GLI Calibration Status

- Activities of Calibration Working Group -

1. Results of Mission Data Evaluation Test
2. Calibration Teams and Activities
3. Initial Checkout on Orbit

4. Detail of the results of MDET (Mr.Tanaka)
5. Vicarious Calibration Plan(Dr.Asanuma)

Calibration Working Group
Yasuhiro Senga

Review of the PFT schedule

1996/4 - 1998/10 Development of Proto-Flight Model (PFM)

1999/7 Proto-Flight Test (PFT) was completed.

2000/5 1st Report of the Results of PFT. (in Japanese)

Some parameters didn't meet the requirement.
Several requests for additional test were proposed.

2000/9 Kicked off Calibration WG

- to evaluate the configuration & results of each test
- to decide the necessity of the additional test

2000/12-2001/3 GLI mission data evaluation test

(GLI was unloaded from ADEOS-II)

2001/7 End-to-End Test

2001/9- Re-integration

2002/11 Launch

GLI Mission Data Evaluation Test (Dec. 2000 – Mar.2001)

	parameters	PFT (1998-1999) Ambient VN/SW	PFT (1998-1999) Ambient MT	PFT (1998-1999) T/V VN/SW	PFT (1998-1999) T/V MT	Mission Data Evaluation Test Health check for VN/SW	Mission Data Evaluation Test Adidtional Analysis
1	Scan angle	○	◇	◇	◇	evaluate using MTF data	Analysis with witness sample
2	S/N	○	—	○	—	Same as PFT	—
3	NEΔT	—	◇	—	○	—	—
4	Dynamic Range, Linearity	○	—	○	○	Same as PFT	PFT Analysis
5	MTF	○	◇	○	○	Same as PFT	—
6	Polarization Sensitivity	○	—	—	—	—	PFT Analysis
7	Stray light	○	○	—	—	—	PFT Analysis
8	Flare	◇	—	—	—		
9	Optical Allignment	○	○	—	—	analyze MTF data	—
10	Inter band Registration	○	○	○	○	analyze MTF data	—
11	Deviation of the sensitivity	○	◇	○	○	Same as PFT	—
12	Internal Lamp Callibration	○	—	○	—	Same as PFT	—
13	Black Body Calibration	—	—	—	○	—	—
14	Solar Light Calibration	○	—	—	—	—	—
15	Thernal Band Output	—	◇	—	—	Same as PFT	—
	○: test data, ◇: Reference data						

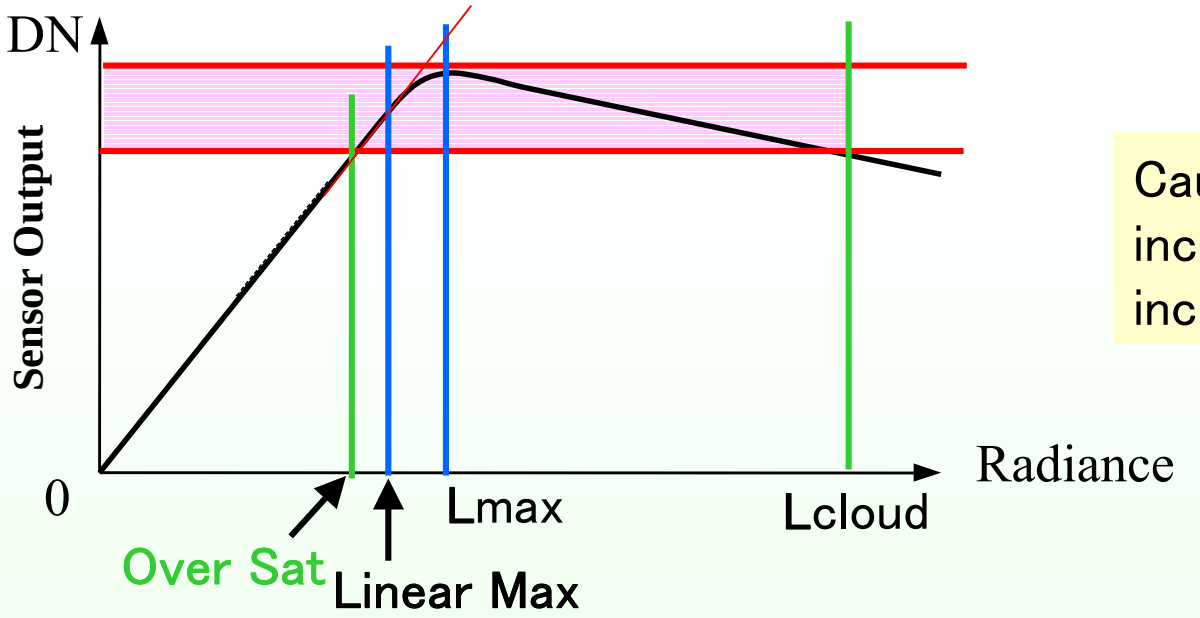
Summaries of Mission Data Evaluation Test

1. Characteristics of the Integration Sphere used for the Calibration was evaluated.
2. All Sensors were working fine.
3. Calibration Curves were renewed following the results.
4. Further analysis were carried out for;
   - Scan angle dependence of optical system by using witness sample,
   - Polarization Sensitivity by re-analyzing PFT data set.

New issues

- Sensitivity decreasing phenomenon over the saturation light level on Ocean Channels in VNIR2(625nm (ch.10)– 865nm (ch.18))
- Ch.27(1.38um) was affected by humidity (Water vapor).

