GLI Mission Data Evaluation Test Results

～ GLI特別点検結果報告 ～

Nov. 15, 2001

GLI Workshop @ EORC

ADEOS-II Project Team

National Space Development Agency of Japan

GLI Mission Data Evaluation Test (GLI特別点検)

A) Calibration of the Integrating Sphere using the Fixed Point Black Body source.
- Before "GLI Mission Evaluation Test": for VN wavelength
- After "GLI Mission Evaluation Test" : for VN and SW wavelength

B) GLI PFM Sensor test
- Integrating Sphere Test
- Collimator Test
- Others

C) Re-analysis of PFT data

D) Others

GLI Mission Data Evaluation Test (GLI特別点検)

		Proto-Flight Test (PFT) 1998-1999				GLI特別点検		
		Ambient		T/V		Mission Data Evaluation Test		Additional PFT Data Analysis
		VN／SW	MT	VN／SW	MT	Health Check (*)	User Req.	
1	Scan Angle	○	◇	◇	◇	Confirmation using MTF Data	—	—
2	S/N	○	—	○	—	PFT Equivalent	—	—
3	NEΔT	—	◇	—	○	—	—	—
4	Dynamic Range, Linearity	○	—	○	○	PFT Equivalent	Additional Measurement	Re-Analysis
5	MTF	○	◇	○	○	PFT Equivalent (CT)	—	—
6	Polarization Sensitivity	○	—	—	—	—	—	Re-Analysis
7	Stray Lights	○	○	—	—	—	—	Re-Analysis
8	Flare	◇	—	—	—			
9	Optical Alignment	○	○	—	—	Analysis using MTF Data	—	—
10	Inter-Band Registration	○	○	○	○	Analysis using MTF Data	—	—
11	Deviation of the Sensitivity	○	◇	○	○	PFT Equivalent	—	—
12	Internal Lamp Calibration	○	—	○	—	PFT Equivalent	—	—
13	Black Body Calibration	—	—	—	○	—	—	—
14	Solar Light Calibration	◇	—	—	—	—	—	—
15	Thermal Bands Output	—	◇	—	—	PFT Equivalent	—	—

○ : Test Daya、 ◇ : Reference Data、 — : Not Applied

＊ : All Tests for VN/SW except Thermal Bands Output test

GLI VN/SW Performance Summary

		λc [nm]	Δλ [nm]	Lstd	Lmax [W/m²/sr/μm]				Lcloud	S/N	
		Specification				Mod Req *1	Linear Max*2	Lmax*3	Over Sat*4	GLI Design	Spec.	Test Results*5
VN1-1km	CH-01	380	10	59	365			683		365	600	455
	CH-02	400	10	70	139			162		515	800	1137
	CH-03	412	10	65	130			130		529	800	1406
	CH-04H	443	10	54	109			110		560	800	809
	CH-04L	443	10	54	560			680		560		
	CH-05H	460	10	54	108			124		624	800	847
	CH-05L	460	10	54	624			769		624		
	CH-06	490	10	43	86	95		64		608	800	1392
	CH-07H	520	10	31	64			92		539	600	656
	CH-07L	520	10	31	539			569		539		
	CH-08H	545	10	28	56			96		549	600	609
	CH-08L	545	10	28	549			596		549		
	CH-09	565	10	23	47	60		39		510	800	1194
VN2-1km	CH-10	625	10	17	33	47	28	39	31.7	493	800	935
	CH-11	666	10	13	26	40	22	31	20.1	454	800	1181
	CH-12	680	10	12	24	37	23	33	21.5	438	800	1274
	CH-13	678	10	12	438		342	522		438	200	244
	CH-14	710	10	10	18	31	16	24	15.5	311	700	1351
	CH-15	710	10	10	311		233	369		311	250	313
	CH-16	749	10	7	14	24	11	17	10.8	295	550	984
	CH-17	763	8	6	350		246	473		350	130	290
	CH-18	865	20	5	9	14	8	13	6.6	304	450	1204
	CH-19	865	10	5	304		211	339		304	130	351
VN1-250m	CH-20	460	70	36	624			691		624	200	206
	CH-21	545	50	25	549			585		549	150	155
VN2-250m	CH-22	660	60	14	150		115	156	161.0	448	100	279
	CH-23	825	110	21	257		210	287		257	140	271
SW1-1km	CH-24	1050	20	8	203			227		203	300	356
	CH-25	1135	70	8	200			184		200	350	424
	CH-26	1240	20	5.4	138			208		138	70	315
	CH-27	1380	40	1.5	94			153		94	120	258
SW2-250m	CH-28	1640	200	5	69			76		69	109	262
	CH-29	2210	220	1.3	30			32		30	105	166

*1 Specified Value by Ocean User for GLI Dynamic Range Modification Study (Feb. 2000)
*2 Maximum Radiance for Linear Response (VN2)
*3 Predicted Maxmum Obs. Radiance for DN=4095 or Output Saturation
*4 Over-Saturation Radiance equivalent to Lcloud
*5 S/N Test Results for GLI Mission Data Evaluation Test (GLI特別点検) in ambient condition.

GLI MT-Band Performance Summary

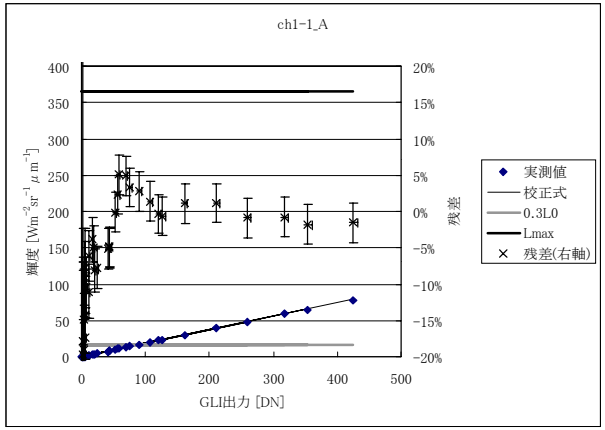
		λc	Δλ	High Temp. Target				Low Temp. Target				DynamicRange [K]		
				Target	NEΔT [K]			Target	NEΔT [K]			Spec	On-Orbit*1	Results
		[μm]	[nm]	[K]	Spec	Cold T/V	Hot T/V	[K]	Spec	Cold T/V	Hot T/V			
MT-1km	CH-30	3.715	0.33	300	0.15	0.07	0.07	250	1.8	0.71	0.78	340		345
	CH-31	6.7	0.5	285	0.1	0.02	0.03	200	1.5	0.27	0.32	296	265	307
	CH-32	7.3	0.5	300	0.1	0.02	0.03	200	1.0	0.24	0.27	322	290	322
	CH-33	7.5	0.5	300	0.1	0.02	0.02	200	1.0	0.21	0.24	326	293	324
	CH-34	8.6	0.5	300	0.1	0.03	0.05	180	0.5	0.47	0.49	340		350
	CH-35	10.8	1.0	300	0.1	0.04	0.05	180	0.5	0.24	0.30	340		354
	CH-36	12.0	1.0	300	0.1	0.04	0.06	180	0.5	0.23	0.27	340		358

*1 Predicted on-orbit maximum obs. Temperature using MODTRAN simulation fot Water Vapor Bands.

VN/SW Linearity Coefficients

- GLI VN/SW Linearity Coefficients were re-calculated based on "GLI Mission Data Evaluation Test (GLI特別点検).

