

L1A : Process RAW to L1A

Raw binary to HDF5 and filter data on SZA.

Processing Parameters and metadata:

HyperInSPACE version: 1.0.7

SZA Filter (L1A): 70.0

The stuff that dreams are made of.

/version=R0

/investigators=Sam_Spade

/affiliations=Sam_Spade_Detective_Agency

/contact=supersleuth@noir.com

/experiment=sample

/cruise=Sample1

/documents=LogSheet.xls,ProcessReport.xls

/instrument_manufacturer=Satlantic

/instrument_model=HyperSAS

/calibration_date=

/calibration_files=HSE488B.cal,HSL386B.cal,HLD386B.cal,HED488B.cal,SATTHS0045A.tdf,HLD385B.cal,HSL385B.cal,SATNAV0001A.tdf,GPRMC_NMEA0183v3.01.tdf

/data_type=above_water

/data_status=preliminary

/water_depth=NA

/measurement_depth=0

/cloud_percent=NA

/wave_height=NA

/secchi_depth=NA

/station=

/original_file_name=

/start_date=

/end_date=

/start_time=

/end_time=

/north_latitude=

/south_latitude=

/east_longitude=

/west_longitude=

/wind_speed=

Process log:

Process Single Level

ProcessL1a.processL1a: 09-Apr-2021 16:11:45

L1A file produced:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1A/SAMPLE_HYPERSAS_NOTRACKER_L1A.hdf

Process	Single	Level:
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/Users/daurin/GitRepos/HyperInSPACE/Data/L1A/SAMPLE_HYPERSAS_NOTRACKER_L1A.hdf		-
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SUCCESSFUL

id: SATHSE0488

id: SATHSL0386
id: SATHLD0386
id: \$GPGGA
id: SATHED0488
id: SATHLD0385
id: SATHSL0385

L1B : Process L1A to L1B

Apply factory calibrations.

Processing Parameters: None

Process log:

Process Single Level

ProcessL1b.processL1b: 09-Apr-2021 16:11:58

Applying factory calibrations.

Group: GPGGA_NMEA0183.tdf

File: \$GPGGA

Group: HED488B.cal

File: SATHED0488

Group: HLD385B.cal

File: SATHLD0385

Group: HLD386B.cal

File: SATHLD0386

Group: HSE488B.cal

File: SATHSE0488

Group: HSL385B.cal

File: SATHSL0385

Group: HSL386B.cal

File: SATHSL0386

L1B file produced:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1B/SAMPLE_HYPERSAS_NOTRACKER_L1B.hdf

Process

Single

Level:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1B/SAMPLE_HYPERSAS_NOTRACKER_L1B.hdf

-

SUCCESSFUL

id: SATHSE0488

id: SATHSL0386

id: SATHLD0386

id: \$GPGGA

id: SATHED0488

id: SATHLD0385

id: SATHSL0385

L1C : Process L1B to L1C

Filter data on pitch, roll, yaw, and azimuth angles.

Processing Parameters:

Rotator Home Angle: 0.0

Rotator Delay: 60.0

Rel Azimuth Min: 90.0

Rel Azimuth Max: 135.0

Process log:

Process Single Level

Found data: station

Found data: lat

Found data: lon

Found data: speed_f_w

Found data: wind

Found data: wt

Found data: sal

Found data: cloud

Found data: waveht

Found data: heading

Found data: relaz

ProcessL1c:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1B/SAMPLE_HYPERSAS_NOTRACKER_L1B.hdf

ProcessL1c.processL1c: 09-Apr-2021 16:16:26

No POINTING data found. Filtering on rotator delay failed.

Filtering file for bad Relative Solar Azimuth

Percentage of data out of Relative Solar Azimuth bounds: 0 %

Eliminate combined filtered data from datasets.*****

Remove ES_DARK Data

Length of dataset prior to removal 118 long

Length of records removed from dataset: 0

Data end 118 long, a loss of 0 %

Remove ES_LIGHT Data

Length of dataset prior to removal 500 long

Length of records removed from dataset: 0

Data end 500 long, a loss of 0 %

Remove GPGGA_NMEA0183.tdf Data

Length of dataset prior to removal 372 long

Length of records removed from dataset: 0

Data end 372 long, a loss of 0 %

Remove LI_DARK Data

Length of dataset prior to removal 88 long

Length of records removed from dataset: 0

Data end 88 long, a loss of 0 %

Remove LI_LIGHT Data

Length of dataset prior to removal 405 long

Length of records removed from dataset: 0

Data end 405 long, a loss of 0 %

Remove LT_DARK Data

Length of dataset prior to removal 27 long

Length of records removed from dataset: 0

Data end 27 long, a loss of 0 %

Remove LT_LIGHT Data

Length of dataset prior to removal 137 long

Length of records removed from dataset: 0

Data end 137 long, a loss of 0 %

Remove ANCILLARY_METADATA Data

Length of dataset prior to removal 5 long

Length of records removed from dataset: 0

Data end 5 long, a loss of 0 %

L1C file produced:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1C/SAMPLE_HYPERSAS_NOTRACKER_L1C.hdf

Process

Single

Level:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1C/SAMPLE_HYPERSAS_NOTRACKER_L1C.hdf

-

SUCCESSFUL

id: SATHSE0488

id: SATHSL0386

id: SATHLD0386

id: \$GPGGA

id: SATHED0488

id: SATHLD0385

id: SATHSL0385

L1D : Process L1C to L1D

Deglitch data and apply shutter dark corrections.

Processing Parameters:

ES Dark Window: 11

ES Light Window: 9

ES Dark Sigma: 3.2

ES Light Sigma: 2.4

LT Dark Window: 9

LT Light Window: 9

LT Dark Sigma: 3.2

LT Light Sigma: 2.3

LI Dark Window: 11

LI Light Window: 9

LI Dark Sigma: 3.5

LI Light Sigma: 2.4

Process log:

Process Single Level

No deglitching parameter file found. Resorting to values in ConfigFile.settings.

ProcessL1d:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1C/SAMPLE_HYPERSAS_NOTRACKER_L1C.hdf

ProcessL1d.processL1d: 09-Apr-2021 16:16:33

Screening ANCILLARY_METADATA for clean timestamps.

