



October 13, 2022

Jet Propulsion Laboratory
California Institute of Technology

AUTHOR: Mike Smyth

SUBJECT: EMIT Level 1 Geo V1.6.0 Delivery Memo

1. Introduction

This is the delivery of version 1.6.0 of the EMIT Level 1 Geo software to SDS. The previous delivery was version 1.5.0.

This is an update to the version that will be used in IOC.

2. Capabilities and Features

The major capabilities and improvements delivered in this build included:

1. Numerous fixes found during IOC
2. IOC calibration of the camera exterior orientation.

3. Libraries and Executables Created in this Build

The top level executables is `l1b_geo_pge`. In addition, there is a utility program installed: `l1b_project`.

Software is installed in

`/store/emit/ops/repos/emit_l1b_geo_installs/1.6.0`

Support configuration files are installed in

`/store/emit/ops/repos/emit_l1b_osp_installs/1.6.0`

4. Testing

Unit tests are run as part of the build procedures.

In addition, there is test data for a Level 1 end to end test, starting with Level 0 and proceeding through all of the Level 1 processing. There is a script that runs these tests:

```
cd <working directory>
/store/shared/emit-test-data/1.6.0/end_to_end.sh
```

Note that you may get error message such as:

```
rm: cannot remove './orbit_8000': No such file or directory
```

You can ignore these, the script cleans up any output that already exists, and it is harmless if it doesn't find these directories.

5. Change Requests and Problem Reports

The following CRs and PRs are closed in this build:

<i>Issue Number</i>	<i>Short Description</i>
84	l1b-geo - Add orbit error model
85	l1b-geo - Add QA content
91	L1B Geo not correcting all images in the input file
97	Orbit 2221206 failure in L1B Geo
101	L1B Geo renaming timestamp on output files
109	L1B Geo camera model update and initial static offset between emit frame and ISS BAD frame
110	GDAL has trouble reading ENVI file
122	GLT should be 1 based, with 0 for nodata values
127	Fix error in view angle calculation
128	Add unit test with comparison of OBS data with independent pyorbital package
129	Handle all zero radiance data
130	Add more robust handling for quicklook/kmz failures
131	Populate the GEO QA file
132	Support L1 flipping the sample order in the image data
133	Smooth slope and aspect values in OBS file

6. Liens and Waivers

6.1 None

7. Build/Run Requirements

7.1 The emit software depends on AFIDS, GeoCal, and a Python 3 setup. These have been created as a conda environment

`/store/shared/nostripe/conda-shared-envs/afids-20220711`

7.2 Although you can set the conda environment, this is automatically done by the `l1b_geo_pge` script. You do not need to set the conda environment before running the PGE.

7.3 Software run depends on datasets:

```
/store/shared/nostripe/conda-shared-envs/afids-  
20220711/data/vdev/EGM96_20_x100.HLF  
/store/shared/dem/srtm_v3_dem_L2  
/store/shared/spice_data  
/store/shared/landsat  
/store/emit/ops/repos/emit_l1b_osp_installs/1.6.0
```

7.4 Test data for test run is found at

```
/store/shared/emit-test-data
```

8. Build Instructions

8.1 It is not necessary to build the software. It has been built and is available at `/store/emit/ops/repos/emit_l1b_geo_installs/1.6.0`.

8.2 If you did need to build, there are two steps – creating the conda environment and building the emit software.

8.3 The AFIDS/GeoCal software is available at [git@github.jpl.nasa.gov:Cartography/afids-conda-package.git](https://github.com/nasa/Cartography/afids-conda-package.git), with the tag `geocal-20220711`.

8.4 If you don't already have it set up, then initialize the system anaconda

```
source /store/shared/anaconda3/etc/profile.d/conda.sh
```

8.5 Check out the afids conda repository. Note that you need to have git lfs activated to download the larger file size used in the conda repository:

```
git lfs install  
cd <work dir>  
git clone git@github.jpl.nasa.gov:Cartography/afids-conda-  
package.git  
cd afids-conda-package  
git checkout geocal-20220711  
make emit-env
```

8.6 The emit level 1 software is available at [git@github.com:emit-sds/emit-sds-l1b-geo.git](https://github.com/nasa/emit-sds/emit-sds-l1b-geo.git) with the tag `v1.6.0-rc1`¹.

8.7 The emit software is built with the normal configure/make cycle, after setting up the environment:

```
cd <work dir>  
git clone git@github.com:emit-sds/emit-sds-l1b-geo.git
```

¹ Note, over the years I've developed the convention of delivering an initial version with a -rc1 tag, so that if there are any issues in the delivery we can update to a rc2 etc. Once the delivery has been completed, we can create a final tag without the "rc" extension to mark the final version that was used in the delivery.

```
cd emit-sds-l1b-geo
git checkout v1.6.0-rc1
conda activate /store/shared/nostripe/conda-shared-envs/afids-20220711
./configure --prefix=/store/emit/ops/repos/emit_l1b_geo_installs/1.6.0
make -j 20 all && make install && make -j 20 check
```

9. Miscellaneous Instructions or Information

None