File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

L1A : Process RAW to L1A

Raw binary to HDF5 and filter data on SZA.

Processing Parameters and metadata:
HyperInSPACE version: 1.2.0
SZA Filter (L1A): 70.0

Example of HyperSAS with pySAS robot.
/version=R0
/investigators=The_Sampler
/affiliations=Sample_University
/contact=sample@sampleu.edu
/experiment=sample_pySAS
/cruise=sample_cuise
/documents=README.md
/instrument_manufacturer=Satlantic
/instrument_model=HyperSAS
/calibration_date=
/calibration_files=SATTHS0045A.tdf,SAS045_20210306.sip,GPRMC_NMEA0183v3.01.tdf,HLD385F.cal,SATMSG.tdf,HSE0488F.cal,HLD0386E.cal,HED0488F.cal,HSL385F.cal,GPGGA_NMEA0183.tdf,HSL0386E.cal,UMTWR_v0.tdf
/data_type=above_water
/data_status=
/measurement_depth=0
/platform=sample_ship

Process log:
Process Single Level
ProcessL1a.processL1a: 21-Apr-2023 18:45:26
Bad Datetag or Timetag2 found. Eliminating record. 1776 DT: 3158326.0 TT2: 758134061.0
SZA passed filter: 50
L1A file produced:

/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1A/SAMPLE_HYPERSAS_SOLARTRACKER_L1A.hdf
Process Single Level: /ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1A/SAMPLE_HYPERSAS_SOLARTRACKER_L1A.hdf - SUCCESSFUL

File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

L1AQC : Process L1A to L1AQC

Low level QC (pitch, roll, yaw, and azimuth) and deglitching.

Processing Parameters:
Rotator Home Angle: 0.0
Rotator Delay: 5.0
Pitch/Roll Filter: 5.0
Rel Azimuth Min: 90.0
Rel Azimuth Max: 135.0
ES Dark Window: 11
ES Light Window: 5
ES Dark Sigma: 3.2
ES Light Sigma: 3.5
LT Dark Window: 11
LT Light Window: 5
LT Dark Sigma: 3.5
LT Light Sigma: 3.2
LI Dark Window: 11
LI Light Window: 5
LI Dark Sigma: 3.4
LI Light Sigma: 3.0

Process log:
Process Single Level
Found data: station
Found data: lat
Found data: lon
Found data: wind
Found data: wt
Found data: sal
Found data: speed_f_w
Deglitching file Config/sample_SOLARTRACKER_anoms.csv found for sample_SOLARTRACKER. Using these parameters.
ProcessL1aqc.processL1aqc: 21-Apr-2023 19:07:57
Filtering file for GPS status
Percentage of data failed on GPS Status: 0 %
Filtering file for high pitch and roll
Percentage of data out of Pitch/Roll bounds: 0 %
Filtering file for Rotator Delay
Flag data from TT2: 2016-05-20 07:01:38.530000+00:00 to 2016-05-20 07:01:42.624000+00:00
Flag data from TT2: 2016-05-20 07:03:43.850000+00:00 to 2016-05-20 07:03:47.946000+00:00
Flag data from TT2: 2016-05-20 07:06:25.603000+00:00 to 2016-05-20 07:06:29.581000+00:00
Flag data from TT2: 2016-05-20 07:12:59.985000+00:00 to 2016-05-20 07:13:03.968000+00:00
Flag data from TT2: 2016-05-20 07:17:40.986000+00:00 to 2016-05-20 07:17:44.946000+00:00
Flag data from TT2: 2016-05-20 07:29:32.831000+00:00 to 2016-05-20 07:29:36.928000+00:00
Flag data from TT2: 2016-05-20 07:33:31.397000+00:00 to 2016-05-20 07:33:35.497000+00:00
Flag data from TT2: 2016-05-20 07:49:27.965000+00:00 to 2016-05-20 07:49:32.058000+00:00
Flag data from TT2: 2016-05-20 07:56:14.385000+00:00 to 2016-05-20 07:56:18.360000+00:00

Flag data from TT2: 2016-05-20 07:57:43.269000+00:00 to 2016-05-20 07:57:47.365000+00:00
Flag data from TT2: 2016-05-20 07:59:16.203000+00:00 to 2016-05-20 07:59:20.163000+00:00
Percentage of Tracker data out of Rotator Delay bounds: 2 %
Filtering file for bad Absolute Rotator Angle
Percentage of Tracker data out of Absolute Rotator bounds: 0 %
Filtering file for bad Relative Solar Azimuth
Percentage of data out of Relative Solar Azimuth bounds: 3 %
Flag data from TT2: 2016-05-20 07:58:17.566000+00:00 to 2016-05-20 07:59:48.483000+00:00 (HHMMSSMSS)
Eliminate combined filtered data from datasets.******************************
Remove GPS Data
Length of dataset prior to removal 1777 long
Length of records removed from dataset: 65
Data end 1712 long, a loss of 4 %
Remove ES_DARK Data
Length of dataset prior to removal 1033 long
Length of records removed from dataset: 8
Data end 1025 long, a loss of 1 %
Remove LI_DARK Data
Length of dataset prior to removal 1027 long
Length of records removed from dataset: 8
Data end 1019 long, a loss of 1 %
Remove LT_DARK Data
Length of dataset prior to removal 245 long
Length of records removed from dataset: 2
Data end 243 long, a loss of 1 %
Remove ES_LIGHT Data
Length of dataset prior to removal 3579 long
Length of records removed from dataset: 48
Data end 3531 long, a loss of 1 %
Remove LI_LIGHT Data
Length of dataset prior to removal 4753 long
Length of records removed from dataset: 57
Data end 4696 long, a loss of 1 %
Remove LT_LIGHT Data
Length of dataset prior to removal 1243 long
Length of records removed from dataset: 31
Data end 1212 long, a loss of 2 %
Remove SOLARTRACKER Data
Length of dataset prior to removal 1776 long
Length of records removed from dataset: 76
Data end 1700 long, a loss of 4 %
Remove PYROMETER Data
Length of dataset prior to removal 317 long
Length of records removed from dataset: 2
Data end 315 long, a loss of 1 %
ProcessL1aqc.processL1aqc: 21-Apr-2023 19:07:58
Screening GPS for clean timestamps.
Screening ES_DARK for clean timestamps.

