

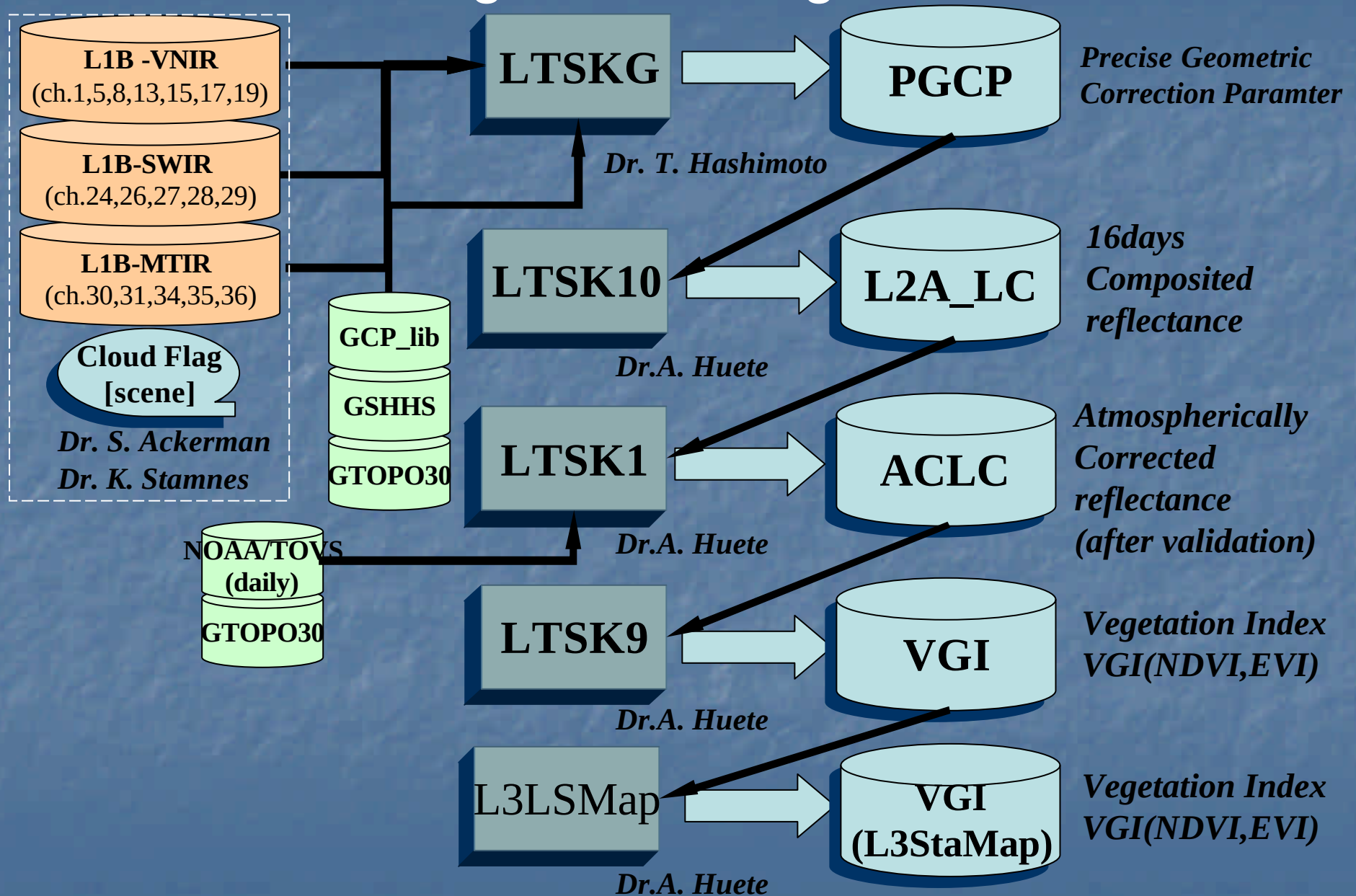
GLI V2 Release

--- Land ---

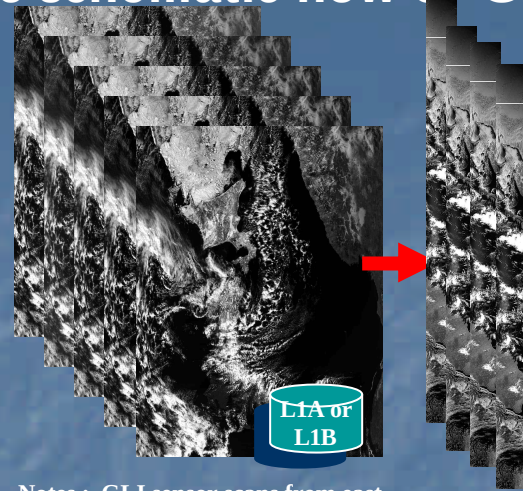
Revision of Ver1.0 to Ver2.0 Standard Algorithm (Land)

Algorithm Code	Product Code	Contents	Channels	Results
LTSK10	L2A_LC	Revision of codes	Ch.1,Ch.5,Ch8,Ch.13,Ch.15,Ch.17,Ch.19,Ch.24,Ch.26,Ch27,Ch28,Ch29,Ch30,Ch31,Ch34,Ch35,Ch36	GOOD
LTSK1	ACLC	Revision of codes (Replacement for LUT etc.)	Ch.1,Ch.5,Ch8,Ch.13,Ch.15,Ch.17,Ch.19,Ch.24,Ch.26,Ch27,Ch28,Ch29	GOOD

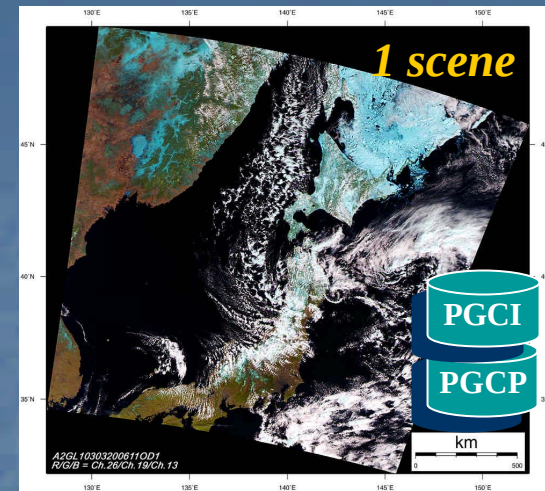
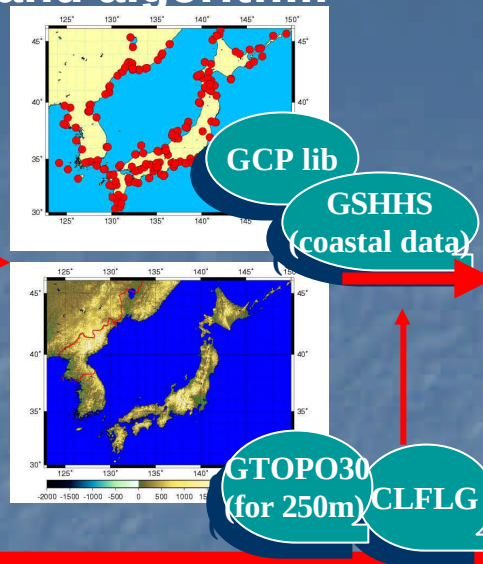
GLI 1km land higher level algorithm



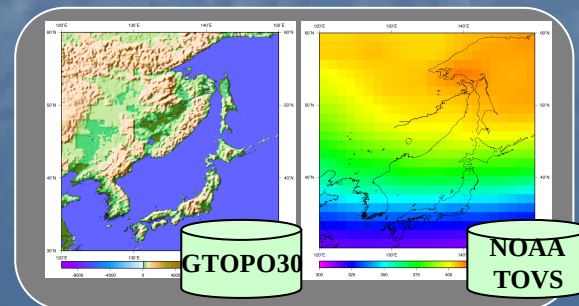
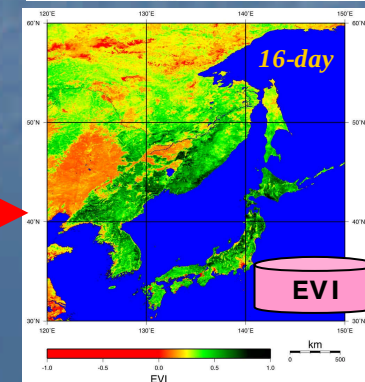
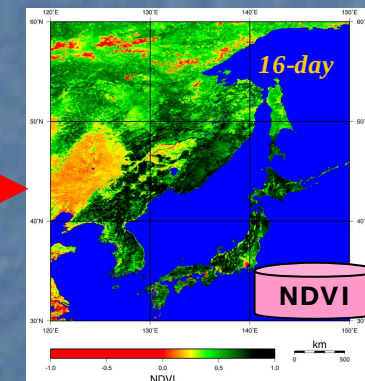
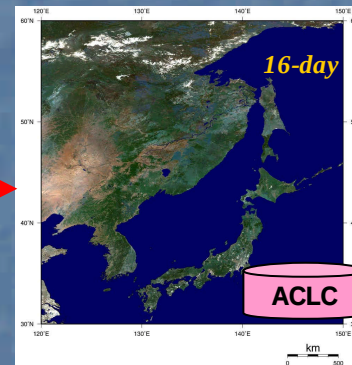
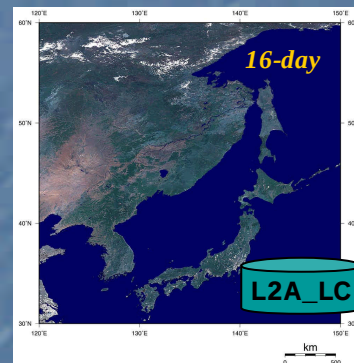
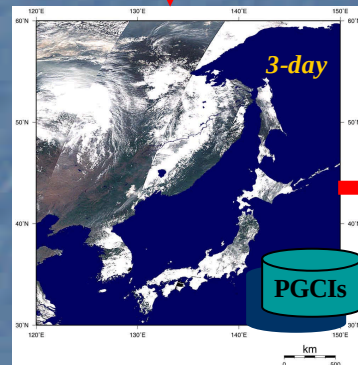
The schematic flow of GLIand algorithm



Notes : GLI sensor scans from east to west.