Screening ES_DARK for clean timestamps.

Screening ES_LIGHT for clean timestamps.

Screening GPGGA_NMEA0183.tdf for clean timestamps.

Out of order TIMETAG2 row deleted at 161

Out of order TIMETAG2 row deleted at 165

Out of order TIMETAG2 row deleted at 169

Out of order TIMETAG2 row deleted at 172

Out of order TIMETAG2 row deleted at 183

Out of order TIMETAG2 row deleted at 213

Out of order TIMETAG2 row deleted at 336

Data eliminated for non-increasing timestamps: 1.9%

Screening LI_DARK for clean timestamps.

Screening LI_LIGHT for clean timestamps.

Screening LT_DARK for clean timestamps.

Screening LT_LIGHT for clean timestamps.

ES

Deglitching dark

Data reduced by 18 (15.0%)

Deglitching light

Data reduced by 134 (27.0%)

LI

Deglitching dark

Data reduced by 3 (3.0%)

Deglitching light

Data reduced by 261 (64.0%)

LT

Deglitching dark

Data reduced by 4 (15.0%)

Deglitching light

Data reduced by 11 (8.0%)

Dark Correction: ES

Dark Correction: LI

Dark Correction: LT

L1D file produced:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1D/SAMPLE_HYPERSAS_NOTRACKER_L1D.hdf

Process

Single

Level:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1D/SAMPLE_HYPERSAS_NOTRACKER_L1D.hdf

-

SUCCESSFUL

id: SATHSE0488

id: SATHSL0386

id: SATHLD0386

id: \$GPGGA

id: SATHED0488

id: SATHLD0385

id: SATHSL0385

Example Deglitching

Randomized. Complete plots of hyperspectral deglitching from anomaly analysis can be found in [output_directory]/Plots/L1C_Anoms.

None found.

None found.

None found.

None found.

None found.

None found.

L1E : Process L1D to L1E

Interpolate data to common timestamps and wavebands.

Processing Parameters:

Wavelength Interp Int: 3.3 nm

Process log:

Process Single Level

ProcessL1e.processL1e: 09-Apr-2021 16:16:49

LT has fewest records (as expected) - interpolating to LT; 126 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 REL_AZ

Interpolate Data SZA

Interpolate Data STATION

Interpolate Data HEADING

Interpolate Data LATITUDE

Interpolate Data LONGITUDE

Interpolate Data SALINITY

Interpolate Data SOLAR_AZ

Interpolate Data SST

Interpolate Data WINDSPEED

Interpolate Data CLOUD

Interpolate Data WAVE_HT

L1E file produced:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1E/SAMPLE_HYPERSAS_NOTRACKER_L1E.hdf

Output SeaBASS for HDF: Es, Li, Lt files

id: SATHSE0488

id: SATHSL0386

id: SATHLD0386

id: \$GPGGA

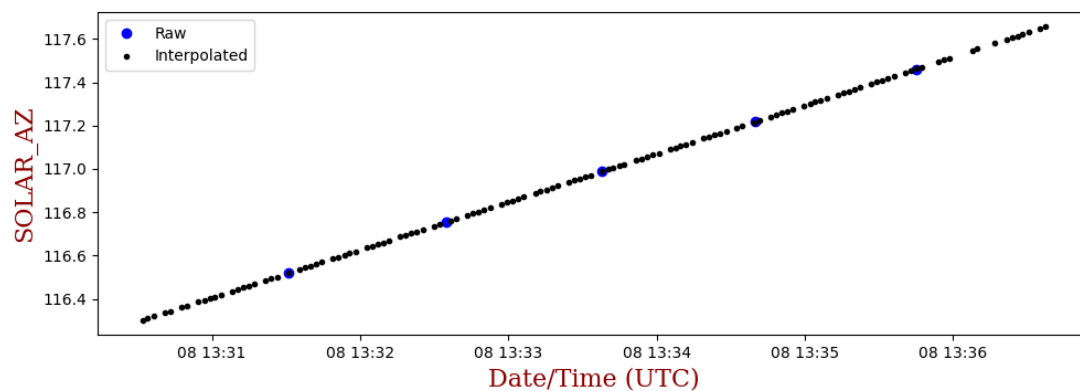
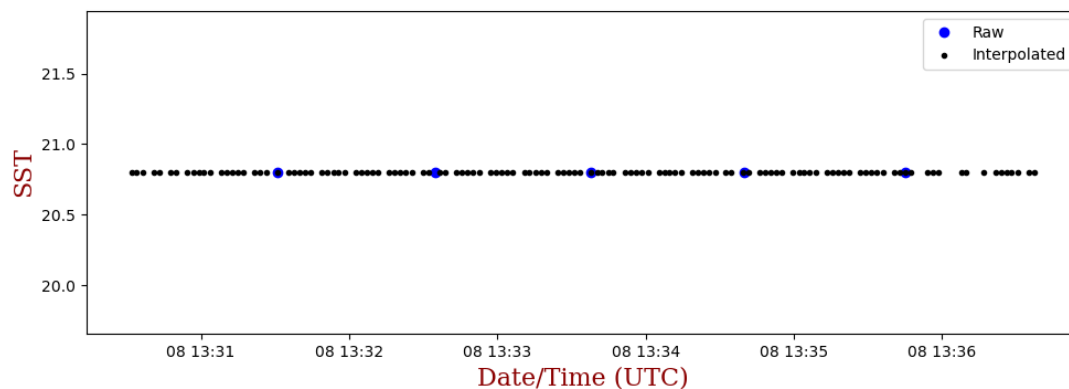
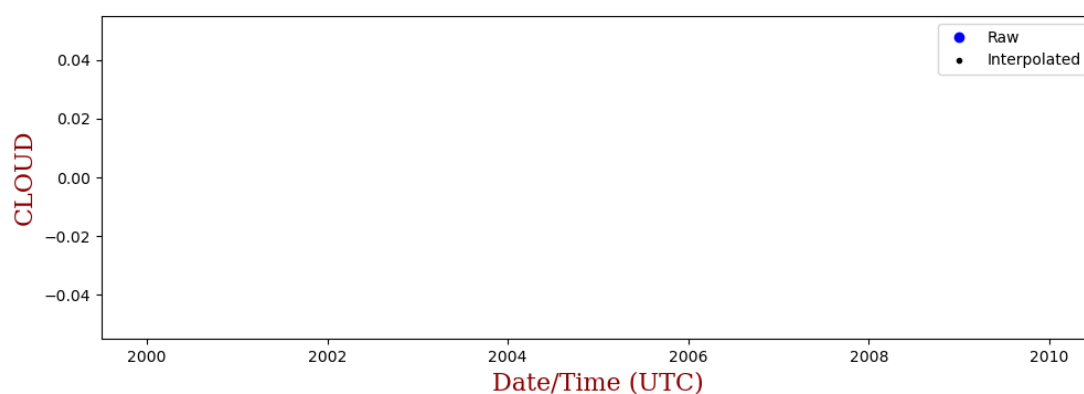
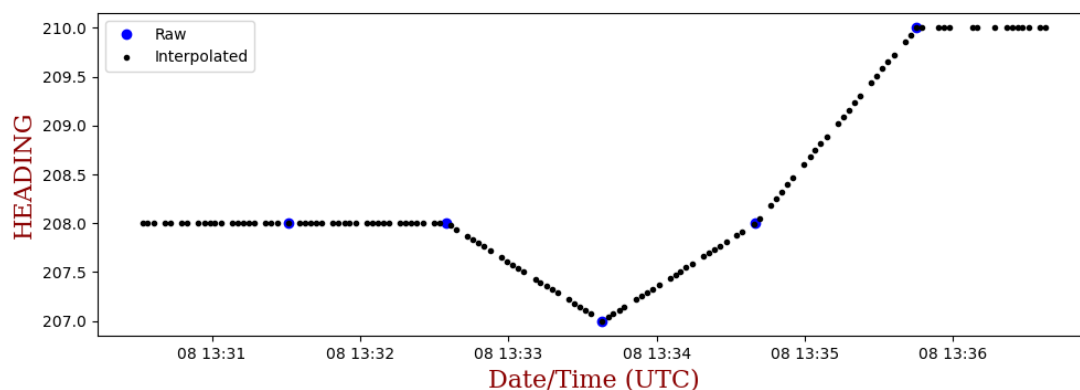
id: SATHED0488