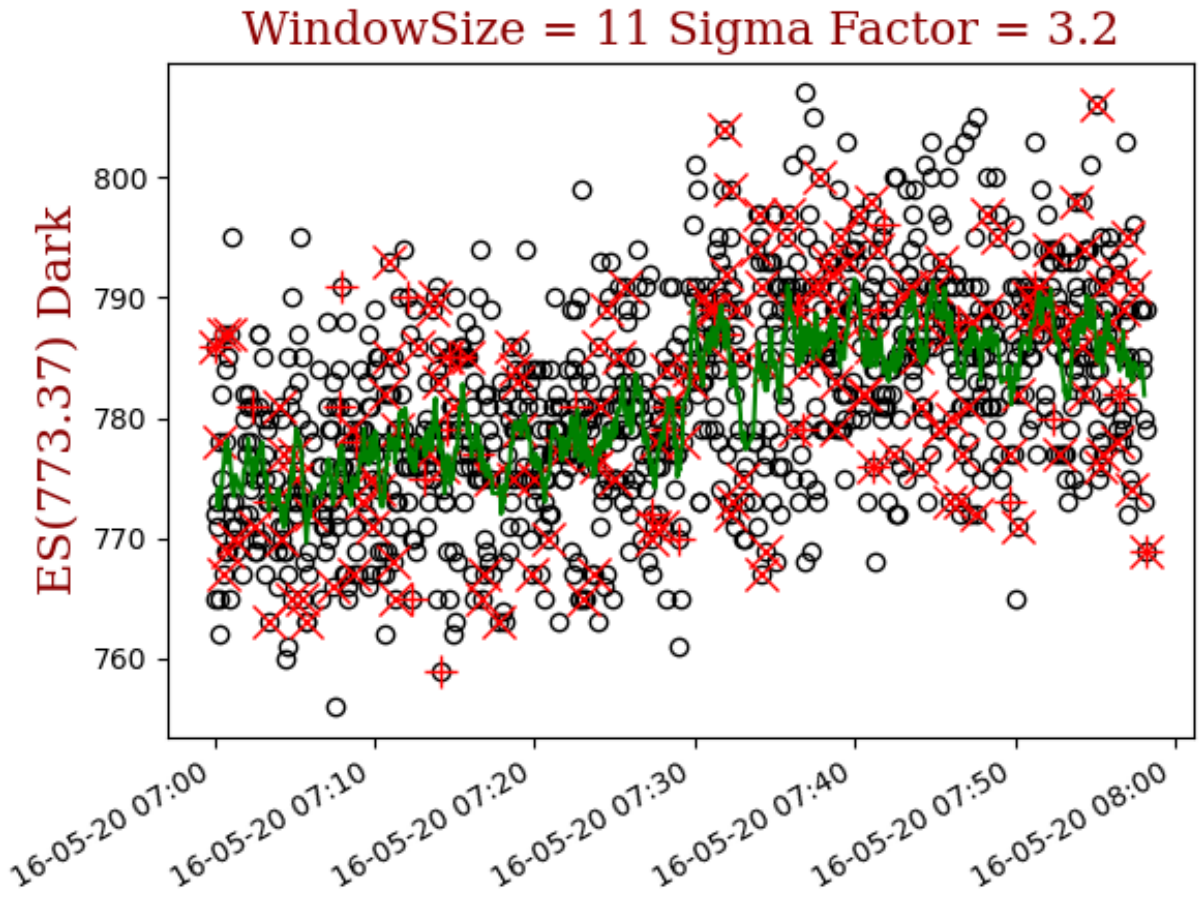
Screening LI_DARK for clean timestamps.
Screening LT_DARK for clean timestamps.
Screening ES_LIGHT for clean timestamps.
Screening LI_LIGHT for clean timestamps.
Screening LT_LIGHT for clean timestamps.
Screening SOLARTRACKER for clean timestamps.
Screening PYROMETER for clean timestamps.
Screening ANCILLARY_METADATA for clean timestamps.
ES
Deglitching dark
Data reduced by 199 (19%)
Deglitching light
Data reduced by 281 (8%)
LI
Deglitching dark
Data reduced by 95 (9%)
Deglitching light
Data reduced by 1112 (24%)
LT
Deglitching dark
Data reduced by 19 (8%)
Deglitching light
Data reduced by 70 (6%)
L1AQC file produced:

/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1AQC/SAMPLE_HYPERSAS_SOLARTRACKER_L1AQC.hdf
Process Single Level: /ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1AQC/SAMPLE_HYPERSAS_SOLARTRACKER_L1AQC.hdf - SUCCESSFUL
id: SATTHS0045
id: SATHLD0386
id: $GPRMC
id: SATHSE0488
id: SATHSL0385
id: SATHED0488
id: SATMSG
id: SATHSL0386
id: SATPYR
id: SATHLD0385
id: SATIRP3397
id: $GPGGA
id: SATNAV0001

