

# SLIMED at NOAA

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**GSICS VIS/NIR Monthly Web Meeting**

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# Overview

- NOAA supports the initiative to convert the SLIMED from IDL to Python and to make it available to GSICS (and broader community?).
  - Dec 2022: Implemented v0 (released in Aug 2022).
  - Feb 2023: presented to the GSICS Annual Meeting that SLIMED is
    - Comparable to GIRO in the visible ( $0.4 - 0.7 \mu\text{m}$ ) and near infrared ( $0.7 - 1.0 \mu\text{m}$ ) spectrum; and
    - Superior to GIRO in the shortwave infrared ( $1 - 3 \mu\text{m}$ ) spectrum.
  - May 2023: Confirmed that v2 (released Apr 2023) is comparable with v0.
    - Details in the following slides.
- NOAA envisioned a modularized Python model to accommodate all participating models.
  - ROLO/GIRO, SLIMED, LIME etc.
  - In line with Tom & Hugh's presentation to the GSICS Annual Meeting.
- Path forward:
  - Confirmation of participating models.
  - Consensus on modules and interfaces, for example those outlined by Tom & Hugh.
  - Release of the SLIMED package for conversion.
  - Coordination of the effort (in sequence or parallel), review & verification, and support.

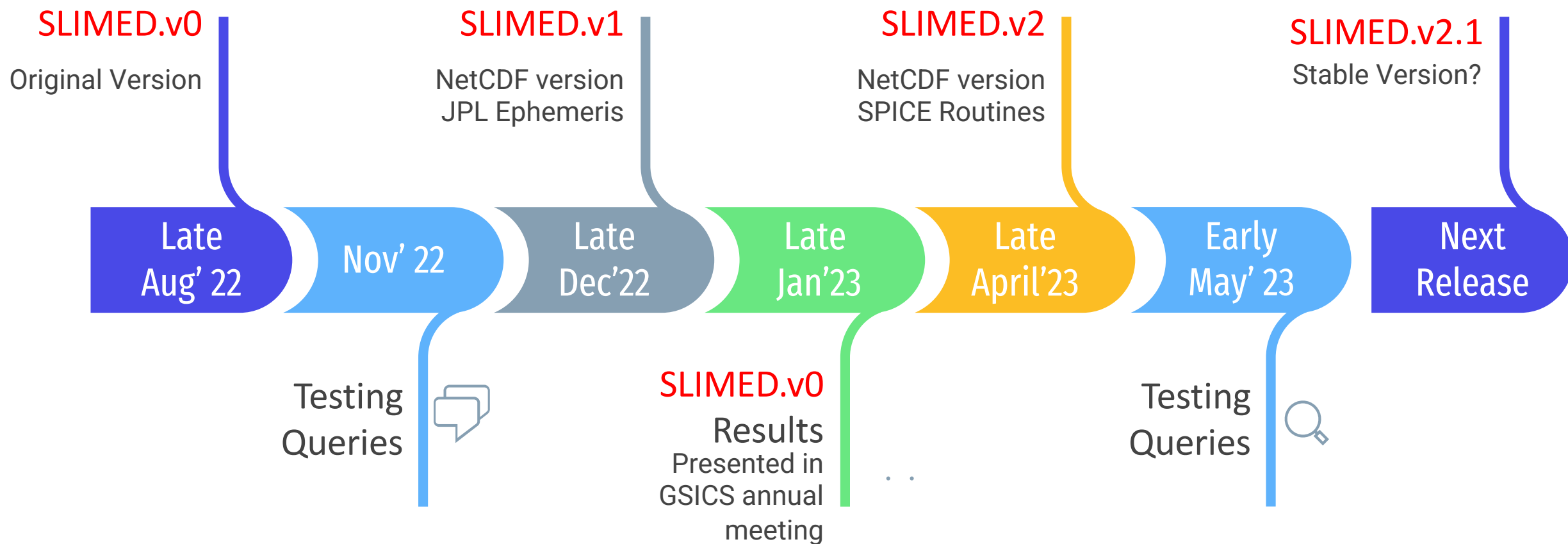


# Comparison of SLIMED.v2 with v0



- **Hugh released SLIMED.v2 in April 2023.**
- **NOAA compared SLIMED.v2 with v0.**

