

# proctool\_owl\_v2.6.1

## AisaOWL pre-processing tool

### quick operation instructions

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*Doc.Ver. 1.3*

*07.10. 2014 / Hannu Holma, Specim*

#### **General**

This document gives an introduction to use AisaOWL pre-processing tool for Windows. Document "Proctool\_owl\_use\_instructions\_linux" introduces execution differences of the Linux version of the tool. Function and use of the input parameters of the both versions are similar.

#### **System requirements**

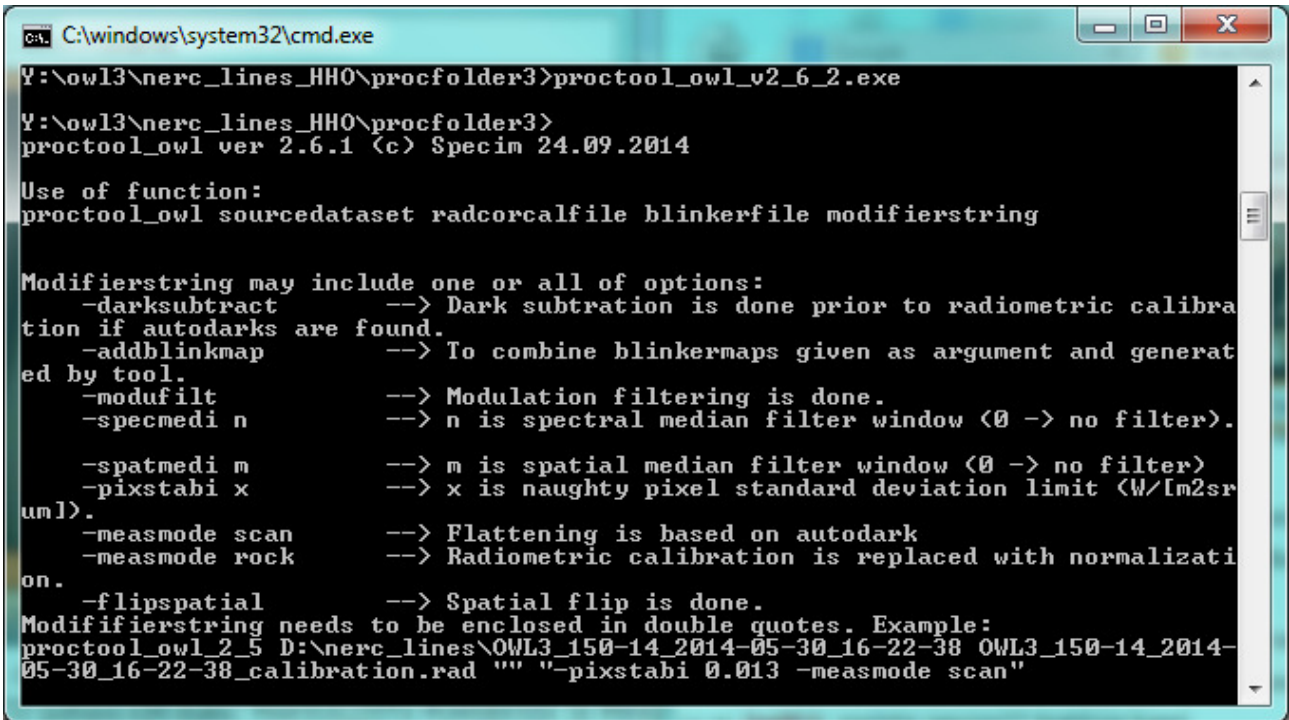
- Operating system: 64 bit Windows or 64 bit Linux

#### **Installation**

1. Run Matlab MCR (MCR\_R2013a\_win64\_installer.exe) and follow instructions.
2. Copy Owl processing tool "proctool\_owl.exe" to your processing folder.
3. Copy "sensor.dat" file to your processing folder.
4. Processing tool is ready for use.

