ASF_CONVERT COMMAND LINE TOOL

BACKGROUND

The new command line version of *asf_convert* is designed to be the future back end of an extended asf_convert graphical user interface. For simplicity a configuration file is the one required input to run the tool. For throughput a batch mode is available that allows users to run large quantities of data files through the system. All essential options can be stored in a default values file that is used to process all files on the batch file list with the same parameters.

CREATING A CONFIGURATION FILE

If no configuration file is available that can be modified for processing a data set, the configuration file can be created from scratch using

```
asf_convert -config <name of configuration file>.
```

This generates a configuration file with the following content.

```
asf_convert configuration file

[General]
input file = < basename of input file >
output file = < basename of output file >
import = < 0 | 1 >
geocoding = < 0 | 1 >
export = < 0 | 1 >
default values = < name of default values file >
intermediates = < 0 | 1 >
batch file = < name of batch file >
```

It is obvious that the input and output files need to be known. The next three parameters are basically switches indicating whether this processing step is supposed to be performed or not. For example, setting the *import* switch to zero assumes that all the data is already in the ASF internal format. The final results are kept in ASF internal format if the *export* switch is set to zero. The default values file is described in more detail in the next section. Intermediate files are usually deleted but the user can set the flag to keep them. The batch file only needs to be defined if you want to run the asf_convert tool in batch mode. This procedure is explained in a later section.

Filled in with the basic minimum the configuration file would look like this.

```
asf_convert configuration file

[General]
input file = R153253303G3S007
output file = R153253303G3S007
import = 1
geocoding = 1
export = 1
```

The configuration file can be extended to include the necessary parameters by using

```
asf_convert -config <name of configuration file>
```

again.

A fully initialized configuration file has the following parameters.

```
asf_convert configuration file

[General]
input file = R153253303G3S007
output file = R153253303G3S007
import = 1
geocoding = 1
export = 1
default values =
intermediates = 0

[Import]
format = CEOS
radiometry = AMPLITUDE_IMAGE
look up table =
lat begin = -99.00
lat end = -99.00
precise =

[Geocoding]
projection =
pixel spacing = 100.00
height = 0.0
datum = WGS84
resampling = BILINEAR
force = 0

[Export]
format = GEOTIFF
byte conversion = SIGMA
```

In this case all three processing step of importing, geocoding and exporting the data set are performed.

Import

As import *formats ASF*, *CEOS* and *STF* are recognized. Defining ASF, being the internal format, as the import format is just another way of actually skipping the import step. The only CEOS format that currently makes sense to include in the processing flow is the CEOS level one data. The conversion of single look complex data to amplitude data as well as the processing of any level zero data, CEOS and STF alike, has not been implemented yet. Without SAR processing being part of the processing flow any of the other steps are obsolete at this point.

The radiometry can be one of the following:

- AMPLITUDE_IMAGE
- POWER_IMAGE
- SIGMA_IMAGE
- GAMMA_IMAGE

- BETA_IMAGE

The amplitude image is the regularly processed SAR image. The power image represents the magnitude (square of the amplitude) of the SAR image. The sigma, gamma and beta image are different representations of calibrated SAR images. Their values are in power scale.

The *look up table* option is primarily used by the Canadian Ice Service (CIS) and scales the amplitude values in range direction. The file parsed in to the import tool is expected to have two columns, the first one indicating the look angle with the corresponding scale factor as the second column. Here is an example of part of the ice look up table that the CIS is using.

```
...
22.0316 2.063874702
22.2442 2.087184476
22.4568 2.110376734
22.6694 2.133451475
22.882  2.156408699
23.0946 2.179248406
23.3072 2.201970597
23.5198 2.22457527
23.7324 2.247062427
23.945  2.269432068
24.1576 2.291684191
24.3702 2.313818798
24.5828 2.335835887
24.7954 2.35773546
25.008  2.379517517
...
```

The latitude constraints (*lat begin* and *lat end*) can only be used when importing level zero swath data (STF). This is the most convenient way to cut a subset out of a long image swath.

The *precise* option, currently under development, will allow the use of ERS precision state vector from DLR as a replacement of the restituted state vectors that are provided from the European Space Agency. The parameter required here defines the location of the precision state vectors.

Geocoding

The geocoding tool currently supports five different map projections: Universal Transverse Mercator (UTM), Polar Stereographic, Albers Equal Area Conic, Lambert Conformal Conic and Lambert Azimuthal Equal Area. For all these map projections a large number of projection parameter files have been predefined for various parts of the world. The *projection* parameter in the geocoding block indicates the file name of the predefined projection parameter file. Users can define their projection parameter file using the text editor of their choice. On Unix systems the projection parameter files are located in the asf_tools/share/projections/<projection> directories, while on Windows systems they are located in the asf_tools/projections/<projection> directories. The projection parameter file for the UTM projection is a special case. It contains an empty zone parameter. asf_geocode by default determines the zone from the center longitude of the image. It allows the use of any other zone for the geocoding as long as that zone is covered in the imagery. For these cases the user can define the zone parameter in the generic UTM projection file.