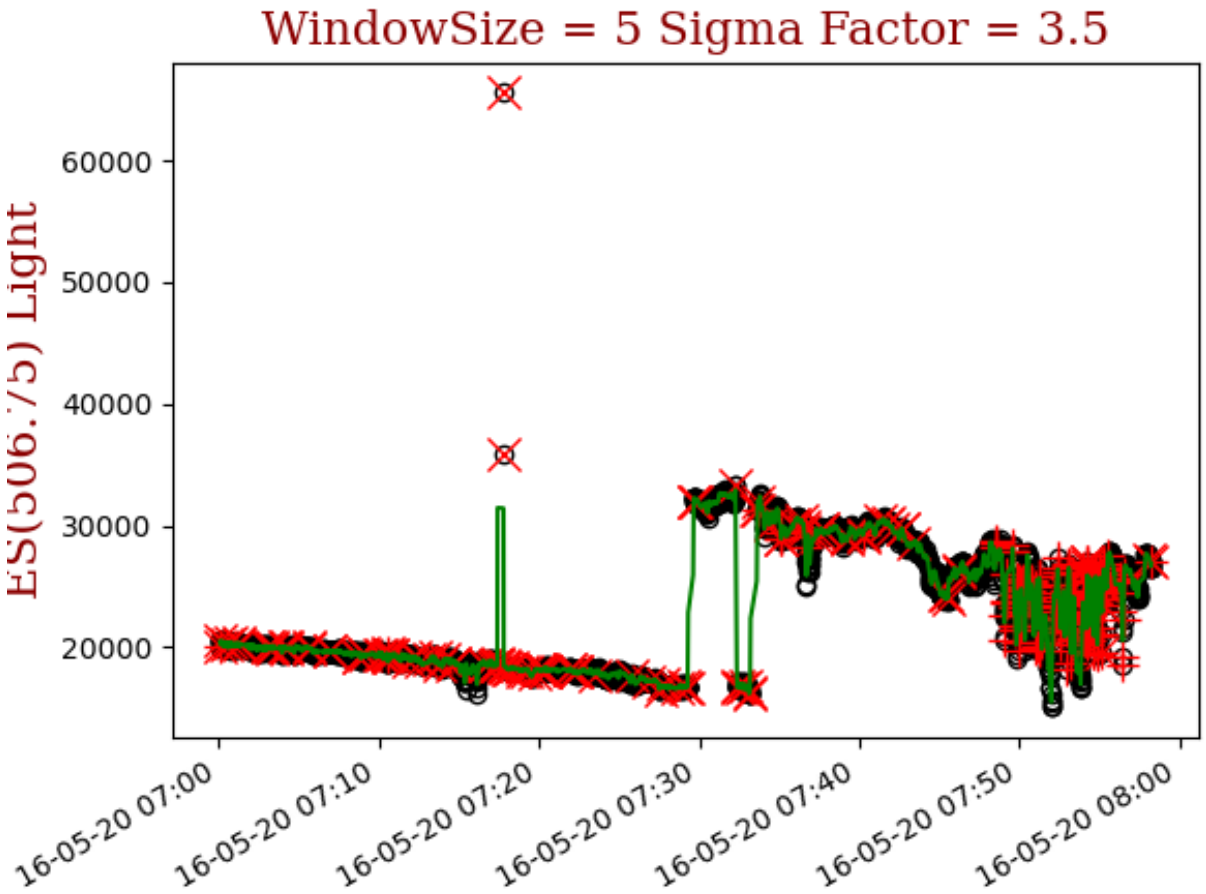
Example Deglitching

Randomized. Complete plots of hyperspectral deglitching from anomaly analysis can be found in [output_directory]/Plots/L1AQC_Anoms.

