.

3.6 GeoTIFF

GeoTIFF files are image files (in the TIFF format) with additional tags which specify geolocation of the image. MapReady produces GeoTIFFs, as do many GIS applications.

There are many different flavors of GeoTIFF, and Convert To Vector supports many of them. If you find a particular GeoTIFF that cannot be ingested by Convert To Vector, let us know (at uso@asf.alaska.edu), and we will attempt to support it in a future version!

3.7 AUIG

AUIG files are a particular flavor of CSV file, generated by the ALOS User Interface Gateway. (https://auig.eoc.jaxa.jp/auigs/en/top/index.html)

Each line in the CSV file describes one rectangular region together with a set of associated metadata fields. Convert To Vector selects a useful subset of the given metadata to place as attributes (when converting to a shapefile), or in the description field (when converting to KML).

You may also process your AUIG files as "Generic CSV". In this case all of the data columns will be added as attributes, or placed in the description, to each polygon, instead of just the "useful subset."

If you are logged in as a "Guest" to the AUIG, the export currently does not contain the required corner point information to generate any of the output formats. Unfortunately, this means you will need have a login account at AUIG in order to use the exported CSV files with Convert To Vector.

3.8 URSA

The URSA format is a CSV format that comes from the ASF URSA data ordering web site. (https://ursa.asfdaac.alaska.edu/cgi-bin/login/guest/). The CSV files describe scenes that are available to be ordered through the URSA interface. As with the AUIG files, you can process URSA files as Generic CSV if you wish.

3.9 Generic CSV

This is a text file that contains a set of polygons defined in a CSV (comma-separated value) file. Excel or any other spreadsheet application can save files as CSV. The CSV file contains columns that identify the corner points of the polygons as well as other metadata fields.

The first line of the CSV file is the "header" line, containing the names of the columns, and the remaining lines are the "data" lines, each line defining one polygon. When the file is processed, Convert To Vector guesses which fields are point data and which are metadata, using simple rules based on the names of the columns in the header line.

Here is how the CSV file is ingested:
1. The first line in the file is the header line, which defines the data columns in the file. All subsequent lines are the data lines.
2. Lines beginning with the '#' character are comment lines. You may add comment lines anywhere else in the file as long as they are after the first line.
3. Point or polygon data is taken from columns which start with the characters 'lat' or 'lon'. For example: 'Latitude1' or 'Lon_UL'   There must be an equal number of lat and lon columns.
4. Values and text strings shall be separated by a comma, ','

5. Values and text strings may be quoted with double-quotes. The quotes will be discarded. To include the quote character in a quoted string, use two double-quotes in a row.
6. Blank lines and white space before/after comma characters will be ignored, unless surrounded by quotes.
7. Generic CSV files do NOT need to list a closing point that is the same as the first (beginning) point. The polygons are automatically closed.
8. In the output, all columns are exported as attributes for the point or polygon.
9. Convert To Vector attempts to determine the data type of each column by inspecting the column values. The detected data types are: string, double, integer, logical.

For example, a CSV file could look like this.

```
ID,DATE,LAT1,LON1,LAT2,LON2,LOOK_ANGLE
P1,11/27/07,41.9839,-124.263,41.8375,-120.9325,23.3
P2,11/30/07,41.89028,-122.79667,42.29389,-112.64056,23.3
P3,12/1/07,42.29389,-112.64056,41.885,-110.49084,37.7
```

In this file, there are 7 columns. The ID, DATE and LOOK_ANGLE fields are metadata. The LAT/LON 1/2 columns are the polygon coordinates. Normally your polygons will have more than 2 points—usually, you will have eight points, a latitude and a longitude for each corner of a rectangular region. However, the conversion doesn't assume any particular number.

For the metadata columns, ID would be set as an integer attribute, DATE as a string attribute, and LOOK_ANGLE a double attribute.

The AUIG files described in the previous section are valid files for use with "Generic CSV".