Accuracy is less than 1pixel

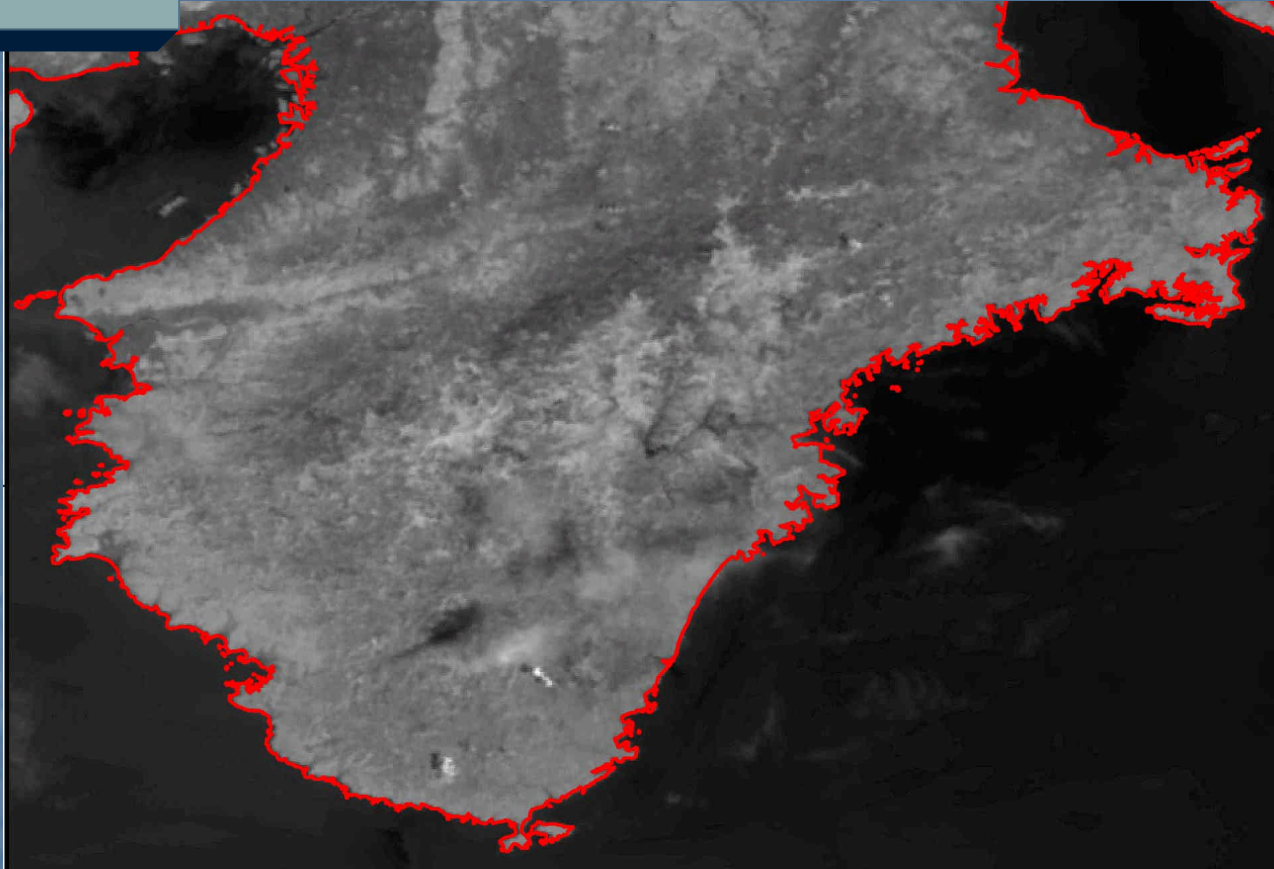


Accuracy Requirement of GLI 1km land standard products

Product Code	Algorithm Code	Product	Name	Required Accuracy
VGI	LTSK9	NDVI	Normalized Difference Vegetation Index	10%
		EVI	Enhanced Vegetation Index	10%
ACLC	LTSK1	ACLC	Atmospherically Corrected Reflectance	10%
PGCP	LTSKG	---	Precise Geometric Corrected Parameter	<1pixel
L2A_LC	LTSK10	---	16-day composite Image	---

LTSKG

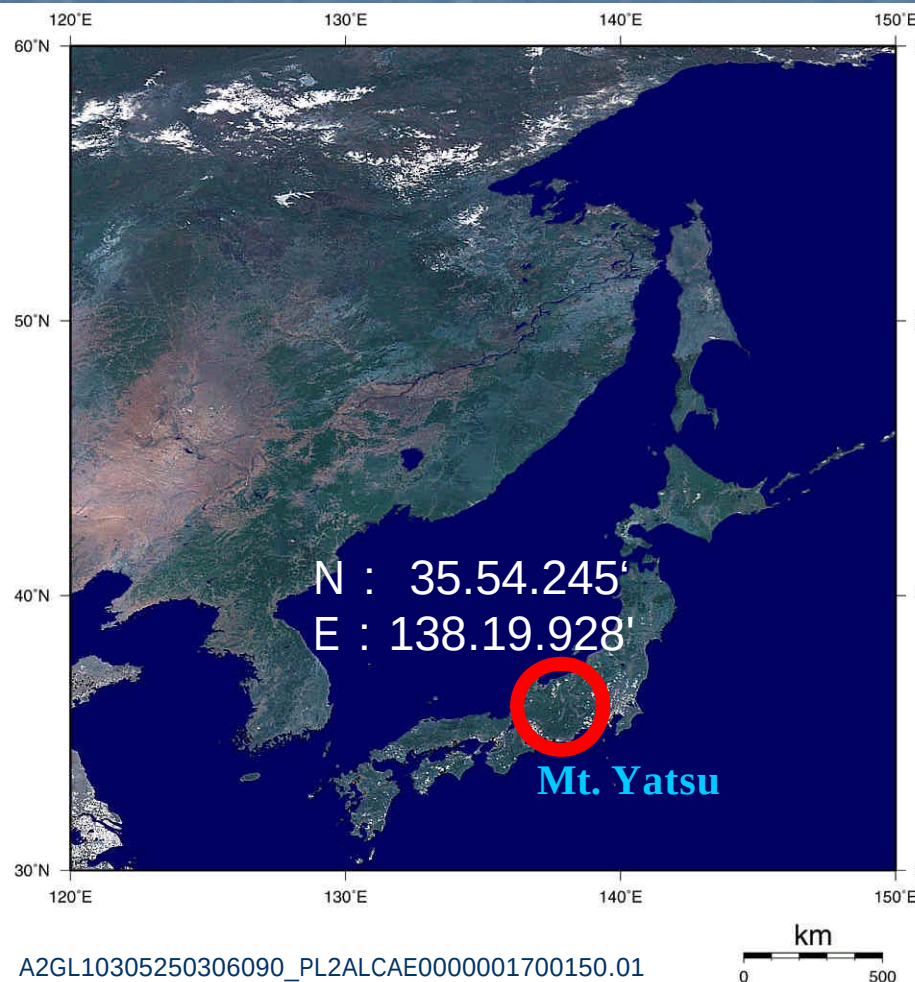
GLI 1km precise geometric correction



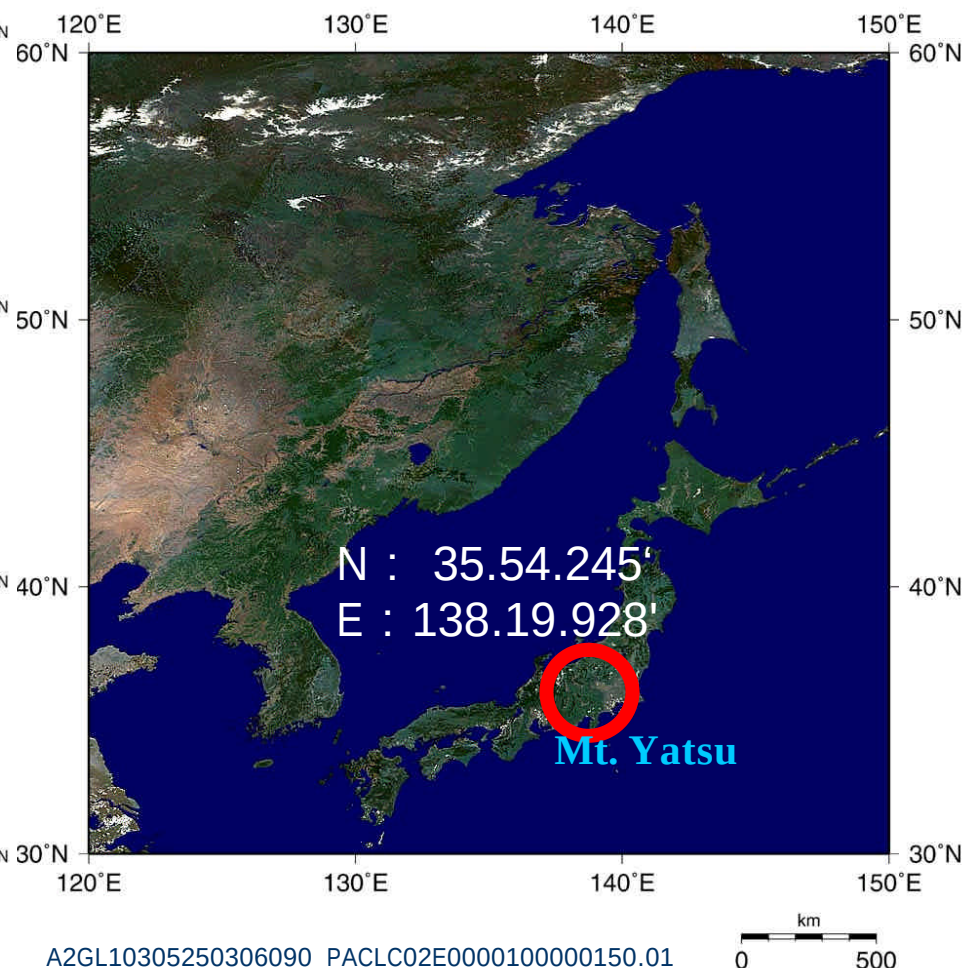
—— The accuracy of 1km/250m precise geometric correction is **less than 1pixel**.