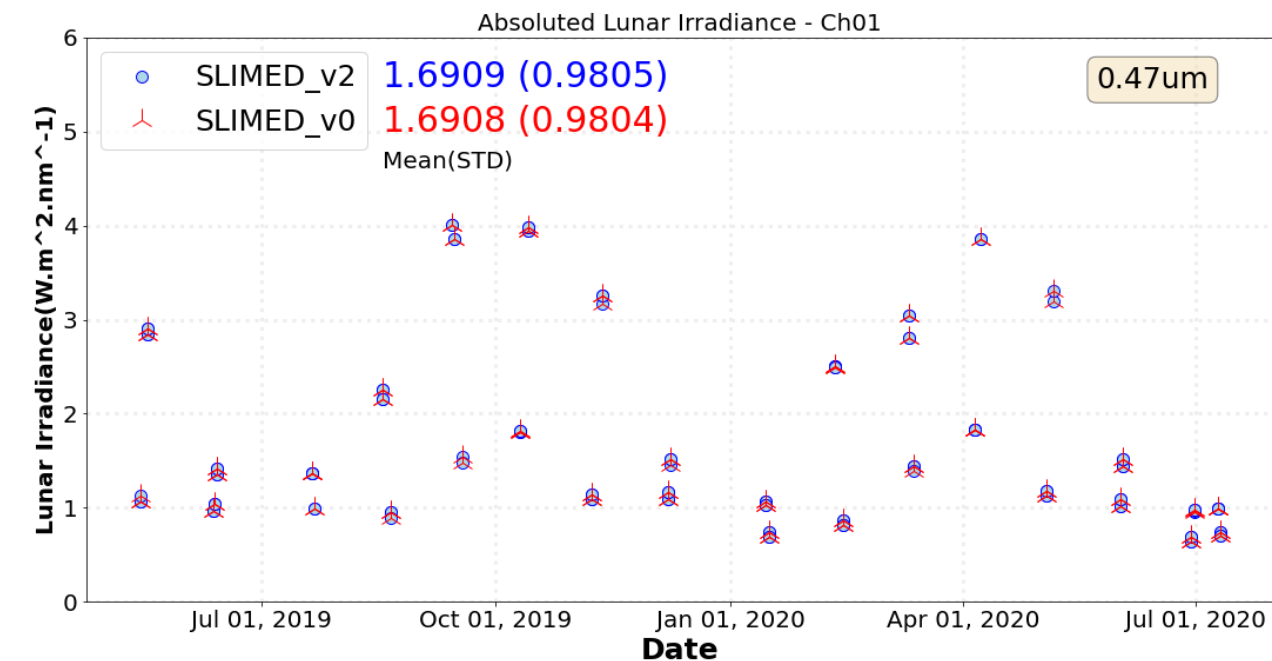
# SLIMED Versions and Testing by NOAA



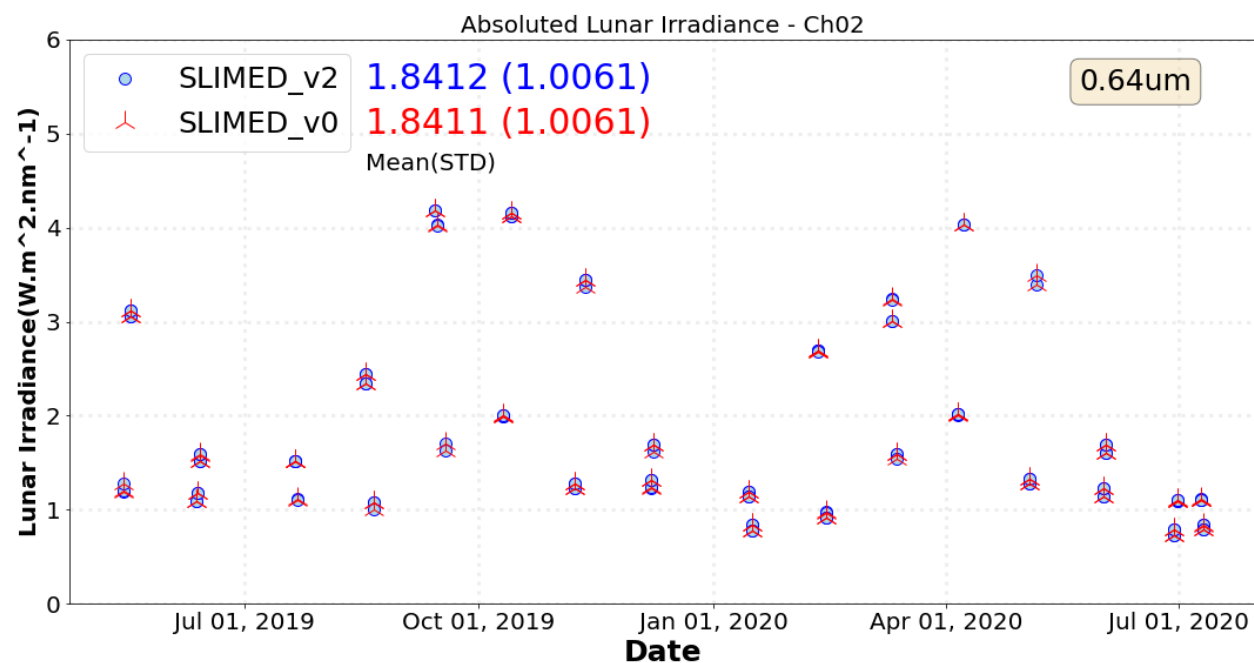
- Stable released version of SLIMED model will be helpful before it is converted to python.