Another example:

```
NAME,DATE,LAT1,LON1,LAT2,LON2,LAT3,LON3,"LOOK ANGLE"
# Generated on 12/1/07 08:32
First,"11/27/07, 17:45",41,-124,41.8,-120.9,41.3,-122.1,23.3
Second,"11/28/07, 1:02",41.1,-124.1,42.6,-120,39.3,-122.1,23.3
Third,"11/29/07, 12:43",40.7,-124.8,40.7,-120.1,42.9,-122.1,23.3
```

In this example, each line defines a triangular region since we have three lat/lon pairs.

The second column DATE requires quoting around each data column value, since the column value contains a comma (which would otherwise be interpreted as a column separator). The column header LOOK ANGLE does not require quoting since the space would be preserved even without the quotes.

The lat/lon values do not need to be listed in alternating order. The first latitude is paired with the first longitude, etc. For example, if the header line had been specfed as:
```
NAME,DATE,LAT1,LAT2,LAT3,LON1,LON2,LON3,"LOOK ANGLE"
```

the result would have been the same (provided the data values were also reordered to match the new header line).

This does mean that a header line with columns listed like this:
```
LAT1,LON2,LAT2,LON1
```

will probably produce unexpected results, since LAT1 would be paired with LON2, and LAT2 with LON1. The latitude and longitude values must be listed in the same order.

3.10 Terrasar
This refers to data from the TerraSAR-X satellite. The metadata for TerraSAR-X is in the xml format; you should select the .xml file. Since this file contains relative references to the actual data file, you should keep the directory structure intact.

3.11 STF
This refers to data in the Sky Telemetry Format. This data file has a ".000" extension (sometimes ".001"), and the metadata file has the ".par" extension (often ".000.par"). To process with Convert To Vector, select the metadata .par file.

4. Output Formats

This section goes through each of the output formats available in Convert To Vector, and describes each in detail.
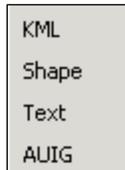
4.1 KML
This is the data file format used by Google Earth, and has a ".kml" extension. KML is a specialized XML format, the files are plain text and so can be viewed with any text editor. However, usually they will be viewed using Google Earth's "Open" menu item, or by double-clicking the kml file, which will start Google Earth.

4.2 Shape
These are shapefiles, and are used by GIS applications such as ArcMap. A shapefile is a vector data format—conversion to this format is what led to the inclusion of "Vector" in the name Convert To Vector.

Converting to a shapefile will give you four files. When you add the ".shp" file to ArcMap or other GIS application, the other files should be in the same directory as the .shp file, so keep them together when copying or moving.

If you convert R162462082G1S001.L (a leader file) into Shape, the four files will be:

R162462082G1S001.shp	the polygon data itself
R162462082G1S001.dbf	attribute data
R162462082G1S001.prj	projection file

R162462082G1S001.shx   index file

The shapefile output format does not yet support the "Open Output" option (to open, for example, the output in ArcMap after conversion). You will need to open the file using the "Add Data" capability in ArcMap (choose the .shp file). Other applications will have their own methods for opening the shapefile.

4.3 Text
This the ASF-style polygon CSV text file, as described in Section 3.3 in the "Input Formats" section above. It simply lists the vertexes of the polygon, one per line.

For example, converting the file CEOS leader file E122590290G1U014.L to Text produces the following file (by default, it is named E122590290G1U014.csv):

```
# File type       , polygon
# Polygon ID (name), E122590290G1U014.L
#
# Latitude, Longitude
63.275219, -144.282684
63.519260, -146.251251
64.410049, -145.710998
64.160240, -143.680084
```

Outputting to "Text" will produce a file that you can then use as input with the "Polygon" type. If you wish to have a "Point" file, you just need to change the word "polygon" to "point" in the first line of the file.

