ASTER data acquisition over RadCalNet site

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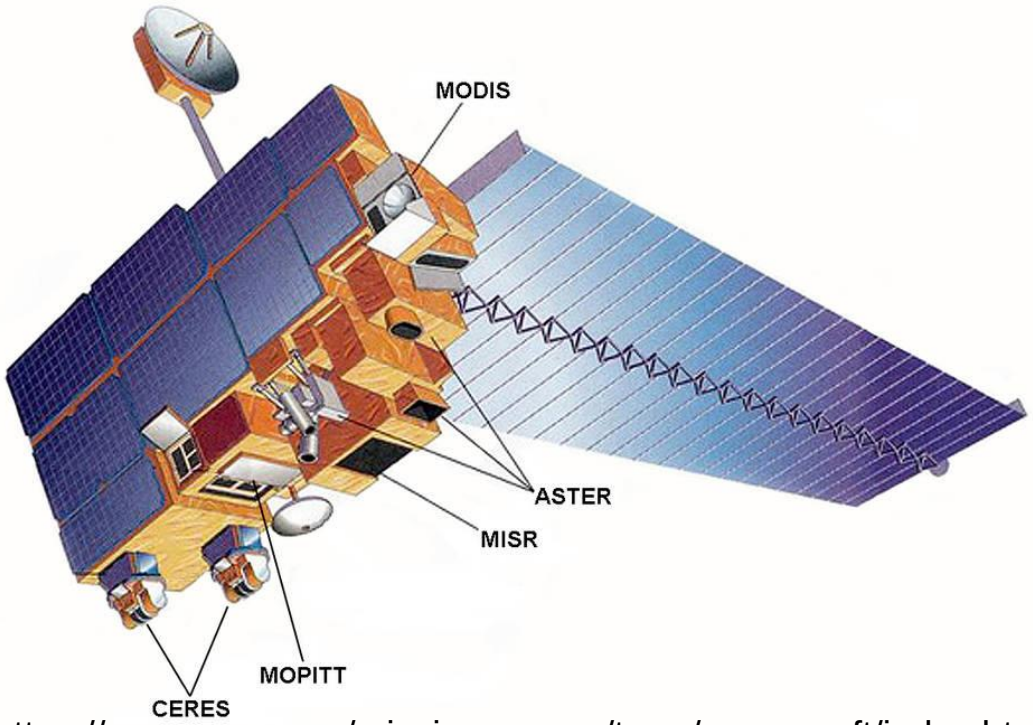
CEOS WGCV IVOS meetings

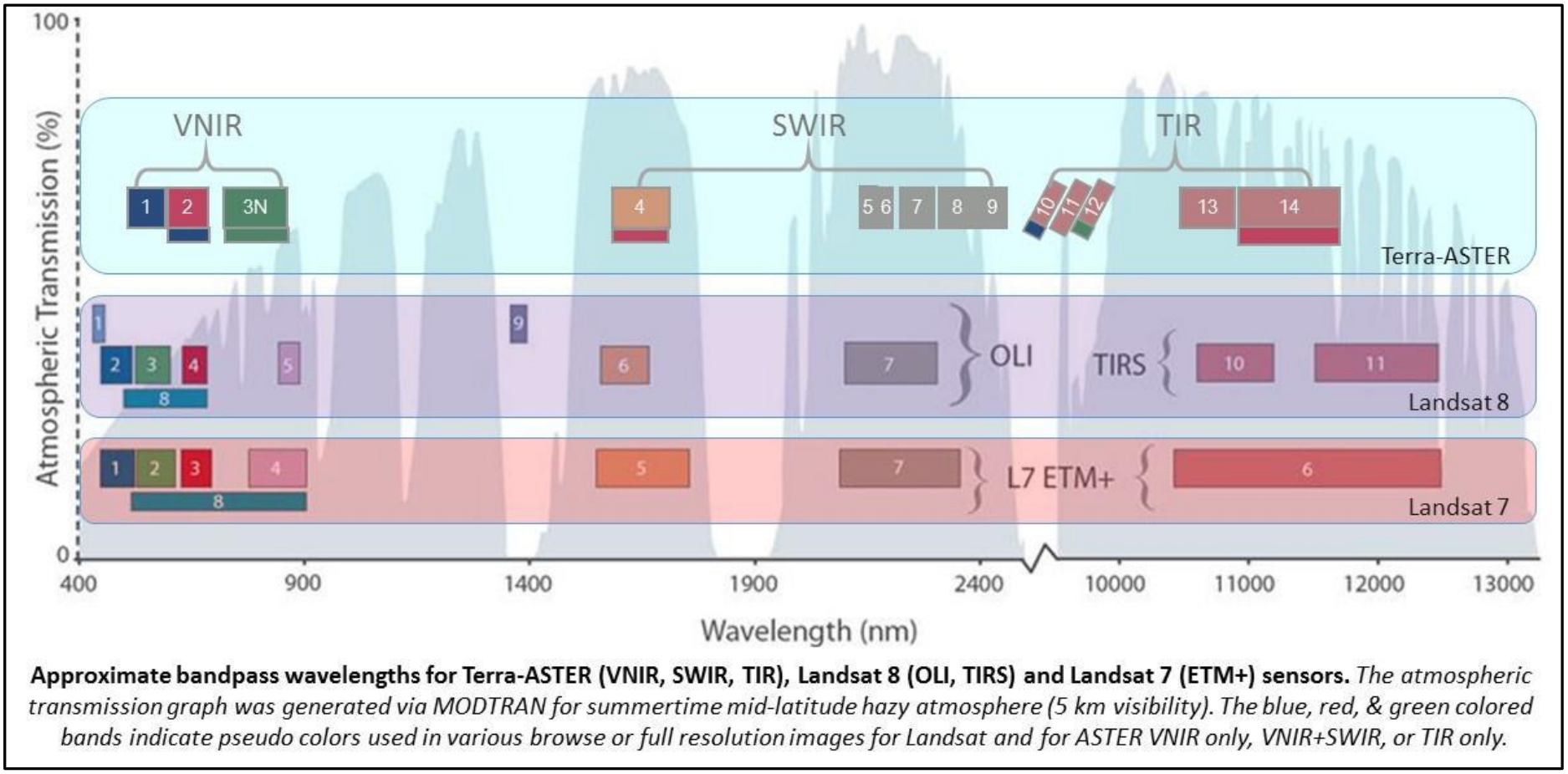
Mar 16, 2017 University of Arizona, US

Launched on Dec. 18th, 1999



https://www.nasa.gov/mission_pages/terra/spacecraft/index.html

1. ASTER (VNIR, SWIR, TIR; 15,30,90m)
   (Advanced Spaceborne Thermal Emission and Reflection Radiometer)
2. MODIS (VNIR, SWIR, TIR; 250,500,1000m)
   (Moderate-resolution Imaging Spectroradiometer)
3. MISR
   (Multi-angle Imaging SpectroRadiometer)
4. CERES
   (Clouds and the Earth's Radiant Energy System)
5. MOPITT
   (Measurements of Pollution in the Troposphere)



Approximate bandpass wavelengths for Terra-ASTER (VNIR, SWIR, TIR), Landsat 8 (OLI, TIRS) and Landsat 7 (ETM+) sensors. *The atmospheric transmission graph was generated via MODTRAN for summertime mid-latitude hazy atmosphere (5 km visibility). The blue, red, & green colored bands indicate pseudo colors used in various browse or full resolution images for Landsat and for ASTER VNIR only, VNIR+SWIR, or TIR only.*