Sensitivity Decreasing Phenomenon Over Saturation level



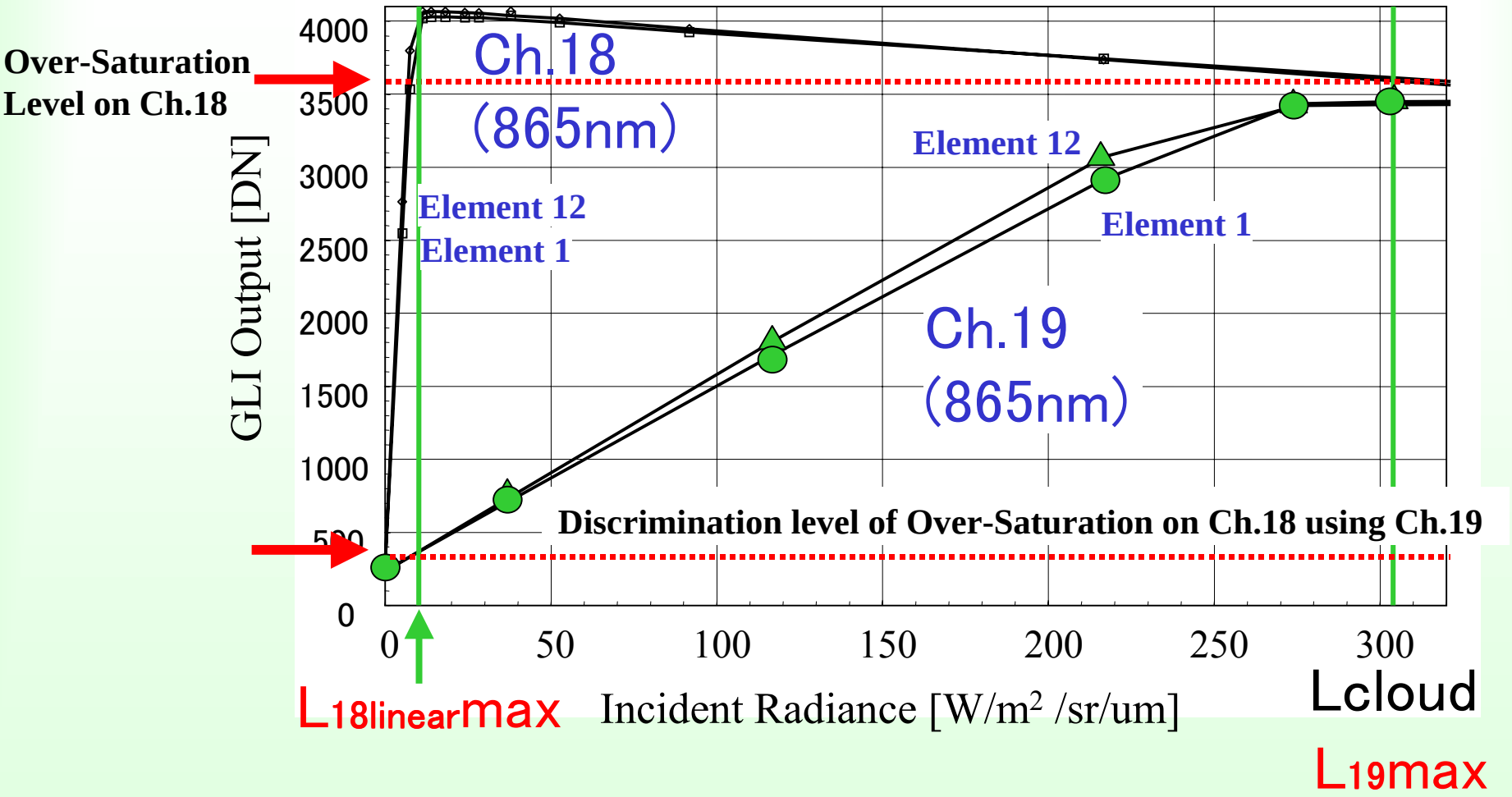
Caused by a dark level increasing for the strong incident light

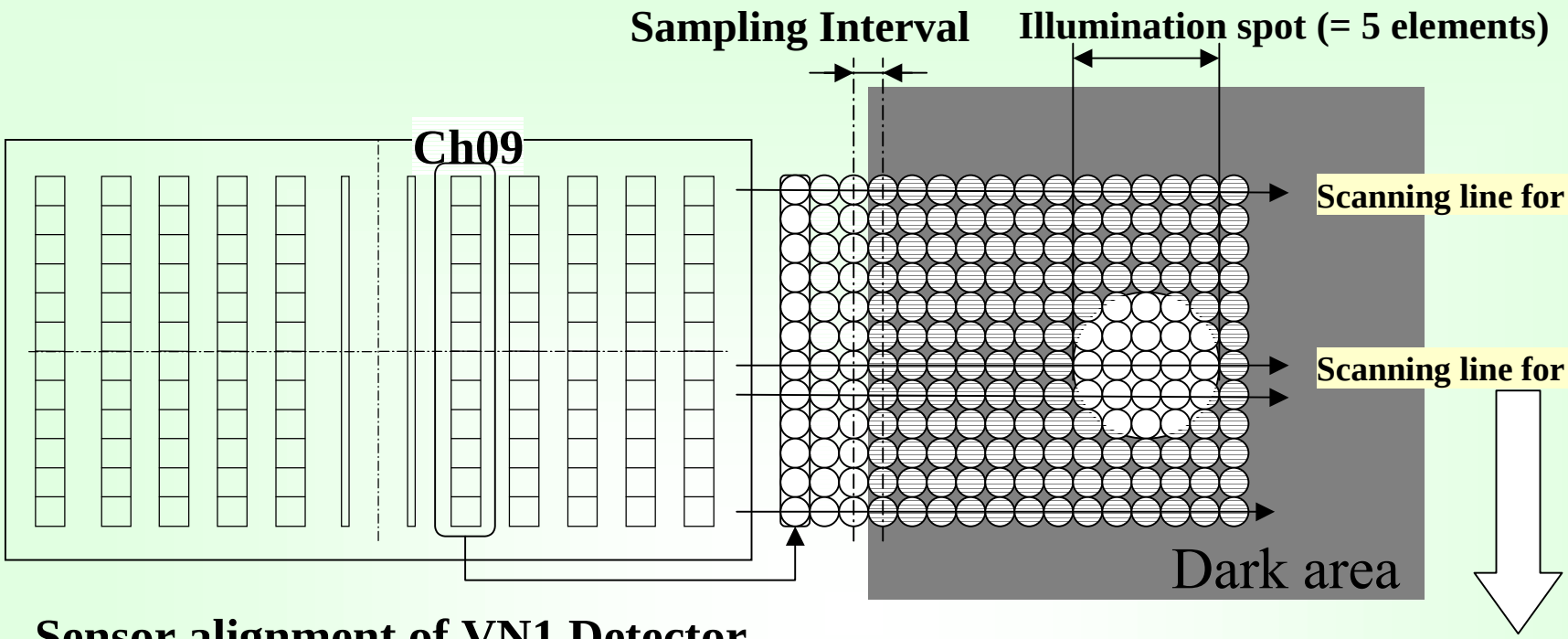
		λc [nm]	Δλ [nm]	Lstd	Lmax [W/m²/sr/μm]					③Lcloud
		Specification				Mod Req *1	①Linear Max*2	②Lmax*3	④Over Sat*4	GLI Design
VN2-1km	CH-10	625	10	17	33	47	28	39	31.7	493
	CH-11	666	10	13	26	40	22	31	20.1	454
	CH-12	680	10	12	24	37	23	33	21.5	438
	CH-14	710	10	10	18	31	16	24	15.5	311
	CH-16	749	10	7	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