## Running tool without input parameters

AisaOWL pre-processing tool may be executed without input parameters to print a simplified help list on the screen:



```
C:\windows\system32\cmd.exe
Y:\ow13\nerc_lines_HH0\procfolder3>proctool_owl_v2_6_2.exe
Y:\ow13\nerc_lines_HH0\procfolder3>
proctool_owl ver 2.6.1 (c) Specim 24.09.2014

Use of function:
proctool_owl sourcedataset radcorcalfile blinkerfile modifierstring

Modifierstring may include one or all of options:
-darksubtract      --> Dark subtraction is done prior to radiometric calibration if autodarks are found.
-addblinkmap      --> To combine blinkermaps given as argument and generated by tool.
-modufilt         --> Modulation filtering is done.
-specmedi n       --> n is spectral median filter window (0 -> no filter).

-spatmedi m       --> m is spatial median filter window (0 -> no filter)
-pixstabi x       --> x is naughty pixel standard deviation limit (W/[m2sruml]).
-measmode scan    --> Flattening is based on autodark
-measmode rock    --> Radiometric calibration is replaced with normalization.
-flipsatial       --> Spatial flip is done.

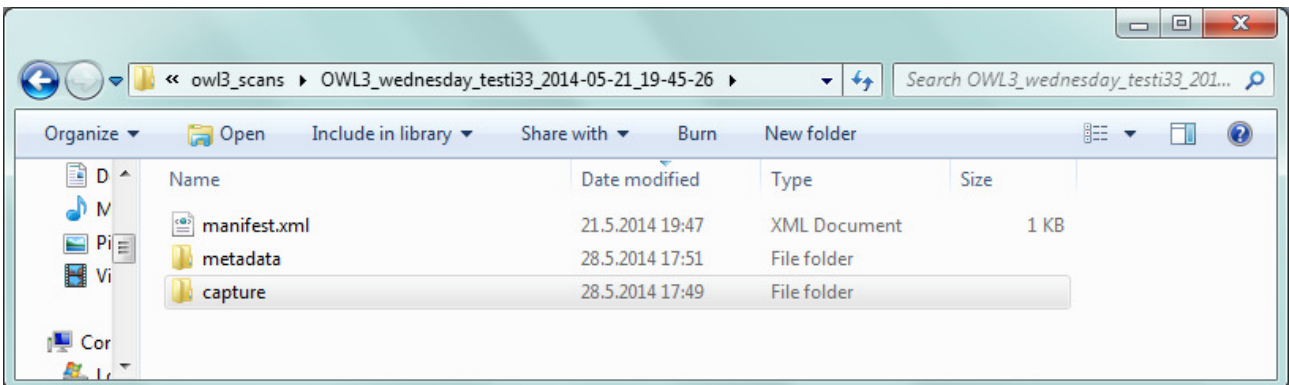
Modifierstring needs to be enclosed in double quotes. Example:
proctool_owl 2_5 D:\nerc_lines\OWL3_150-14_2014-05-30_16-22-38 OWL3_150-14_2014-05-30_16-22-38_calibration.rad "" "-pixstabi 0.013 -measmode scan"
```

## Data acquisition settings

- There are several settings (“workflow”) available to be used in data acquisition software. They must be set correctly to result compatible data for processing tool:
  - Collect data cubes with “**Image with GPS-data, embedded dark with thermal images**” workflow.
  - Radiometric calibration measurements (called as “thermal images” in workflow) are then automatically acquired every time at the end of the measurement.