Marked for exclusions in ALL bands

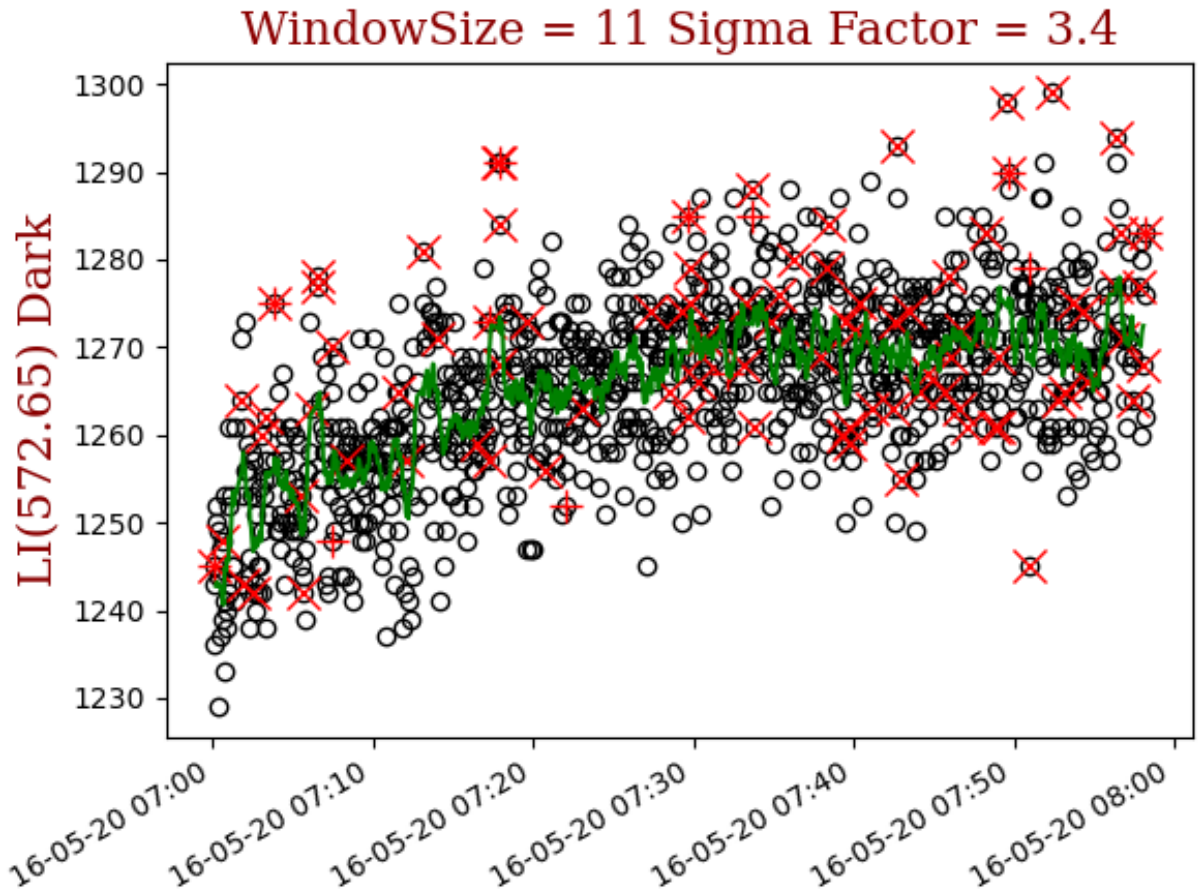


Marked for exclusions in ALL bands

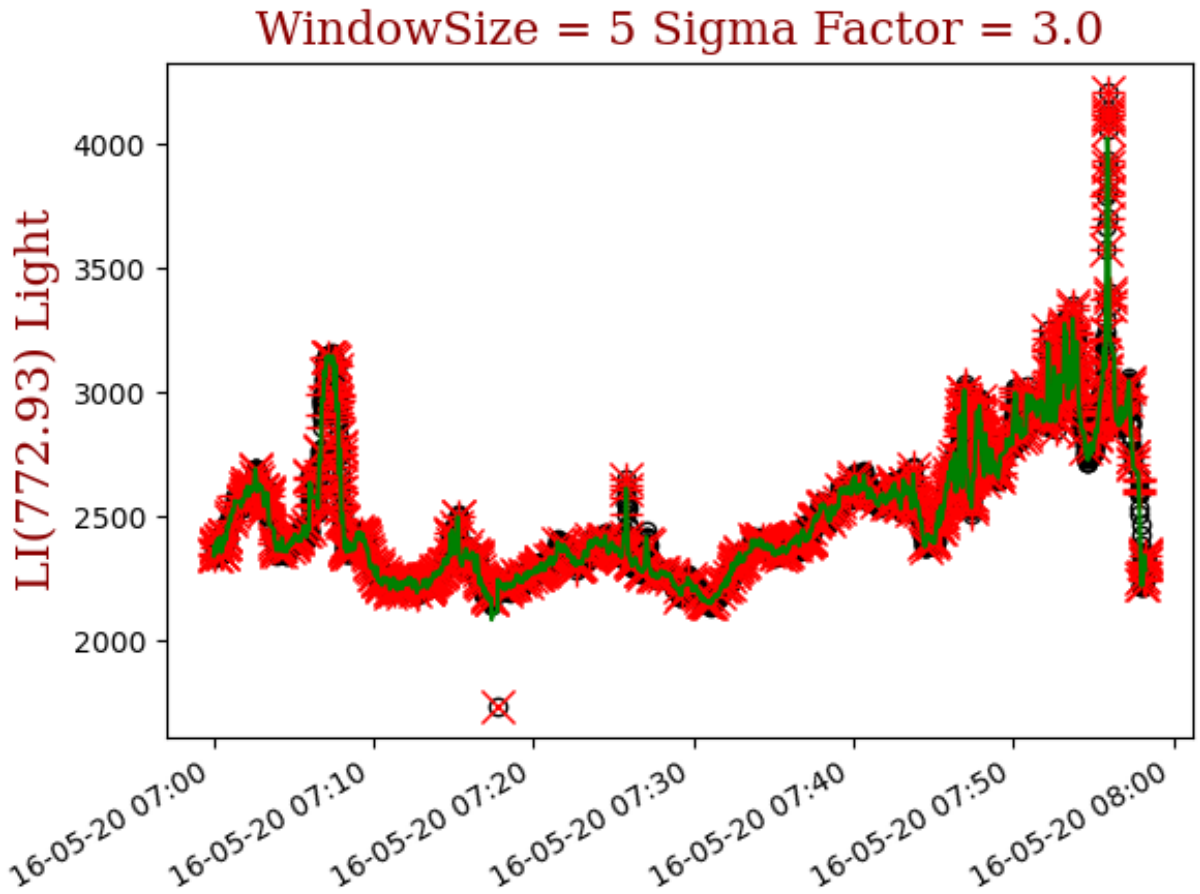


File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

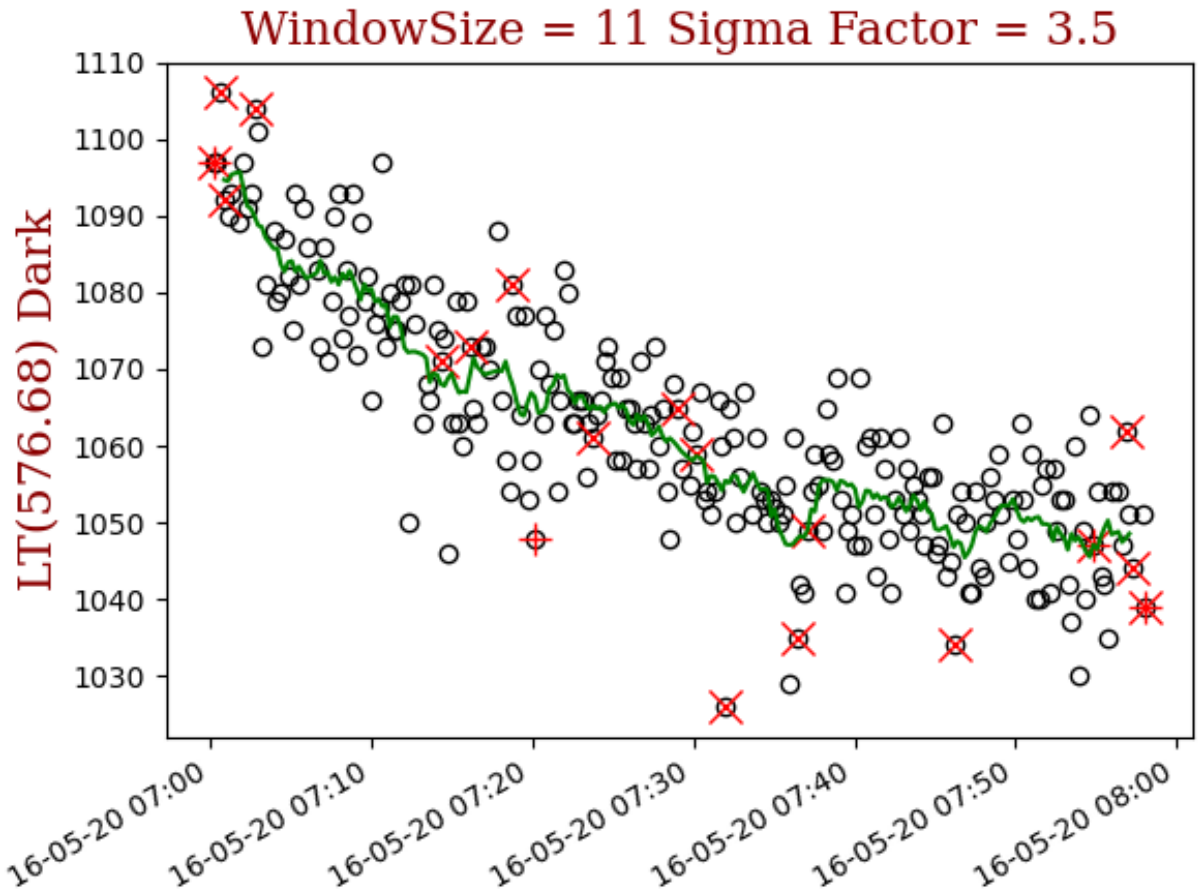
Marked for exclusions in ALL bands



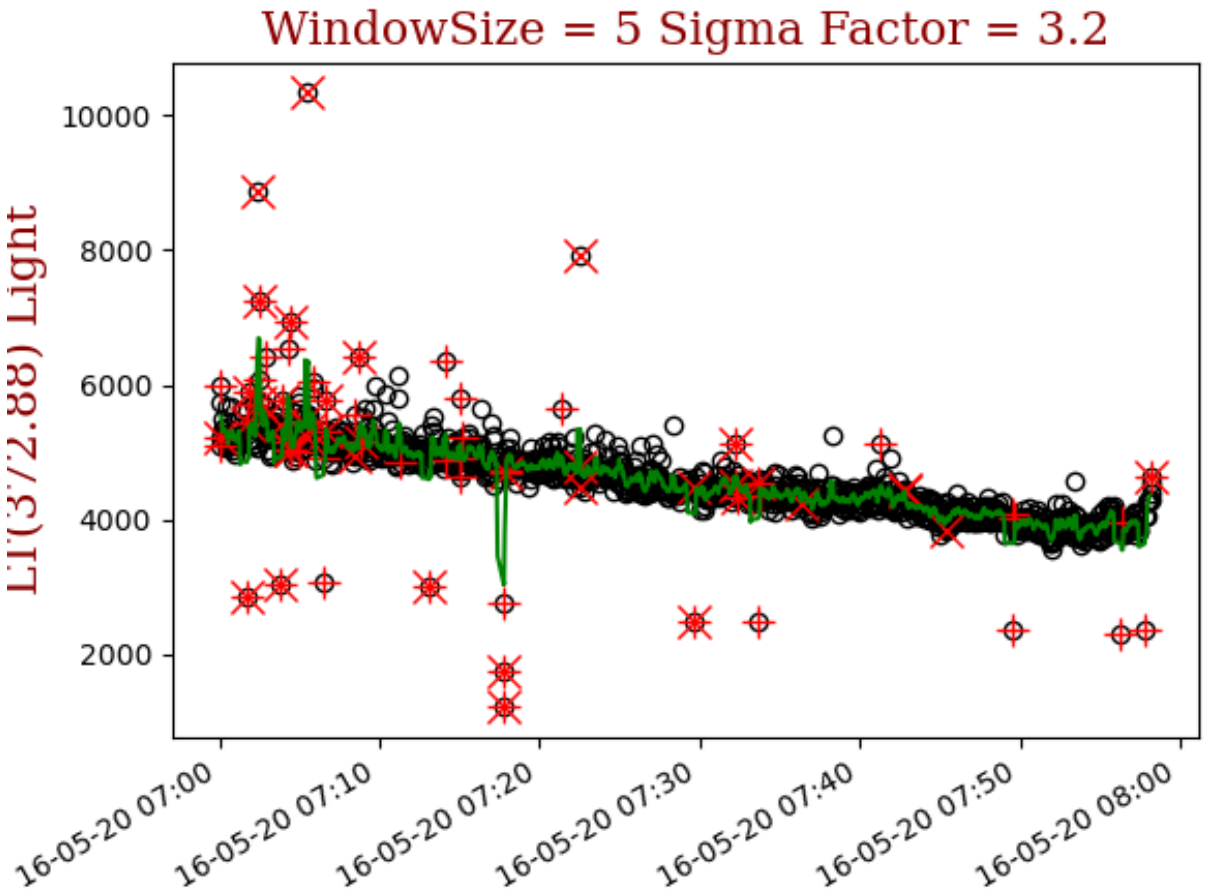
Marked for exclusions in ALL bands



Marked for exclusions in ALL bands



Marked for exclusions in ALL bands



File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

L1B : Process L1AQC to L1B

Dark correction. Calibration and/or full characterization. Match timestamps & wavebands.

Processing Parameters: None
Cal. Type: Default/Factory
Wavelength Interp Int: 3.3 nm

Process log:
Process Single Level
ProcessL1b:
/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1AQC/SAMPLE_HYPERSAS_SOLARTRACKER_L1AQC.hdf
ProcessL1b.processL1b: 21-Apr-2023 19:10:19
Dark Correction: ES
Dark Correction: LI
Dark Correction: LT
ProcessL1b_DefaultCal.processL1b: 21-Apr-2023 19:11:50
Applying factory calibrations.
  Group: ANCILLARY_METADATA
  Group: ES
    File: SATHSE0488
  Group: GPS
    File: $GPRMC
  Group: LI
    File: SATHSL0385
  Group: LT
    File: SATHSL0386
  Group: PYROMETER
    File: SATPYR
  Group: SOLARTRACKER
    File: SATNAV0001
ProcessL1b_Interp.processL1b_Interp: 21-Apr-2023 19:11:55
LT has fewest records (as expected) - interpolating to LT; 1142 records