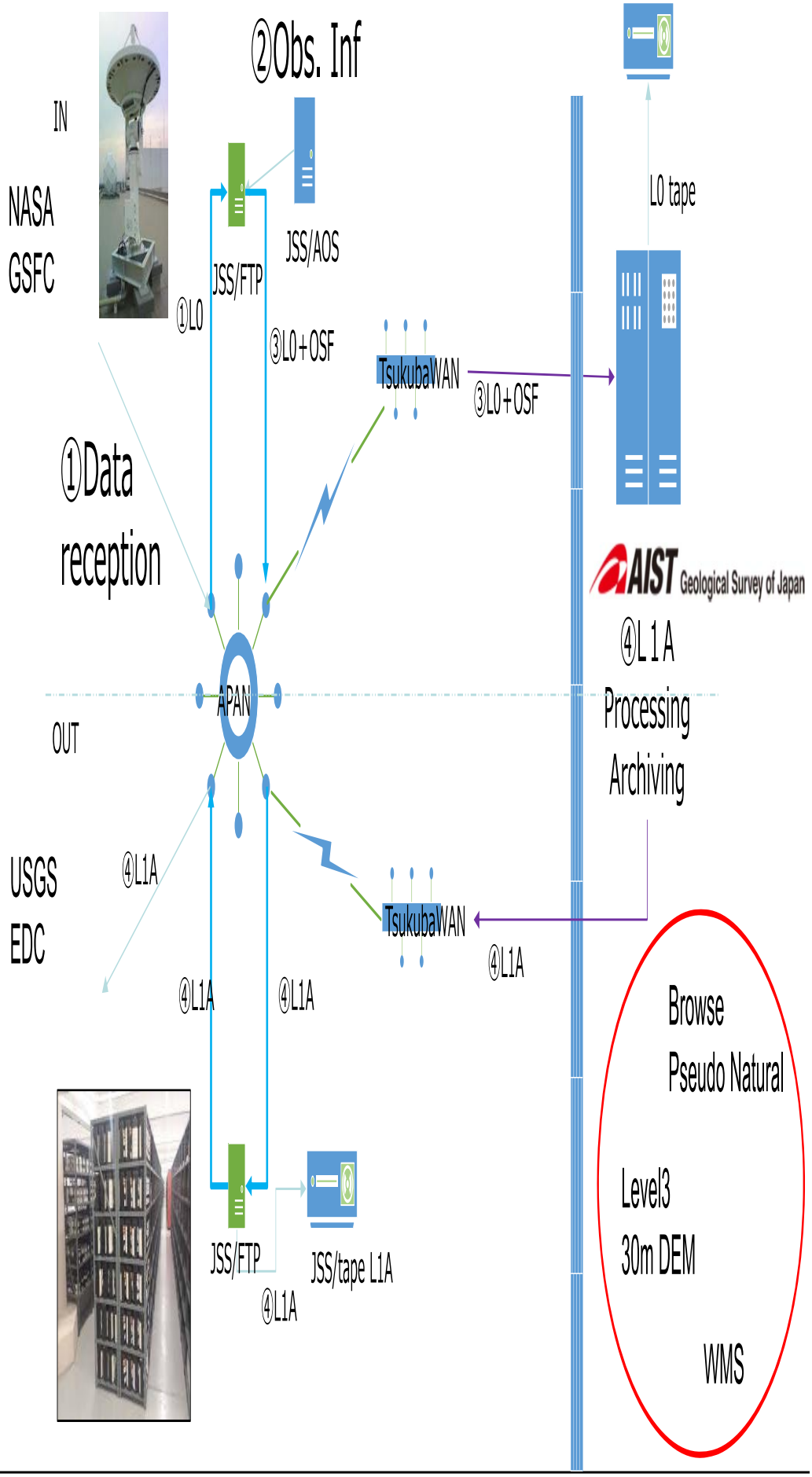
Terra-ASTER and Landsat 7/8 Spectral Bands Compared

AST_L1T Product User's Guide Version 1.0, 2015

ASTER SWIR detectors are no longer functioning due to anomalously high SWIR detector temperatures.
ASTER SWIR data acquired since April 2008 are unavailable.

Characteristics of the 3 ASTER Sensor Systems.

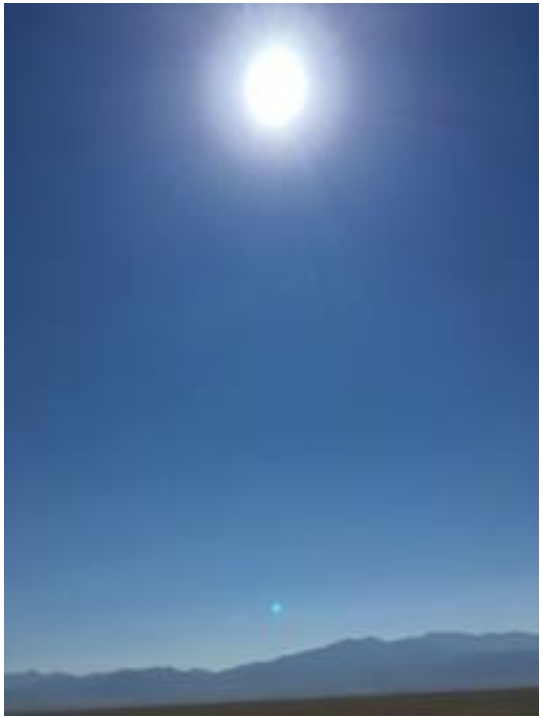
Subsystem	Band No.	Spectral Range (μm)	Spatial Resolution, m	Quantization Levels
VNIR	1	0.52-0.60	15	8 bits
	2	0.63-0.69		
	3N	0.78-0.86		
	3B	0.78-0.86		
SWIR	4	1.60-1.70	30	8 bits
	5	2.145-2.185		
	6	2.185-2.225		
	7	2.235-2.285		
	8	2.295-2.365		
	9	2.360-2.430		
TIR	10	8.125-8.475	90	12 bits
	11	8.475-8.825		
	12	8.925-9.275		
	13	10.25-10.95		
	14	10.95-11.65		



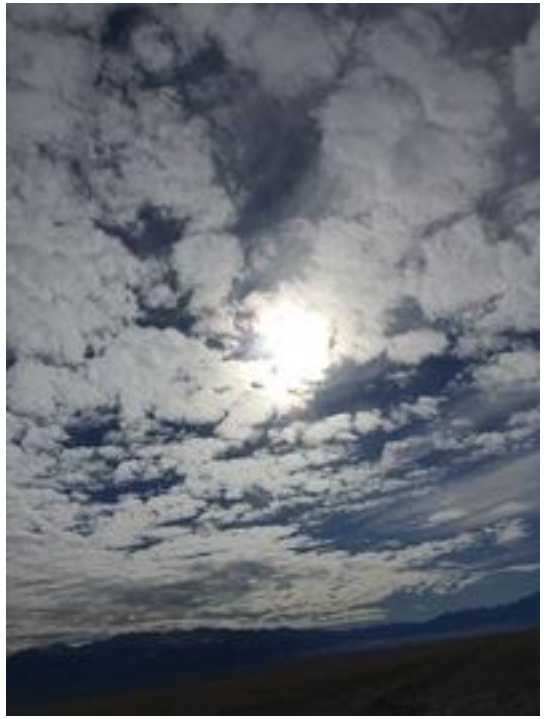
Background

- ASTER is developed by Ministry of Economy, Trade and Industry (METI), Japan and is on TERRA satellite managed by NASA. About 3 million images have been archived covers globally. AIST has been involved in ASTER project from the development stage.
- The calibration WG in the US-Japan ASTER science team steer the radiometric calibration, and AIST plays many roles in this WG.
- AIST has been conducted vicarious calibration for ASTER (@Railroad Valley Playa, Ivanpah Playa, Alkali Lake etc.) since 2000.
- We try to measure for vicarious calibration in the both of Northern and Southern hemispheres only once a year, and ground and sky conditions would NOT be always good.
- Especially, post-ASTER, ISS HISUI will be limited to a few times over each calibration site in one year because of its orbital characteristics.
- We have started to discuss the use of the automated calibration facilities such as the radiometric calibration network of automated instruments.

21 Jun, 2016



24 Aug, 2016



30 Nov, 2016

- A request from an individual ASTER User is called a Data Acquisition Request (DAR).
- A request from the entire ASTER Science Team is called a Science Team Acquisition Request (STAR).