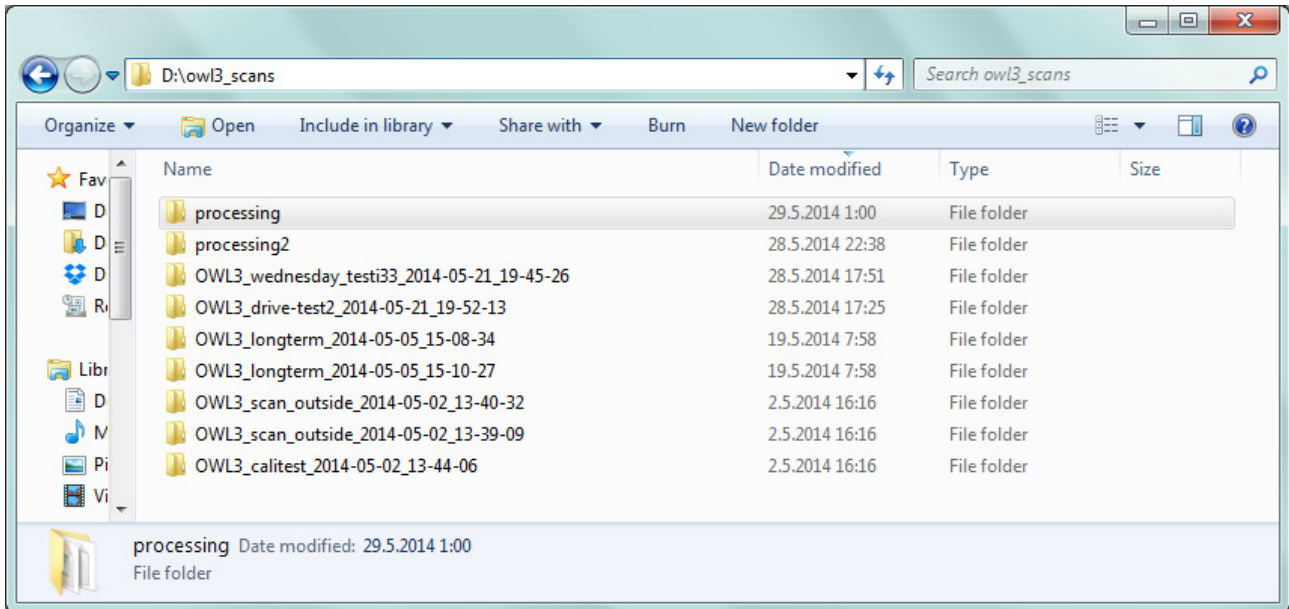
## Pre-processing

- AisaOWL data is stored as “datasets” by data acquisition software (see figure)

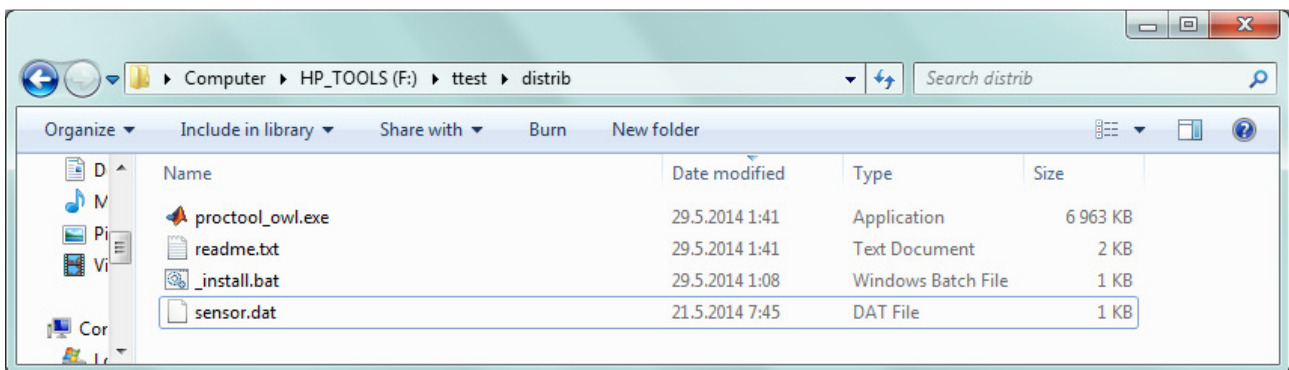


- These datasets are acquired and stored automatically by data acquisition software and **their structure may not be modified!**
- Processing folder needs to have space of about four times of the file to be processed.
- Place in folder structure is not restricted.
- “sensor.dat” file must be copied to processing folder. It includes image sizing parameters that are sensor specific and **may not be changed.**

Example of folder structure containing two processing folders and several datasets:



Note that processing folders might also be somewhere else in the computer as in next example of contents of processing folder before start of processing:



#### Inputs :

- proctool\_owl demands four inputs:
  - Dataset name that will be processed with full folder path.
  - Optionally radiometric calibration file.
  - Optionally blinking pixel file.