The *pixel spacing* determines the pixel size used for the resulting geocoded image and, therefore, the size of the output image.

An average *height* can be defined for the image that is taken into account and adjusted for during the geocoding process.

Furthermore, a vertical *datum* can be defined for geocoded image. WGS84 is the only currently supported datum. However, NAD27 and NAD83 are planned to be appropriate alternatives.

Three different *resampling* methods have been implemented as part of the geocoding: NEAREST NEIGHBOR, BILINEAR and BICUBIC. The bilinear resampling method is the default.

In order to ensure the proper use of projection parameter files, we have implemented a number of checks that verify whether the map projection parameters are reasonable for the area that is covered by the data. For example, applying a projection parameter file that is defined for South America for a data set that is covering Alaska would lead to huge distortions. These checks can be overwritten by setting the *force* option.

Export

The following *format* are considered valid format:

- ASF
- TIFF
- GEOTIFF
- JPEG
- PPM

In the same way as for the import block, ASF as an export option results in skipping the export step entirely. All other format, with the exception of GeoTIFF, require the scaling of the internal ASF format from floating point to byte. The GeoTIFF supports byte as well as floating point data.

The *byte conversion* options are SIGMA, MINMAX, TRUNCATE or HISTOGRAM_EQUALIZE. They scale the floating point values to byte values.

DEFAULT VALUES FILE

The default values file is used to define the user's preferred parameter settings. In most cases, you will work on a study where your area of interest is geographically well defined. You want the data for the entire project in the same projection, with the same pixel spacing and the same output format. The default values file is essential part of the batch processing, described in the next section.

Here is an example of a default values file that the CIS is using for their automated processing system.

```
import = 1
geocoding =1
export = 1
intermediates = 0
input format = CEOS
radiometry = AMPLITUDE_IMAGE
look up table = /export/cis/cis_ice.lut
projection = /export/asf_tools/share/projections/lambert_conformal_conic/
                    lambert_conformal_conic_cis.proj
pixel spacing = 100
height = 0.0
```

```
datum = WGS84
resampling = BILINEAR
force = 1
output format = GEOTIFF
byte conversion = SIGMA
```

RUNNING ASF_CONVERT IN BATCH MODE

asf_convert can be used in a batch mode to run a large number of data sets through the processing flow with the same processing parameters. This requires a much shorter configuration file that for the regular processing.

```
asf_convert configuration file

[General]
default values = cis.defaults
batch file = cis.batch
```

In this case there are only two parameters that need to be defined, the default values file (as described in the previous section) and the batch file. The batch file contains the basenames of all the data sets to be processed, so the file would look like this:

```
R153253303G3S007
R153253303G4S013
...
```

EXAMPLE RUN

```
Command line: asf_convert batch.config
Date: 16-Mar-2006, 10:54:12
PID: 7965
Program: asf_convert


Processing R153253303G3S007 ...

Command line: asf_convert R153253303G3S007.config
Date: 16-Mar-2006, 10:54:12
PID: 7967
Program: asf_convert


Command line: asf_import -format CEOS -log R153253303G3S007.log -quiet -amplitude
R153253303G3S007 tmp7967_import
Date: 16-Mar-2006, 10:54:13
Program: asf_import


Command line:
asf_geocode --height 0.0 --pixel-size 100.00 --read-proj-file
/export/home/rgens/svnbuild/asf_tools/share/projections/lambert_conformal_conic/lambert_conformal_c
onic_cis.proj --datum WGS84 --resample-method bilinear --force -log R153253303G3S007.log
tmp7967_import tmp7967_geocoding

Date: 16-Mar-2006, 10:54:42
```

PID: 7971

Since --force was specified, projection errors will be reported as warnings.

Projection: Lambert Conformal Conic
First standard parallel: 49.0000
Second standard parallel: 77.0000
Central meridian: -100.0000
Latitude of origin: 40.0000
False easting: 0
False northing: 0
Determining input image extent in projection coordinate space... done.

Performing analytical projection of a spatially distributed
subset of input image pixels... done.

For the differences between spline model values and projected values
for the analytically projected control points:
Mean: 0.043396
Standard deviation: 0.0392993
Maximum (Worst observed error in pixel index distance): 0.230956
Maximum x error (worst observed error in x pixel index): -0.174755
Maximum y error (worst observed error in y pixel index): 0.18787
Upper left x corner error: 0.073563
Upper left y corner error: 0.010475
Lower right x corner error: 0.059700
Lower right Y corner error: 0.026906

Resampling input image into output image coordinate space...
Processed   6983 of 6983 lines.

Done resampling image.

Storing geocoded image...

Done storing geocoded image.

Command line:
 asf_export -format geotiff -byte sigma tmp7967_geocoding R153253303G3S007
Date: 16-Mar-2006, 11:00:03
PID: 7975

Loading image...
Gathering image statistics...
Writing Output File...
Processed   6983 of 6983 lines.

...