→ Warning Flag

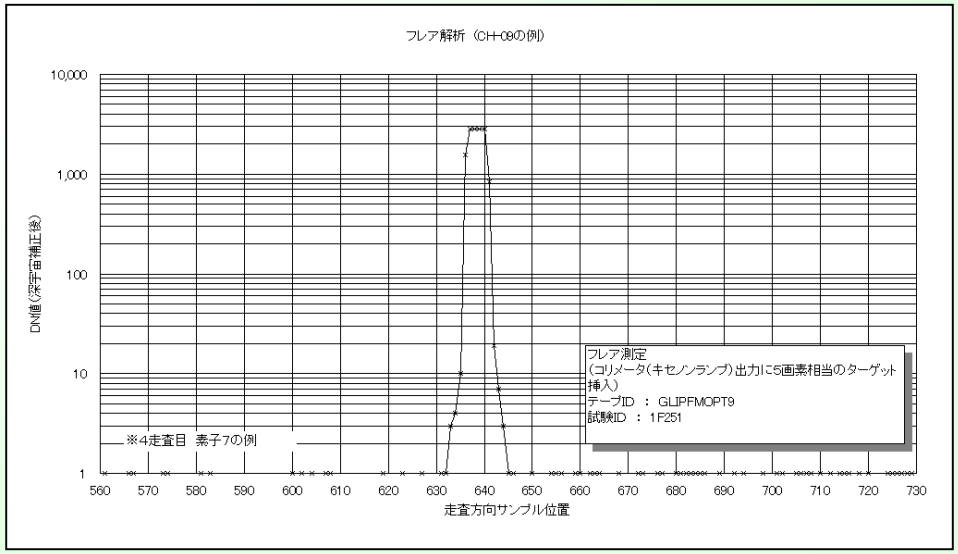
Discrimination of the Over-Saturation



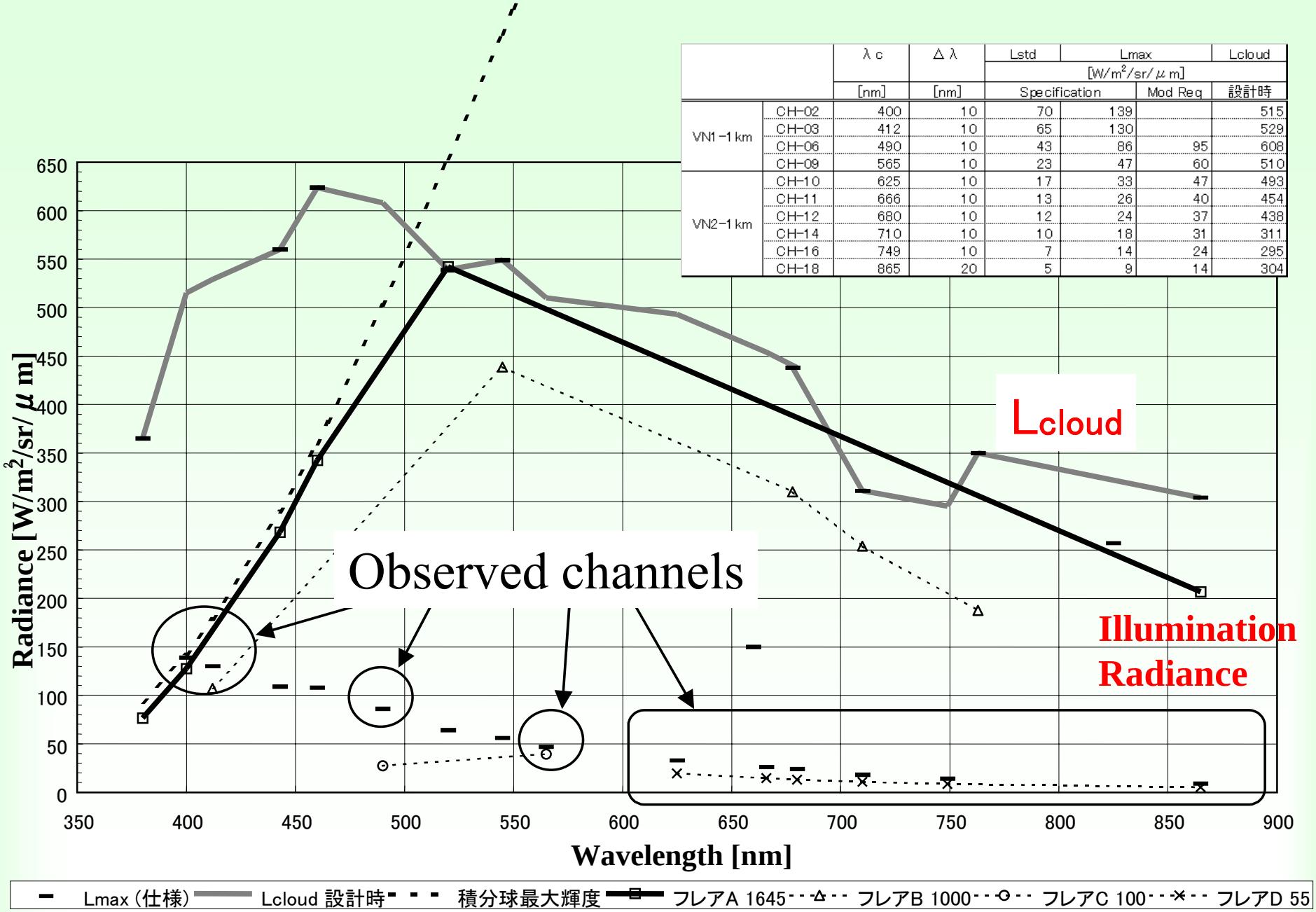


Sensor alignment of VN1 Detector

Stray light & Flare Observation



		λc	Δλ	Lstd	Lmax		Lcloud
				[W/m²/sr/μm]			
		[nm]	[nm]	Specification		Mod Req	設計時
VN1 −1 km	CH-02	400	10	70	139		515
	CH-03	412	10	65	130		529
	CH-06	490	10	43	86	95	608
	CH-09	565	10	23	47	60	510
VN2 −1 km	CH-10	625	10	17	33	47	493
	CH-11	666	10	13	26	40	454
	CH-12	680	10	12	24	37	438
	CH-14	710	10	10	18	31	311
	CH-16	749	10	7	14	24	295
	CH-18	865	20	5	9	14	304