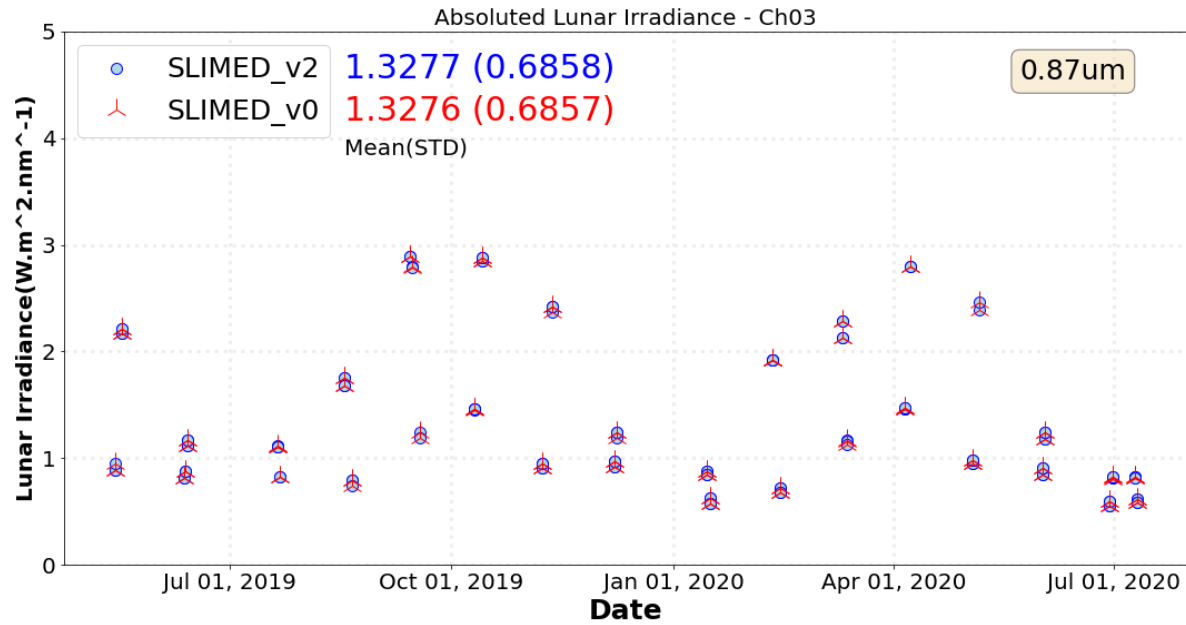
# SLIMED.v2 vs v0 Comparison : G16 Band 1,2



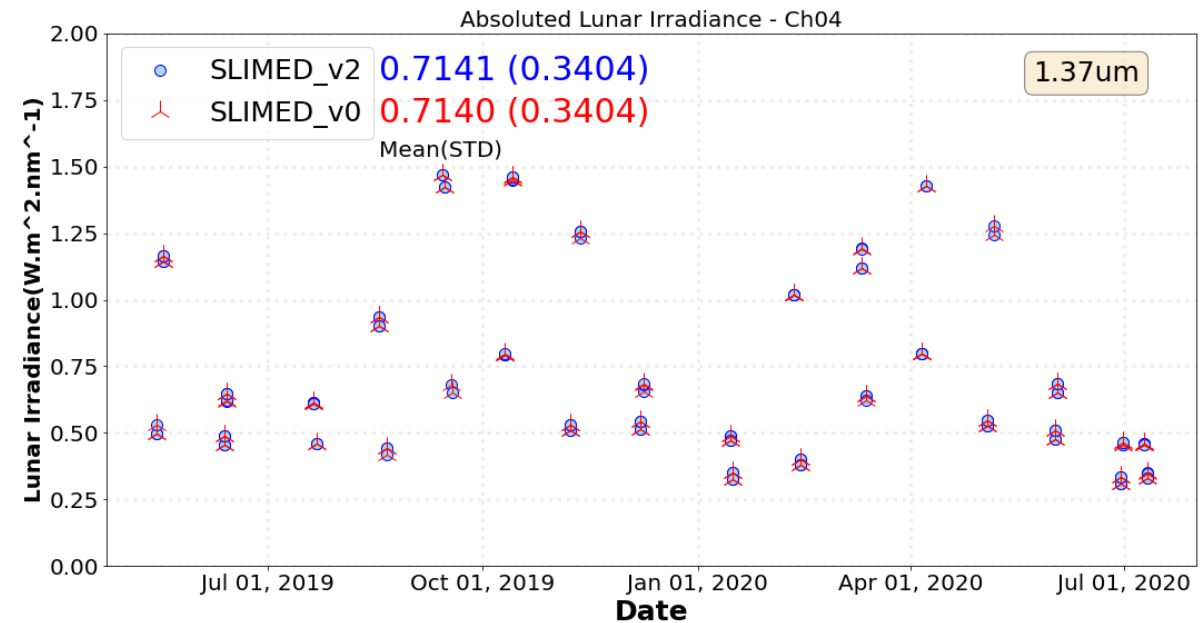
- Absolute Lunar Irradiance outputs from SLIMED\_v0 and SLIMED.v2 were compared.
- Similar outputs for G16 band 1 and 2.
  - Both mean and STD metric within 0.01%.