Interpolate Data ES
Interpolate Data LI
Interpolate Data LT
Skip. Other instruments are being interpolated to this one.
Interpolate Data LATITUDE
Interpolate Data LONGITUDE
Interpolate Data COURSE
Interpolate Data SOG
Interpolate Data REL_AZ
Interpolate Data SZA
Interpolate Data SOLAR_AZ
Interpolate Data POINTING
Interpolate Data HUMIDITY
Interpolate Data PITCH
Interpolate Data ROLL

Interpolate Data HEADING
Interpolate Data REL_AZ
Interpolate Data SZA
Interpolate Data SOLAR_AZ
Interpolate Data STATION
found NaN 146
found NaN 158
Interpolate Data LATITUDE
Interpolate Data LONGITUDE
Interpolate Data SALINITY
found NaN 146
found NaN 158
Interpolate Data SST
found NaN 146
found NaN 158
Interpolate Data WINDSPEED
found NaN 146
found NaN 158
Interpolate Data SPEED_F_W
found NaN 146
found NaN 158
Interpolate Data T
L1B file produced:

/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1B/SAMPLE_HYPERSAS_SOLARTRACKER_L1B.hdf
Process Single Level: /ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1B/SAMPLE_HYPERSAS_SOLARTRACKER_L1B.hdf - SUCCESSFUL
id: SATTHS0045
id: SATHLD0386
id: $GPRMC
id: SATHSE0488
id: SATHSL0385
id: SATHED0488
id: SATMSG
id: SATHSL0386
id: SATPYR
id: SATHLD0385
id: SATIRP3397
id: $GPGGA
id: SATNAV0001

Example Temporal Interpolations

Randomized. Complete plots of hyperspectral interpolations can be found in [output_directory]/Plots/L1B_Interp.
None found.