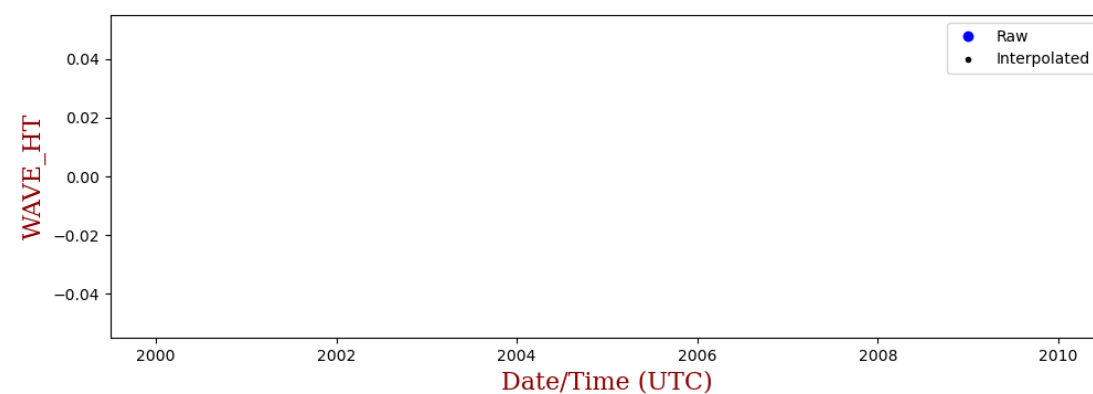
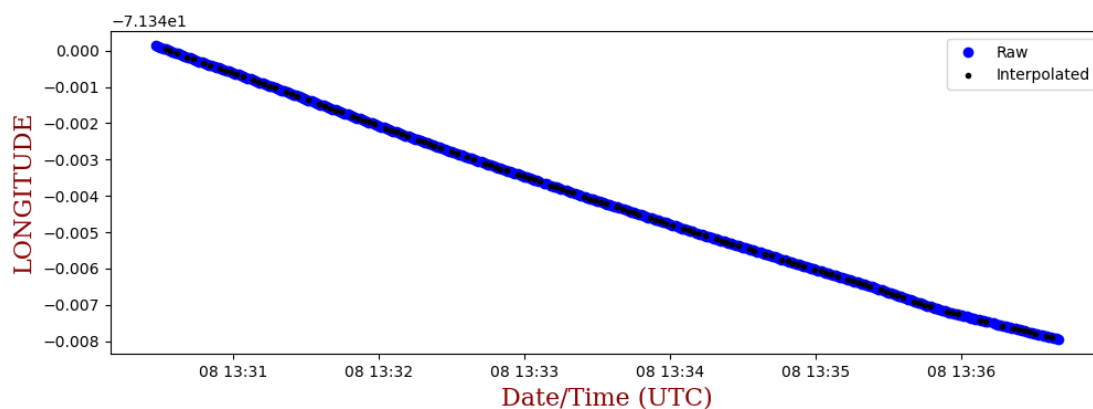
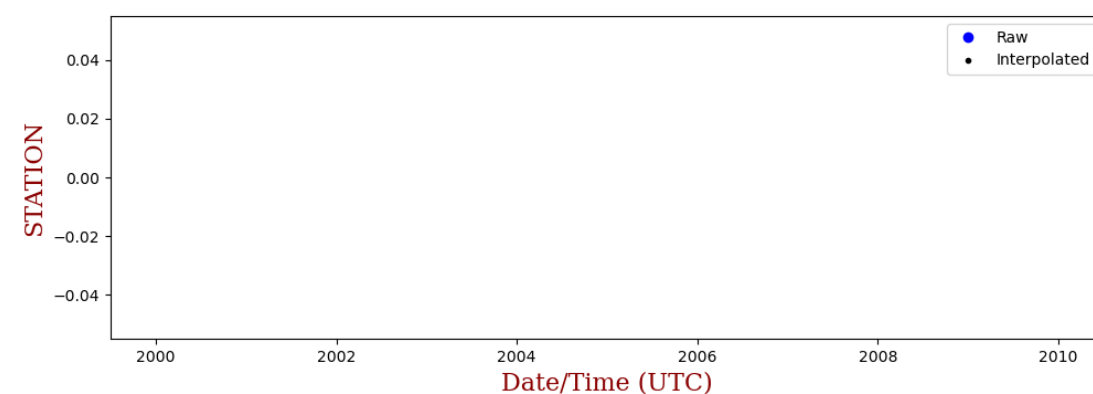
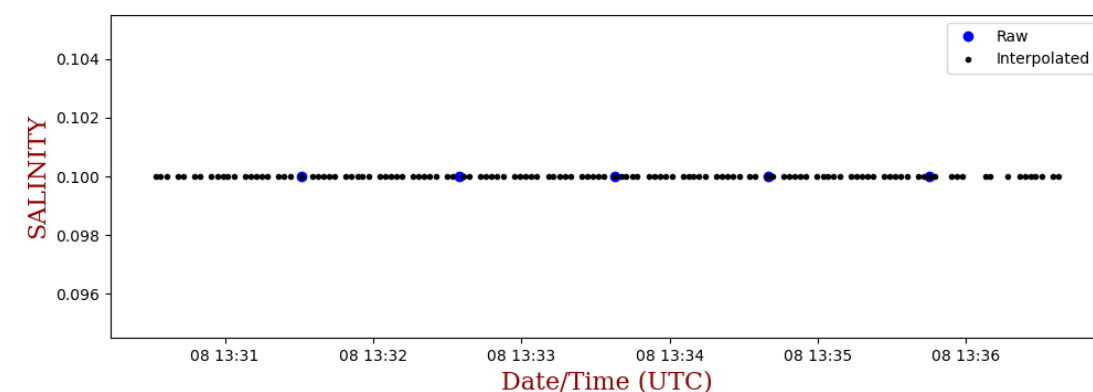
id: SATHLD0385