- Information for acquisition request
  - AOI (longitude / latitude)
  - Date / Time
  - Gain mode (VNIR)
  - Cloud
  - Other

RadCalNet site

- Railroad Valley Playa
  - latitude 38.497[deg] longitude -115.690[deg]
  - Path40 Row96 View4 Pointing 0.0 [deg]
- La Crau
  - latitude 43.559 [deg] longitude 4.864[deg]
  - Path196 Row86 View4 Pointing 0.0 [deg]
- Baotou
  - latitude 40.852[deg] longitude 109.629[deg]
  - Path128 Row91 View5 2.85[deg]

ASTER Path Calendar

2017																
													1/1	1/2	1/3	1/4
1/5	1/6	1/7	1/8	1/9	1/10	1/11	1/12	1/13	1/14	1/15	1/16	1/17	1/18	1/19	1/20
1/21	1/22	1/23	1/24	1/25	1/26	1/27	1/28	1/29	1/30	1/31	2/1	2/2	2/3	2/4	2/5
2/6	2/7	2/8	2/9	2/10	2/11	2/12	2/13	2/14	2/15	2/16	2/17	2/18	2/19	2/20	2/21
2/22	2/23	2/24	2/25	2/26	2/27	2/28	3/1	3/2	3/3	3/4	3/5	3/6	3/7	3/8	3/9
3/10	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	3/19	3/20	3/21	3/22	3/23	3/24	3/25
3/26	3/27	3/28	3/29	3/30	3/31	4/1	4/2	4/3	4/4	4/5	4/6	4/7	4/8	4/9	4/10
4/11	4/12	4/13	4/14	4/15	4/16	4/17	4/18	4/19	4/20	4/21	4/22	4/23	4/24	4/25	4/26
4/27	4/28	4/29	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9	5/10	5/11	5/12
5/13	5/14	5/15	5/16	5/17	5/18	5/19	5/20	5/21	5/22	5/23	5/24	5/25	5/26	5/27	5/28
5/29	5/30	5/31	6/1	6/2	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10	6/11	6/12	6/13
6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	6/22	6/23	6/24	6/25	6/26	6/27	6/28	6/29
6/30	7/1	7/2	7/3	7/4	7/5	7/6	7/7	7/8	7/9	7/10	7/11	7/12	7/13	7/14	7/15
7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23	7/24	7/25	7/26	7/27	7/28	7/29	7/30	7/31
8/1	8/2	8/3	8/4	8/5	8/6	8/7	8/8	8/9	8/10	8/11	8/12	8/13	8/14	8/15	8/16
8/17	8/18	8/19	8/20	8/21	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/30	8/31	9/1
9/2	9/3	9/4	9/5	9/6	9/7	9/8	9/9	9/10	9/11	9/12	9/13	9/14	9/15	9/16	9/17
9/18	9/19	9/20	9/21	9/22	9/23	9/24	9/25	9/26	9/27	9/28	9/29	9/30	10/1	10/2	10/3
10/4	10/5	10/6	10/7	10/8	10/9	10/10	10/11	10/12	10/13	10/14	10/15	10/16	10/17	10/18	10/19
10/20	10/21	10/22	10/23	10/24	10/25	10/26	10/27	10/28	10/29	10/30	10/31	11/1	11/2	11/3	11/4
11/5	11/6	11/7	11/8	11/9	11/10	11/11	11/12	11/13	11/14	11/15	11/16	11/17	11/18	11/19	11/20
11/21	11/22	11/23	11/24	11/25	11/26	11/27	11/28	11/29	11/30	12/1	12/2	12/3	12/4	12/5	12/6
12/7	12/8	12/9	12/10	12/11	12/12	12/13	12/14	12/15	12/16	12/17	12/18	12/19	12/20	12/21	12/22
12/23	12/24	12/25	12/26	12/27	12/28	12/29	12/30	12/31							
ASTER PATH																
77	84	91	82	89	80	87	78	85	76	83	90	81	88	79	86
93	100	107	98	105	96	103	94	101	92	99	106	97	104	95	102
109	116	123	114	121	112	119	110	117	108	115	122	113	120	111	118
125	132	139	130	137	128	135	126	133	124	131	138	129	136	127	134
141	148	155	146	153	144	151	142	149	140	147	154	145	152	143	150
157	164	171	162	169	160	167	158	165	156	163	170	161	168	159	166
173	180	187	178	185	176	183	174	181	172	179	186	177	184	175	182
189	196	203	194	201	192	199	190	197	188	195	202	193	200	191	198
205	212	219	210	217	208	215	206	213	204	211	218	209	216	207	214
221	228	2	226	233	224	231	222	229	220	227	1	225	232	223	230
4	11	18	9	16	7	14	5	12	3	10	17	8	15	6	13
20	27	34	25	32	23	30	21	28	19	26	33	24	31	22	29
36	43	50	41	48	39	46	37	44	35	42	49	40	47	38	45
52	59	66	57	64	55	62	53	60	51	58	65	56	63	54	61
68	75		73		71		69		67	74		72		70	

22~23 times / year

- The VNIR subsystem
  - nadir-looking and the other backward-looking (26.7 degrees) for stereo observations
  - Cross-track pointing : ±24 degrees
- The SWIR subsystem
  - Nadir looking
  - Cross-track pointing : ± 8.55 degrees
- The TIR subsystem
  - Nadir-looking
  - Cross-track pointing : ± 8.55 degrees

ASTER Gain mode

Band No.	Maximum radiance (W/(m^2*sr*μm)			
	High gain	Normal Gain	Low Gain 1	Low gain 2
1	170.8	427	569	N/A
2	179.0	358	477	
3N	106.8	218	290	
3B	106.8	218	290	
4	27.5	55.0	73.3	73.3
5	8.8	17.6	23.4	103.5
6	7.9	15.8	21.0	98.7
7	7.55	15.1	20.1	83.8
8	5.27	10.55	14.06	62.0
9	4.02	8.04	10.72	67.0
10	N/A	28.17	N/A	N/A
11		27.75		
12		26.97		
13		23.30		
14		21.38		