File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

L1BQC : Process L1B to L1BQC

Apply more quality control filters.

Processing Parameters:
Max Wind: 10.0
Min SZA: 20.0
Max SZA: 60.0
Filter Sigma Es: 5.0
Filter Sigma Li: 8.0
Filter Sigma Lt: 3.0

Process log:
Process Single Level
Model data for Wind and AOD may be used to replace blank values. Reading in model data...
Ancillary file found locally: GMAO_MERRA2.20160520T070000.MET.nc
Ancillary file found locally: GMAO_MERRA2.20160520T070000.AER.nc
Filling in field data with model data where needed.
Filling in ancillary data with default values where still needed.
Applying Lt(NIR)>Lt(UV) quality filtering to eliminate spectra.
0.0% of spectra flagged
Percentage of data out of Wind limits: 0 %
Low SZA. SZA: 60
Percentage of data out of SZA limits: 18 %
  Flag data from TT2: 2016-05-20 07:47:38.115000+00:00 to 2016-05-20 07:58:13.339000+00:00
Remove IRRADIANCE Data
  Length of dataset prior to removal 1142 long
  Length of dataset after removal 936 long: 18% removed
Remove RADIANCE Data
  Length of dataset prior to removal 1142 long
  Length of dataset after removal 936 long: 18% removed
Remove ANCILLARY Data
  Length of dataset prior to removal 1142 long
  Length of dataset after removal 936 long: 18% removed
Applying spectral filtering to eliminate noisy spectra.
0.9% of Es data flagged
0.2% of Li data flagged
6.0% of Lt data flagged
Remove IRRADIANCE Data
  Length of dataset prior to removal 936 long
  Length of dataset after removal 874 long: 7% removed
Remove RADIANCE Data
  Length of dataset prior to removal 936 long
  Length of dataset after removal 874 long: 7% removed
Remove ANCILLARY Data
  Length of dataset prior to removal 936 long
  Length of dataset after removal 874 long: 7% removed
L1BQC file produced:

File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1BQC/SAMPLE_HYPERSAS_SOLARTRACKER_L1BQC.hdf
Process Single Level: /ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1BQC/SAMPLE_HYPERSAS_SOLARTRACKER_L1BQC.hdf - SUCCESSFUL
id: SATTHS0045
id: SATHLD0386
id: $GPRMC
id: SATHSE0488
id: SATHSL0385
id: SATHED0488
id: SATMSG
id: SATHSL0386
id: SATPYR
id: SATHLD0385
id: SATIRP3397
id: $GPGGA
id: SATNAV0001

File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

L2 : Process L1BQC to L2

Apply temporal binning,station selection, glint correction,NIR corrections, reflectance calculation, and OC product calculation.

Processing Parameters:
Ensemble Duration: 300 sec
Glint_Correction: Zhang et al. 2017
NIR Correction: Ruddick et al. 2005/2006
Remove Negatives: ON

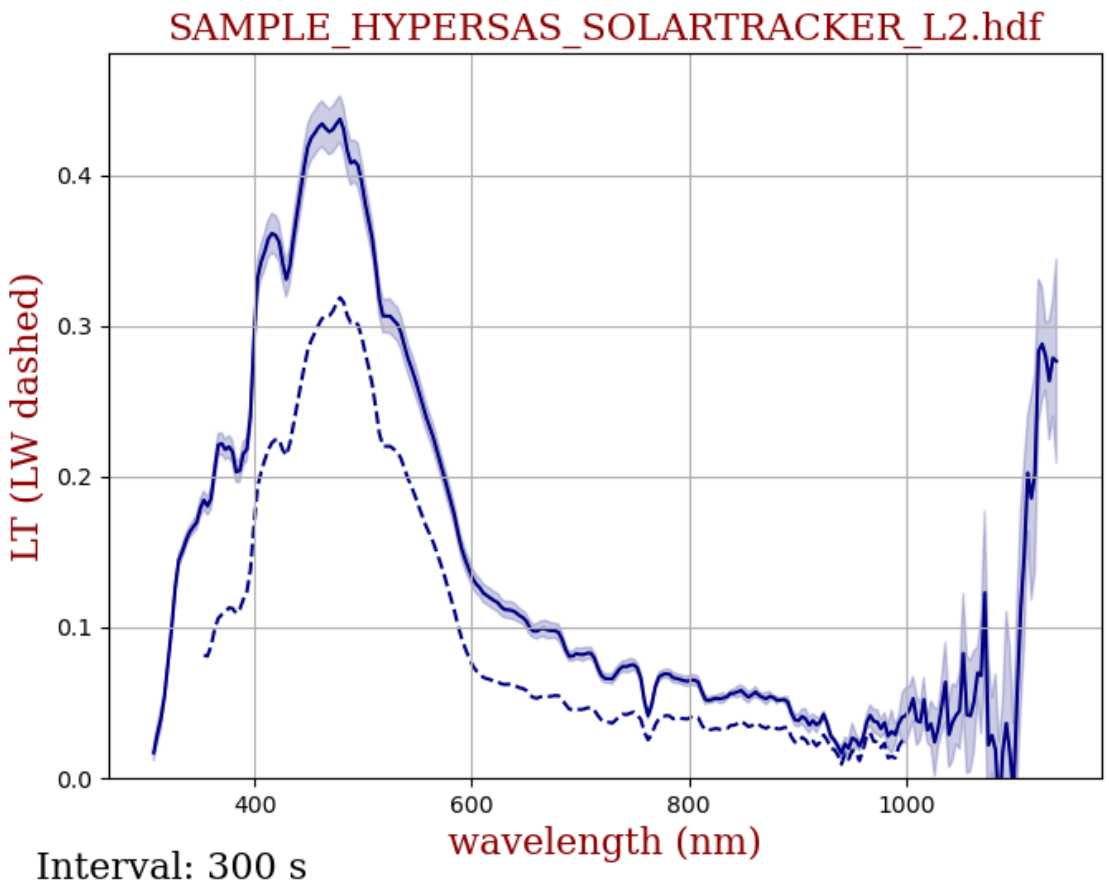
Process log:
Process Single Level
ProcessL2:
/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L1BQC/SAMPLE_HYPERSAS_SOLARTRACKER_L1BQC.hdf
Binning datasets to ensemble time interval.
73 spectra in slice (ensemble).
4 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0027370188963852606; offset(nLw) = 0.29409617869888616
85 spectra in slice (ensemble).
4 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0030473389611084117; offset(nLw) = 0.3291858481106851
89 spectra in slice (ensemble).
4 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.003547177357828954; offset(nLw) = 0.379772163414516
96 spectra in slice (ensemble).
5 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0027639239478011116; offset(nLw) = 0.29674979031092064
106 spectra in slice (ensemble).
5 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0025623602370585946; offset(nLw) = 0.2746043594093105
99 spectra in slice (ensemble).
5 spectra remaining in slice to average after filtering to lowest 5.0%.

Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0023686836367772923; offset(nLw) = 0.2528027182884484
96 spectra in slice (ensemble).
5 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.002285789725218194; offset(nLw) = 0.24398916555942102
98 spectra in slice (ensemble).
5 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0025838668789680127; offset(nLw) = 0.27634919213397224
90 spectra in slice (ensemble).
4 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0029295582720071426; offset(nLw) = 0.31079704573146855
42 spectra in slice (ensemble).
2 spectra remaining in slice to average after filtering to lowest 5.0%.
Wavelengths extend beyond model limits. Truncating to 350 - 1000 nm.
Calculating Zhang glint correction.
Perform similarity spectrum residual NIR subtraction.
offset(rrs) = 0.0030379558648665093; offset(nLw) = 0.32509364707165195
Filtering reflectance spectra for negative values.
90.0% of Rrs_HYPER spectra flagged
0.0% of nLw_HYPER spectra flagged
Remove REFLECTANCE Data
  Length of dataset prior to removal 10 long
  Length of dataset after removal 1 long: 90% removed
Remove IRRADIANCE Data
  Length of dataset prior to removal 10 long
  Length of dataset after removal 1 long: 90% removed
Remove RADIANCE Data
  Length of dataset prior to removal 10 long
  Length of dataset after removal 1 long: 90% removed
Remove ANCILLARY Data
  Length of dataset prior to removal 10 long
  Length of dataset after removal 1 long: 90% removed
Processing chlor_a
Processing kd490
Processing Wei QA
Processing avw
Processing CDOM, Sg, DOC
Processing qaa

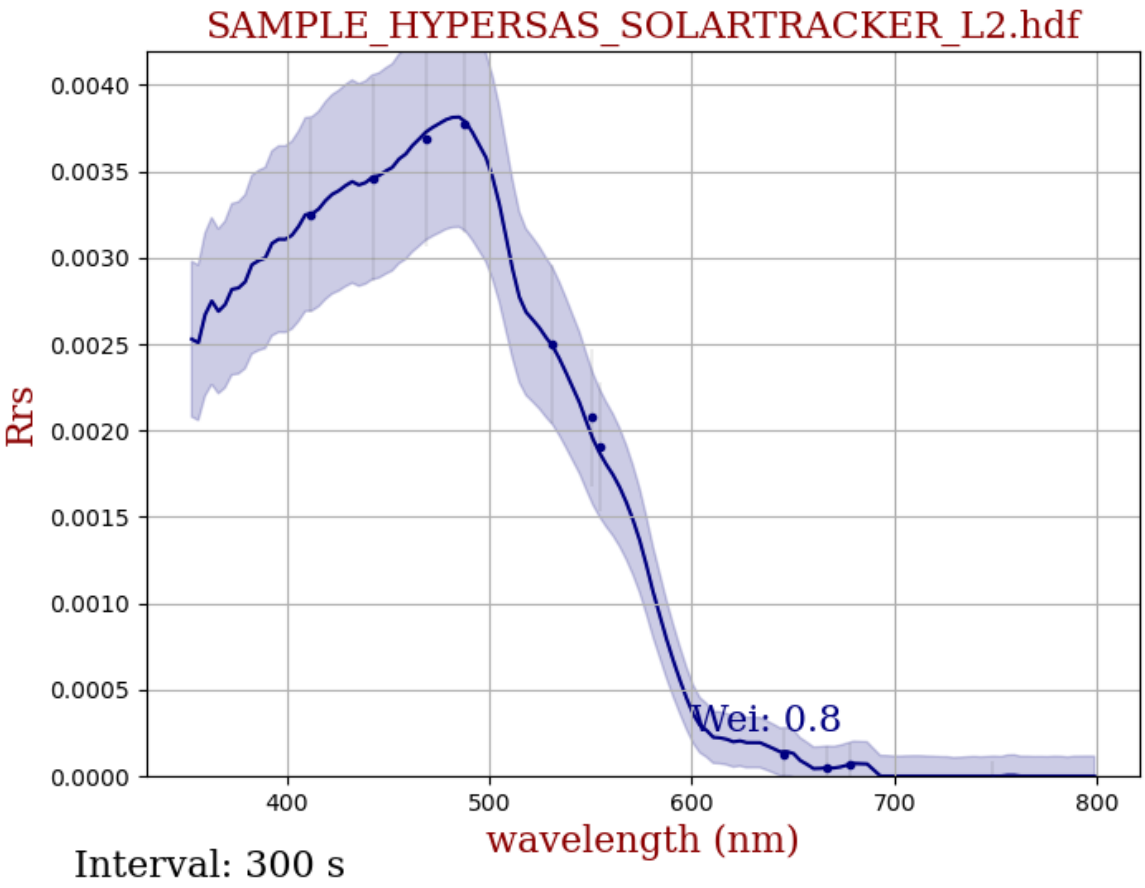
File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201

L2 file produced:
/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L2/SAMPLE_HYPERSAS_SOLARTRACKER_L2.hdf
Output SeaBASS for HDF:
/ssdwork/GitRepos/HyperInSPACE/Data/Sample_Data/L2/SAMPLE_HYPERSAS_SOLARTRACKER_L2.hdf