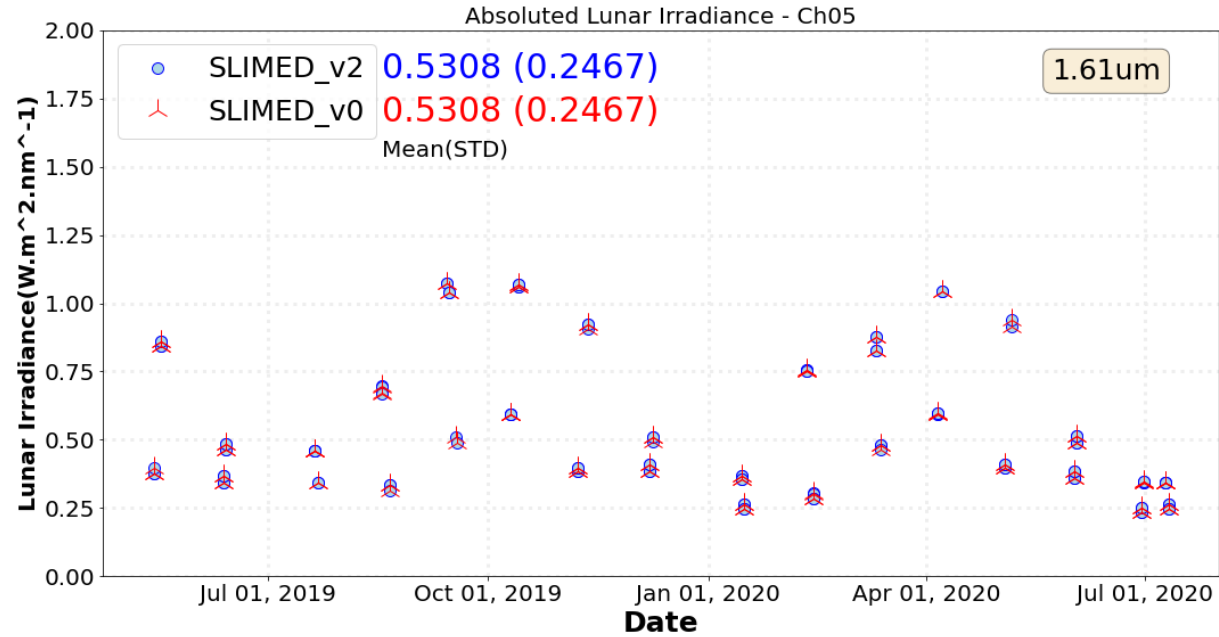
# SLIMED.v2 vs v0 Comparison: G16 Band 3,4



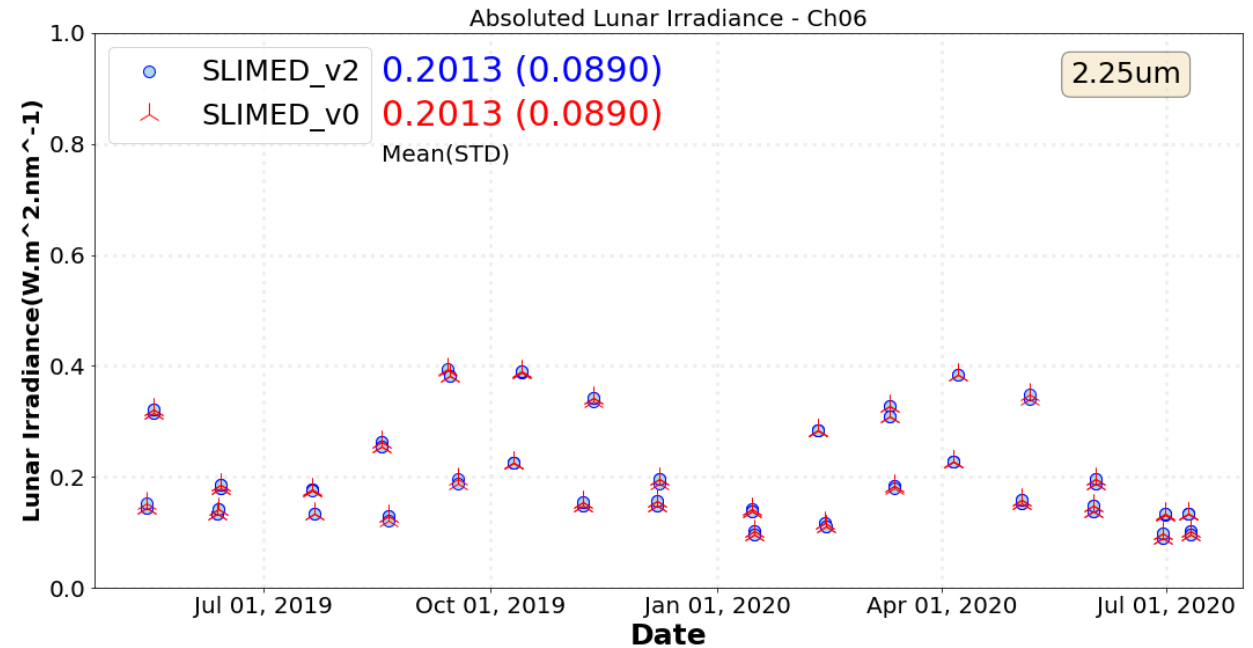
- Similar outputs for G16 band 3 and 4.
  - Both mean and STD metric within 0.01%.