- New Topics
  - VN2 Over-Saturation phenomena was observed.
  - In-stability of CH-27 (1.38 μ m) output was observed.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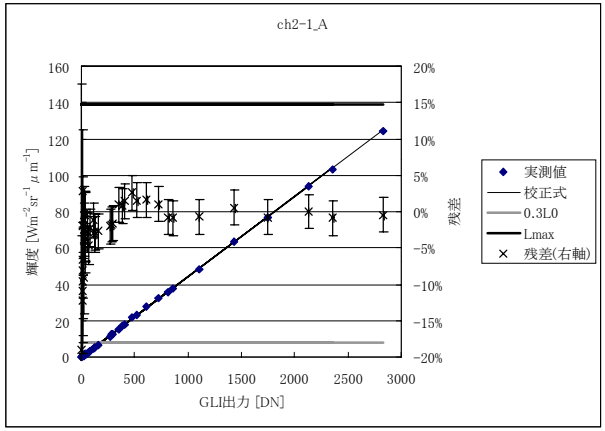
輝度 [Wm-2sr-1μm-1]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)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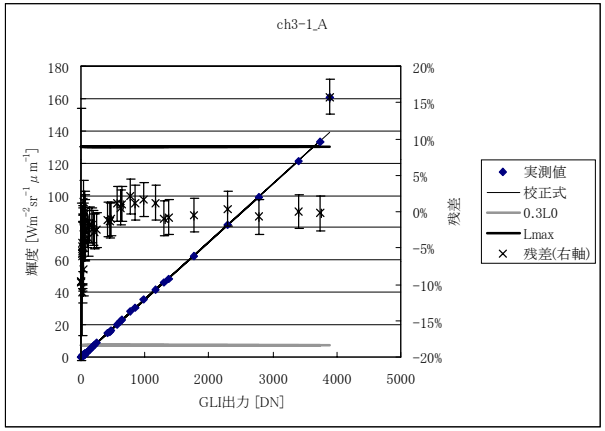
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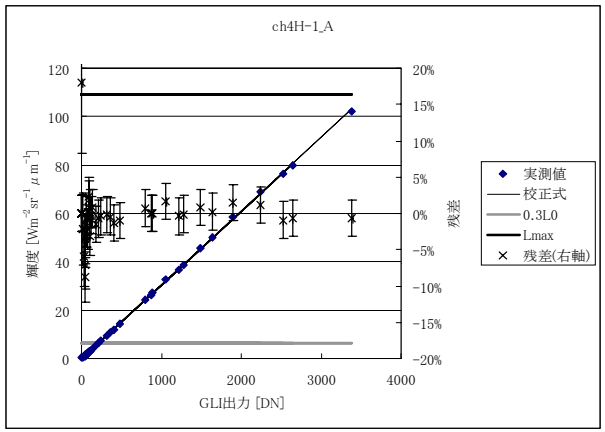
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GLI出力 [DN]
実測値
校正式
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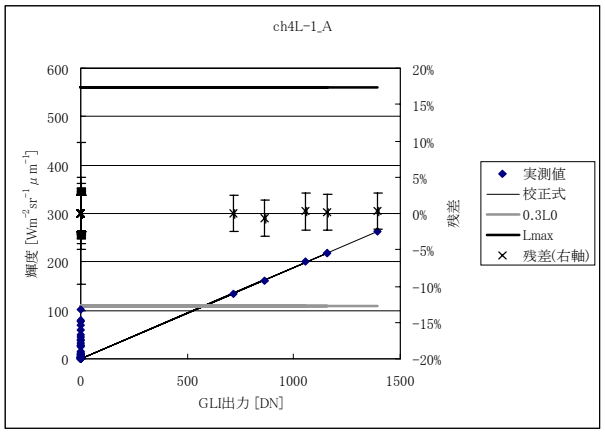
Lmax
残差(右軸)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残差
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実測値
校正式
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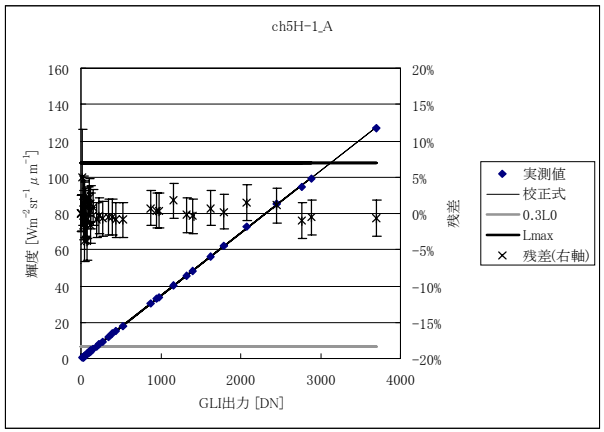
Lmax
残差(右軸)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GLI出力 [DN]
実測値
校正式
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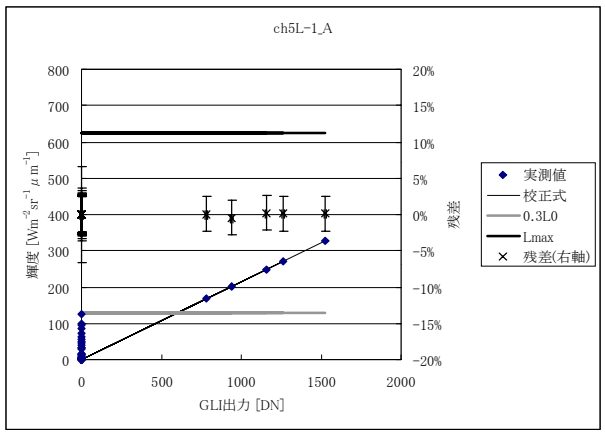
Lmax
残差(右軸)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GLI出力 [DN]
実測値
校正式
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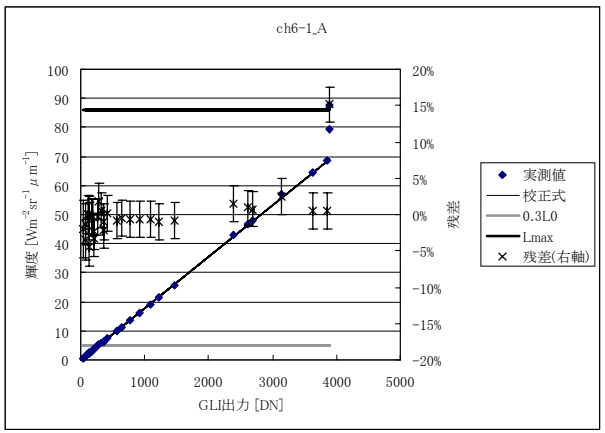
Lmax
残差(右軸)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残差
GLI出力 [DN]
実測値
校正式
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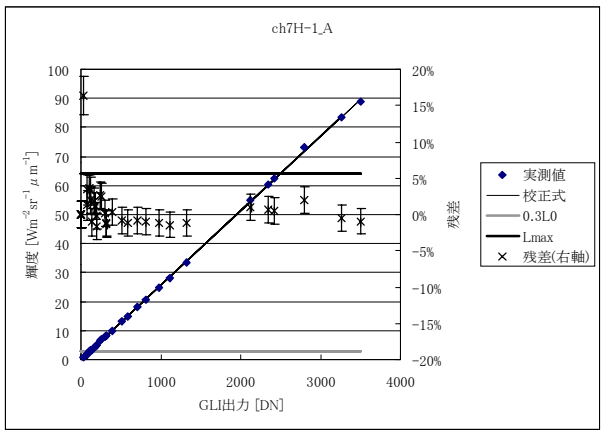
Lmax
残差(右軸)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GLI出力 [DN]
実測値
校正式
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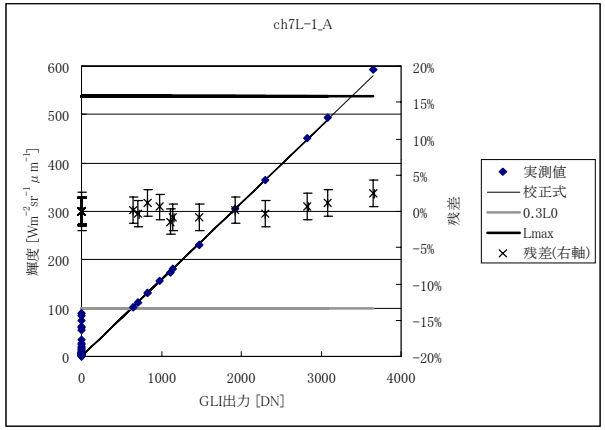