LTSK10

LTSK1

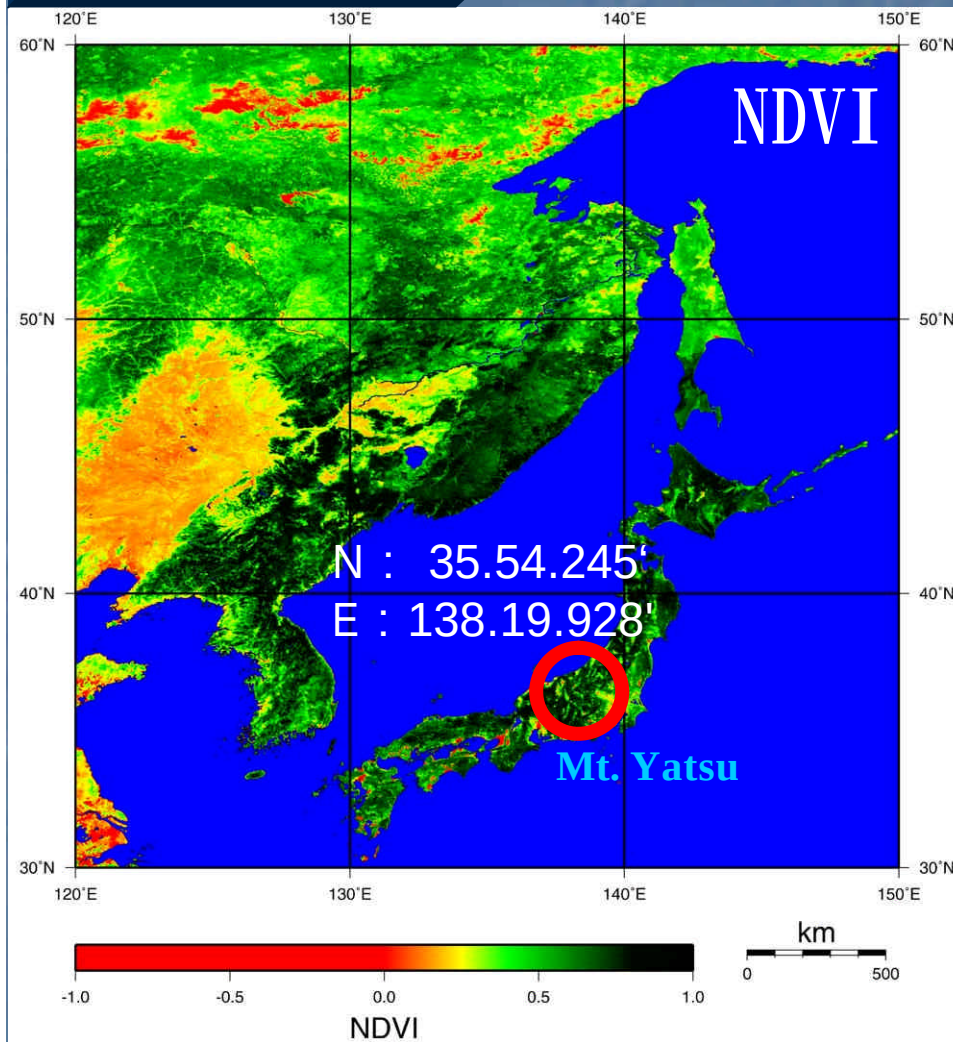


16-day Composite of atmospherically uncorrected reflectance
(May.25~Jun.9, 2003., R/G/B=Ch13/Ch8/Ch5)

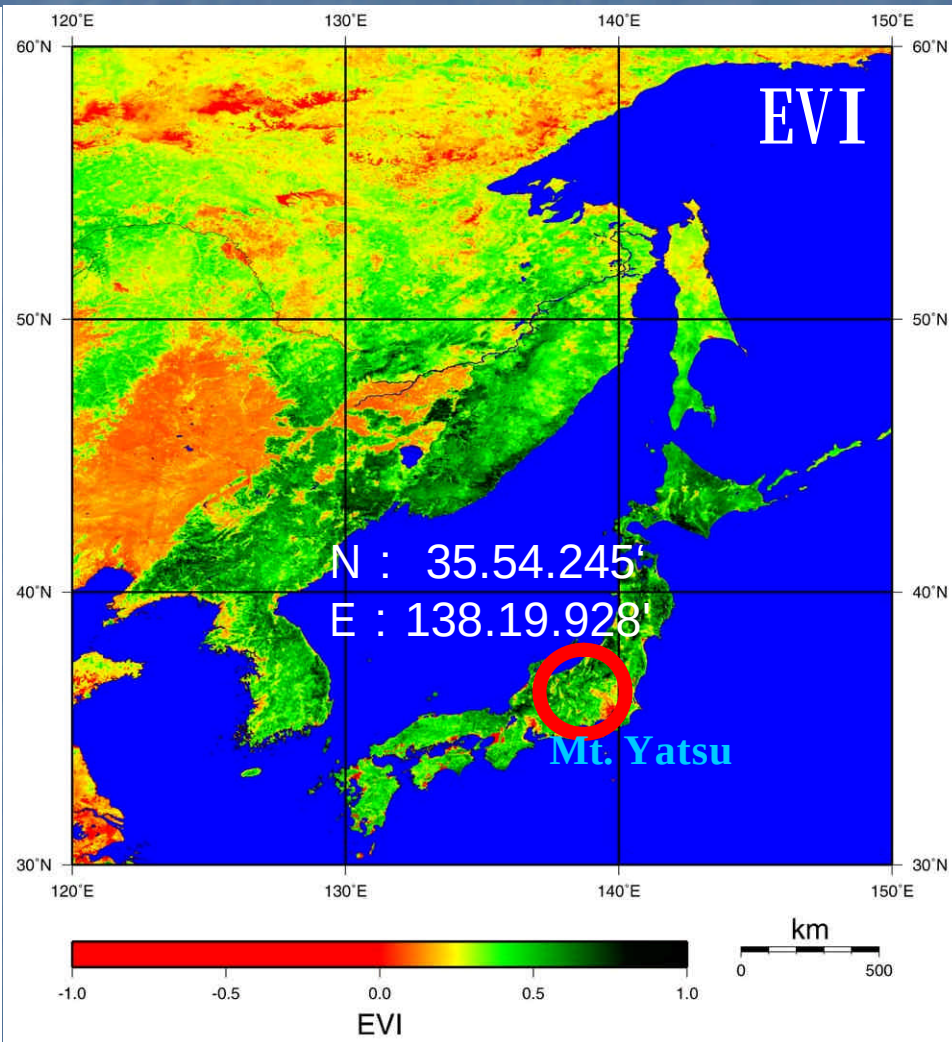


16-day Composite of atmospherically corrected reflectance
(May.25~Jun.9, 2003., R/G/B=Ch13/Ch8/Ch5)

LTSK9



16-day Composite of atmospherically corrected **NDVI**
(May.25~Jun.9, 2003)



16-day Composite of atmospherically corrected **EVI**
(May.25~Jun.9, 2003)

Ground measurement system (Mt. Yatsu)

Validation in Mt. Yatsu is conducted by Chiba university (Honda Lab.).