# SLIMED.v2 vs v0 Comparison: G16 Band 5,6



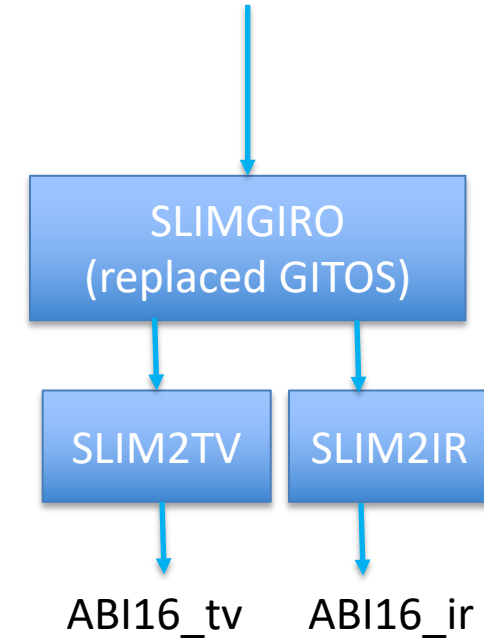
- Same outputs for G16 band 5 and 6.
  - Both mean and STD metric are same.





- **SLIMGIRO module ingested GIRO Lunar output files and converted to SLIMED model inputs.**
  - GIRO lunar output files also contain Lunar input files information needed.
- **The module ran successfully and output were produced.**
  - Input
    - G16 ABI (May'19-July'20) GIRO output files
  - Output
    - ABI16\_tv
      - Observation time (Date)
      - Satellite Position(XYZ of earth centered inertial position)
      - Oversampling factor
    - ABI16\_ir
      - irradiance observed
      - Observed uncertainty(1 sigma)

W\_US-NESDIS-STAR,SATCAL+ROLOVISNIR,GOES16+ABI\_C\_RJTD\_20190613142426\_00.nc  
W\_US-NESDIS-STAR,SATCAL+ROLOVISNIR,GOES16+ABI\_C\_RJTD\_20190720200316\_00.nc  
W\_US-NESDIS-STAR,SATCAL+ROLOVISNIR,GOES16+ABI\_C\_RJTD\_20190720200416\_00.nc  
W\_US-NESDIS-STAR,SATCAL+ROLOVISNIR,GOES16+ABI\_C\_RJTD\_20190720200616\_00.nc  
W\_US-NESDIS-STAR,SATCAL+ROLOVISNIR,GOES16+ABI\_C\_RJTD\_20190720200716\_00.nc  
W\_US-NESDIS-STAR,SATCAL+ROLOVISNIR,GOES16+ABI\_C\_RJTD\_20190721212216\_00.nc



# SLIMED.v2 SLIMGIRO output by CWG vs Hugh

- **ABI16\_tv**
  - Same satellite position
  - Two date formats in new file
    - Difference of ~5 seconds in date UTC format.
  - Oversampling factor present.
    - Same value for all indexes present.
    - For ABI, it should be one value for each band.
    - Absent in SLIMED package file
  - No **tele\_loc** available in new file
    - This is correct as these are satellite measurements.
    - Tele\_loc are observatory measurements.