Lmax
残差(右軸)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輝度 [Wm-2sr-1μm-1]
残差
GLI出力 [DN]
実測値
校正式
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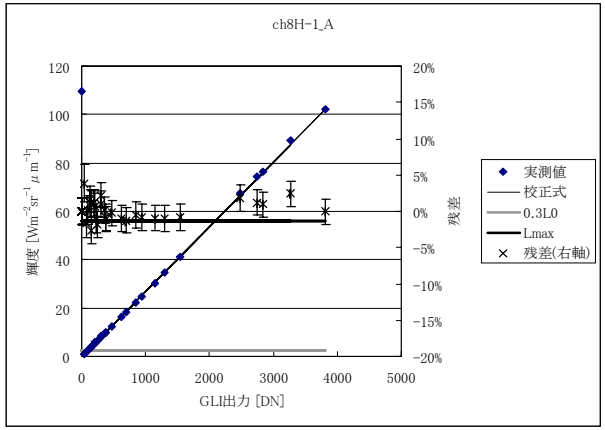
Lmax
残差(右軸)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輝度 [Wm-2sr-1μm-1]
残差
GLI出力 [DN]
実測値
校正式
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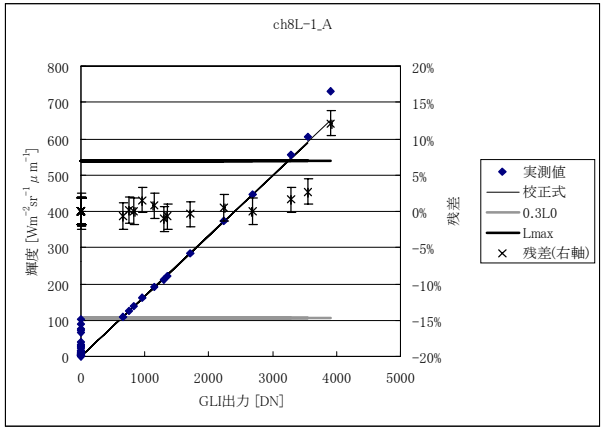
Lmax
残差(右軸)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残差
GLI出力 [DN]
実測値
校正式
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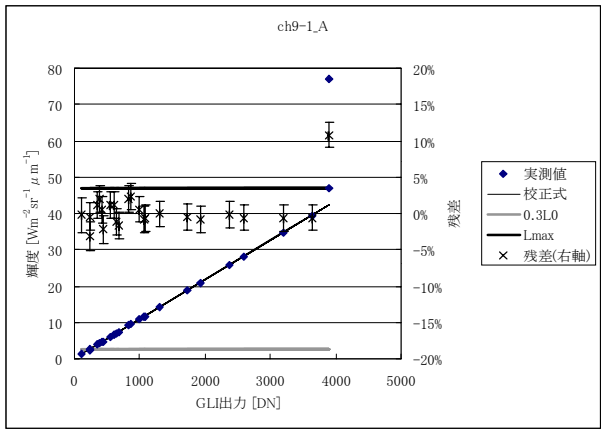
Lmax
残差(右軸)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実測値
校正式
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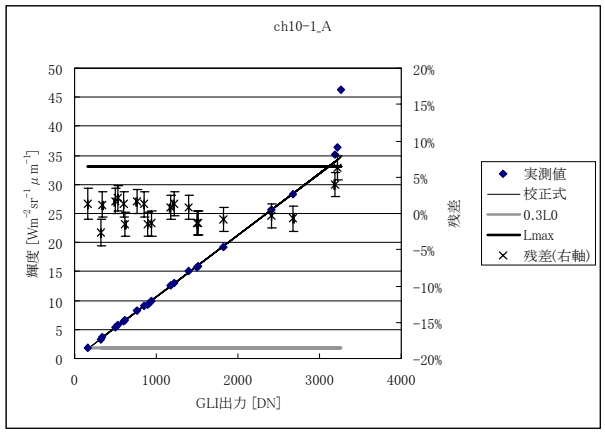
Lmax
残差(右軸)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GLI出力 [DN]
実測値
校正式
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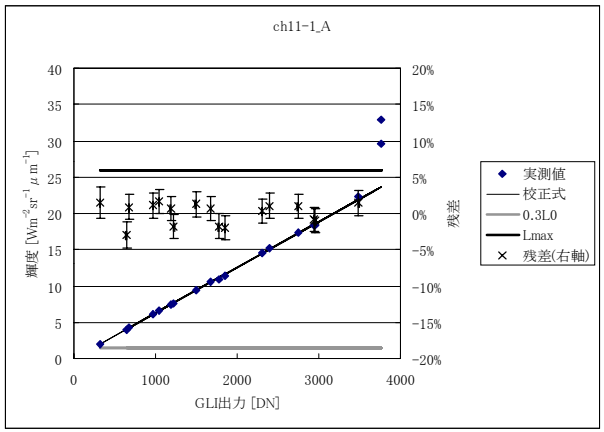
Lmax
残差(右軸)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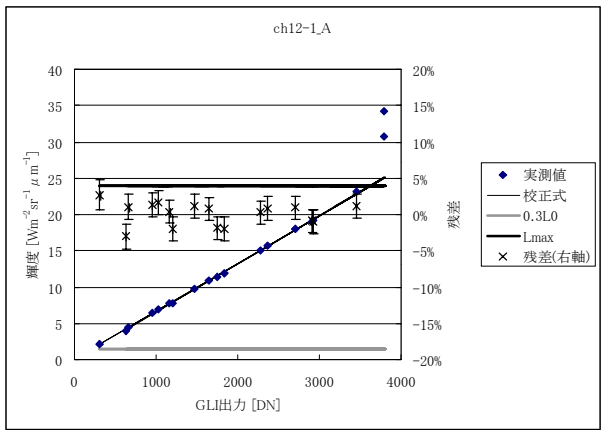
残差(右軸)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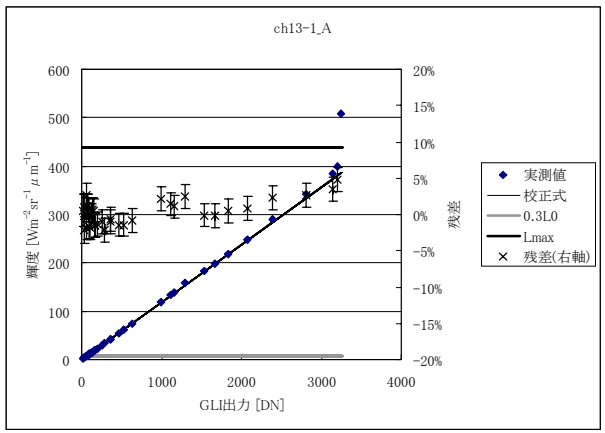
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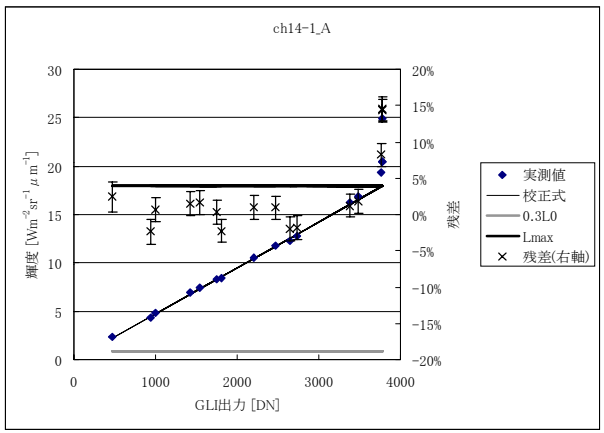
残差(右軸)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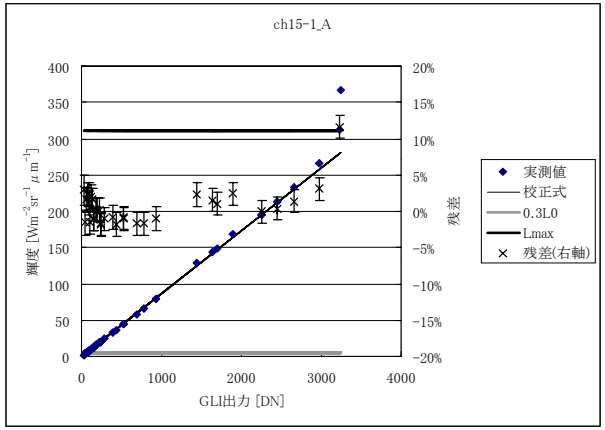
残差(右軸)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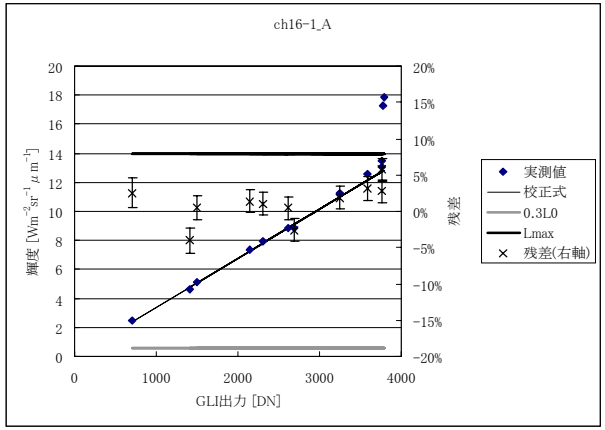
残差(右軸)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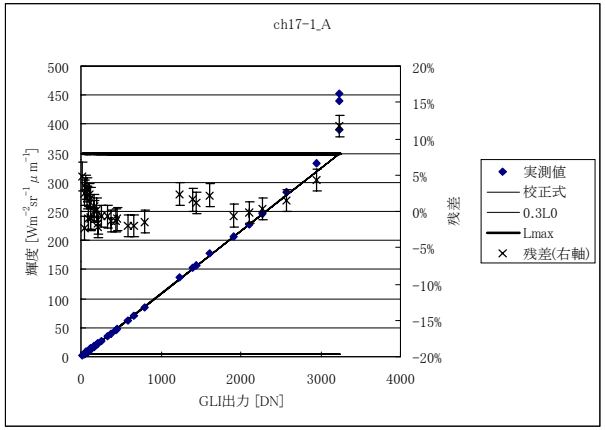