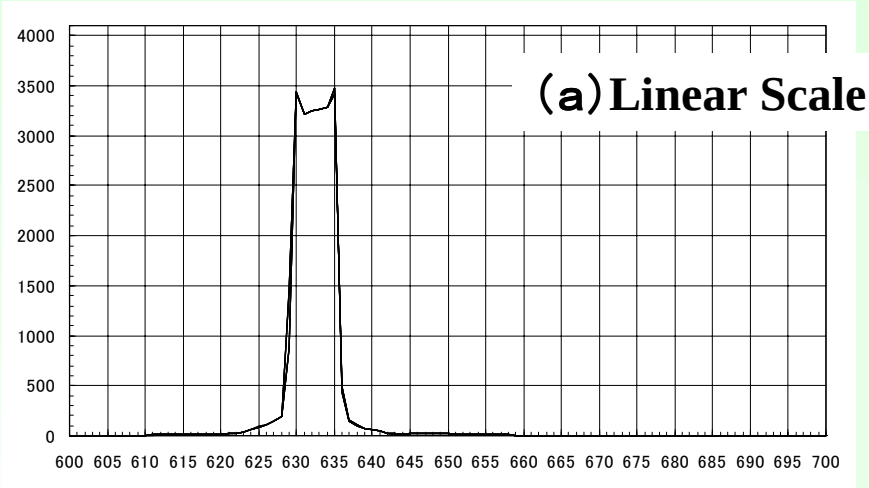


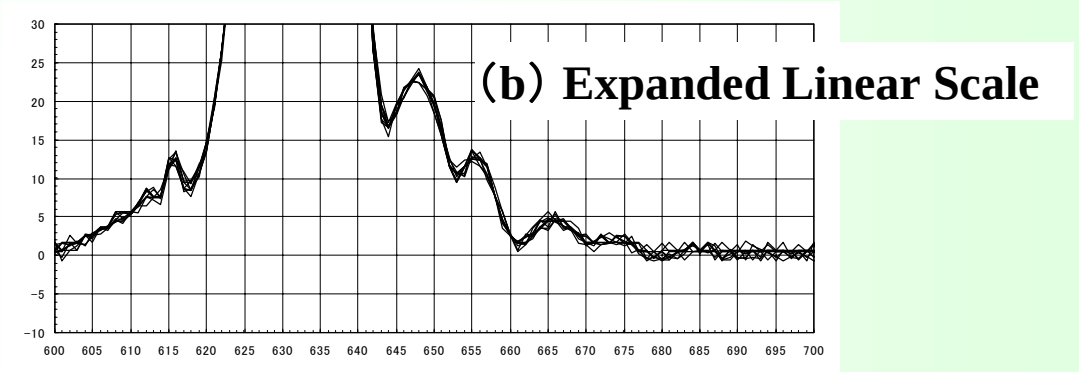
Illumination Radiance for Flare Observation

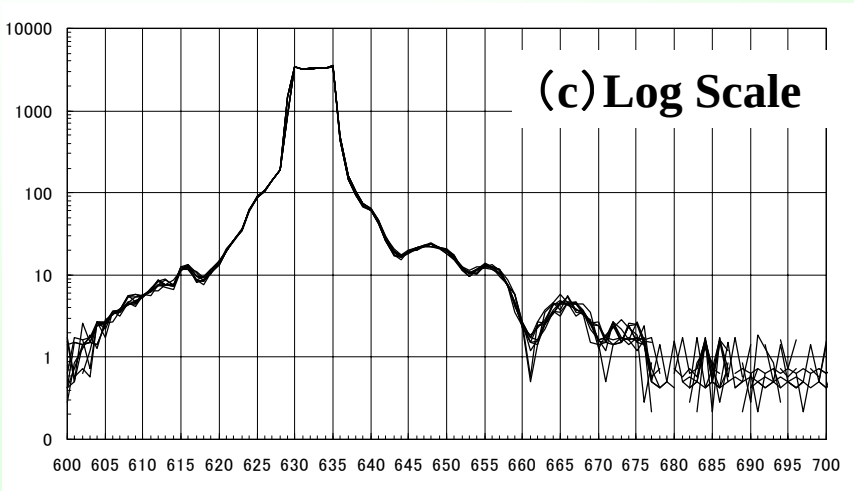
Ch.14 (710nm)

6th Element

1F500125



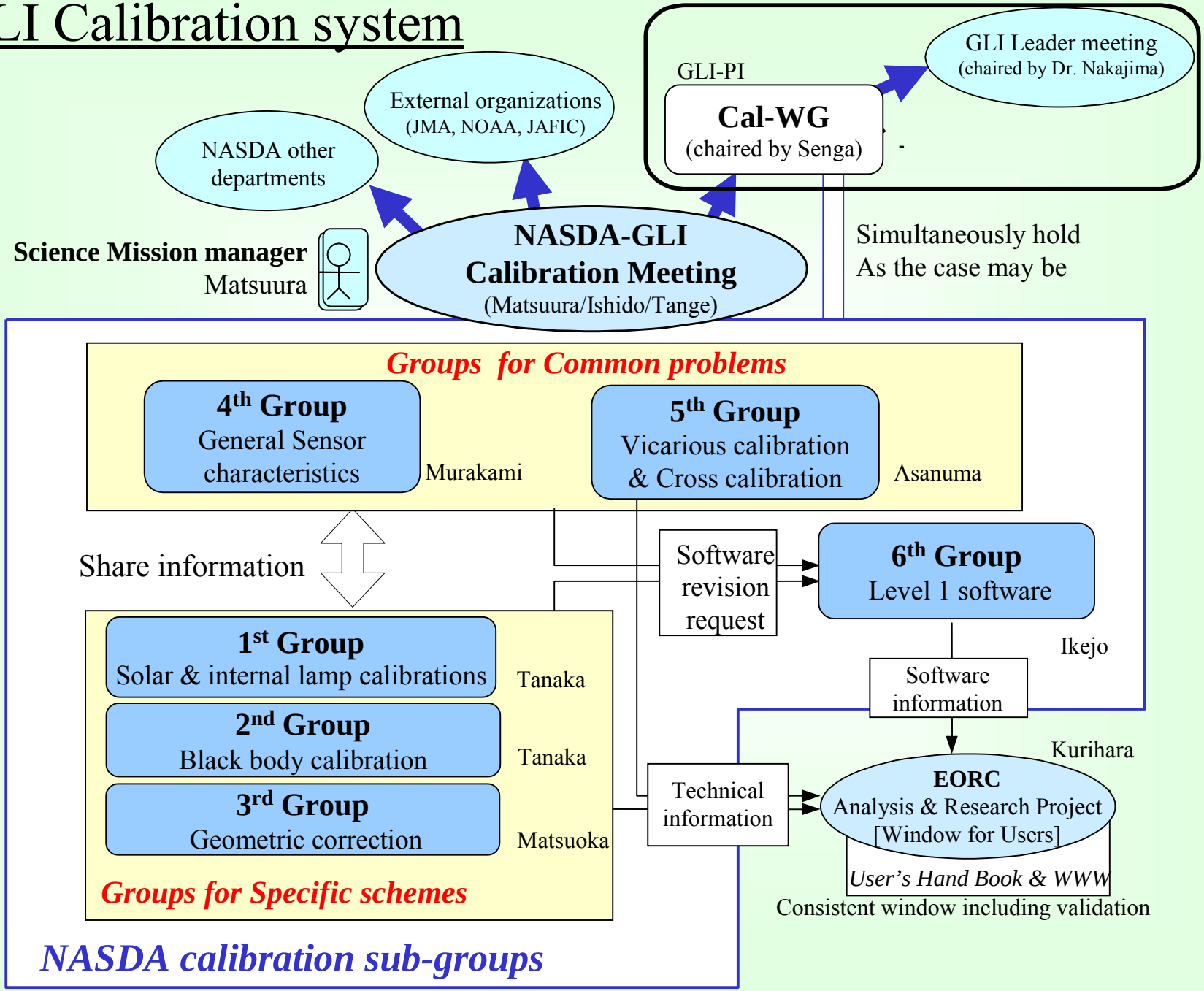




Sampling position along the scanning line

Discontinuity in the log scale chart indicates minus caused by the deep space correction.