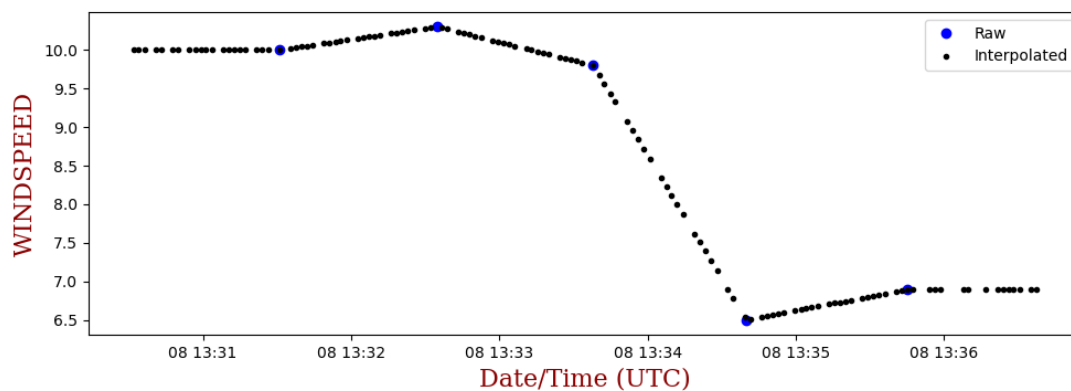
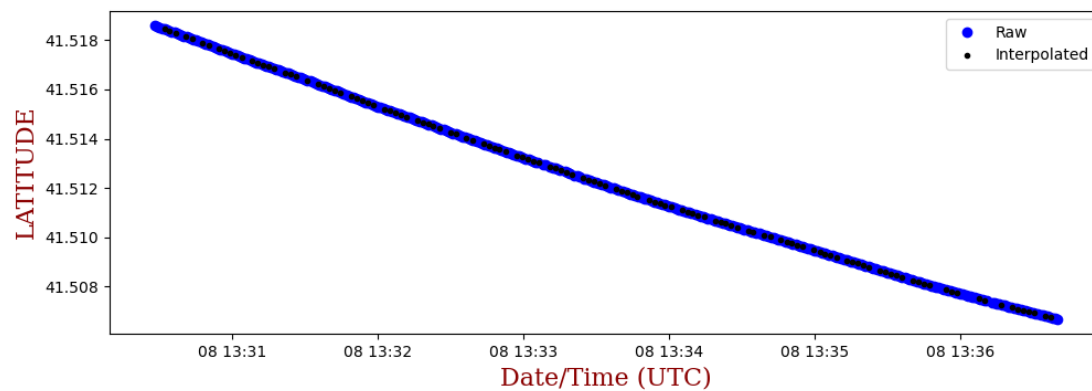
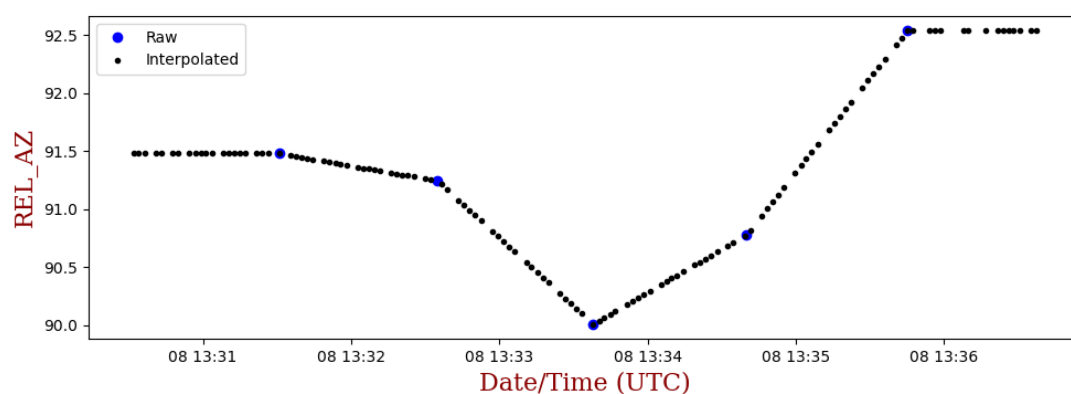
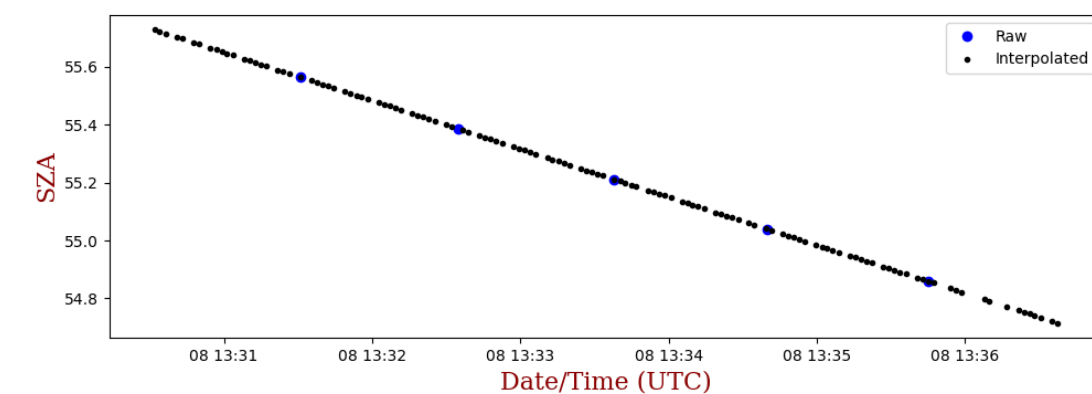
id: SATHSL0385