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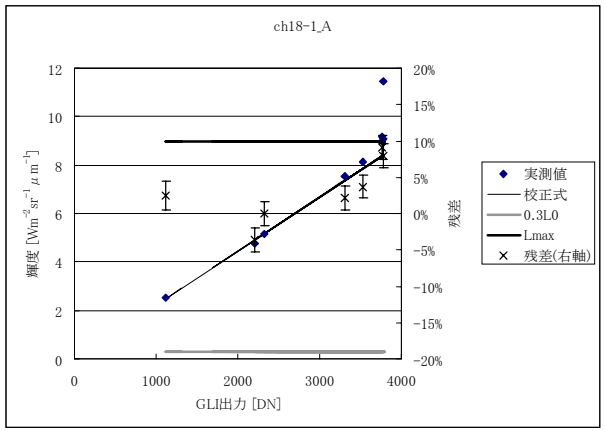
残差(右軸)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GLI出力 [DN]
実測値
校正式
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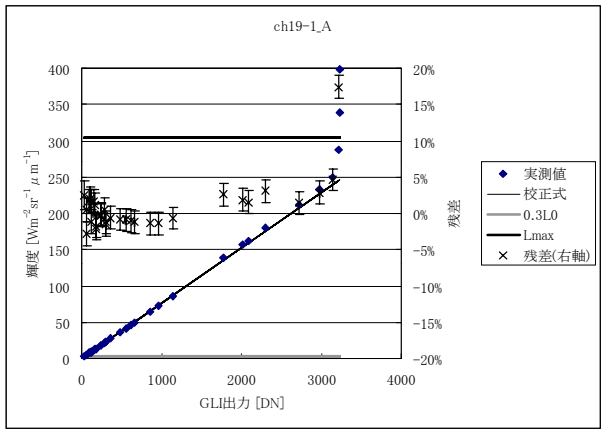
Lmax
残差(右軸)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残差
GLI出力 [DN]
実測値
校正式
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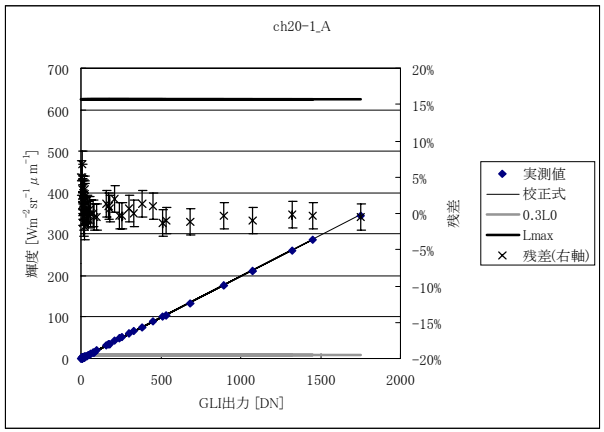
Lmax
残差(右軸)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残差
GLI出力 [DN]
実測値
校正式
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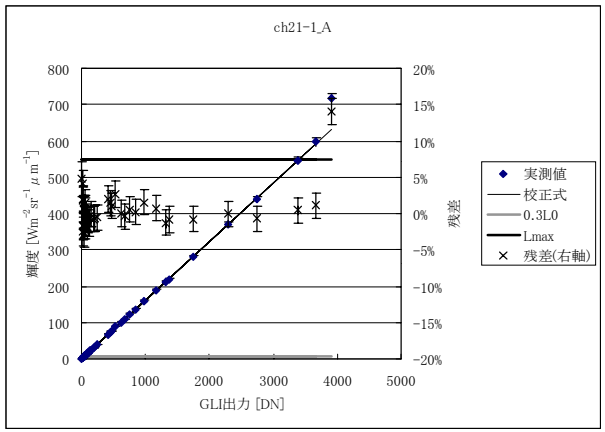
Lmax
残差(右軸)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輝度 [Wm-2sr-1μm-1]
残差
GLI出力 [DN]
実測値
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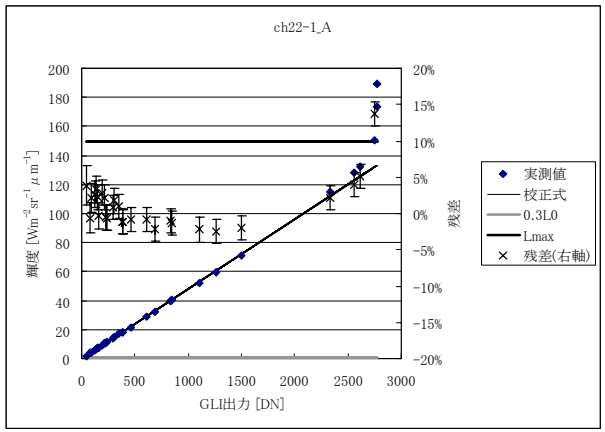
残差(右軸)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残差
GLI出力 [DN]
実測値
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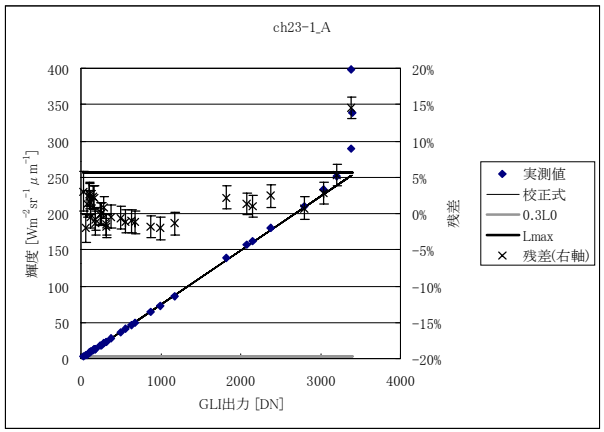
残差(右軸)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輝度 [Wm-2sr-1μm-1]
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GLI出力 [DN]
実測値
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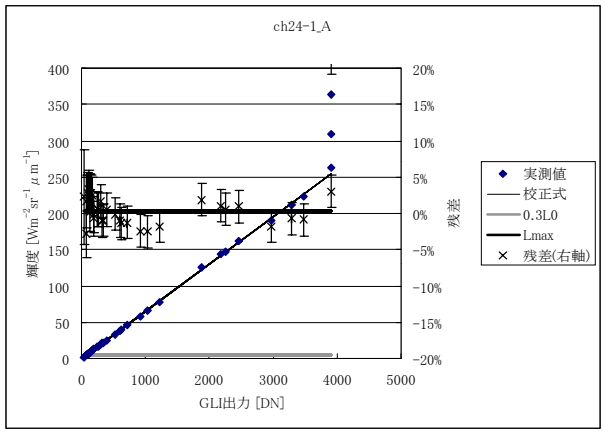
残差(右軸)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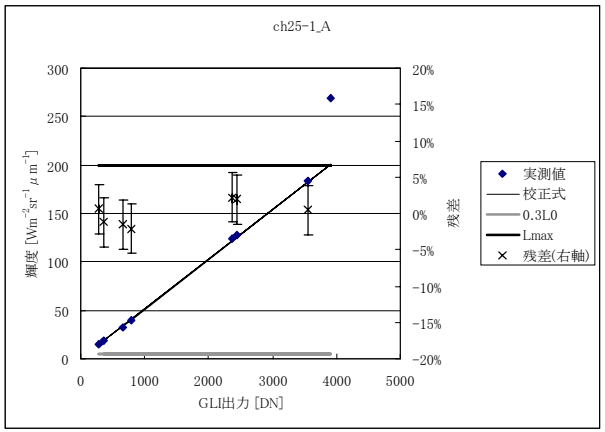
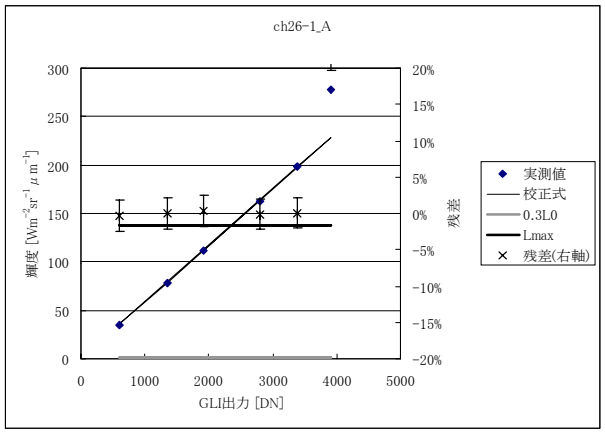
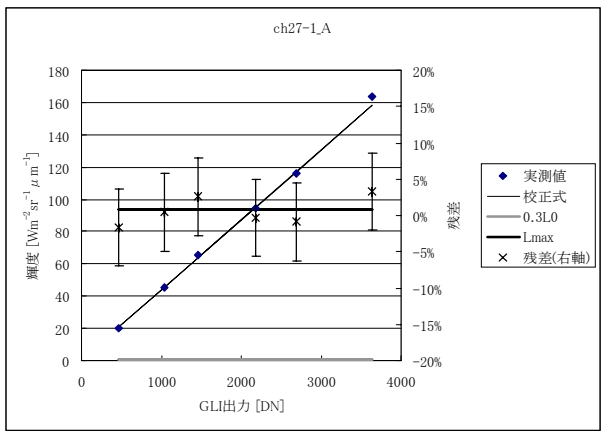
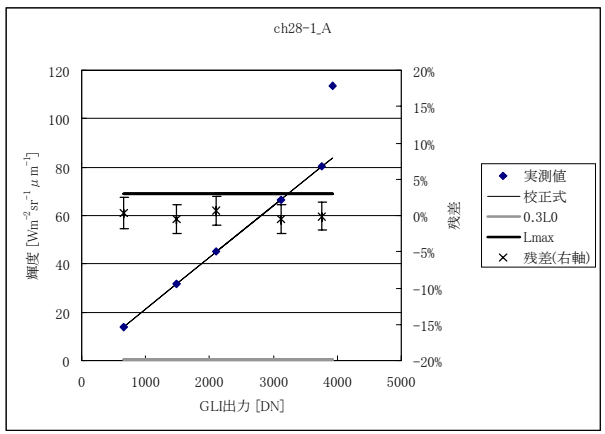
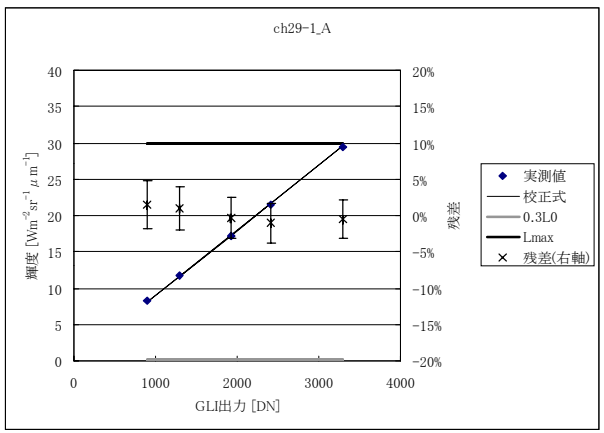
輝度 [Wm⁻²sr⁻¹μm⁻¹]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)