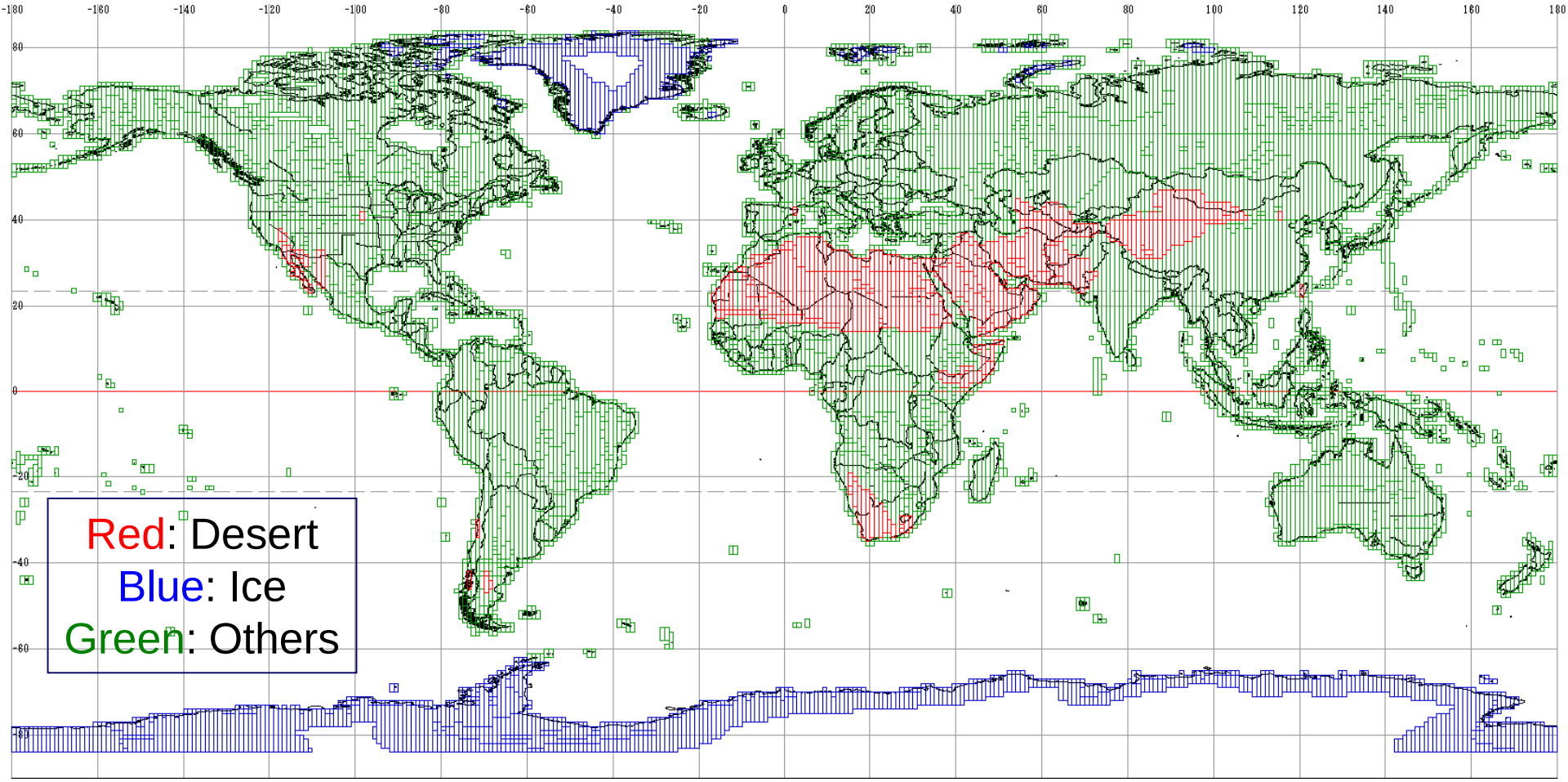
Maximum Radiance Values for all ASTER Bands and all Gains.

Band No.	Coefficient (W/(m^2*sr*μm)/DN)			
	High gain	Normal Gain	Low Gain 1	Low gain 2
1	0.676	1.688	2.25	N/A
2	0.708	1.415	1.89	
3N	0.423	0.862	1.15	
3B	0.423	0.862	1.15	
4	0.1087	0.2174	0.290	0.290
5	0.0348	0.0696	0.0925	0.409
6	0.0313	0.0625	0.0830	0.390
7	0.0299	0.0597	0.0795	0.332
8	0.0209	0.0417	0.0556	0.245
9	0.0159	0.0318	0.0424	0.265
10	N/A	6.822×10^{-3}	N/A	N/A
11		6.780×10^{-3}		
12		6.590×10^{-3}		
13		5.693×10^{-3}		
14		5.225×10^{-3}		

Calculated Unit Conversion Coefficients.

Abrams, Hook, Ramachandran, 2002, ASTER User Handbook Version 2

GM (Global Mapping) Type Map



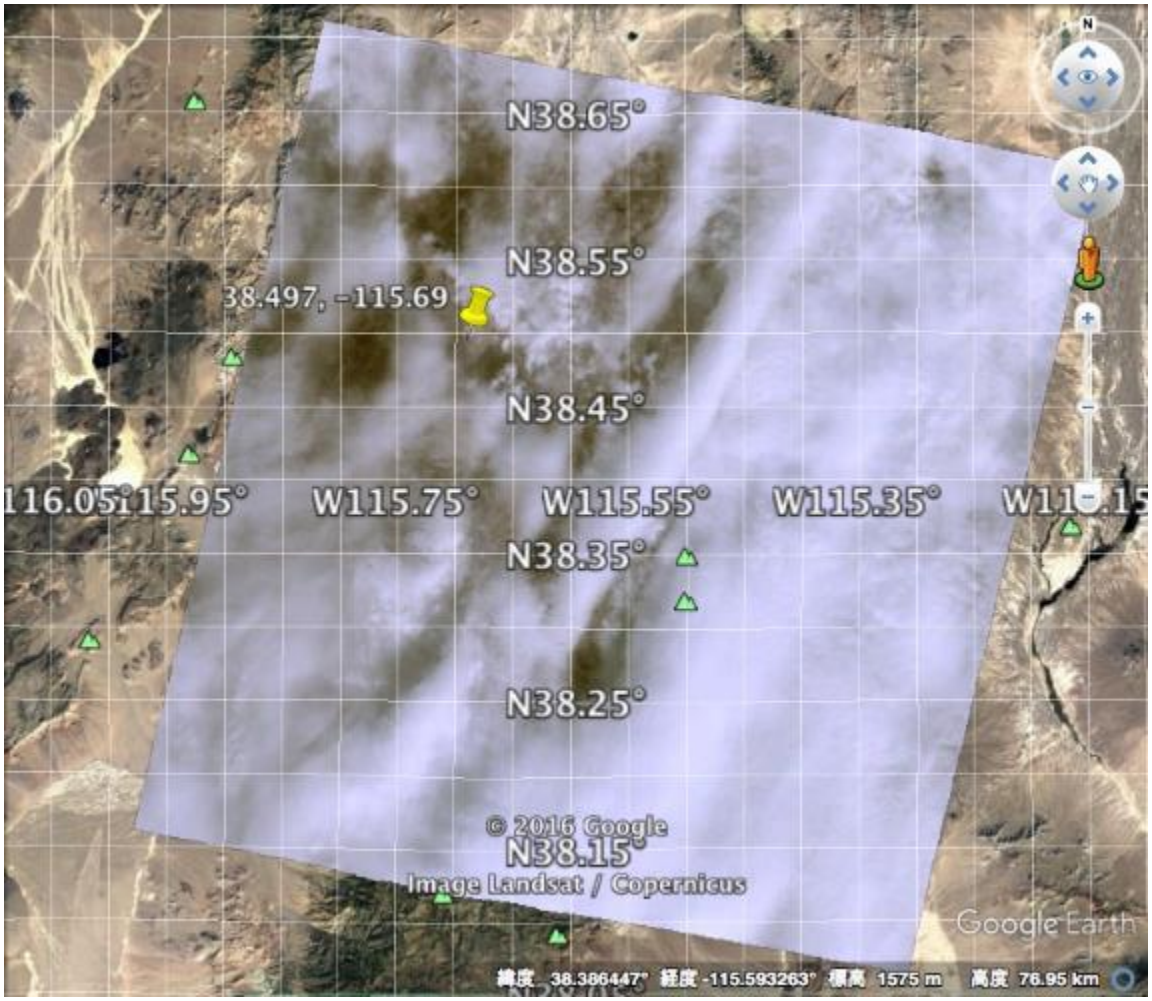
GM (Global Mapping) parameter

Type	Avoid Cloud	Gain				AW		Sun Angle Minimum
		VNIR			SWIR	Start	End	
		1	2	3	4~9			
Ice								
N90~N40	No	N	N	N	Any	Jun.	Sep.	20
N40~S40	-	-	-	-	-	-		-
S40~S90	No	N	N	N	Any	Dec.	Mar.	20
Desert								
N90~N40	20%	N	N	N	Any	Jun.	Sep.	20
N40~S40	20%	N	N	N	Any	Whole Year		30
S40~S90	20%	N	N	N	Any	Dec.	Mar.	20
Others								
N90~N40	20%	H	H	N	Any	Jun.	Sep.	20
N40~S40	20%	H	H	N	Any	Whole Year		40
S40~S90	20%	H	H	N	Any	Dec.	Mar.	20