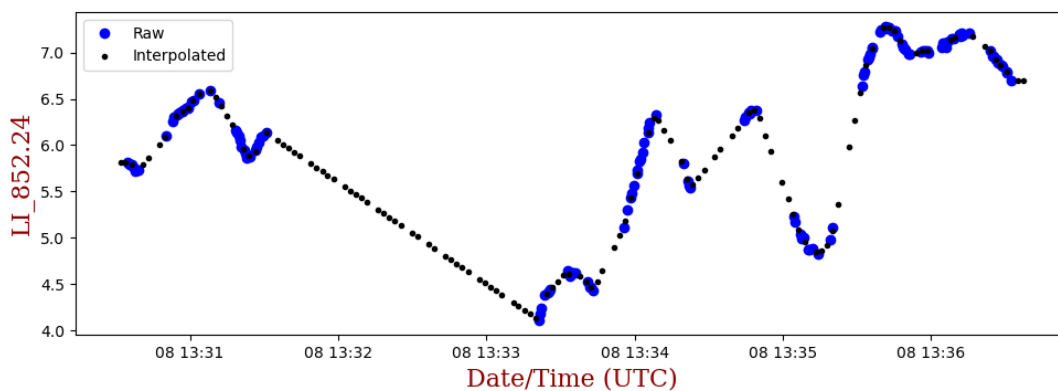
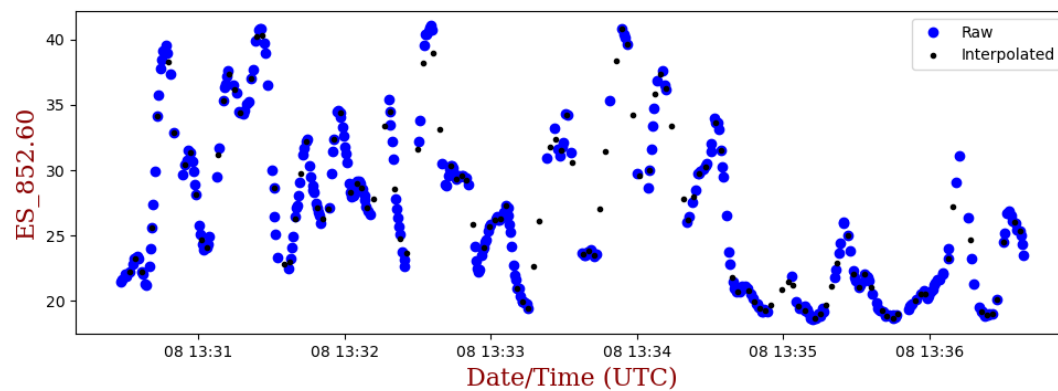
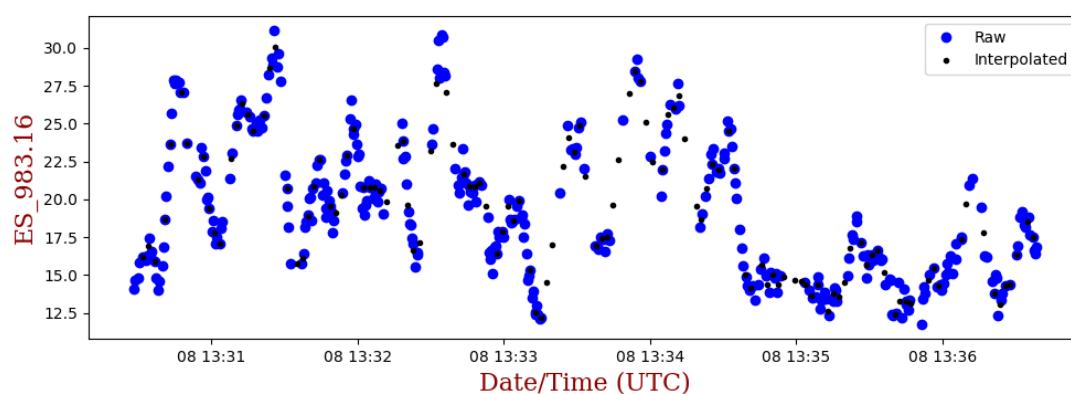
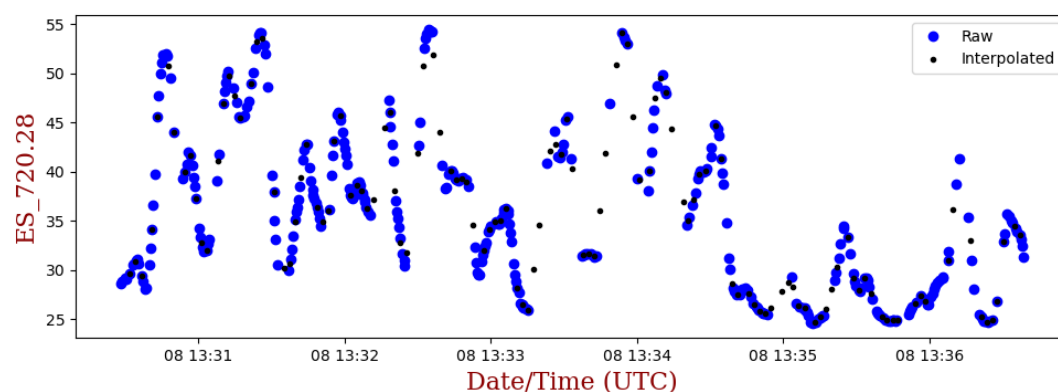
Example Temporal Interpolations