Example of measurement system



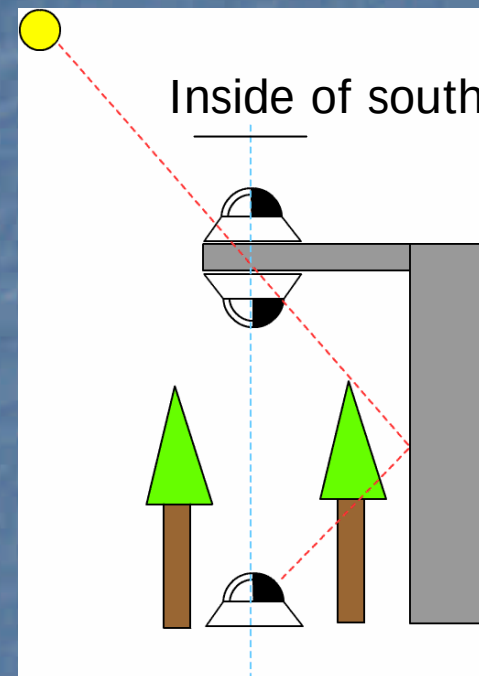
GRATING UV/VISIBLE SPECTRORADIOMETER

MS-700 Éko instruments CO.,LTD)

Wavelength : 0.35 to 1.05 μ m

Resolution : 2.4nm

Accuracy : <0.3nm



Measurement Method

**May 25, 2003~Jun. 9, 2003 -> 1. May 12, 2003
2. Jun. 9, 2003**

Accuracy (ACLC)

GLI land Channel	Center of Wavelength[nm]							Ver1.0		Ver2.0	
		Mt. Yatsu (030512)	Mt. Yatsu (030609)	L2A_LC (ver1.0)	ACLC (Ver1.0)	L2A_LC (Ver2.0)	ACLC (Ver2.0)	Accuracy for ACLC (030512)[%](ver1.0)	Accuracy for ACLC (030609)[%](ver1.0)	Accuracy for ACLC (030512)[%](Ver2.0)	Accuracy for ACLC (030609)[%](Ver2.0)
1	380	0.020	0.012	0.176	0.123	0.159	0.010	-525.920	-899.271	48.728	18.146
5	460	0.025	0.015	0.109	0.09	0.091	0.022	-266.592	-500.413	10.181	-47.108
8	545	0.057	0.034	0.097	0.113	0.076	0.047	-99.056	-231.879	15.852	-40.297
13	678	0.028	0.014	0.064	0.077	0.044	0.031	-171.581	-450.139	-9.967	-122.760
15	710	0.108	0.063	0.111	0.145	0.085	0.076	-34.053	-128.666	29.694	-19.928
17	763	0.294	0.239	0.153	0.204	0.123	0.116	30.781	15.009	60.272	51.219
19	865	0.320	0.260	0.288	0.392	0.233	0.231	-22.320	-50.557	27.819	11.157
24	1050			0.311	0.424	0.267	0.266				
26	1240			0.262	0.358	0.231	0.231				
27	1380			0.011	0.014	0.007	0.006				
28	1640			0.112	0.153	0.086	0.085				
29	2210			0.051	0.07	0.034	0.034				

Accuracy (VGI)

Water Vapor channel

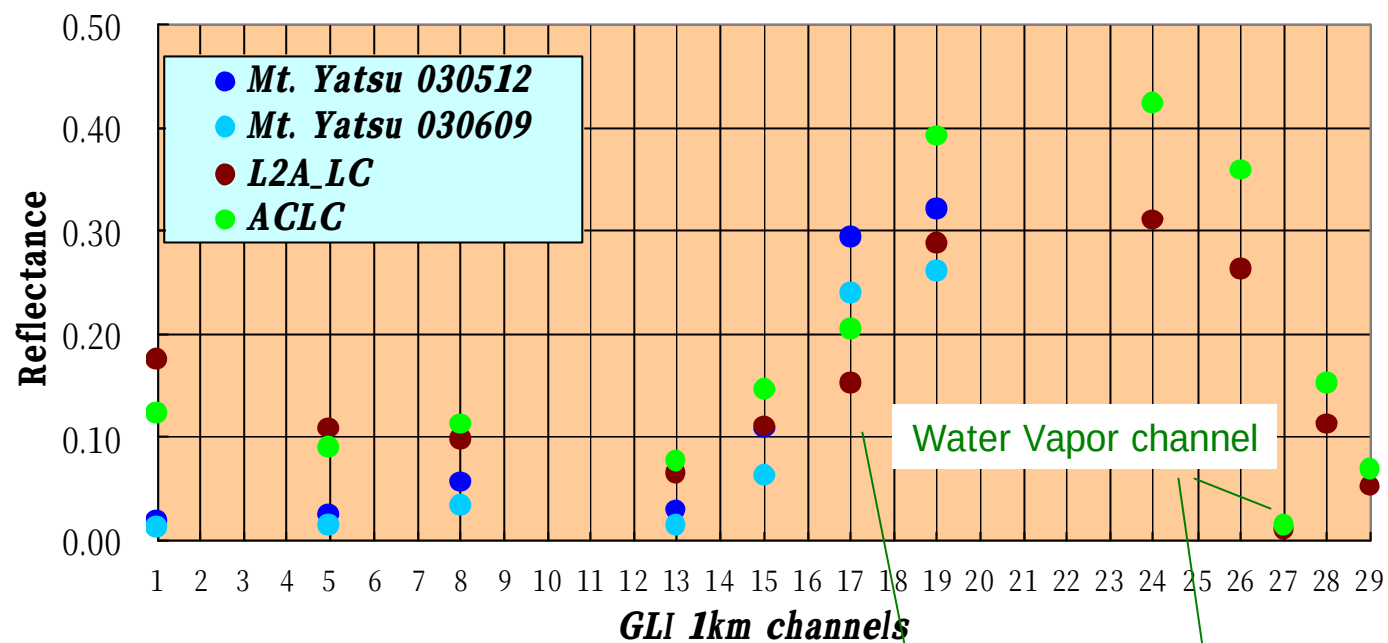
oxygen absorption channel

VI	Mt. Yatsu (030512)	Mt. Yatsu (030609)	L2A_LC (ver1.0)	ACLC (Ver1.0)	L2A_LC (ver2.0)	ACLC (Ver2.0)	Accuracy for ACLC (030512)[%](Ver1.0)	Accuracy for ACLC (030609)[%](Ver1.0)	Accuracy for ACLC (030512)[%](Ver2.0)	Accuracy for ACLC (030609)[%](Ver2.0)
NDVI	0.837	0.898	0.636	0.670	0.682	0.762	19.880	29.128	8.994	23.968
EVI	0.558	0.500	0.655	0.667	0.581	0.399	-19.411	-31.108	28.592	-16.266

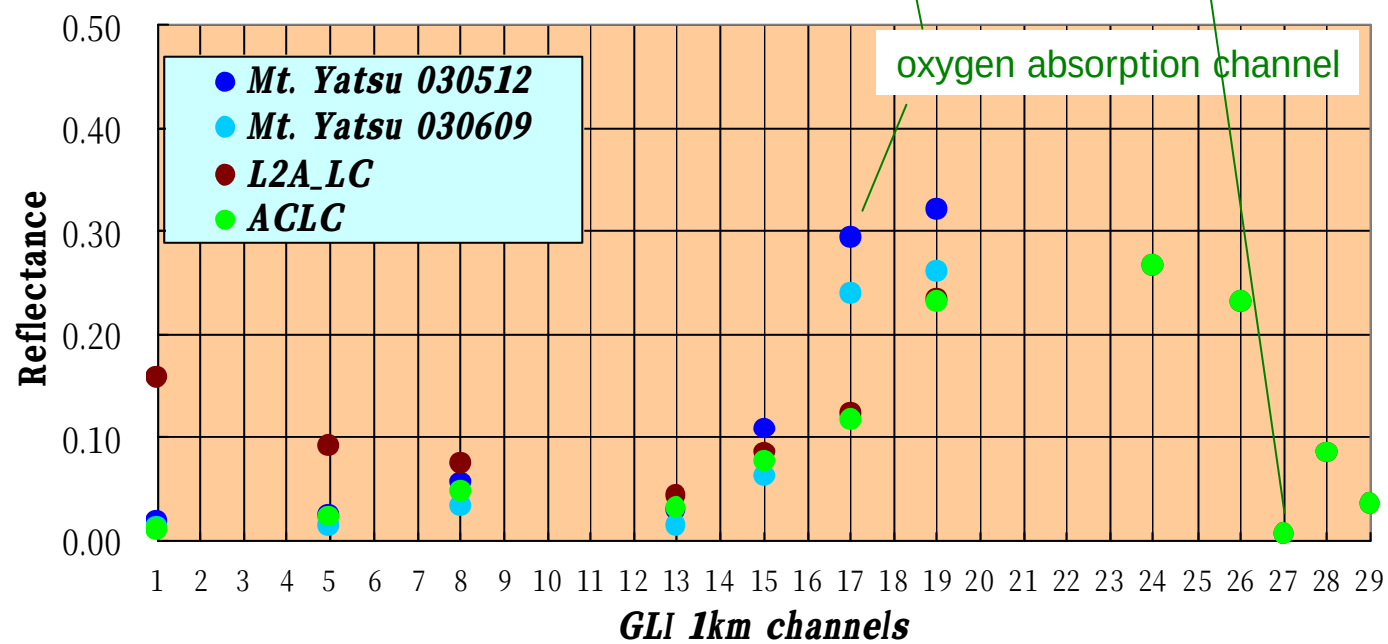
ACLC : The accuracy of ver2.0 is quite better than ver1.0.

VGI (NDVI,EVI) : The accuracy of ver2.0 is better than ver1.0.