Radiometry

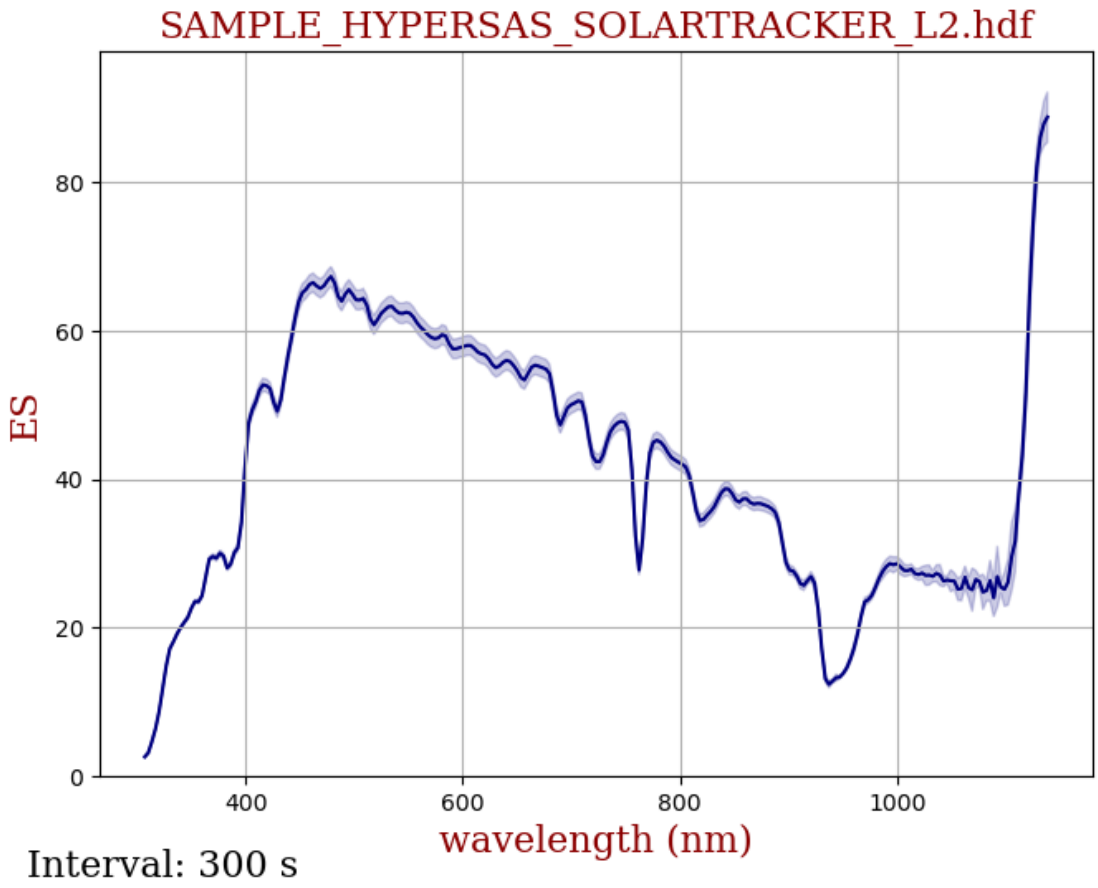


File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201



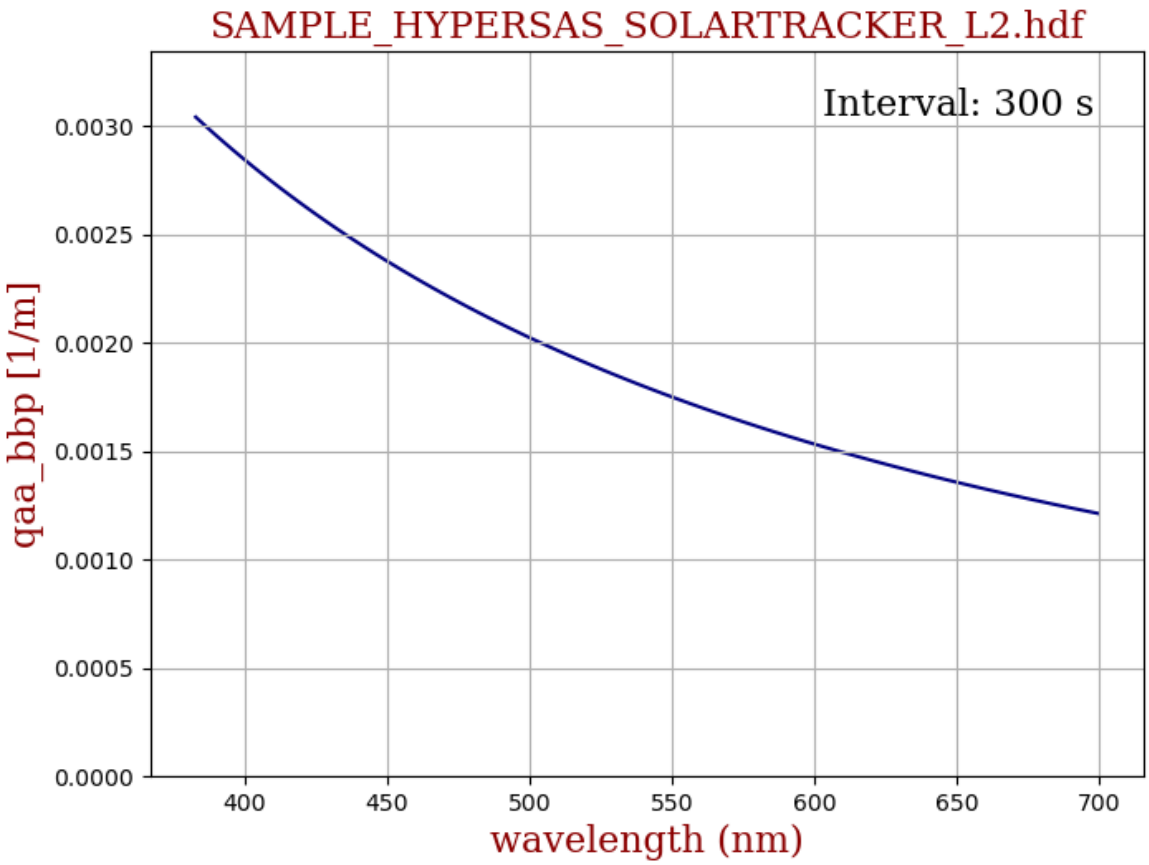
Interval: 300 s

File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201



Derived Spectral Products

File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201



File: SAMPLE_HYPERSAS_SOLARTRACKER Collected: Fri May 20 07:00:00 201