## CWG output (ABI16\_tv)

```
sat_pos =
41363.18, 41398.57, 41630.86, 34169.66, 34061.24, 30642.36, 30515.34,
41498.4, 41465.34, 35458.13, 35357.96, 37494.27, 37409.52, 31204.11,
31079.73, -40514.75, -40565.43, -40664.47, -40712.82, -42020.09,
-42004.53, -40585.94, -40635.52, -42159.05, -42160.82, -40607.54,

date = 1557838090.00002, 1557838150.00001, 1557842950.00001,
1558107848.99999, 1558107908.99999, 1558109649.00001, 1558109709,
1560341965.99999, 1560342025.99999, 1560347365.99999, 1560347425.99999,
1560432206, 1560432266, 1560435805.99999, 1560435865.99999, 1563652996,

date2 =
"2019-05-14T12:48:10",
"2019-05-14T12:49:10",
"2019-05-14T14:09:10",
"2019-05-17T15:44:09",
"2019-05-17T15:45:09",
"2019-05-17T16:14:09",
"2019-05-17T16:15:09",
"2019-06-12T12:19:26",
"2019-06-12T12:20:26",
"2019-06-12T13:49:26",
"2019-06-12T13:50:26",

oversamp_fa = 1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398,
1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398,
1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398,
1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398,
1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398,
1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398, 1.012398,
```

## Hugh output (ABI16\_tv)

```
sat_pos =
41363.18, 41398.57, 41630.86, 34169.66, 34061.24, 30642.36, 30515.34,
41498.4, 41465.34, 35458.13, 35357.96, 37494.27, 37409.52, 31204.11,
31079.73, -40514.75, -40565.43, -40664.47, -40712.82, -42020.09,
-42004.53, -40585.94, -40635.52, -42159.05, -42160.82, -40607.54,

date =
"2019-05-14T12:48:04.997",
"2019-05-14T12:49:04.998",
"2019-05-14T14:09:05.000",
"2019-05-17T15:44:04.000",
"2019-05-17T15:45:04.001",
"2019-05-17T16:14:03.998",
"2019-05-17T16:15:03.999",
"2019-06-12T12:19:21.001",
"2019-06-12T12:20:21.001",
"2019-06-12T13:49:21.001",
"2019-06-12T13:50:21.001",
```

tele loc = 19.53601, -155.5768, 3402 :  
for testing?