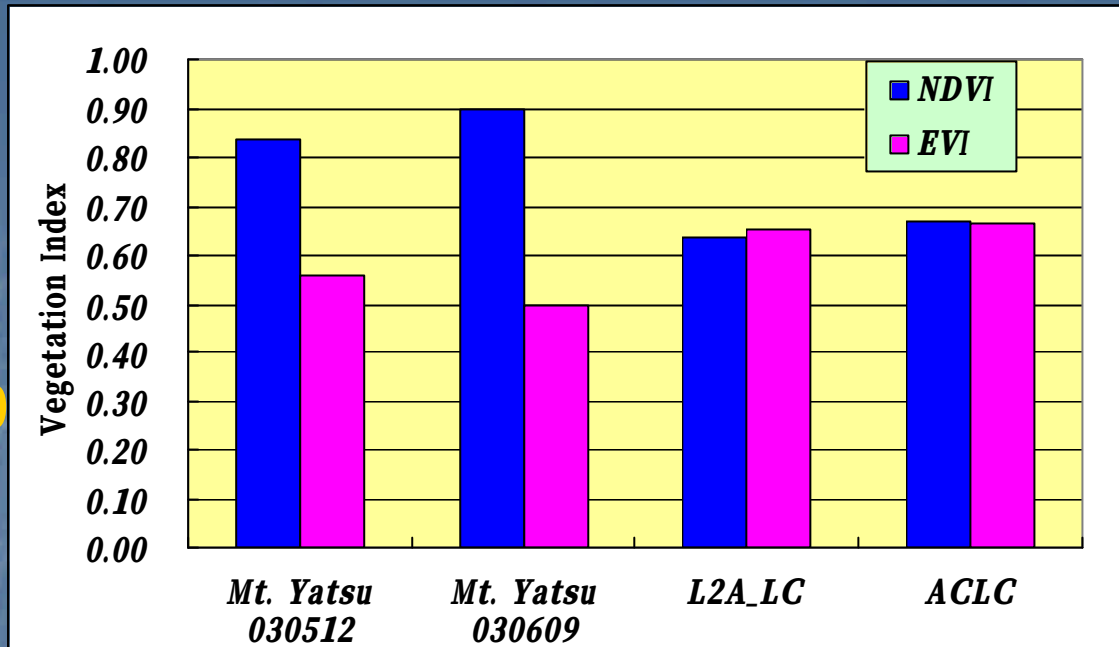
Ver1.0



Ver2.0



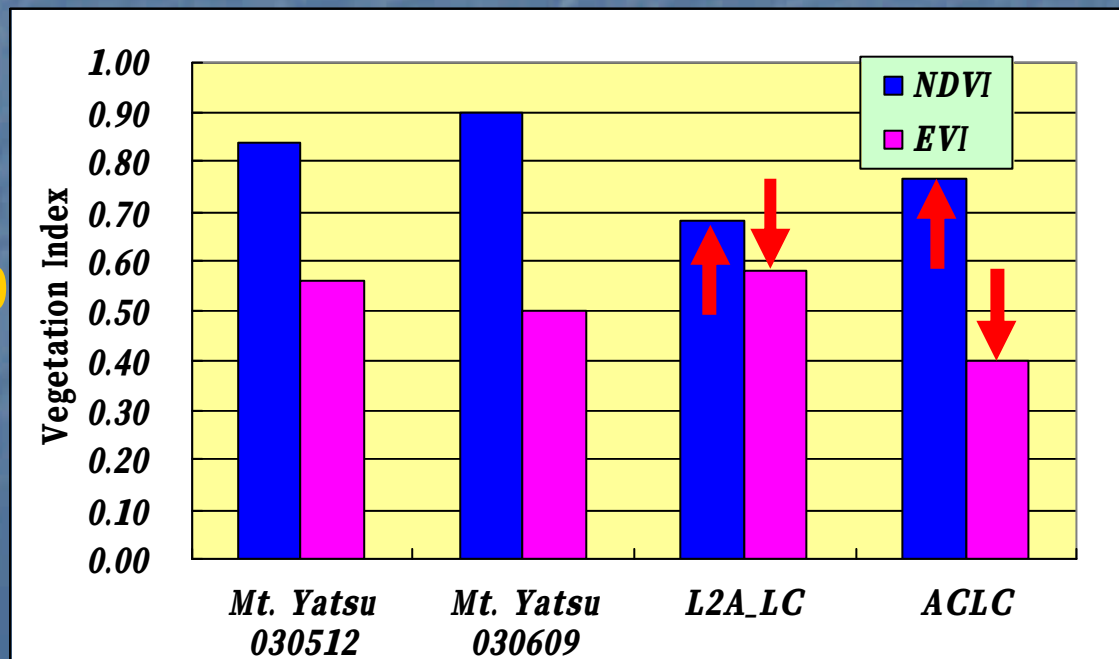
Ver1.0

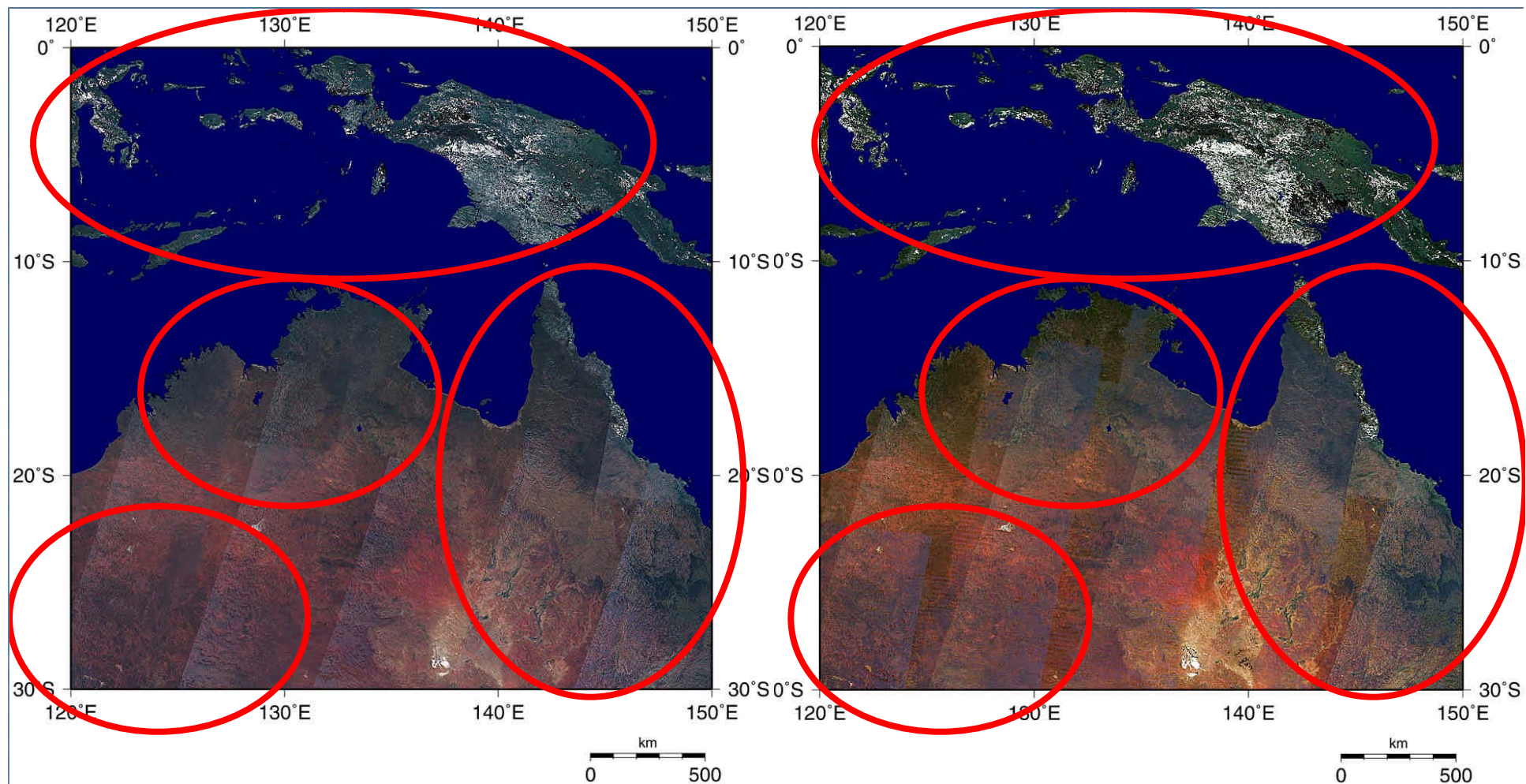


NDVI is higher , but
EVI is lower than Ver1.0

→
Closer to ground truth data!!