4.4 AUIG
AUIG files are a particular flavor of CSV file, generated by the ALOS User Interface Gateway. Generally, you will only output **to** this format when you are ingesting a KML file that was previously ingested from an AUIG file. The only input format that can generate AUIG files is KML, and only certain KML files will work. This is discussed in more detail in the AUIG section of "Input Formats" (section 3.7, above).

5. The "Open Output" Option

Currently, only Google Earth and Excel are supported as an external application that can be opened by Convert To Vector. Excel is only available when converting to the AUIG format.

If you wish to convert to a KML file and view the output with Google Earth (and have Google Earth installed), there is a shortcut you can use to quickly do this without opening Convert To Vector.

1. In the Windows File Manager, select the file you wish to convert to KML.
2. Drag & drop the file on to the Convert To Vector desktop icon.
3. Google Earth should open with the result.

When you drag the file onto the Convert To Vector icon, (1) Convert To Vector starts up, (2) the file will be converted to KML, (3) Google Earth is started with generated file, and then (4) Convert To Vector exits.

A similar trick works for conversion of AUIG files back from KML. From the file manager, drag the KML file onto the Convert To Vector desktop icon, and Excel should start up with the converted file.

6. Customizing the conversion

It is possible to configure which metadata fields are put into the output shapefile as attributes, or into the KML file as part of the description, by editing the "header.lst" file in the Convert To Vector installation directory. If you used the default, then this file is: C:\Program Files\ASF_Tools\Convert To Vector 2.1\header.lst. This is a plain-text file that you can edit with any text editor, such as Notepad.

Here are the first few lines of the file:

```
[META]
meta.general.basename = string
meta.general.sensor = string
```

The line "[META]" indicates that the settings apply to the metadata conversions. (This section also applies to Leader files.) Later in the file, you'll find the settings for the other conversions, expect for Shape and KML (which don't have a set of standard features).

The line "meta.general.basename = string" means that when converting a metadata file, the basename field should be included in the output, and that it should be a string. That it is a string doesn't matter so much for KML files, but for Shapefiles it determines the type of the attribute, so that, e.g., it sorts correctly.

The next line is the sensor, also a string field. If you do not wish to have the Sensor field in the output, you can remove the line by deleting it, or by inserting a "#" at the beginning of the line. Doing the latter is recommended since it will be easier to put it back in later, if desired.

```
[META]
meta.general.basename = string
# meta.general.sensor = string
```

7. The Command-Line Tool

A command-line tool that can perform the same conversions available in the GUI is also available. The command-line tool can be useful in cases where you wish to use Convert To Vector in a script.

Please note that to use the convert2vector command-line tool, you'll need to reboot after installing, or manually add convert2vector's location to your path.

The tool is called "convert2vector" and works like this:

```
convert2vector -input-format <input format>
               -output-format <output format>
               <input file> <output file>
```

For example:

```
convert2vector -input-format metadata –output-format kml
               test.meta test.kml
```

The example above converts the metadata file "test.meta" into the KML file "test.kml". You can usually omit the input format, and let it be autodetected:

```
convert2vector –output-format kml test.meta test.kml
```

The valid input formats are: meta, leader, shape, point, polygon, geotiff, csv. These match the corresponding options available in the GUI. Similarly, the output formats are: shape, kml, text.

Note that the AUIG format is not available in the command-line tool in this version, as an input or output format

7.1 Batch Processing

The command-line tool has a capability not available in the GUI, which allows users to process multiple files into a single output file. To do this, run convert2vector with the "-list" option, and give as an input file a text file containing the names of all the input files. (This is similar to how the batch processing option in the command-line MapReady works.)

For example:

```
convert2vector -list –output-format kml files test.kml
```

The –list option means that the input file ("files") is not an actual input file, instead it is a text file, containing lines with the actual input files, one input file per line. E.g.:

```
test1.meta
test2.meta
test3.meta
```

All three scenes will be placed in the single output file "test.kml".

Not all conversions support the "-list" option.