GLI Calibration system



NASDA Calibration sub-Groups

Objective : Improve Level-1B data ASAP

For Specific Schemes

1st Group: Solar & internal lamp calibration (Tanaka)

2nd Group: Black body calibration (Tanaka)

3rd Group: Geometric Correction (Matsuoka)

For Common problems

4th Group: General Sensor characterization (Murakami)

- Evaluate GLI characteristics and improve Level-1 operational algorithm
- Evaluate on-board calibration functions and optical performance of GLI during the initial checkout period

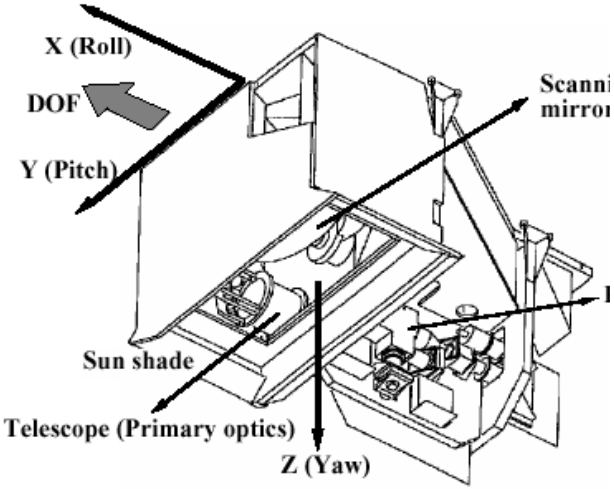
5th Group: Vicarious calibration & Cross calibration (Asanuma)

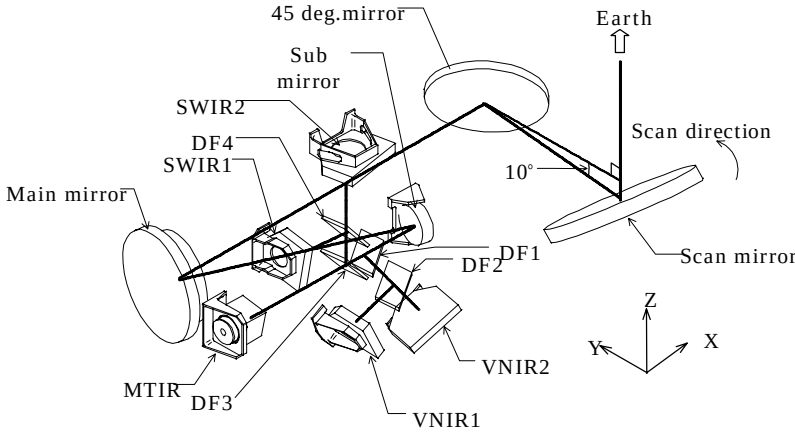
For Software revision

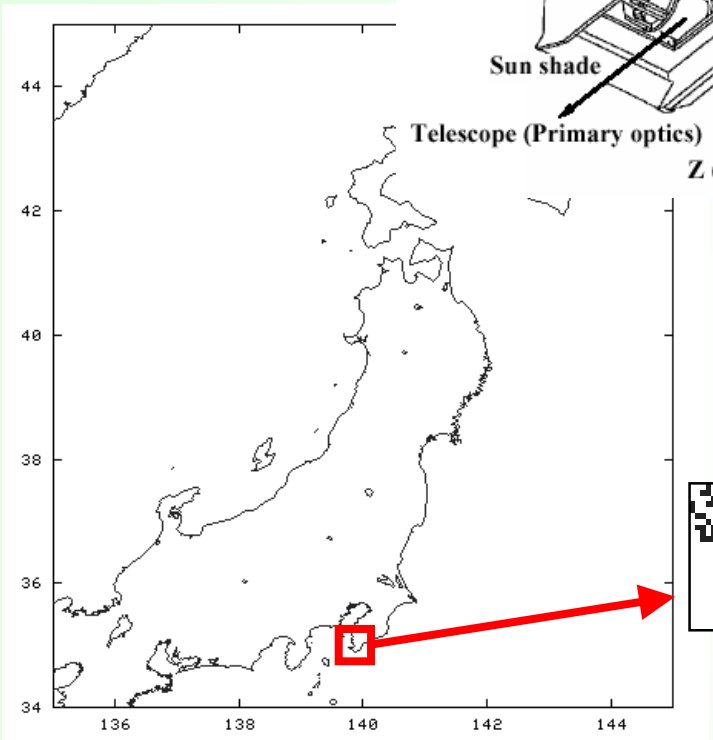
6th Group: Level-1 software (Ikejo)

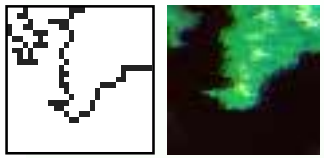
- Calibration Data Archiving

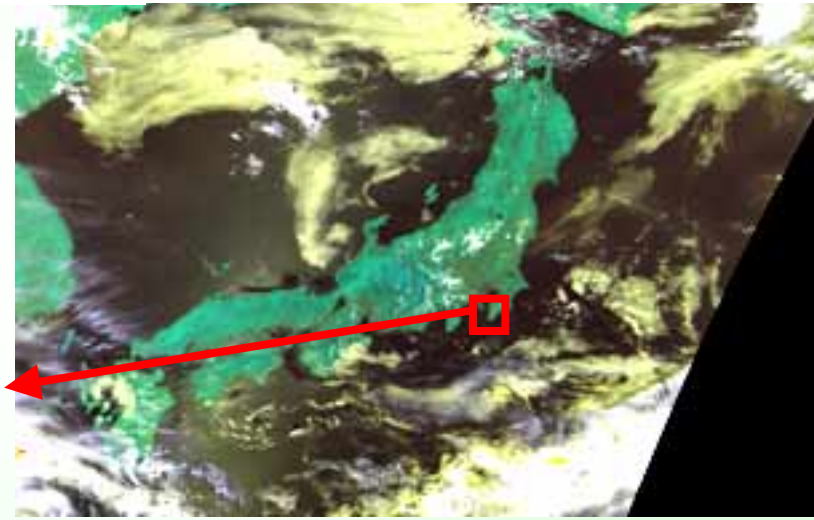
3rd Group
Geometric Correction











Vector shoreline map

GLI band Image

* Ground Control Points are set on the vector shoreline map (GSHHS).
* Matching point is derived from GLI image manually (and automatically).
* Geographical locations of GLI are archived.

Sensor alignment is estimated and updated.

4th Group

Items to be done

Items	*Data source*
Scan mirror reflectance depending on its sides and angle	**PFT, on-board calibration, and earth observation data**
Detector correlated noise	**PFT, on-board calibration, and earth observation data**
Periodic noise of MTIR	**PFT, on-board calibration, and earth observation data**
SNR and NEΔT	**PFT, on-board calibration, and earth observation data**
Dynamic range, Over-saturation and linearity	**PFT, and earth observation data**
Continuity between piece-wise linear gains	**PFT, and earth observation data**
Transitional response, stray light, cross talk and MTF	**PFT, and earth observation data**
Stability of dark current	**PFT, deep space, and night time observation data**
Stability of sensor and on-board monitors	**Telemetry and monitor outputs**

FILE NAME : MOD021KM.A2000170.0730.002.2000180093300 BAND : 8 MODEL7

<BEFOR CALIBRATION>
E= 3.5483647e+08

<AFTER CALIBRATION>
E= 70536243.