ch25-1_A
輝度 [Wm⁻²sr⁻¹μm⁻¹]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)

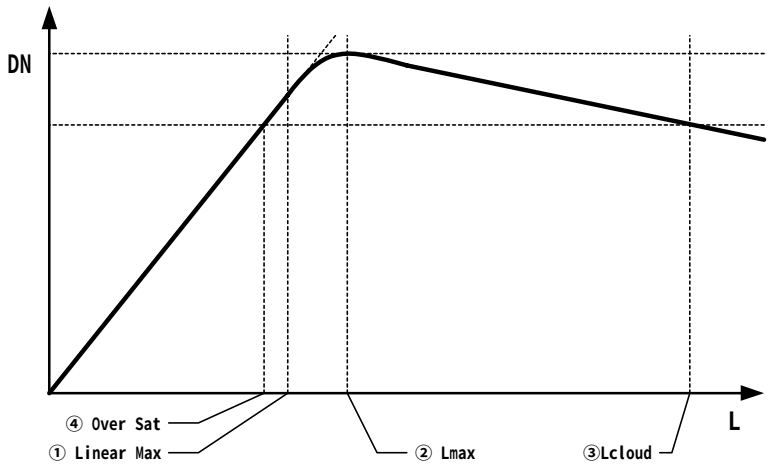

ch26-1_A
輝度 [Wm⁻²sr⁻¹μm⁻¹]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)


ch27-1_A
輝度 [Wm⁻²sr⁻¹μm⁻¹]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)


ch28-1_A
輝度 [Wm⁻²sr⁻¹μm⁻¹]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)


ch29-1_A
輝度 [Wm⁻²sr⁻¹μm⁻¹]
残差
GLI出力 [DN]
実測値
校正式
0.3L0
Lmax
残差(右軸)

VN2 Over-Saturation



		λc [nm]	Δλ [nm]	Lstd	Lmax [W/m^2/sr/μm]				③Lcloud
		Specification				Mod Req *1	①Linear Max*2	②Lmax*3	④Over Sat*4	GLI Design
VN2-1km	CH-10	625	10	17	33	47	28	39	31.7	493
	CH-11	666	10	13	26	40	22	31	20.1	454
	CH-12	680	10	12	24	37	23	33	21.5	438
	CH-14	710	10	10	18	31	16	24	15.5	311
	CH-16	749	10	7	14	24	11	17	10.8	295
	CH-18	865	20	5	9	14	8	13	6.6	304
VN2-250m	CH-22	660	60	14	150		115	156	161.0	448
	CH-23	825	110	21	257		210	287		257