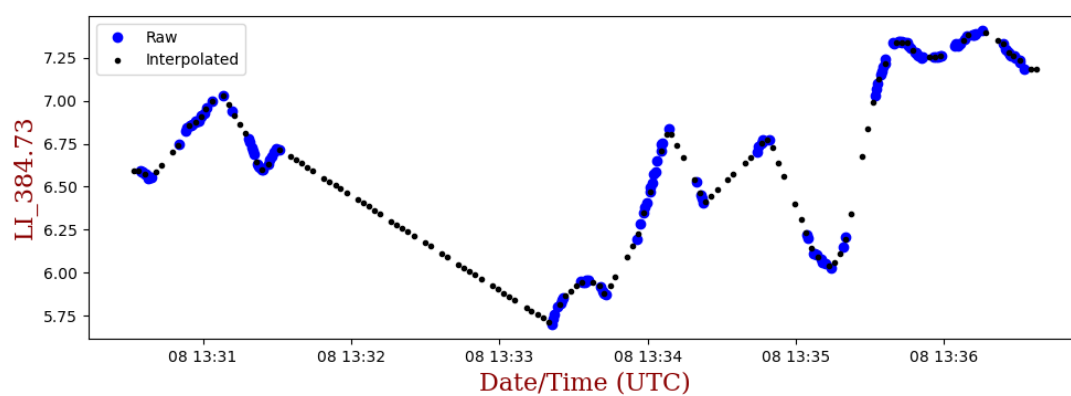
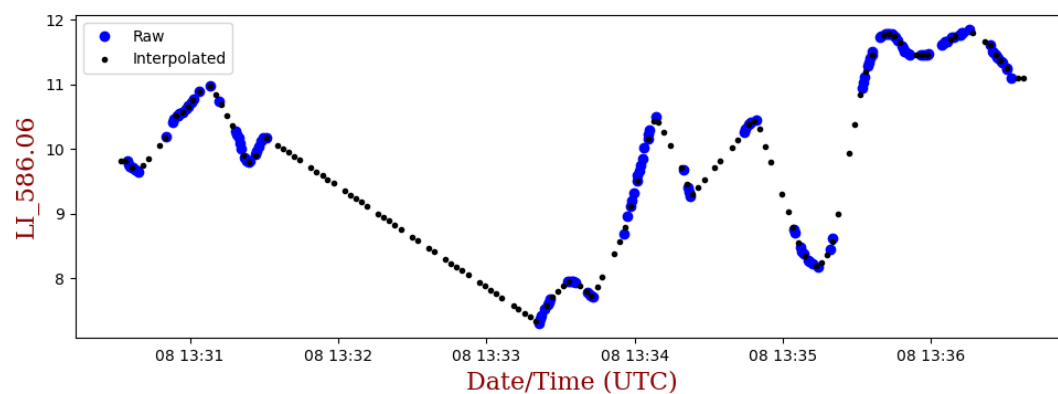
Randomized. Complete plots of hyperspectral interpolations can be found in [output_directory]/Plots/L1E.