No oversampling factor data

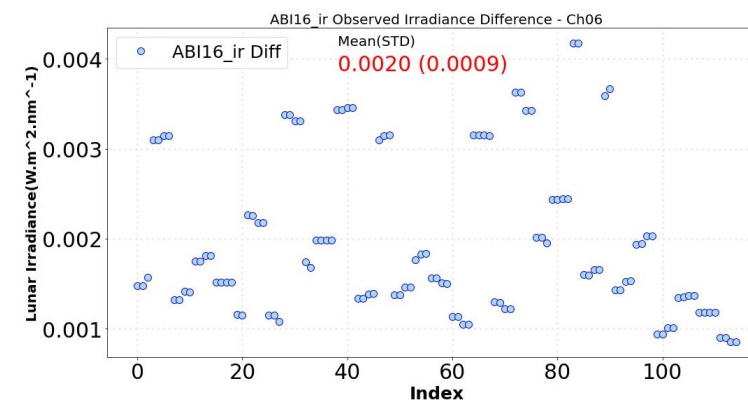
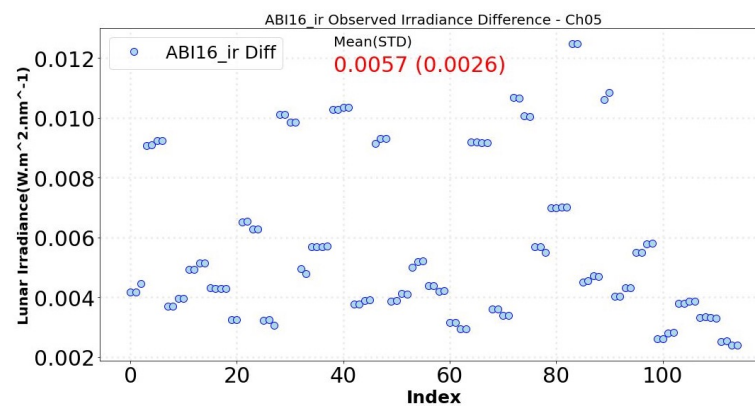
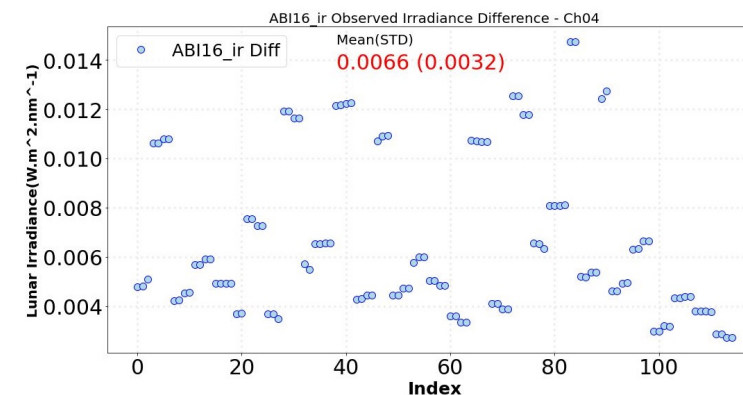
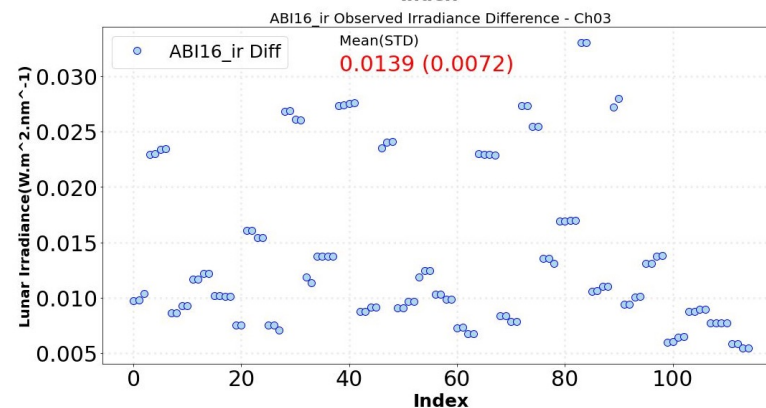
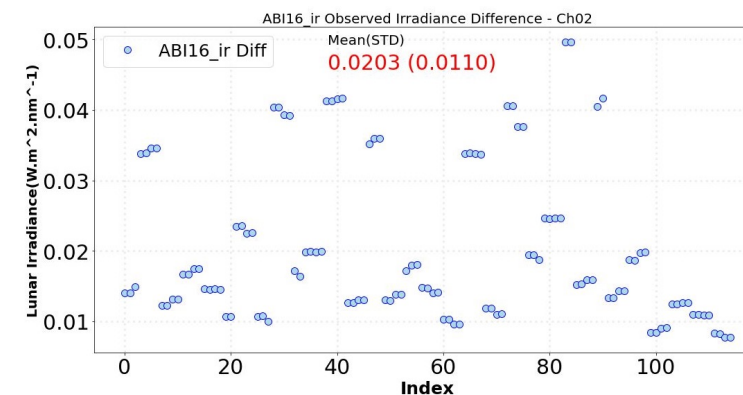
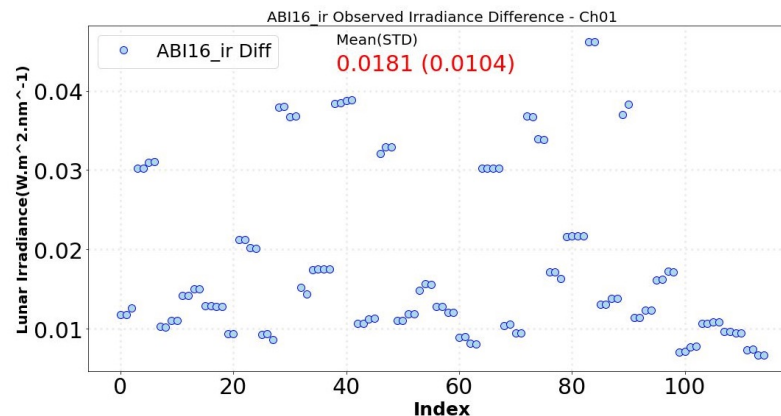
# SLIMED.v2 SLIMGIRO output by CWG vs Hugh

## • ABI16\_ir

- Difference in observed irradiance values between new outputs vs SLIMED package file.