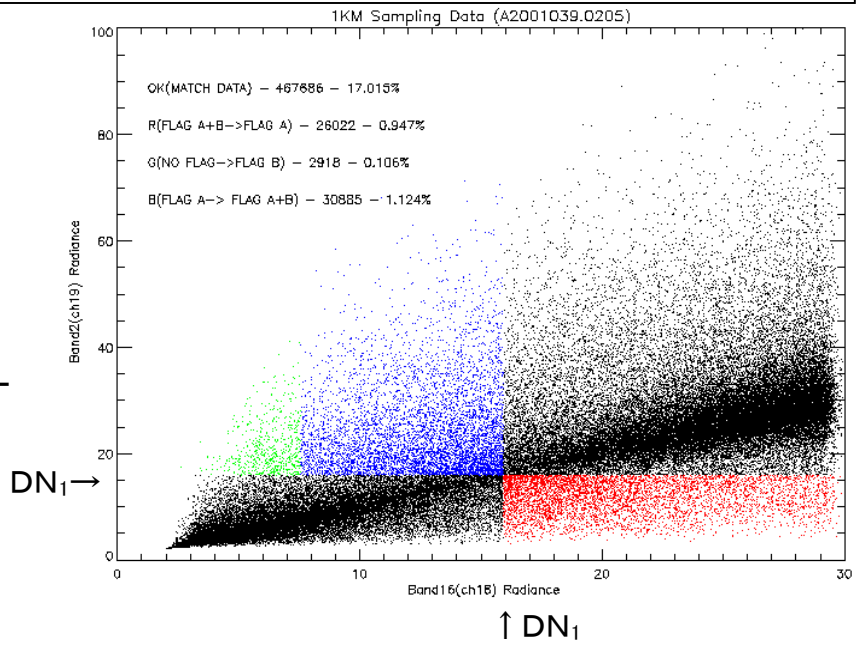
*1 Specified Value by Ocean User for GLI Dynamic Range Modification Study (Feb. 2000)
*2 Maximum Radiance for Linear Response (VN2)
*3 Predicted Maxmum Obs. Radiance for DN=4095 or Output Saturation
*4 Over-Saturation Radiance equivalent to Lcloud

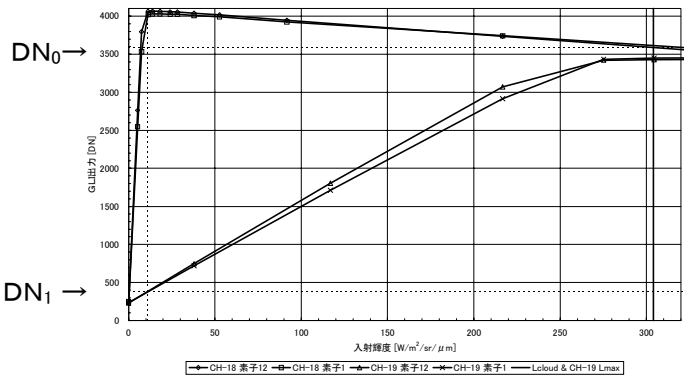
Over-Saturation Simulation using MODIS data

- "Over-Saturation Flag" function will be installed using "Reference Channel Method".
- Over-saturation simulation using MODIS data was conducted.
- For Ch-18/19 (865nm) simulation, "Over-Saturation Flag" will not function properly for approximately 6.8%.

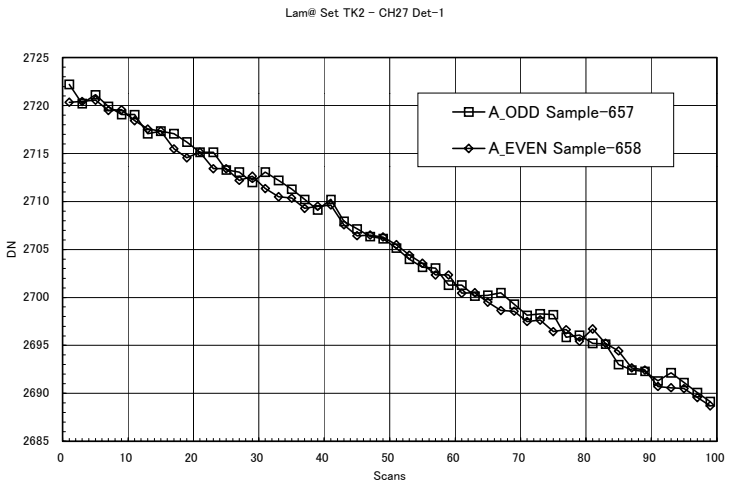
Over-saturation	CH-18 (MODIS Band 2)
Reference	CH-19 (MODIS Band 16)

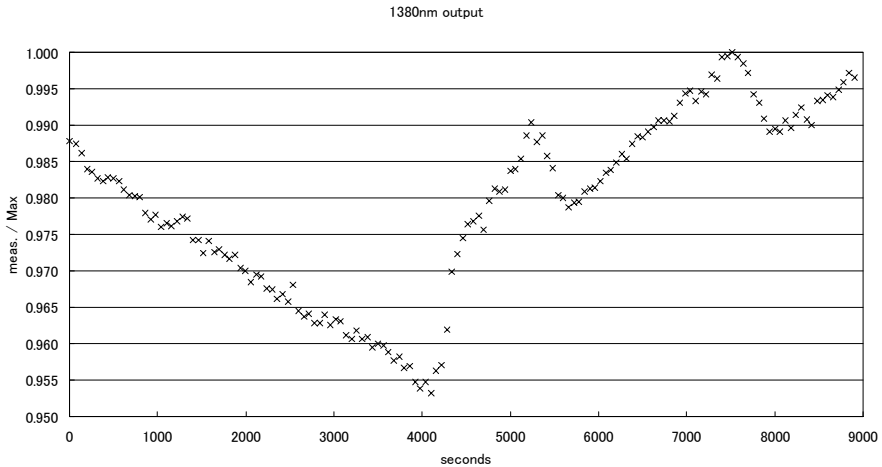
- The following effects is unknown because of the MODIS data simulation.
  - A) The effects of the dependence on MODIS IFOV difference.
  - B) The effects of the different center wavelength.