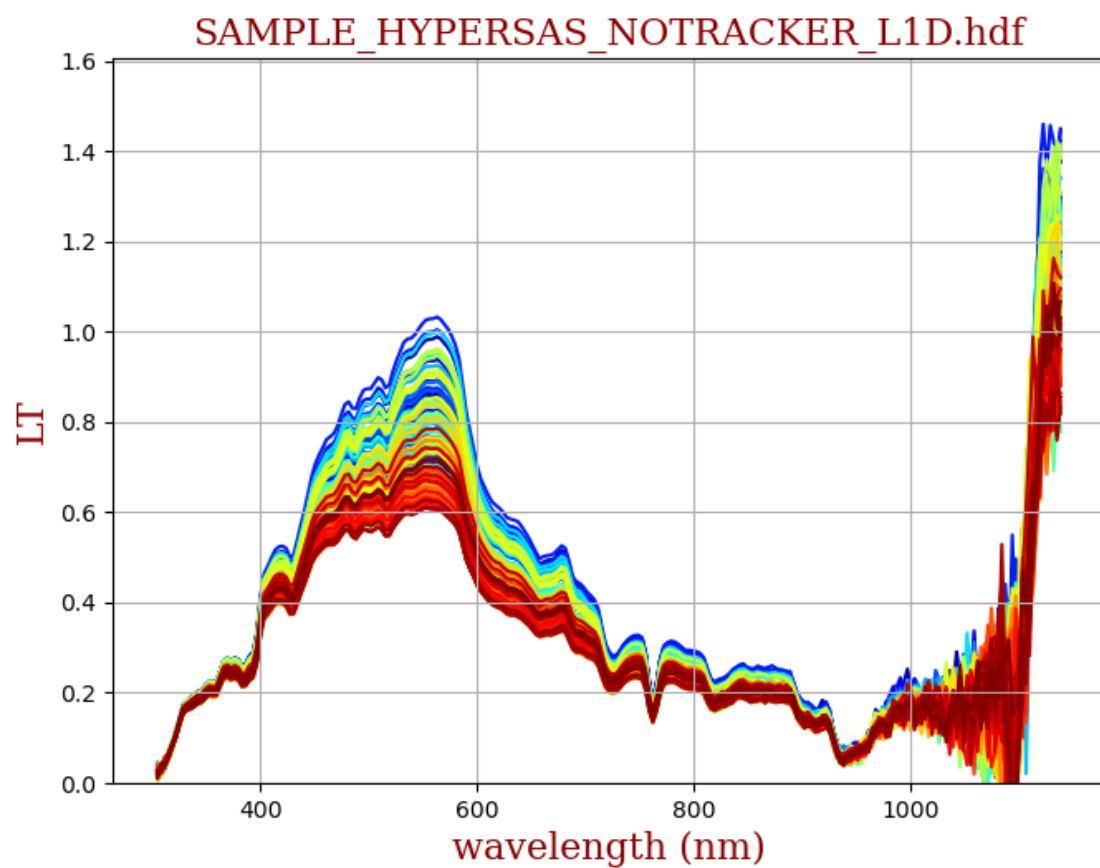


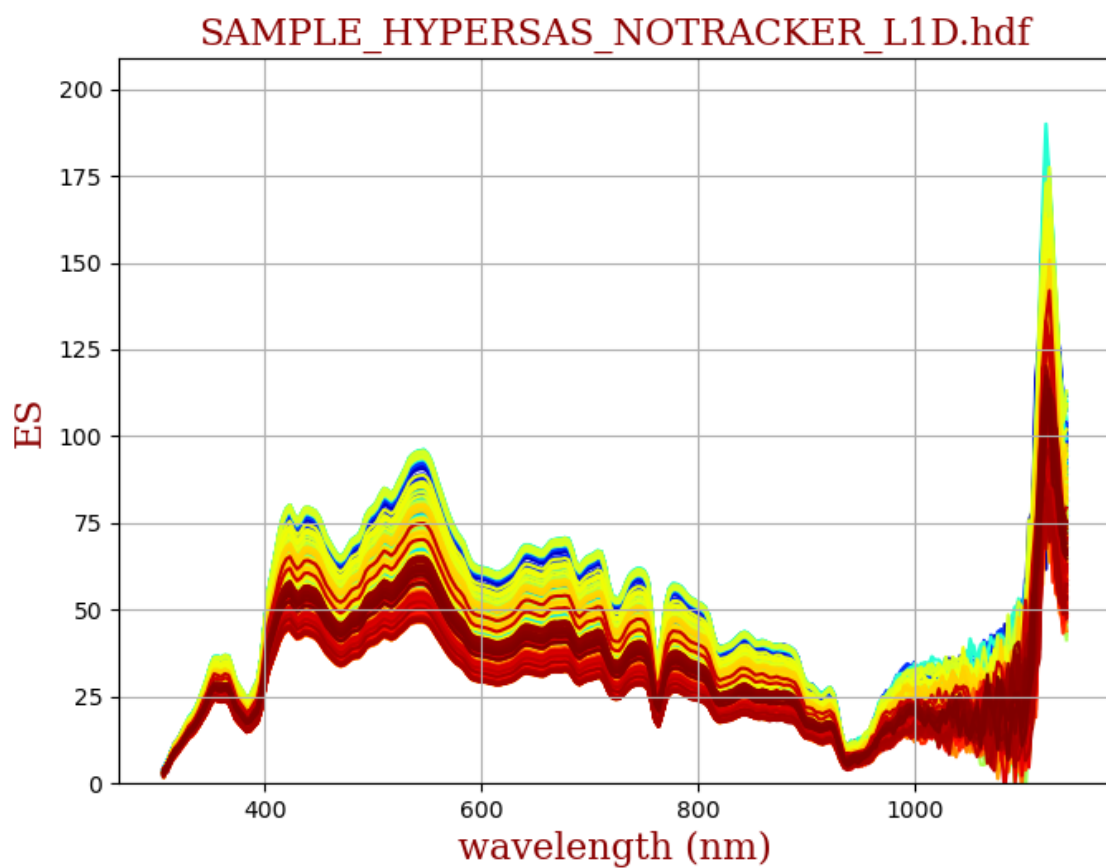


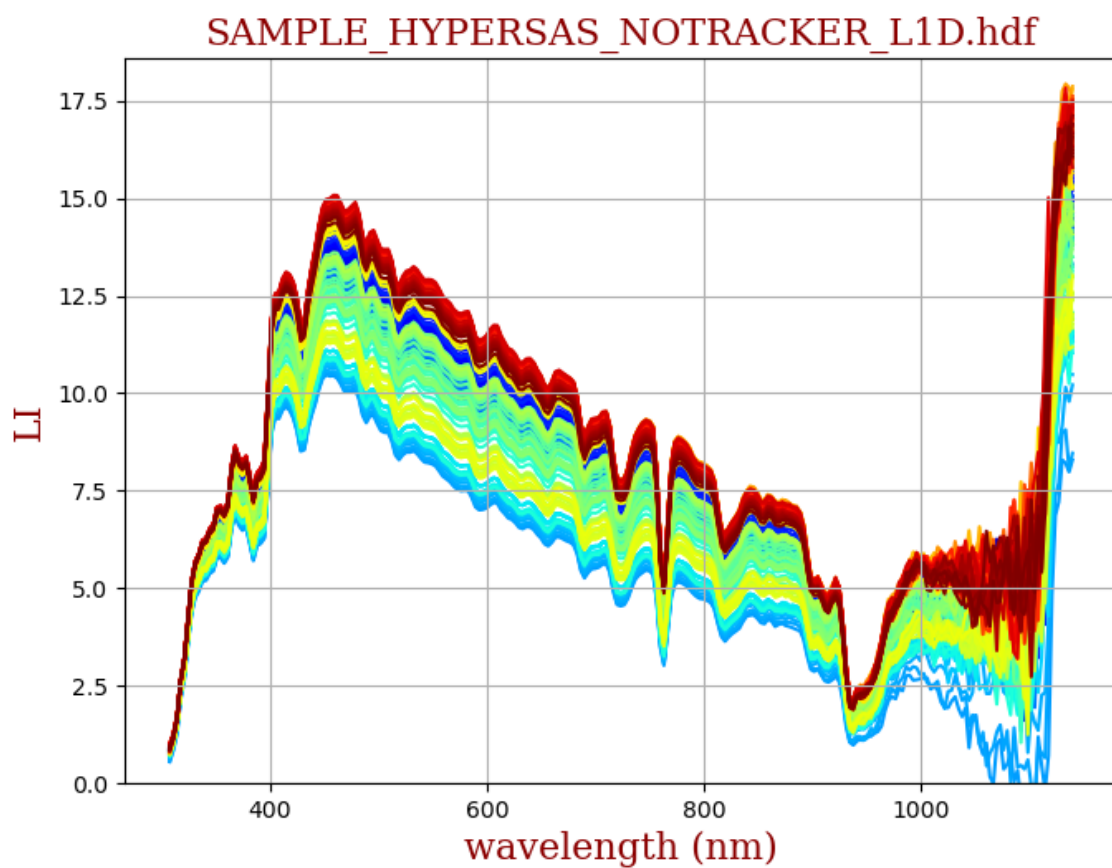




Complete spectral plots







L2 : Process L1E to L2

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

Processing Parameters:

Max Wind: 10.0

Min SZA: 20.0

Max SZA: 60.0

Filter Sigma Es: 5.0

Filter Sigma Li: 3.0

Filter Sigma Lt: 2.0

Cloud Filter: 1.0

Es Filter: 2.0

Dawn/Dusk Filter: 1.0

Rain/Humidity Filter: 1.095

Ensemble Duration: 300 sec

Percent Lt Filter: 10.0

Glint_Correction: Ruddick et al. 2006

NIR Correction: Mueller and Austin 1995

Remove Negatives: ON

Process log:

Process Single Level

ProcessL2:

/Users/daurin/GitRepos/HyperInSPACE/Data/L1E/SAMPLE_HYPERSAS_NOTRACKER_L1E.hdf

Found data: CLOUD

Found data: HEADING

Found data: LATITUDE

Found data: LONGITUDE

Found data: REL_AZ

Found data: SALINITY

Found data: SOLAR_AZ

Found data: SPEED_F_W

Found data: SST

Found data: STATION

Found data: SZA

Found data: WAVE_HT

Found data: WINDSPEED

Model data for Wind and AOD may be used to replace blank values. Reading in model data...

Ancillary file found locally: N201925113_MERRA2_1h.nc

Ancillary file found locally: N201925113_AER_MERRA2_1h.nc

Field wind data has 0 NaNs out of 126 prior to using model data

Field salt data has 0 NaNs out of 126 prior to using model data

Field sst data has 0 NaNs out of 126 prior to using model data

Field aod data has 126 NaNs out of 126 prior to using model data

Field cloud data has 126 NaNs out of 126

Field wave data has 126 NaNs out of 126

Field station data has 126 non-stations out of 126

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

High Wind: 10.0

Passed. SZA: 55, Wind: 10.0

Flag data from TT2: 2019-09-08 13:31:35.407000+00:00 to 2019-09-08 13:33:10.817000+00:00

Percentage of data out of SZA and Wind limits: 28 %

Remove IRRADIANCE Data

Length of dataset prior to removal 126 long

Length of dataset after removal 91 long: 28% removed

Remove RADIANCE Data

Length of dataset prior to removal 126 long

Length of dataset after removal 91 long: 28% removed

Remove ANCILLARY Data

Length of dataset prior to removal 126 long