Ver2.0



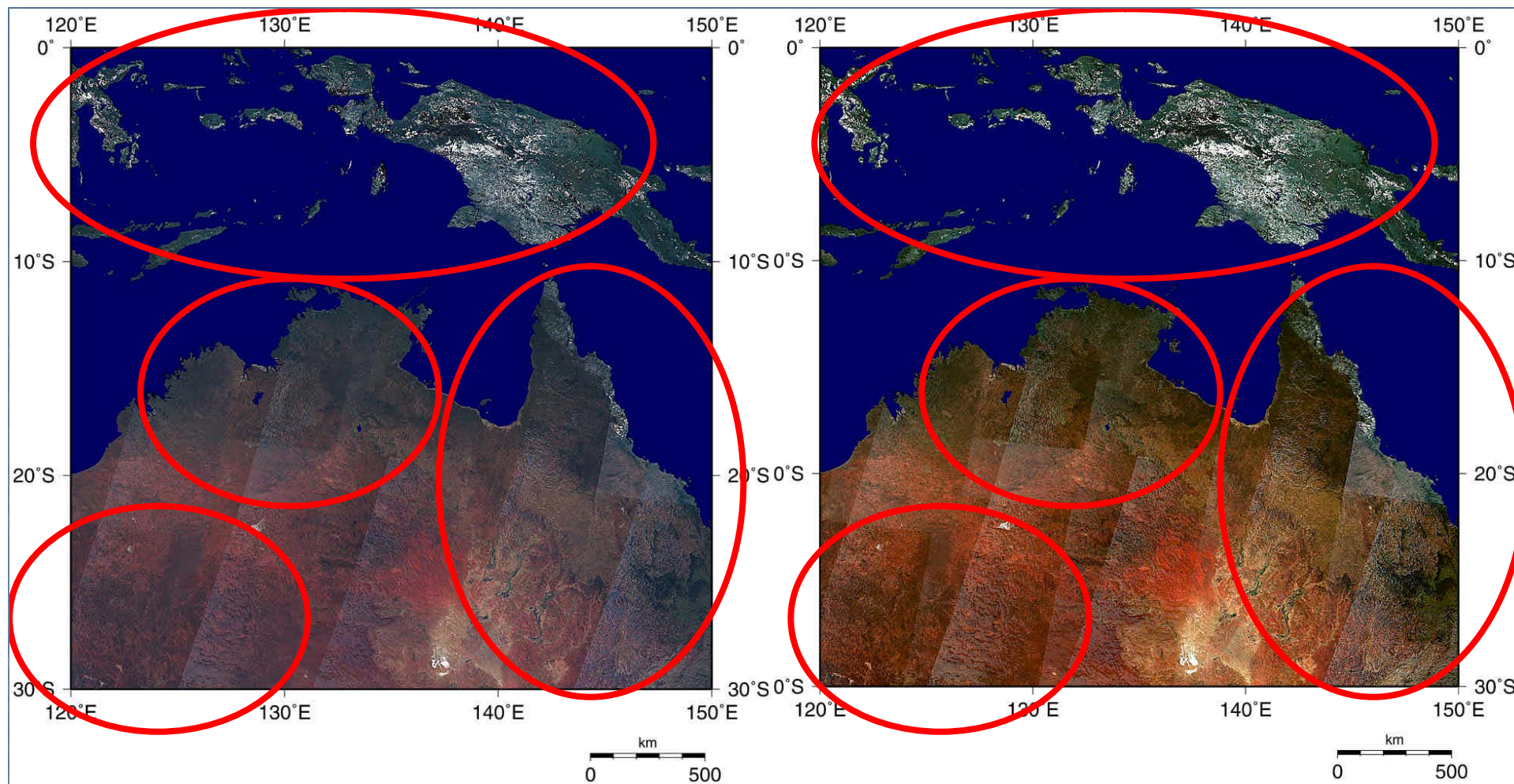


Ver 1.0 L2A_LC

Ver 1.0 ACLC

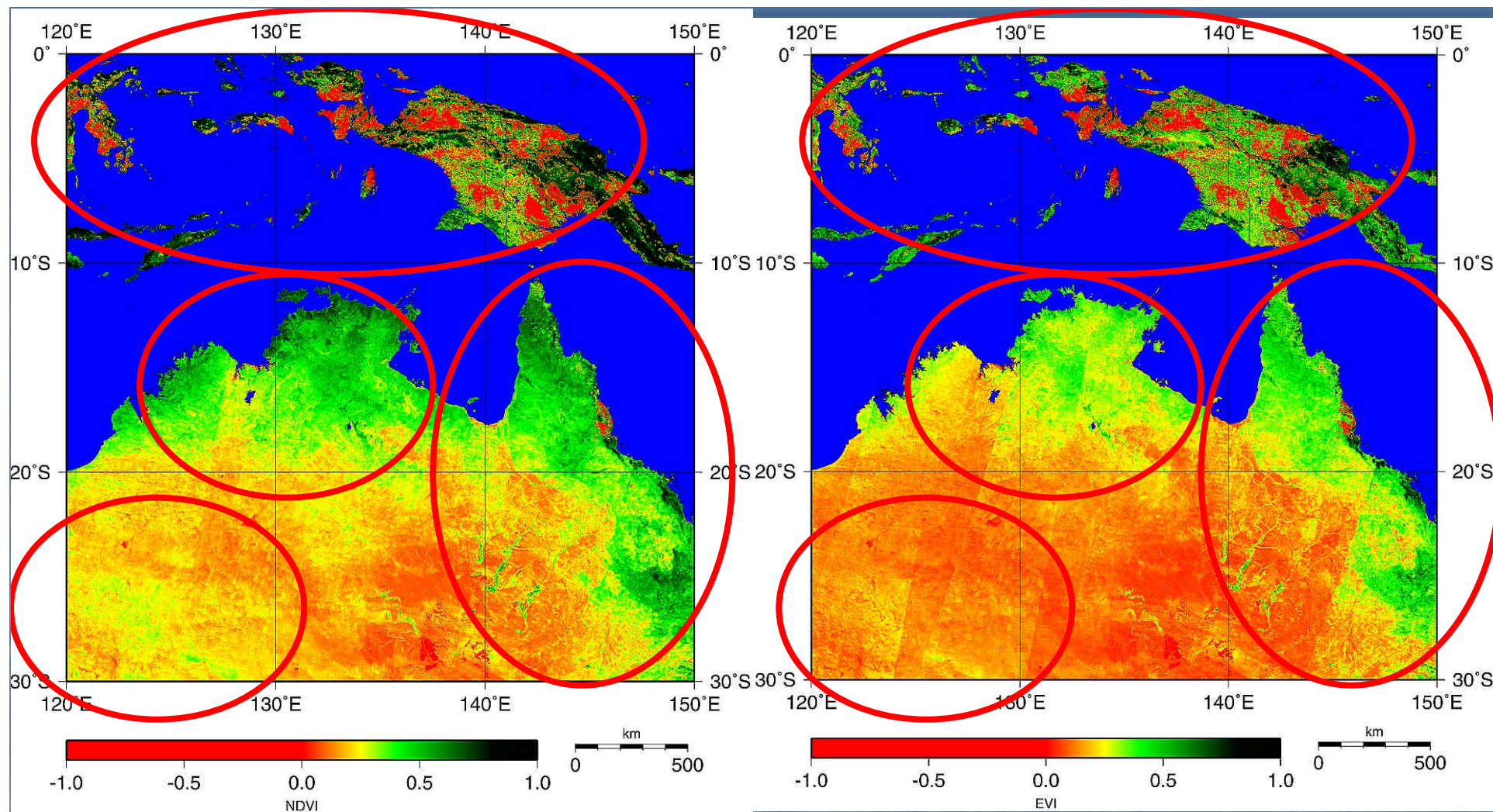
Sometimes atmospherically corrected reflectance is growing up than expected reflectance, and it is NOT normal.