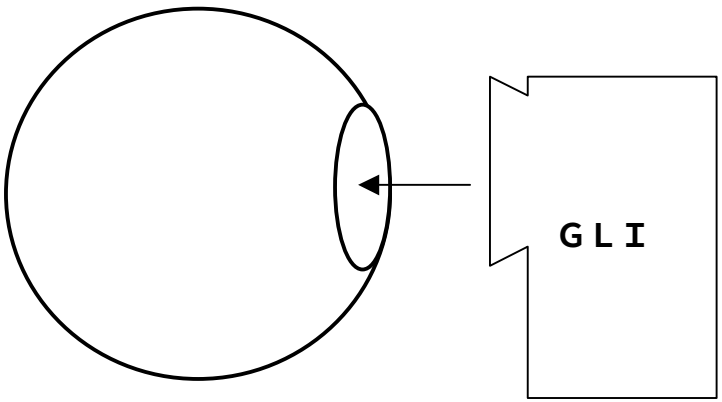




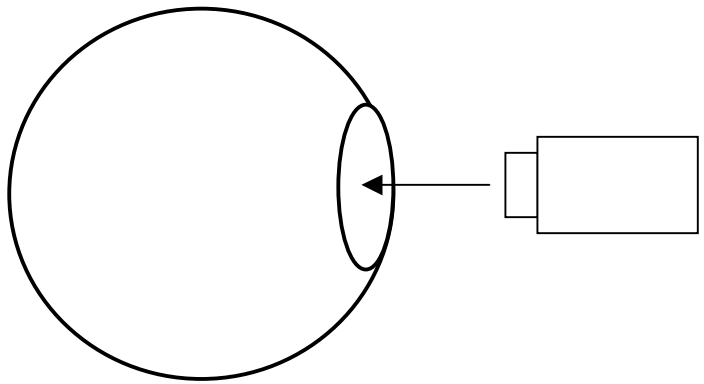
In-stability of CH-27 (1.38 μ m) output





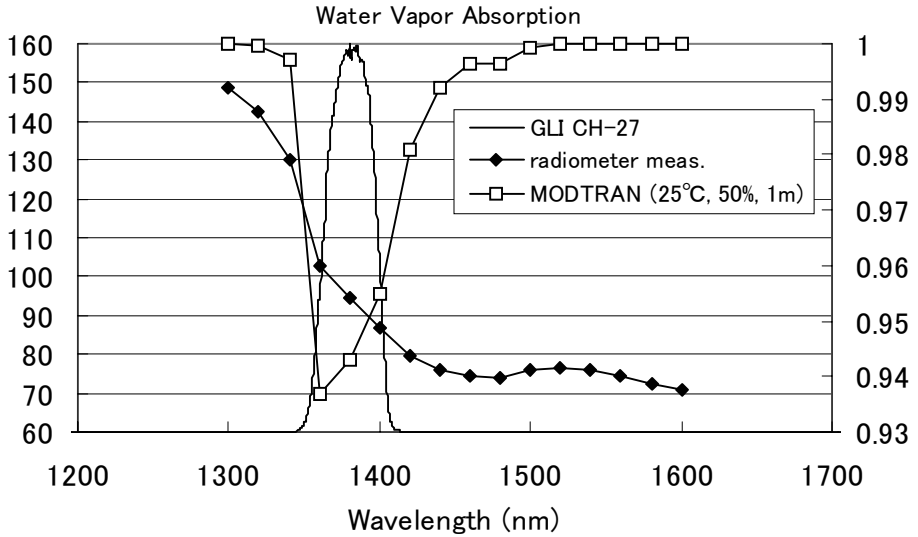


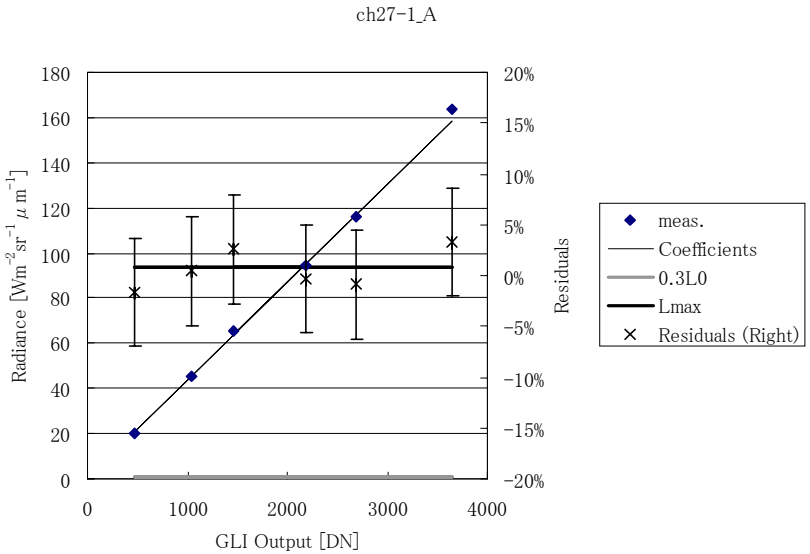
GLI Output



Calibration Radiometer Output

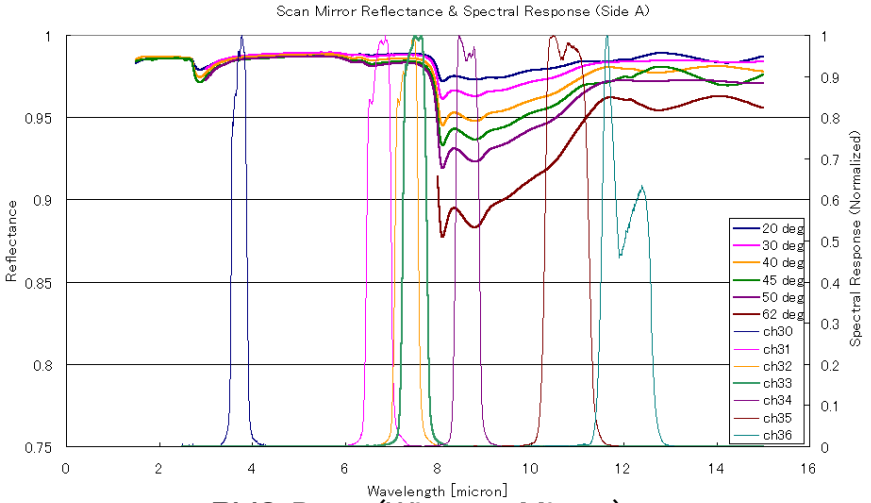
In-stability of CH-27 (1.38 μm) output





- CH-27 output variation is observed by water vapor absorption effects
- On-orbit evaluation should be studied.

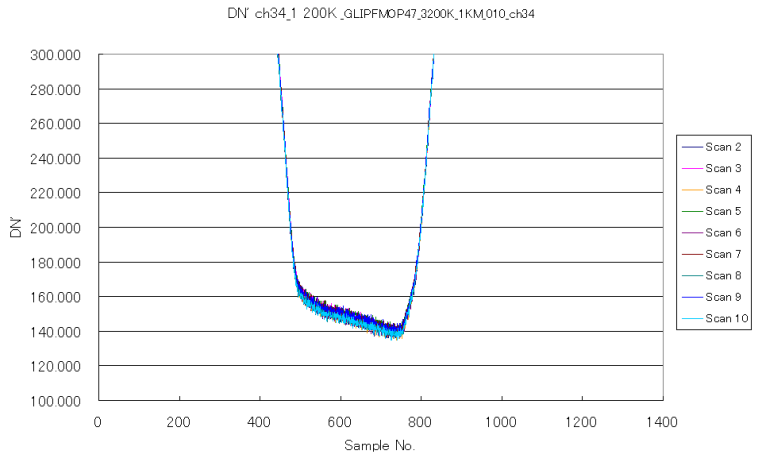
MT Linearity Coefficients



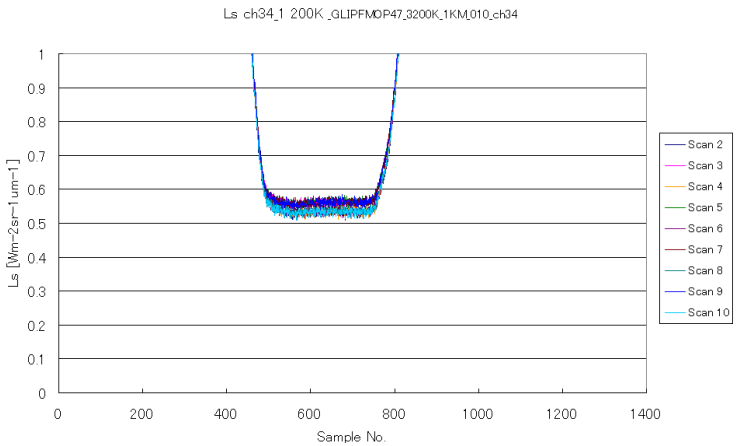
RVS Data (Witness Mirror)

$$L'_s = C_0 + C_1 'DN' + C_2 DN'^2$$

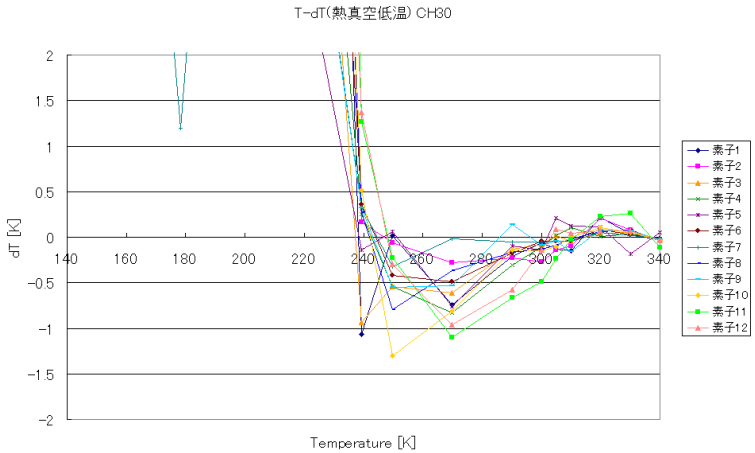
$$L_s = \frac{L_s ' - (\rho_{scn}(\phi_{dsc}) - \rho_{cn}(\phi_s))B_{scn}}{\rho_{cn}(\phi_s)}$$