ASTER observation request

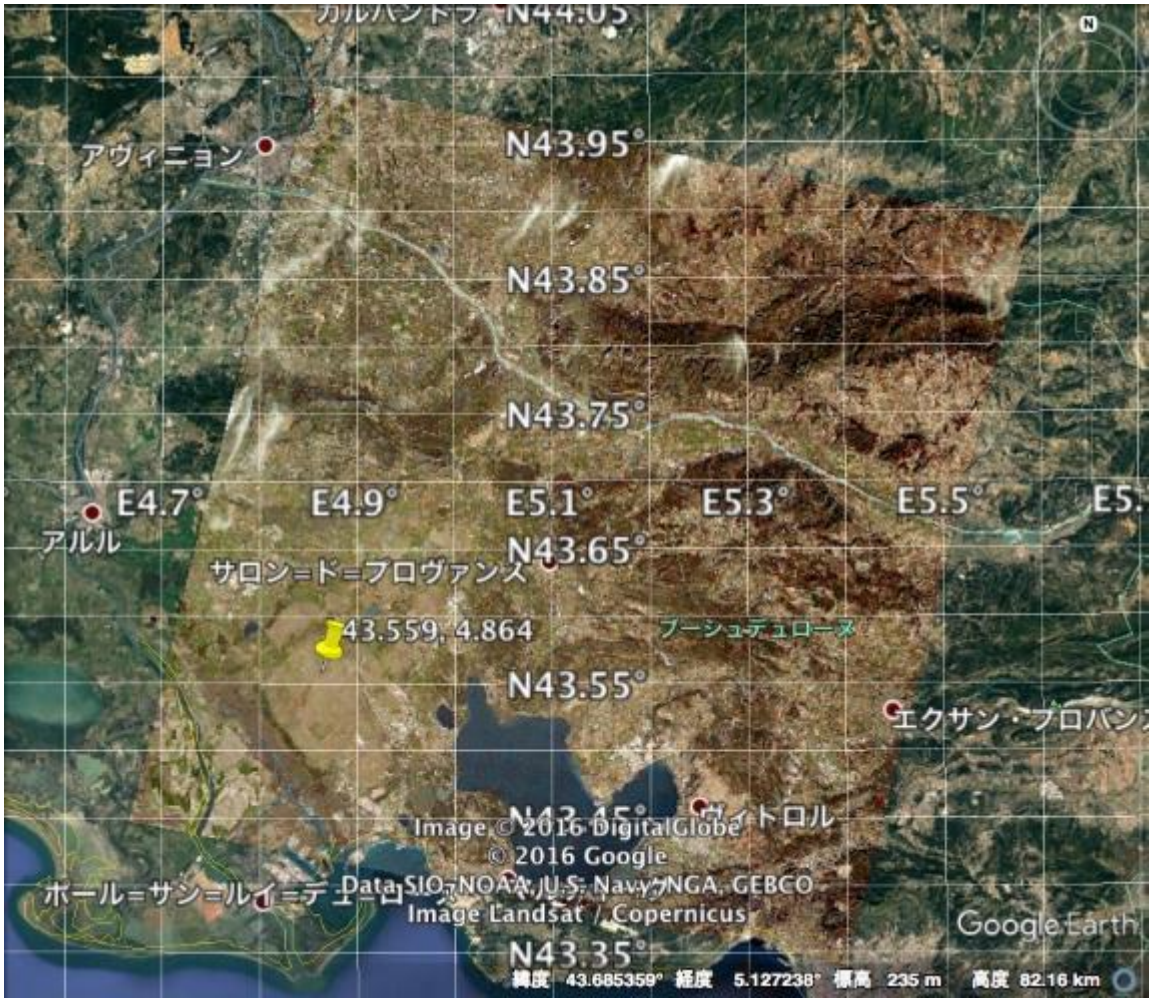
- Category : STAR Local
- Objective : Calibration
- Duration : 3yrs.
- Observation ：FULL mode (VNIR/SWIR/TIR)
- VNIR Gain：NOR/NOR/NOR
- Frequency : 1 obs. / 32days (11 obs. / yr)
  - Usual frequency is 1 obs. / 48 days
  - Both area of west and east cannot be observed in case of 1 obs. / 16 days.
- Cloud : 1~100%
- GC : ON
- EDS(Expedited Data Set) Flag : OFF
- Urgent Flag : OFF

Railroad Valley Playa (Latest)



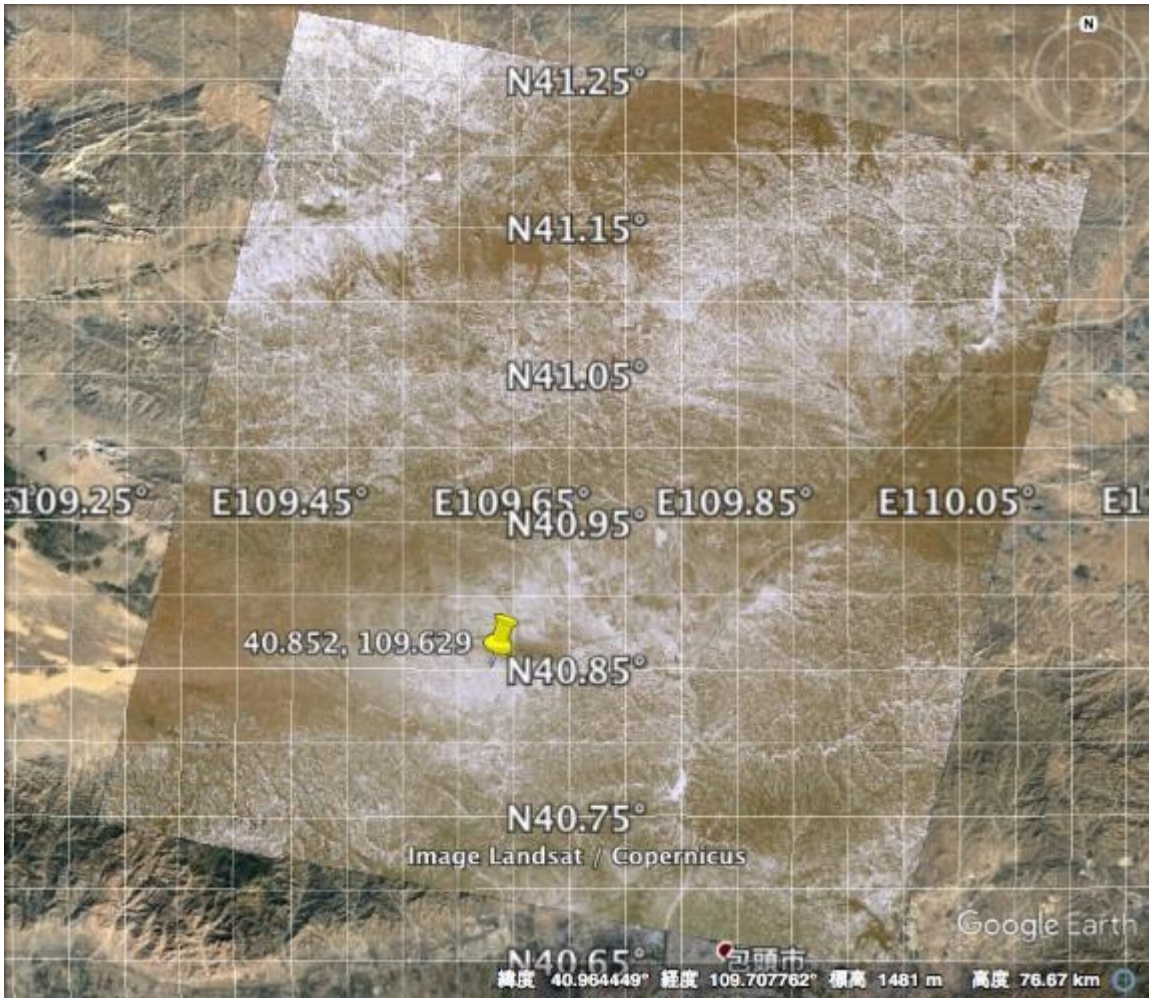
Railroad Valley Playa captured by ASTER
on Feb 18, 2017 (UTC18:38:29)
NOR/NOR/NOR