-> Replacement for LUT



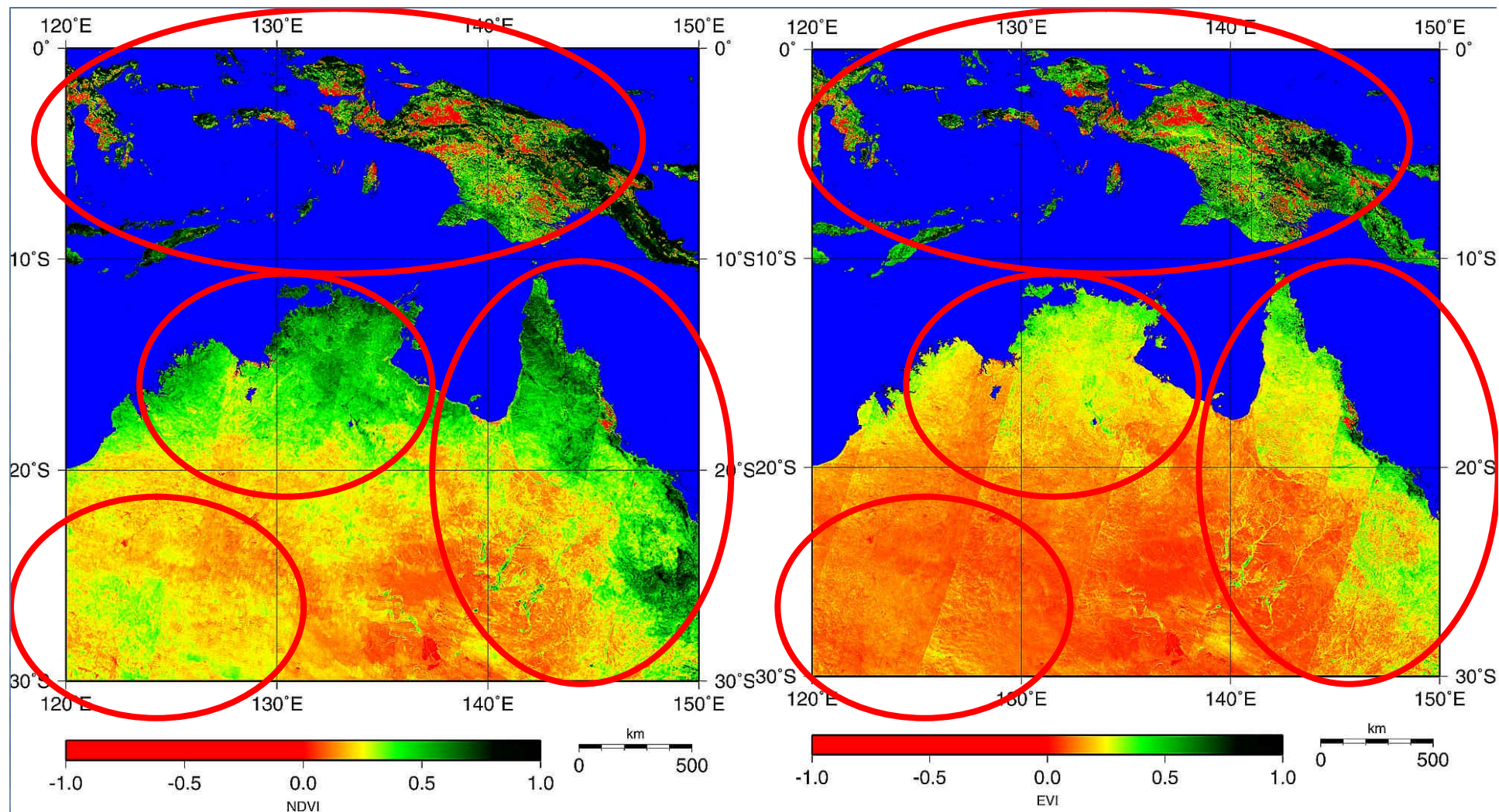
Ver 2.0 L2A_LC

Ver 2.0 ACLC



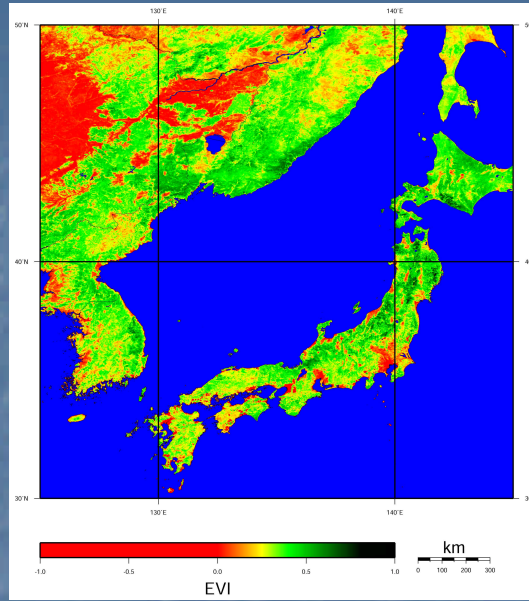
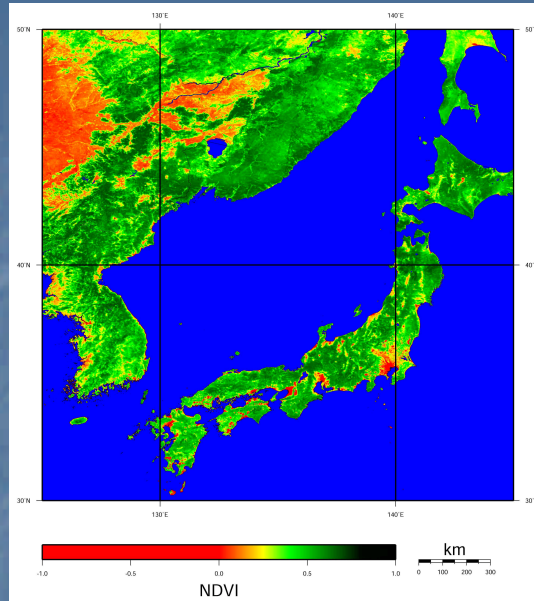
Ver 1.0 NDVI

Ver 1.0 EVI



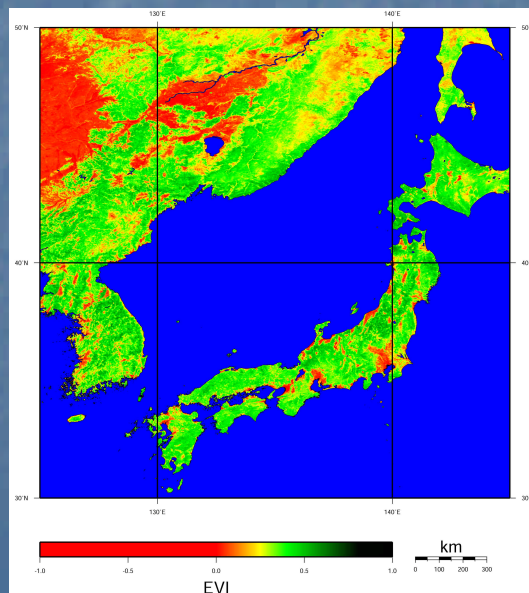
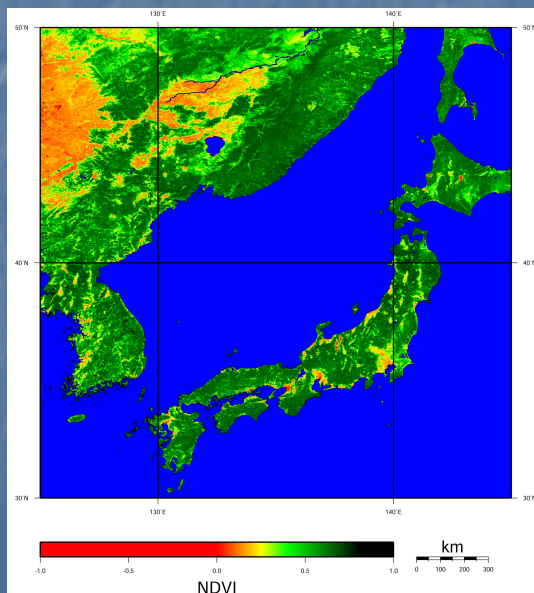
- * Lack of pixels by clouds is decreased.
- * ACLC N/A pixels are decreased.
- * Lower NDVI becomes higher, and higher EVI becomes lower than Ver1.0.

Intercomparison of ADEOS-II/GLI and Terra/MODIS VI



**GLI 1km 16-day
NDVI/EVI Composite
(May.25~Jun.9, 2003.
Left:NDVI Right:EVI)**

Correction for only
Rayleigh scattering and Ozone absorption

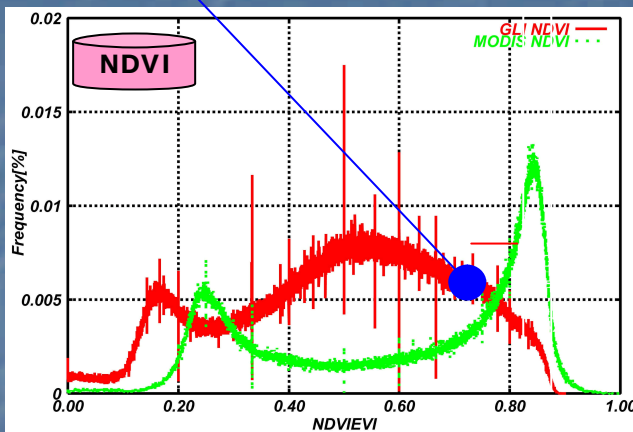


**MODIS 1km 16-day
NDVI/EVI Composite
(MOD13A1)
(May.25~Jun.9, 2003.
Left:NDVI Right:EVI)**

Correction for
* Rayleigh scattering and Ozone absorption
* Aerosol over land
* water vapor
* adjacency effect
* and so on...

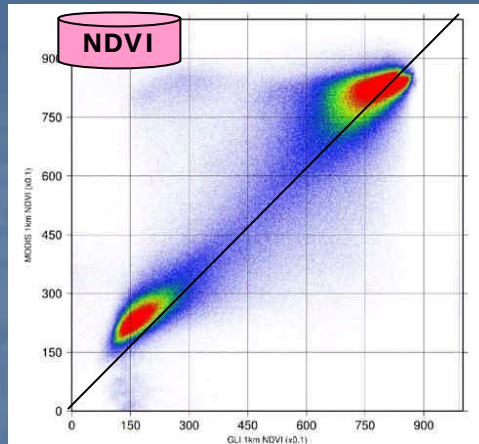
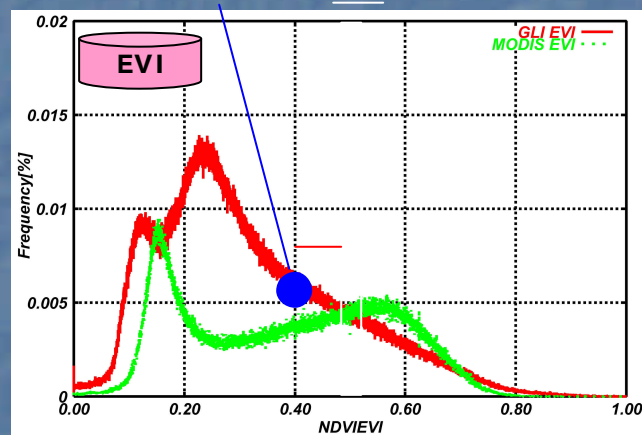
GLI Ver2.0

Field-based

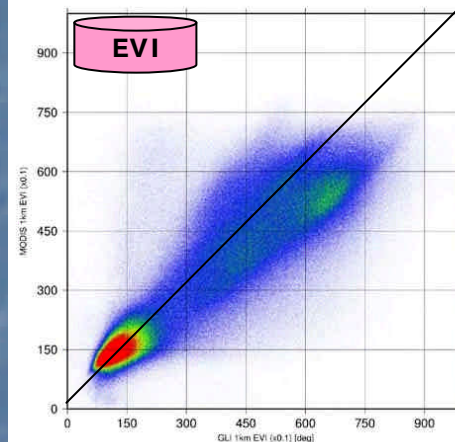


GLI Ver2.0

Field-based



GLI VGI 1km ACLC NDVI
vs. MOD13A2 NDVI



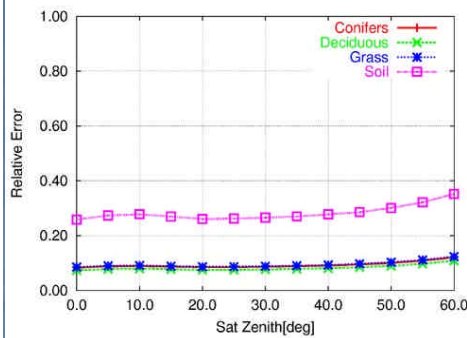
GLI VGI 1km ACLC EVI
vs. MOD13A2 EVI

MODIS

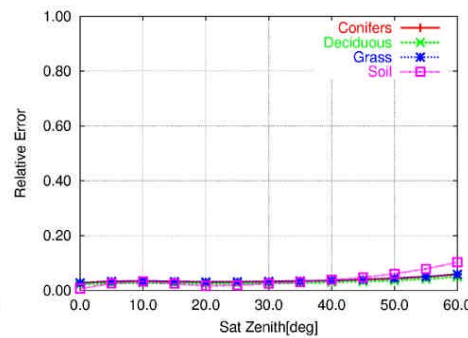
GLI

- *GLI 1km NDVI/EVI is similar trend of MODIS NDVI/EVI.
- *GLI 1km NDVI/EVI is lower than MODIS 1km NDVI/EVI.
- *MODIS NDVI/EVI is closer to field-based value than GLI NDVI/EVI.