Sample; MODIS 412nm

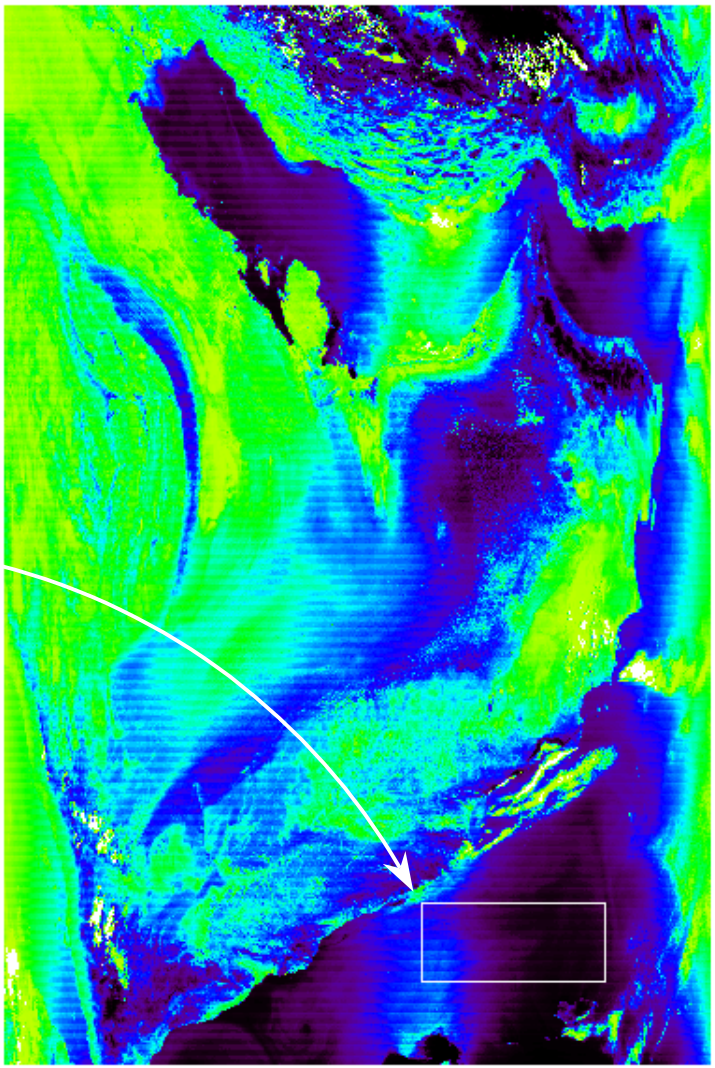
(K=350, L=149)

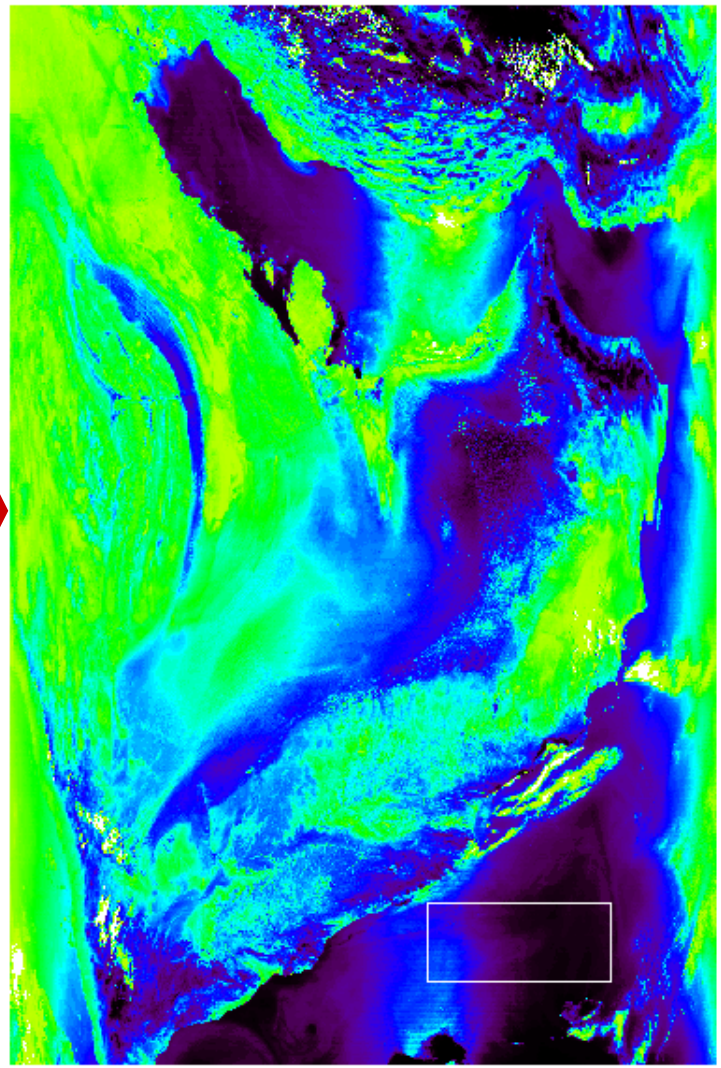
sqrt(E/(K×L)) is decreased from original (i.e., a=1)