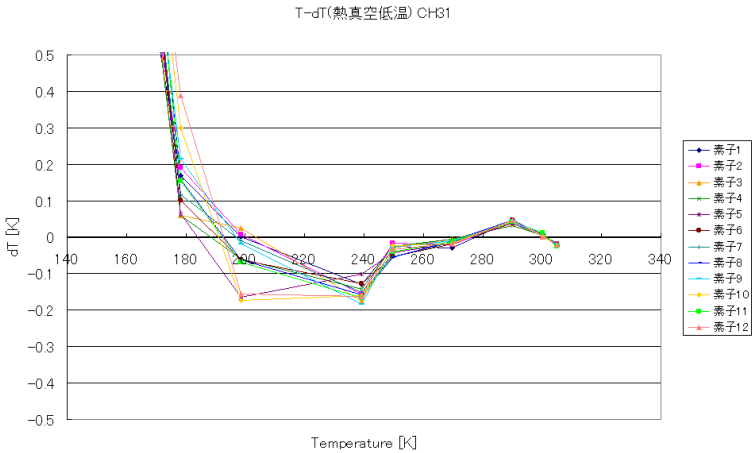


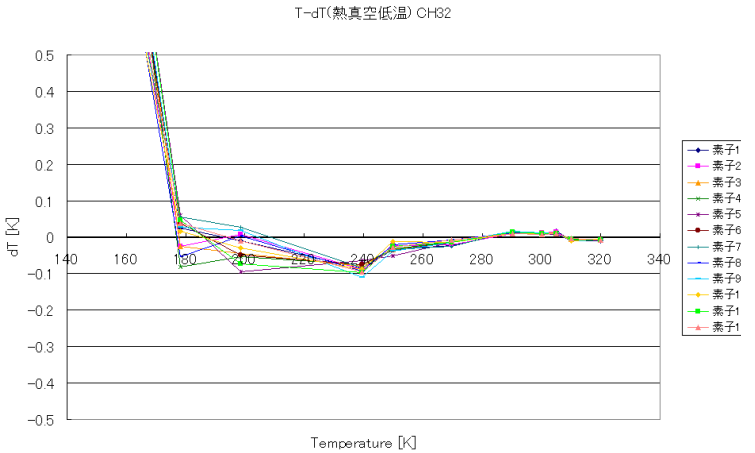
GLI Raw Data

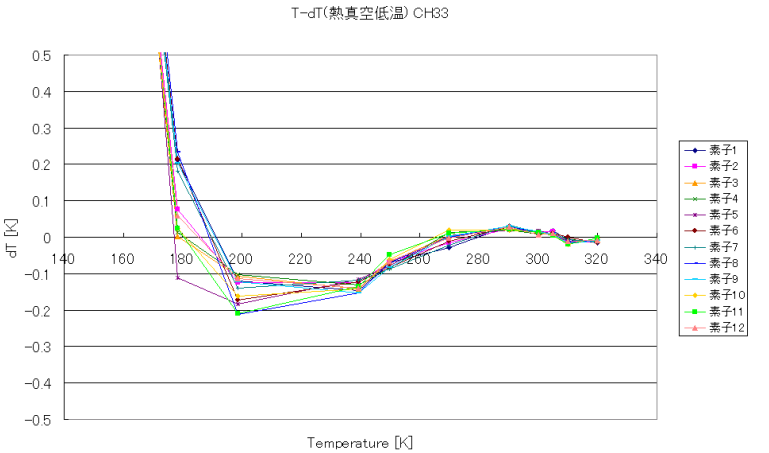


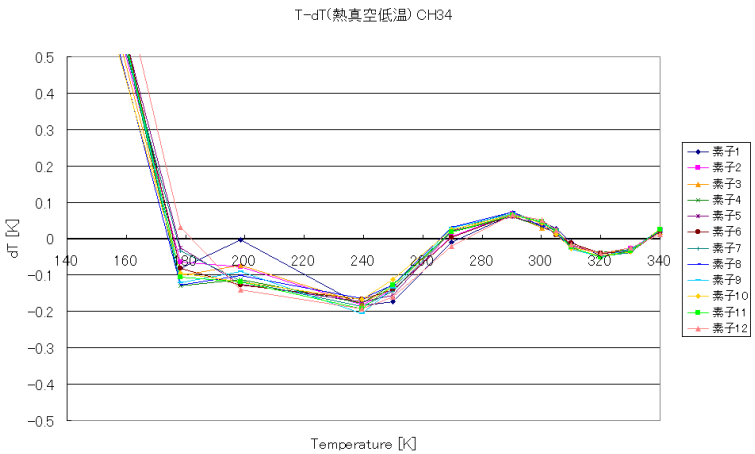
Radiance

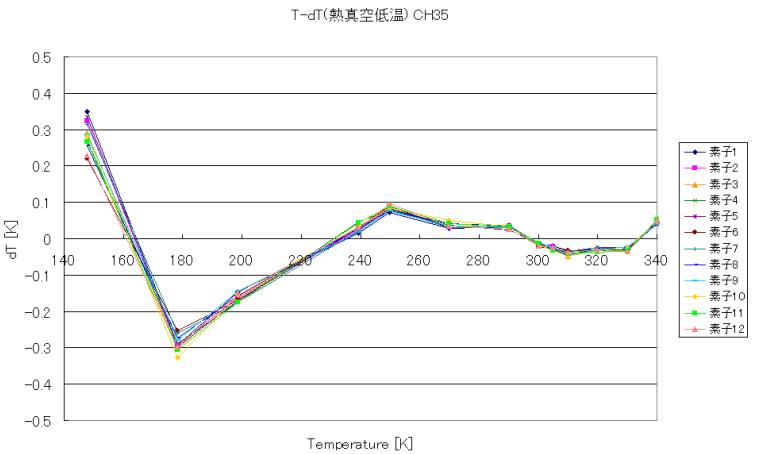

T-dT(熱真空低温) CH30
dT [K]
Temperature [K]
素子1
素子2
素子3
素子4
素子5
素子6
素子7
素子8
素子9
素子10
素子11
素子12


T-dT(熱真空低温) CH31
dT [K]
Temperature [K]
素子1
素子2
素子3
素子4
素子5
素子6
素子7
素子8
素子9
素子10
素子11
素子12


T-dT(熱真空低温) CH32
dT [K]
Temperature [K]
素子1
素子2
素子3
素子4
素子5
素子6
素子7
素子8
素子9
素子1
素子1
素子1


T-dT(熱真空低温) CH33
dT [K]
Temperature [K]
素子1
素子2
素子3
素子4
素子5
素子6
素子7
素子8
素子9
素子10
素子11
素子12


T-dT(熱真空低温) CH34
dT [K]
Temperature [K]
素子1
素子2
素子3
素子4
素子5
素子6
素子7
素子8
素子9
素子10
素子11
素子12


T-dT(熱真空低温) CH35
dT [K]
Temperature [K]
素子1
素子2
素子3
素子4
素子5
素子6
素子7
素子8
素子9
素子10
素子11
素子12