## – Mean Difference

- Bands1-3  
➤ 1.3-2%
- Bands4-6  
➤ 0.2-0.6%



# Executive Summary

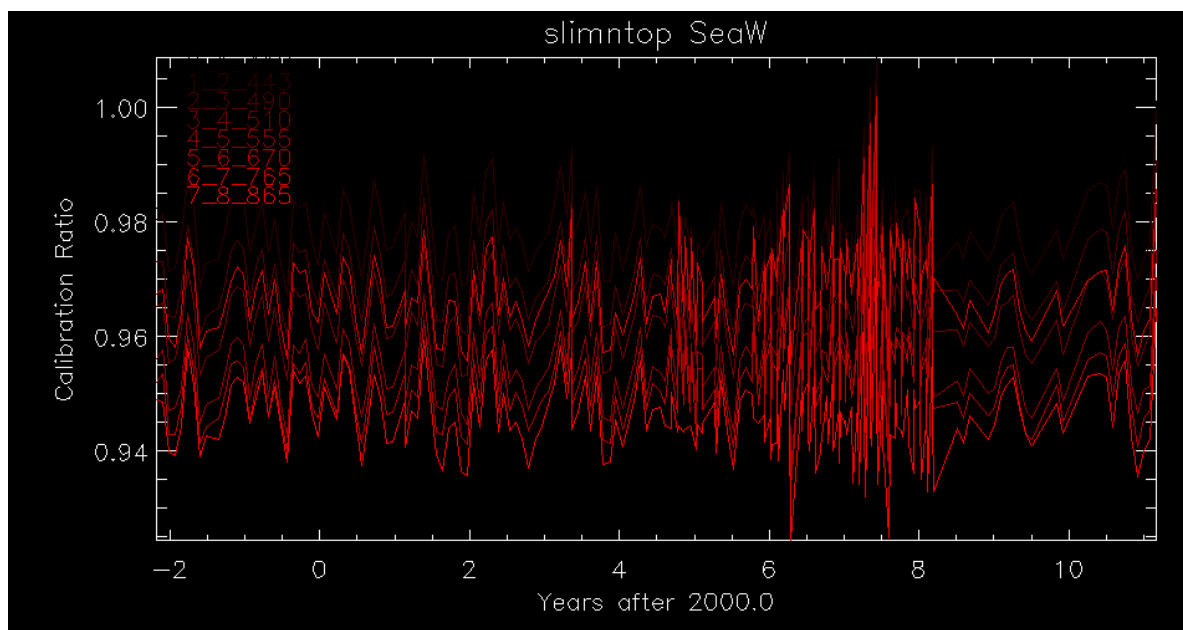
- **SLIMED.v2 IDL package was successfully run for provided ABI16 input files.**
  - Absolute Lunar Irradiance was compared with that of SLIMED\_v0 for provided G16 ABI dataset.
    - Bands 1-4: Absolute Lunar Irradiance Mean/STD metric within 0.01%.
    - Bands 5-6: Same Absolute Lunar Irradiance.
- **SLIMGIRO ingest module runs well and generated outputs.**
  - SLIMGIRO outputs were compared with SLIMED package files.
    - Difference in some variables of output files are currently being investigated.

- **Reference Slides**

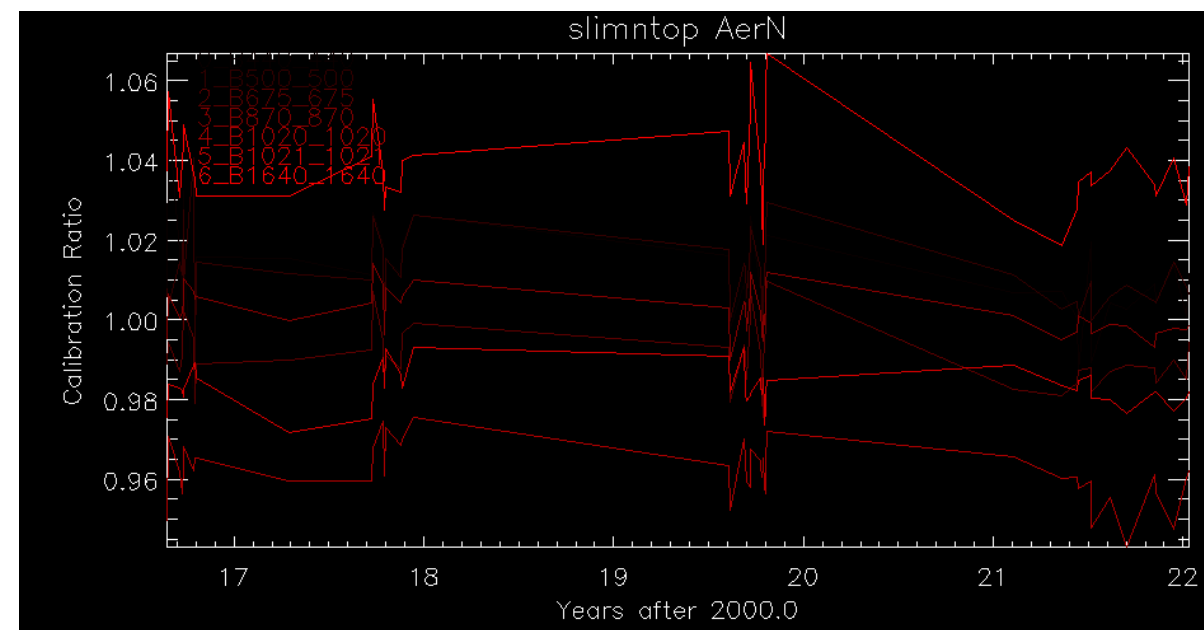
## Successful Runs.

- SeaWIFS
- AeroNet on Mauna Loa
  - Obs @3402m

Instrument	Acronym	Number of				Phase			%
		Band	Lun	Times	Points	Min	Abs	Max	
LEO	—	—	—	—	—	LEO	—	—	—
SeaWIFS	SeaW	8	144	204	1632	-48.9	5.1	65.5	57
Obs. @3402 m	AerN	7	20	50	350	-73.9	4.3	86.8	52



SeaWIFS Output Plot



AeroNet Output Plot