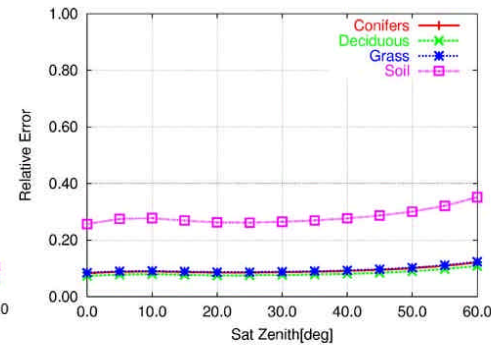
Estimation of effects of water vapor (simulation)



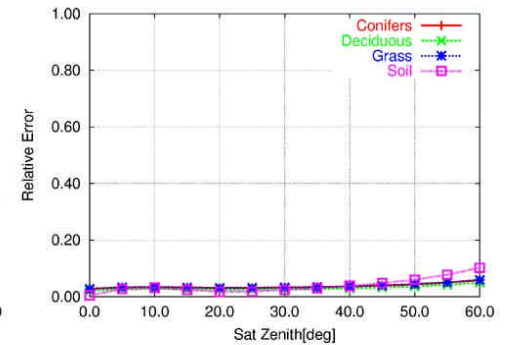
大気未補正 1kmNDVI



GLI 陸域大気補正済 1kmNDVI



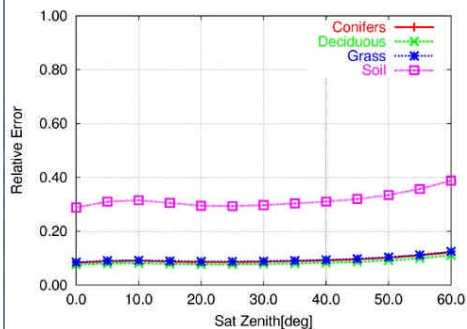
大気未補正 1kmNDVI



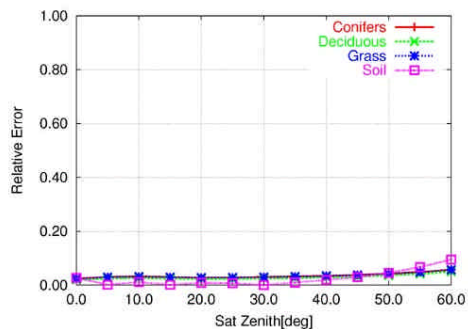
GLI 陸域大気補正済 1kmNDVI

Relative error of GLI **1km** NDVI
N30[deg], Jun.21(**Water:0.0g/cm²**)

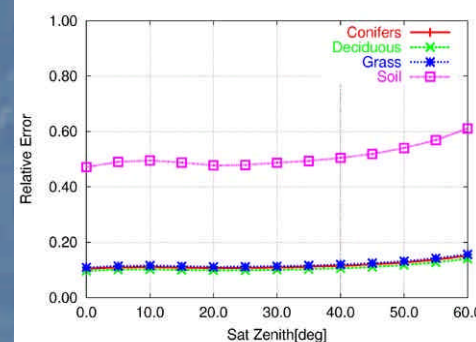
Relative error of GLI **1km** NDVI
N30[deg], Jun.21(**Water:4.0g/cm²**)



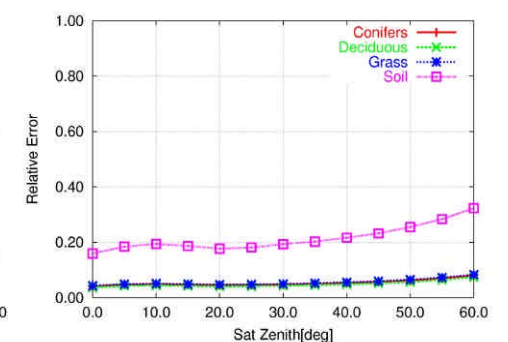
大気未補正 250mNDVI



GLI 陸域大気補正済 250mNDVI



大気未補正 250mNDVI



GLI 陸域大気補正済 250mNDVI

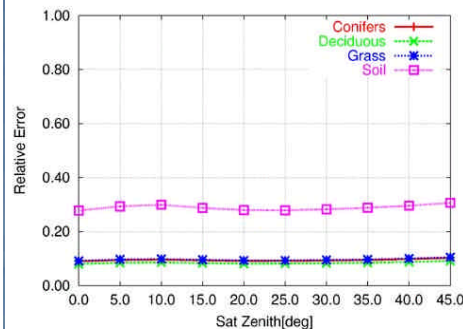
Relative error of GLI **250m** NDVI
N30[deg], Jun.21(**Water:0.0g/cm²**)

Relative error of GLI **250m** NDVI
N30[deg], Jun.21(**Water:4.0g/cm²**)

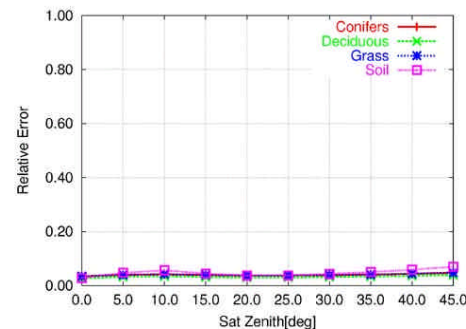
Tropical model = **4.12g/cm²**.

GLI 1km NDVI is NOT affected by water vapor.
GLI 250m NDVI is affected by water vapor.

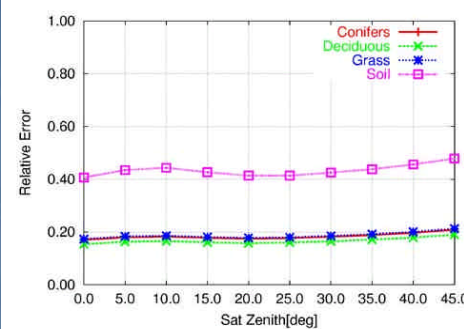
Estimation of effects of aerosol over land (simulation)



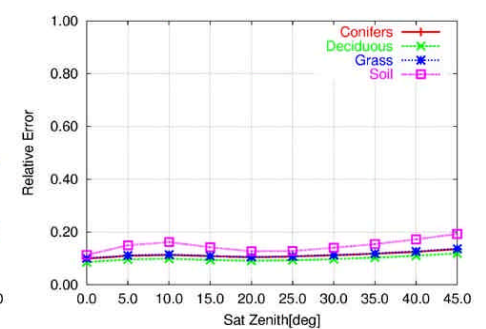
大気未補正 NDVI



GLI 陸域大気補正済 NDVI



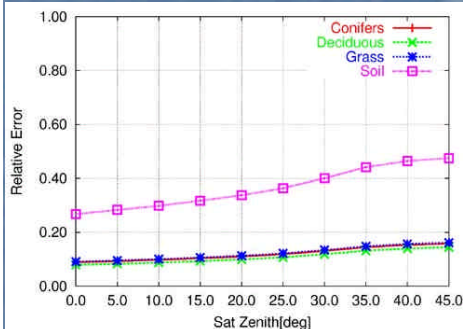
大気未補正 NDVI



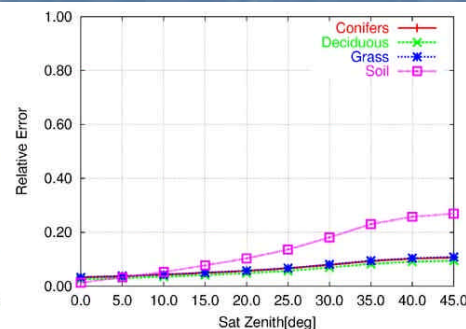
GLI 陸域大気補正済 NDVI

N30[deg], Jun. 21(Continental, visibility:23km)

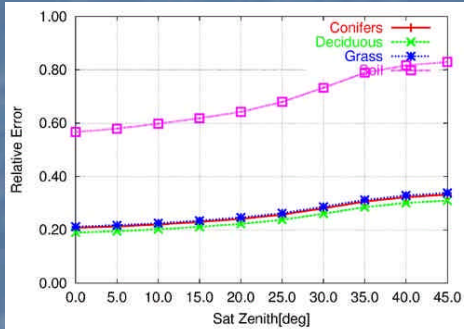
N30[deg], Jun. 21(Continental, visibility:5km)



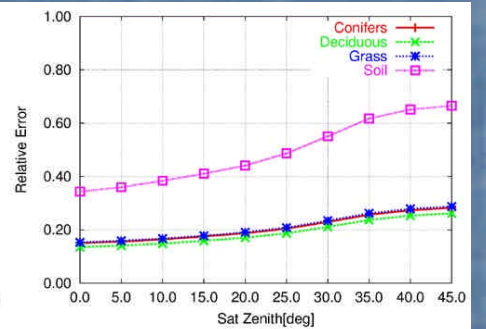
大気未補正 NDVI



GLI 陸域大気補正済 NDVI



大気未補正 NDVI



GLI 陸域大気補正済 NDVI

N60[deg], Jun. 21(Continental, visibility:23km)

N60[deg], Jun. 21(Continental, visibility:5km)

GLI 1km/250m NDVI is affected by aerosol over land.

Conclusions :

1. The accuracy of Ver2.0 is better than Ver1.0. (Especially, 16-day atmospherically corrected reflectance).
2. GLI 1km NDVI/EVI are lower than MODIS 1km NDVI/EVI.
The reasons for difference of MODIS/GLI VI histograms are
+difference of methodology for atmospheric correction and composite
+difference of the characteristics of satellite sensors
+and so on
The coefficients of EVI should be optimized for GLI.
3. Inter-comparison of GLI, other satellite sensors, and field-based measurements data are ongoing studies.
4. GLI 1km NDVI is NOT affected by water vapor, but is affected by aerosol over land.
5. GLI 250m higher level algorithm will be completed.