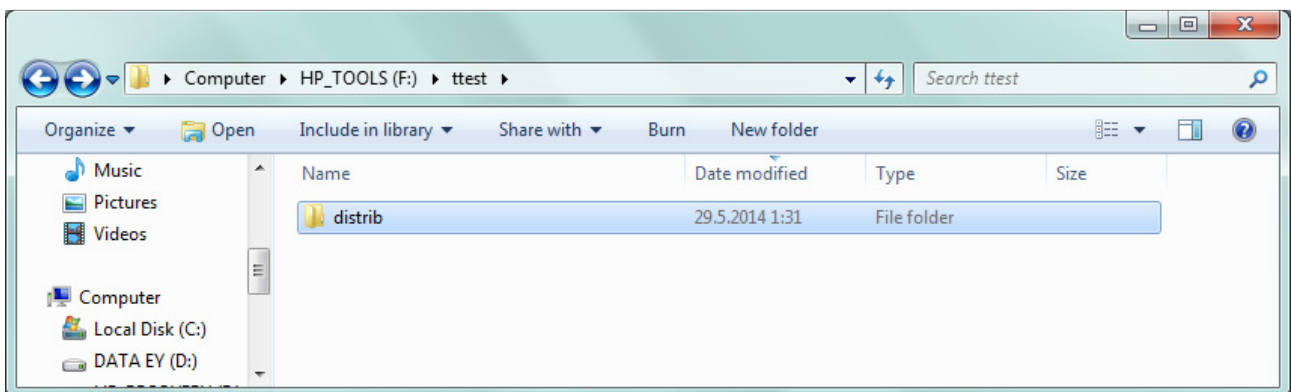
- Optionally processing modifiers.
- The optional inputs have to be set as empty strings ("" ) if not used. Obsolete optional inputs are omitted.
- Processing tool is looking for blackbody measurement files from the same folder as the file to be processed in the dataset if radiometric calibration file has not been specified. There must be two files: one of them with "T1\_" and the other with "T2\_" somewhere in the file name. Corresponding target blackbody temperatures for these calibration files are specified in their hdr-files.

#### Outputs:

- If radiometric calibration file is not set as input it is generated and stored in processing folder (with ending "\_calibration.rad").
- If blinking pixel file is not set as input it is generated and stored in processing folder (with ending "\_blinkers.raw").
- Final pre-processed data file (with ending "\_proc.dat") is stored in processing folder.
- Content of sensor.dat and used modifiers will be added to the end of hdr-file of final processed data file.

#### Executing proctool\_owl and messages during processing:

- Proctool\_owl is started in Windows command prompt. Easiest way to open command prompt is to open file explorer and browse folder structure so that processing folder is visible in the list like folder "F:\ttest\distrib" in following image. Now by pressing shift while right-clicking on the folder name you can choose "Open command window here" from menu.



- Progress of processing and names of used and generated files are prompted but log-file is not generated (software will be updated for that later).
- Example run of proctool\_owl without optional inputs:

```
C:\windows\system32\cmd.exe
proctool_owl.exe F:\OWL3_scan_outside_2014-05-02_13-40-32 ' ' ' '
F:\ttest\distrib>proctool_owl ver 2.0 (c) Specim 28.05.2014

Source file: F:\OWL3_scan_outside_2014-05-02_13-40-32\capture\OWL3_scan_outside_
2014-05-02_13-40-32.raw
Phase: 0/6 - Radiometric calibration.
Blackbody measurement 1(T=278.15K): F:\OWL3_scan_outside_2014-05-02_13-40-32\cap
ture\T1_OWL3_scan_outside_2014-05-02_13-40-32.raw
Blackbody measurement 2(T=303.15K): F:\OWL3_scan_outside_2014-05-02_13-40-32\cap
ture\T2_OWL3_scan_outside_2014-05-02_13-40-32.raw

Read files...
50% 100% 50% 100%
Calculate radiometric coefficients...
10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

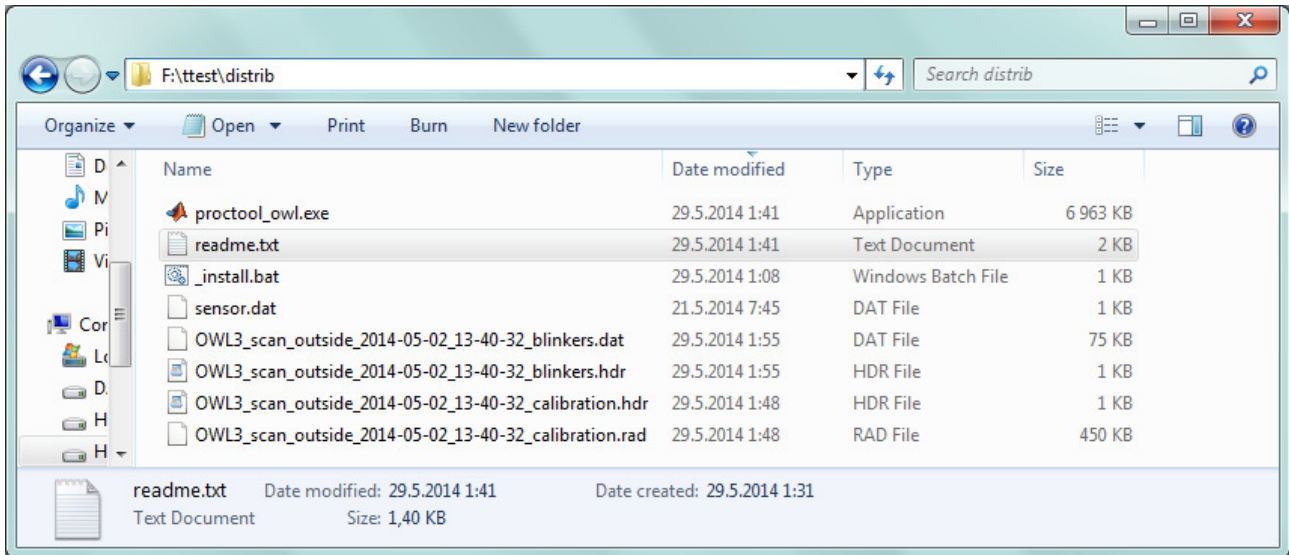
Writing calibration file...
Phase 1/6
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%
Phase 2/6
Read autodark...
Find BP...
Write blinkers to file: F:\ttest\distrib\OWL3_scan_outside_2014-05-02_13-40-32_b
linkers.dat
Replace blinkers...
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%
Phase 3/6
Collecting reference...
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99% Calculating...
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%

Phase 4/6
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%
Phase 5/6
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%
Phase 6/6
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%

F:\ttest\distrib>
F:\ttest\distrib>
```