82.2
W/m²/str/μm

↓

36.7
W/m²/str/μm





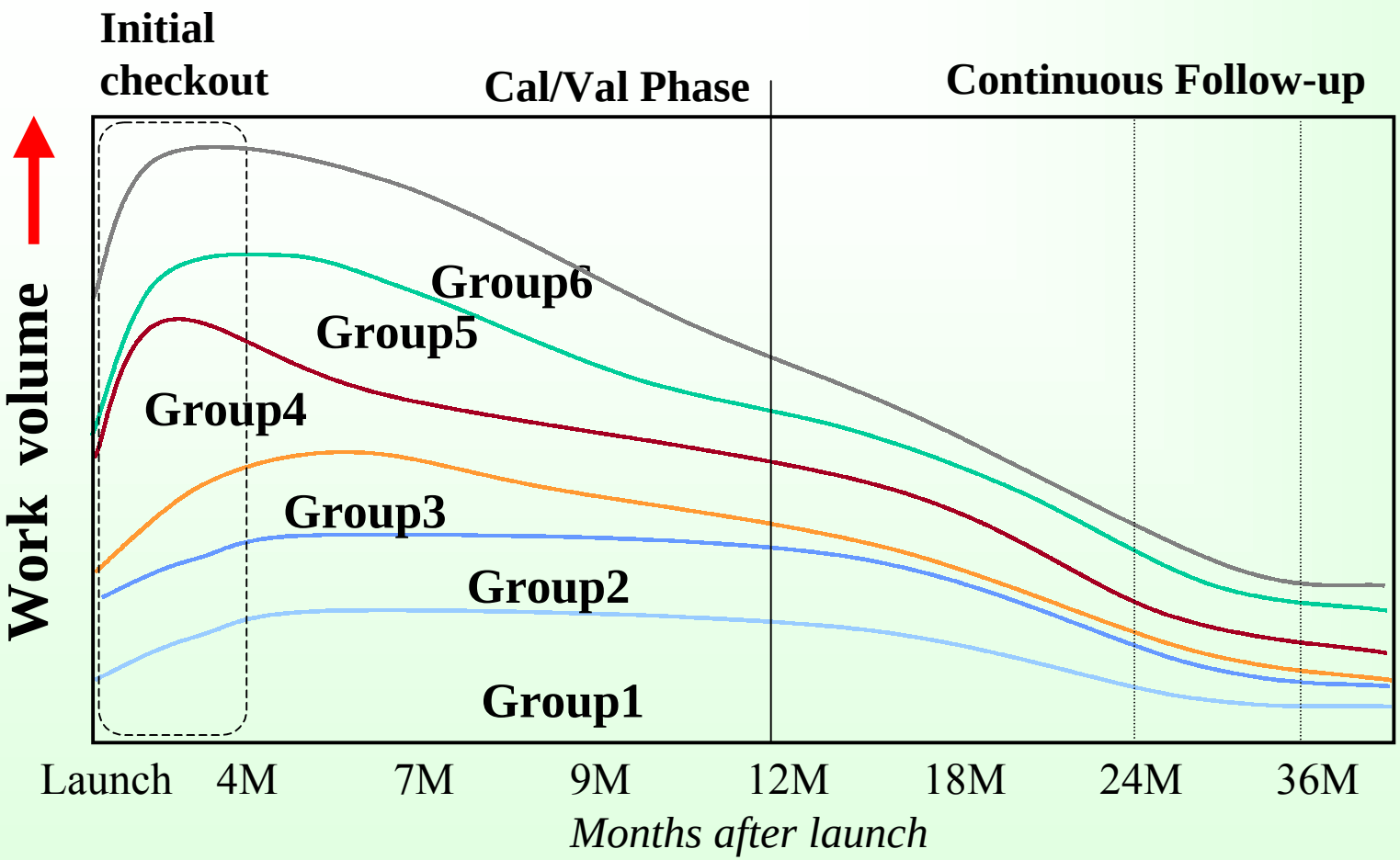
Correction of detector correlated noise

Calibration Data Archiving

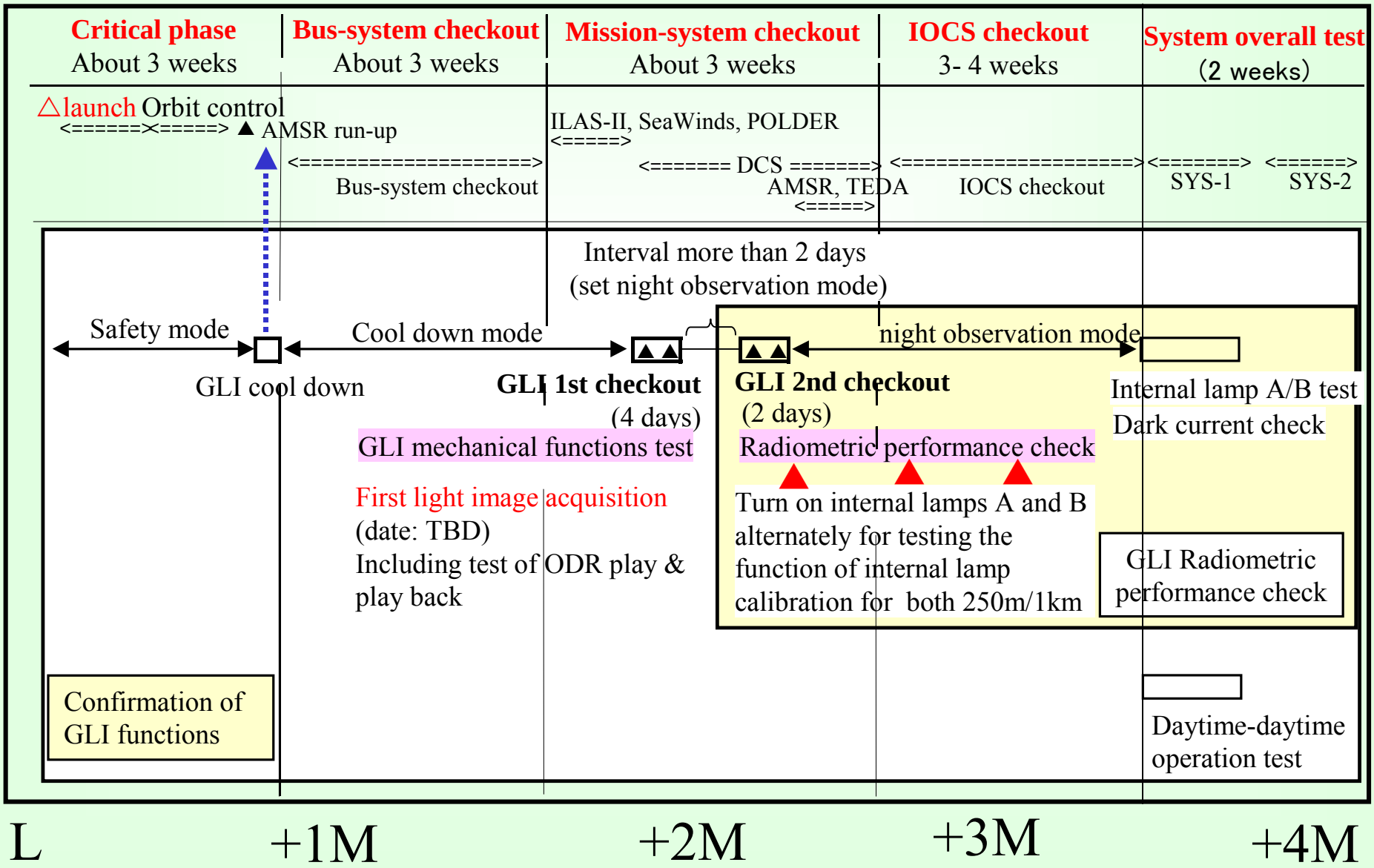
1) Objective
   - Archive GLI supplement data for
     - Analyzing blackbody stability and trend,
     - Analyzing dark current stability and trend by deep-space data,
     - Monitoring VNIR, SWIR, MTIR detector sensitivity,
     - Monitoring long term heat cycle stability.

2) Archive contents
   - Archive GLI supplement data
     - Pay-load Collection Data (GPS Time, etc.)
     - GLI telemetry data (temperature, scan angle signal, tilting angle, etc.)
     - Deep-space calibration data, blackbody data and wall clamp data
   - Archive sun calibration, onboard lamp calibration, and electrical calibration data