La Crau (Latest)



La Crau captured by ASTER
on Feb 23, 2017 (UTC10:41:08)
NOR/NOR/NOR

Baotou (Latest)



Baotou captured by ASTER
on Feb 27, 2017 (UTC03:41:38)
NOR/NOR/NOR

Railroad Valley Playa

ASTER L1A	Date	Time(UTC)	pointing_angle	solar_elevation	mod35_cloud	Obs Mode	Path-Row-View	Gain
ASTL1A_000406190630130421900	2000/4/6	19:06:30	21.061	57.089097	1	V	42-95--1	HGH/HGH/NOR/NOR-OFF/OFF/OFF/OFF/OFF/OFF
ASTL1A_000501190040130421902	2000/5/1	19:00:40	8.547333333	65.02878	N/A	VST	41-95-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000501190049130421903	2000/5/1	19:00:49	8.547333333	65.360864	N/A	VST	41-96-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000510185409130421900	2000/5/10	18:54:09	2.841	67.471195	11	VST	40-96-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000526185352130421900	2000/5/26	18:53:52	2.845666667	70.445287	15	VST	40-96-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000602185958130421901	2000/6/2	18:59:58	8.558333333	71.190634	1	VST	41-95-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000602190006130421901	2000/6/2	19:00:06	8.558333333	71.500718	1	VST	41-96-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000609190607020502004	2000/6/9	19:06:07	21.058	72.834595	37	V	42-95--1	HGH/HGH/NOR/NOR-OFF/OFF/OFF/OFF/OFF/OFF
ASTL1A_000611185353130421902	2000/6/11	18:53:53	1.995372333	71.658351	N/A	VST	40-96-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000618185947130421903	2000/6/18	18:59:47	8.564	71.802892	27	VST	41-95-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000618185956130421903	2000/6/18	18:59:56	8.564	72.235217	14	VST	41-96-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000729185301130421903	2000/7/29	18:53:01	0.008666667	66.803605	8	VST	40-96-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000814185318130421902	2000/8/14	18:53:18	2.857666667	63.027644	N/A	VST	40-96-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000821185930130421908	2000/8/21	18:59:30	8.572333333	61.123113	N/A	VST	41-95-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
⋮								
ASTL1A_160529184525160530904	2016/5/29	18:45:25	8.579333333	69.153541	54	VST	41-95-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160529184534160530904	2016/5/29	18:45:34	8.579333333	69.582796	28	VST	41-96-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160623183931160624900	2016/6/23	18:39:31	0.016	69.56834	N/A	VST	40-96-4	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160702183320160703900	2016/7/2	18:33:20	-8.569666667	68.053188	34	VST	39-96-1	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160824185121160825900	2016/8/24	18:51:21	20.44	59.9045	1	V	42-95--1	NOR/NOR/NOR/NOR-OFF/OFF/OFF/OFF/OFF/OFF
ASTL1A_160826183906160827900	2016/8/26	18:39:06	-0.013333333	58.161187	4	VST	40-96-4	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160911183851160912900	2016/9/11	18:38:51	0.018	53.194377	29	VST	40-96-4	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_161128185059161129900	2016/11/28	18:50:59	20.459	29.173292	82	V	42-95--1	NOR/NOR/NOR/NOR-OFF/OFF/OFF/OFF/OFF/OFF
ASTL1A_161130183847161201900	2016/11/30	18:38:47	0.016	28.812808	50	VST	40-96-4	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_170218183829170219900	2017/2/18	18:38:29	0.014	36.870506	97	VST	40-96-4	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR

170 Scenes (need to check)

La Crau

ASTER L1A	Date	Time(UTC)	pointing_angle	solar_elevation	mod35_cloud	Obs Mode	Path-Row-View	Gain
ASTL1A_000904105612130502902 2	2000/9/4	10:56:12	-2.838	51.806845	1	VST	196-86-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010315105146130515904 6	2001/3/15	10:51:46	-2.876333333	42.399988	1	VST	196-86-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010527104426130515901 9	2001/5/27	10:44:26	-8.579	65.003793	7	VST	195-86-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010527104435130515902 0	2001/5/27	10:44:35	-8.579	65.313005	1	VST	195-87-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010603105024130515905 2	2001/6/3	10:50:24	-0.038666667	66.299248	29	VST	196-86-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010626105523130515903 2	2001/6/26	10:55:23	5.705	67.230488	N/A	VST	197-86-6	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010813105504130515905 7	2001/8/13	10:55:04	8.569333333	59.138174	1	VST	197-86-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_011018104033130515903 1	2001/10/18	10:40:33	-8.534333333	35.365343	100	VST	195-86-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_011018104042130515903 2	2001/10/18	10:40:42	-8.534333333	35.931045	100	VST	195-87-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_011025104620130515900 0	2001/10/25	10:46:20	0.018	33.467822	1	VST	196-86-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_011101105159130515902 2	2001/11/1	10:51:59	8.594	31.643543	89	VST	197-86-7	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_011110104537130515900 0	2001/11/10	10:45:37	0.018	28.353038	87	VST	196-86-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020104105010130516900 1	2002/1/4	10:50:10	8.562333333	22.703793	100	VST	197-86-7	LOW/LOW/LOW/LOW-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020622104239130516902 8	2002/6/22	10:42:39	-0.022	66.162352	1	VST	196-86-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_130629103512130701903 8	2013/6/29	10:35:12	-8.549	65.220443	81	VST	195-86-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_130629103521130701903 9	2013/6/29	10:35:21	-8.549	65.523744	70	VST	195-87-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_140429103510140515902 1	2014/4/29	10:35:10	-8.573	57.864226	N/A	VST	195-86-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_140429103519140515902 2	2014/4/29	10:35:19	-8.573	58.475681	N/A	VST	195-87-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_140607104152140609903 1	2014/6/7	10:41:52	-2.842666667	65.809304	85	VST	196-86-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_140927104134140929904 7	2014/9/27	10:41:34	0.016	43.218251	1	VST	196-86-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_150407104136150408901 2	2015/4/7	10:41:36	-2.866666667	50.464144	6	VST	196-86-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160324104114160325901 2	2016/3/24	10:41:14	-2.866666667	45.57619	1	VST	196-86-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_160425104131160426901 2	2016/4/25	10:41:31	-2.864666667	57.283122	1	VST	196-86-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_170223104108170224900 1	2017/2/23	10:41:08	0.014	34.089247	1	VST	196-86-4	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR

65 Scenes (need to check)

Baotou

ASTER L1A	Date	Time(UTC)	pointing_angle	solar_elevation	mod35_cloud	Obs Mode	Path-Row-View	Gain
ASTL1A_000731034952130418904 5	2000/7/31	3:49:52	-5.691	64.227071	3	VST	127-91-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000731035001130418904 6	2000/7/31	3:50:01	-5.691	64.525813	1	VST	127-92-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000816035026130418902 8	2000/8/16	3:50:26	-8.541333333	60.269536	N/A	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_000908035639130418902 6	2000/9/8	3:56:39	2.674666667	53.501324	1	VST	128-91-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_001127035438130418901 4	2000/11/27	3:54:38	2.843	27.268667	43	VST	128-91-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_001213035414130513900 9	2000/12/13	3:54:14	0.010666667	25.102339	68	VST	128-91-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010515034516130418906 0	2001/5/15	3:45:16	-2.868	65.653012	3	VST	127-92-3	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010616034418130418904 4	2001/6/16	3:44:18	-8.545666667	68.467017	N/A	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_010702034338130418905 9	2001/7/2	3:43:38	-8.547666667	67.829416	N/A	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020502033706130419902 3	2002/5/2	3:37:06	-4.188333333	61.482277	86	VST	127-92-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020619033655130419904 4	2002/6/19	3:36:55	-5.718333333	67.80154	5	VST	127-91-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020619033704130419904 5	2002/6/19	3:37:04	-5.718333333	68.052487	5	VST	127-92-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020907033701130420901 3	2002/9/7	3:37:01	-8.552333333	52.621277	100	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_020930034255130420900 9	2002/9/30	3:42:55	-0.01	44.687746	74	VST	128-91-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_030426034155130420904 1	2003/4/26	3:41:55	5.709	59.84798	2	VST	128-91-6	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_031003034128130420901 1	2003/10/3	3:41:28	-0.000333333	43.814938	1	VST	128-91-4	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_040710033522130420903 9	2004/7/10	3:35:22	-8.539	66.030845	32	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_040811033510130418903 6	2004/8/11	3:35:10	-8.536	60.092965	100	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_040827033457130418903 6	2004/8/27	3:34:57	-8.527	55.672037	100	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_040912033458130418902 4	2004/9/12	3:34:58	-8.55	50.458814	4	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_040919034059130418903 1	2004/9/19	3:40:59	2.832	48.500146	N/A	VST	128-91-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_040928033453130418901 0	2004/9/28	3:34:53	-8.554333333	45.223534	1	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_041005034051130418902 3	2004/10/5	3:40:51	5.700333333	42.781595	1	VST	128-91-6	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_050118033456130420900 2	2005/1/18	3:34:56	-8.558	26.259201	64	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_060630033517130419906 2	2006/6/30	3:35:17	-8.547	67.109596	1	VST	127-92-1	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_060707034122130419907 4	2006/7/7	3:41:22	2.846666667	67.150322	99	VST	128-91-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_130905033545130906903 0	2013/9/5	3:35:45	-5.718	53.063894	7	VST	127-91-2	HGH/HGH/NOR/NOR-LO2/LO2/LO2/LO2/LO2/LO2
ASTL1A_130905033553130906903 1	2013/9/5	3:35:53	-5.718	53.246839	13	VST	127-92-2	HGH/HGH/NOR/NOR-LO2/LO2/LO2/LO2/LO2/LO2
ASTL1A_140627034211140628902 6	2014/6/27	3:42:11	2.869333333	67.899266	100	VST	128-91-5	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_150725033644150726903 8	2015/7/25	3:36:44	-5.718333333	63.952082	28	VST	127-91-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_150725033653150726903 9	2015/7/25	3:36:53	-5.718333333	64.382485	60	VST	127-92-2	HGH/HGH/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR
ASTL1A_170227034138170228900 1	2017/2/27	3:41:38	2.845333333	38.123467	89	VST	128-91-5	NOR/NOR/NOR/NOR-NOR/NOR/NOR/NOR/NOR/NOR

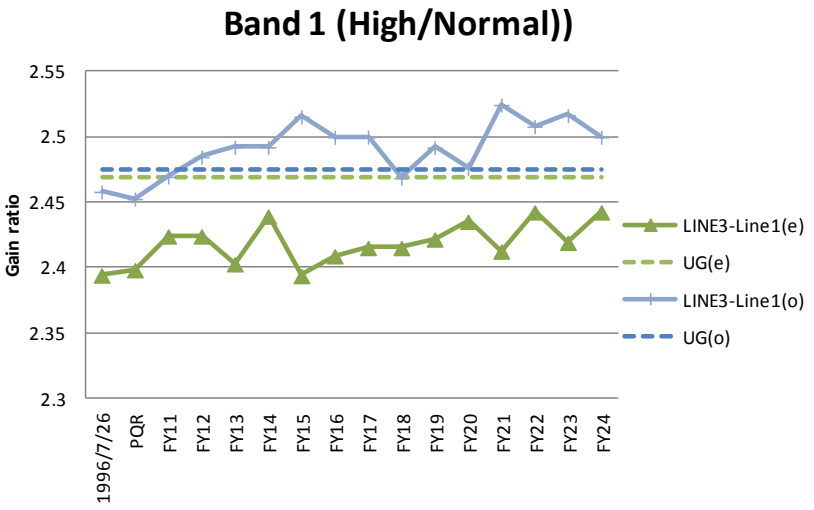
32 Scenes (need to check)

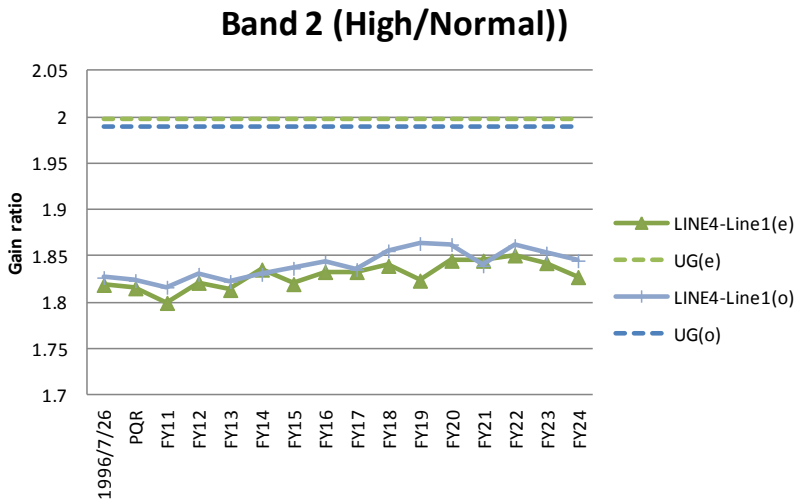
Conclusions

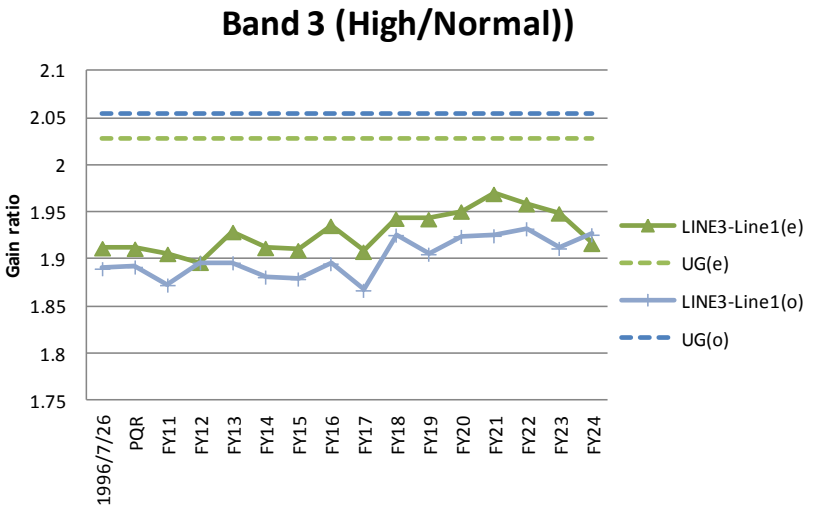
- ASTER observation requests over RadCalNet are done on Feb, 2017.
  - Duration : 3yrs.
  - Observation ：FULL mode (VNIR/SWIR(not Available)/TIR)
  - VNIR Gain：NOR/NOR/NOR
  - Frequency : 1 obs. / 32days (11 obs. / yr)
  - Usual frequency is 1 obs. / 48 days
  - Cloud : 1~100%
- ASTER over RRV on 18 Feb, ASTER over LaCrau on 23 Feb, and ASTER over Baotou on 27 Feb, 2017 are acquired.
- Next : 22 Mar (RRV), 27 Mar (La Crau), and 31 Mar (Baotou)
- It is possible to request for ASTER observation for vicarious calibration.
- ASTER scenes over RadCalNet acquired in the past are also available, but we need to check the pointing angle and gain mode.