- The example processes dataset “OWL3\_scan\_outside\_2014-05-02\_13-40-32” that was stored in folder “D:\owl3\_scans\”. Input is then “D:\owl3\_scans\OWL3\_scan\_outside\_2014-05-02\_13-40-32”.
- Radiometric calibration file input was not specified (input is “ ’ ’ ”) and processing tool then generates the file and stores as “OWL3\_scan\_outside\_2014-05-02\_13-40-32\_calibration.rad” in processing folder. Any string that is not a proper file name with valid path is ignored and calibration file will be calculated.

- Blinking pixel file was not specified either and it is also generated (with ending “\_blinkers.dat”) during processing. The same rule as for radiometric calibration file input format and validity of file name apply also for blinking pixel file input.
- Resulting data file goes to dataset as seen in next figure. It has the original file name with ending “\_proc”.
- Resulting contents of processing folder looks like:



## Using modifiers in processing

User may effect on a couple of processing parameters using following processing modifiers:

Modifier	Parameter	Description	Default
-specmedi	uneven integer	Median filter window (0 means that filtering is not applied).	3
-spatmedi	uneven integer	Spatial window filter (0 means that filtering is not applied).	3
-pixstabi	float	Maximum standard deviation of time series of signal of a pixel in blinking pixel search.	0.011
-measmode	string 'scan' or 'rock'	Spatial uniformity improvement is performed based on autodark if this modifier is given. Radiometric calibration is replaced with normalization in 'rock' mode. This is used with table scanner measurements.	
-darkssubtract	no parameter	Averaged autodark is subtracted from files before radiometric calibration. If calibration files do not have independent autodarks is the autodark of flight line used with them as well.	

-addblinkmap	no parameter	Optional blinking pixel map is input but additionally blinking pixel map is generated from autodark. These maps will be combined.	
-flipspatial	no parameter	Flips spatial dimension of the data in the last processing phase. This may be useful if flight direction is reversed compared to sensor installation or if GaligeoPRO causes data flipping when using GLT-flies for geo rectification.	

An example of using a modifier “-specmedi” with parameter “0”:

```

C:\windows\system32\cmd.exe
F:\train>proctool_owl_v2.1.exe F:\OWL3_scan_outside_2014-05-02_13-40-32 F:\ttest
\distrib\OWL3_scan_outside_2014-05-02_13-40-32_calibration.rad F:\ttest\distrib\
OWL3_scan_outside_2014-05-02_13-40-32_blinkers.dat "-specmedi 0 -spatmedi 0"

```

```

C:\windows\system32\cmd.exe
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%

Phase 4/6
Phase 5/6
Phase 6/6
4% 7% 11% 15% 18% 22% 26% 29% 33% 37%
40% 44% 48% 51% 55% 59% 62% 66% 70% 73%
77% 81% 84% 88% 92% 95% 99%

```

Processing skips steps 4 and 5 as is seen from the second image due to modifiers.

All of the modifiers must be included in the same string like in the above example: “-specmedi 0 -spatmedi 0” in double quotes.