Length of dataset after removal 91 long: 28% removed

Applying spectral filtering to eliminate noisy spectra.

1.1% of Es data flagged

5.5% of Li data flagged

24.2% of Lt data flagged

Remove IRRADIANCE Data

Length of dataset prior to removal 91 long

Length of dataset after removal 65 long: 29% removed

Remove RADIANCE Data

Length of dataset prior to removal 91 long

Length of dataset after removal 65 long: 29% removed

Remove ANCILLARY Data

Length of dataset prior to removal 91 long

Length of dataset after removal 65 long: 29% removed

Applying meteorological filtering to eliminate spectra.

Quality Check: $ES(470.0)/ES(680.0) < dawnDuskFlag:1.0$

Quality Check: $ES(470.0)/ES(680.0) < dawnDuskFlag:1.0$

Quality Check: $ES(470.0)/ES(680.0) < dawnDuskFlag:1.0$

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Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0
Quality Check: ES(470.0)/ES(680.0) < dawnDuskFlag:1.0

46.2% of spectra flagged

Remove IRRADIANCE Data

Length of dataset prior to removal 65 long

Length of dataset after removal 35 long: 46% removed

Remove RADIANCE Data

Length of dataset prior to removal 65 long

Length of dataset after removal 35 long: 46% removed

Remove ANCILLARY Data

Length of dataset prior to removal 65 long

Length of dataset after removal 35 long: 46% removed

Binning datasets to ensemble time interval.

25 spectra in slice (ensemble).

2 spectra remaining in slice to average after filtering to lowest 10.0%.

Calculating Ruddick glint correction

Sky 750 threshold triggered for cloudy sky. Rho set to 0.0256.

Perform simple residual NIR subtraction.

Filtering reflectance spectra for negative values.

0.0% of Rrs_HYPER spectra flagged

0.0% of nLw_HYPER spectra flagged

Processing chlor_a

Processing avw

Processing CDOM, Sg, DOC

Processing qaa

Processing Wei QA

L2 file produced:

/Users/daurin/GitRepos/HyperInSPACE/Data/L2/SAMPLE_HYPERSAS_NOTRACKER_L2.hdf

Output SeaBASS for HDF:

/Users/daurin/GitRepos/HyperInSPACE/Data/L2/SAMPLE_HYPERSAS_NOTRACKER_L2.hdf

Process

Single

Level:

/Users/daurin/GitRepos/HyperInSPACE/Data/L2/SAMPLE_HYPERSAS_NOTRACKER_L2.hdf

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SUCCESSFUL