Backup Slides …

Gain Ratio and Gain Trend Check by Electrical Calibration

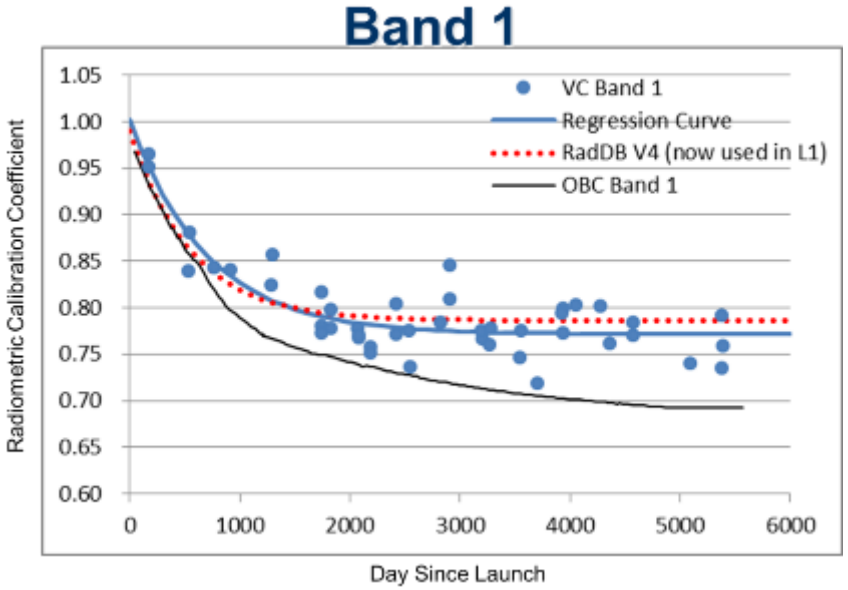


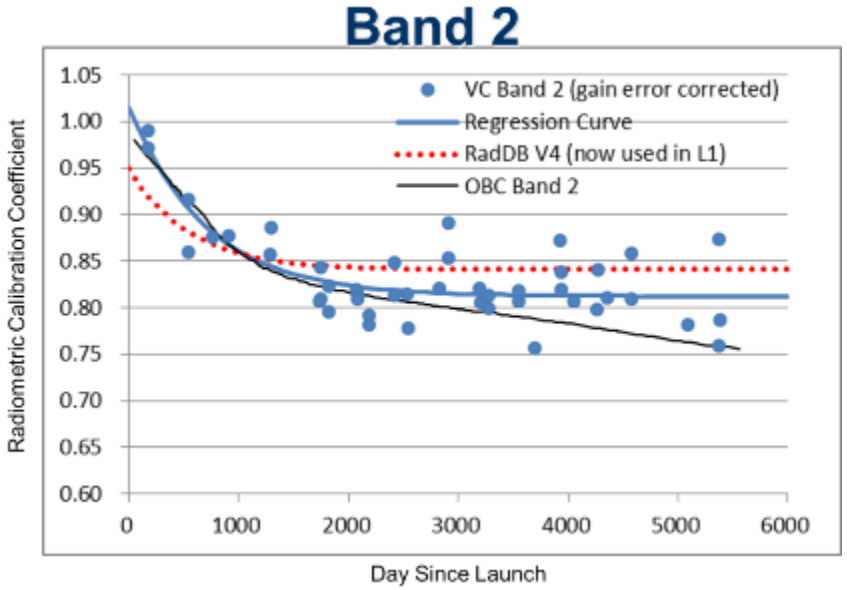




VNIR degradation curve

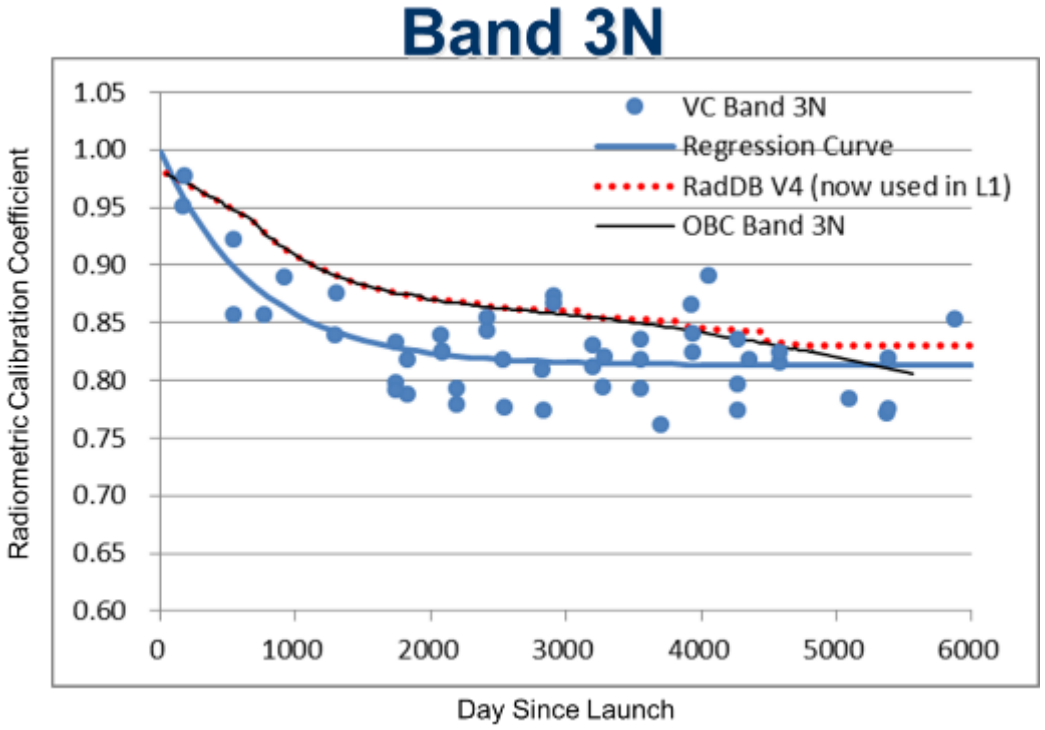
- Calibration for sensitivity degradation for band 1 and 2: Onboard calibration until Feb. 2014
- Band 1 and 2 switched from onboard calibration to vicarious and cross-calibration in Feb. 2014





VNIR degradation curve

- Calibration for sensor sensitivity degradation for band 3N: Onboard calibration “base”



ISS HISUI vicarious calibration

- Observation frequency of the ISS HISUI will be limited to a few times over each calibration site in one year because of its orbital characteristics.

- We can travel to northern and southern hemispheres only once a year for a field campaign for the vicarious calibration, and conditions for ground and sky would **not be always suitable for the measurements.**

- To address the issue, we have started to discuss the use of the automated calibration facilities such as the radiometric calibration network of automated instruments.

That is the RadCalNet.

ISS HISUI vicarious calibration (contd.)

- We have started to discuss the use of the automated calibration facilities as well as **an installation of the automated instruments in Australia.**
  - The installed system will be based on the instruments in Phenological Eyes Network (PEN, http://www.pheno-eye.org/index_e.html).
    - PEN is a network of ground observatories for long-term automatic observation of the vegetation dynamics (phenology), vegetation's optical properties (such as spectral reflectance), and the atmospheric optical properties (such as aerosol optical thickness) and has been started at 2003.
    - An observation protocol and processing methods for the radiometric calibration using the PEN instruments has being developed by AIST.
  - The Australia site as a calibration site in southern hemisphere
    - Easy access to from Japan
    - Good logistic support
    - "Slightly" good homogeneity (Not excellent)
      - The spectrally and spatially homogeneous and topographically flat area doesn't have to be so large, compared with RadCalNet, for the HISUI's ground spatial resolution (30m x 20m). However, the area that shows, at least, slightly good homogeneity is necessary for the smaller adjacency effect
    - Temporal-stability ?
      - The temporal-stability of ground surface is necessary in the HISUI target size (almost 3x3 pixels: 60x60m). We will check it after the installation, and if the stability is not enough, we have to make a correction algorithm.
  - The candidate sites are the Pinnacle desert, Lake Lefroy and …..
    - We hope that Australia site is enough to use…..

Acknowledgement

- Prof. Jeffrey Czapla-Myers (Univ. Arizona) and Dr. Kurtis Thome (NASA GSFC) for support of US field campaign and providing information of automated calibration facilities.