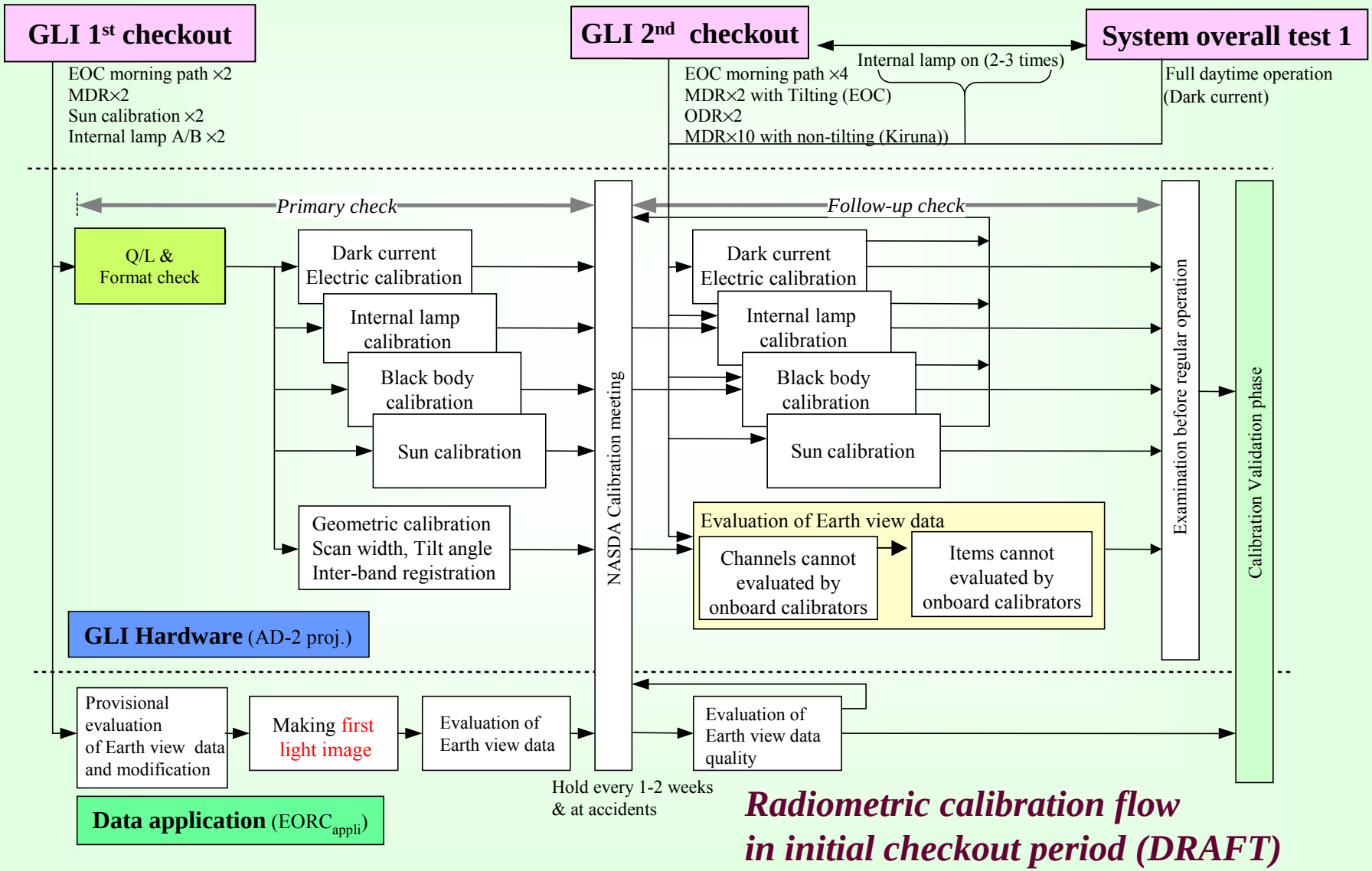
Working Schedule



Outlines of GLI Initial Checkout

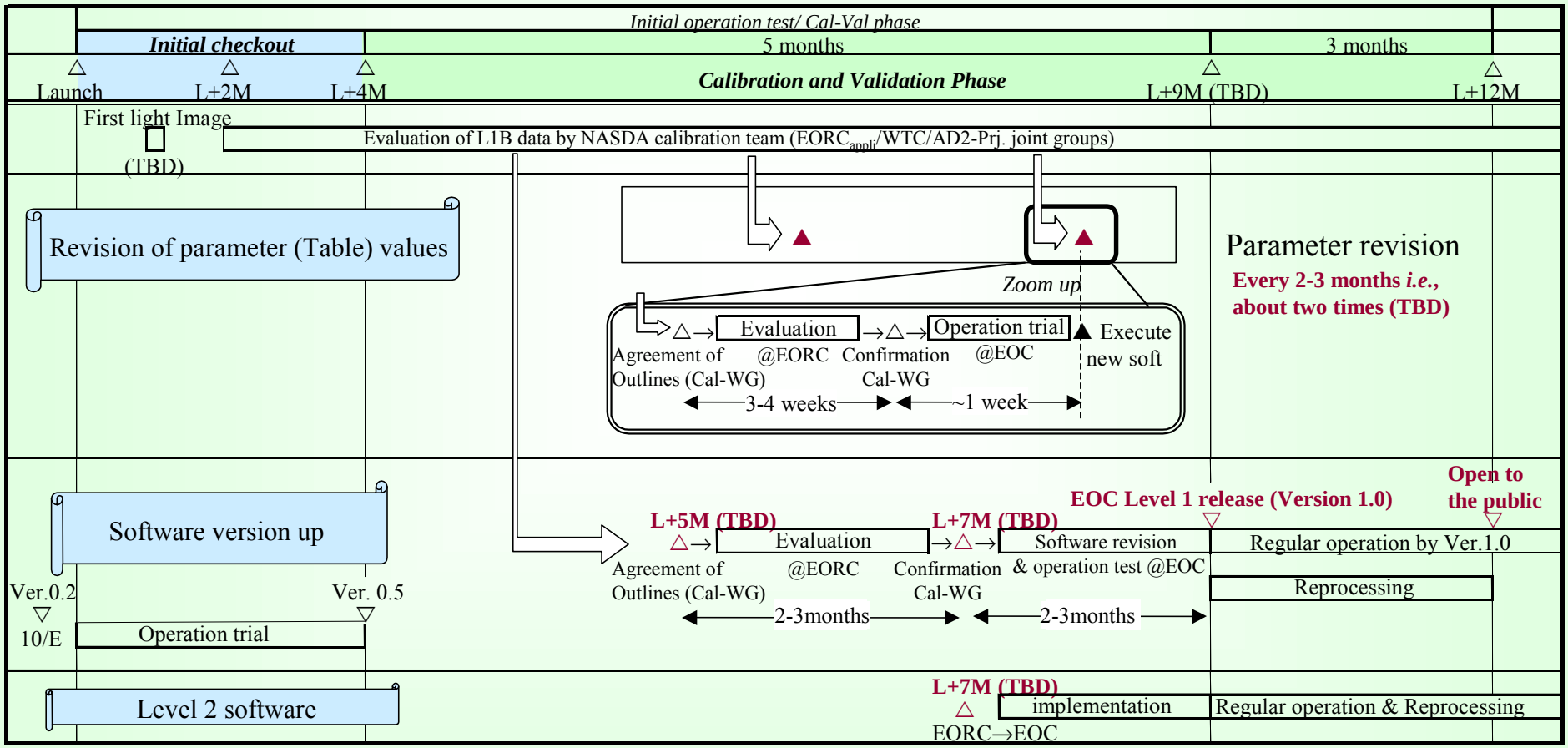


Flowchart of GLI initial checkout



Radiometric calibration flow in initial checkout period (DRAFT)

Calibration activity in GLI cal/val phase (~L+12M) & Implementation schedule to Level 1 software **(DRAFT)**



Details of the Calibration Data will be explained in Ocean Group Session