SCM-03: Land Surface Albedo from geostationary satellites

WebEx Meeting: 10/11/2014

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SCM-03: the project team

EUMETSAT (Darmstadt, Germany)

- Alessio Lattanzio (project coordinator)
- Rob Roebeling

NOAA's NCDC (Asheville, NC, US)

- Jessica Matthews
- Ken Knapp

Visiting scientist in EUMETSAT One week in October 2014

JMA (Tokyo, Japan)

- Masaya Takahashi
- Arata Okuyama

Visiting scientist in EUMETSAT from March 2014 to March 2015

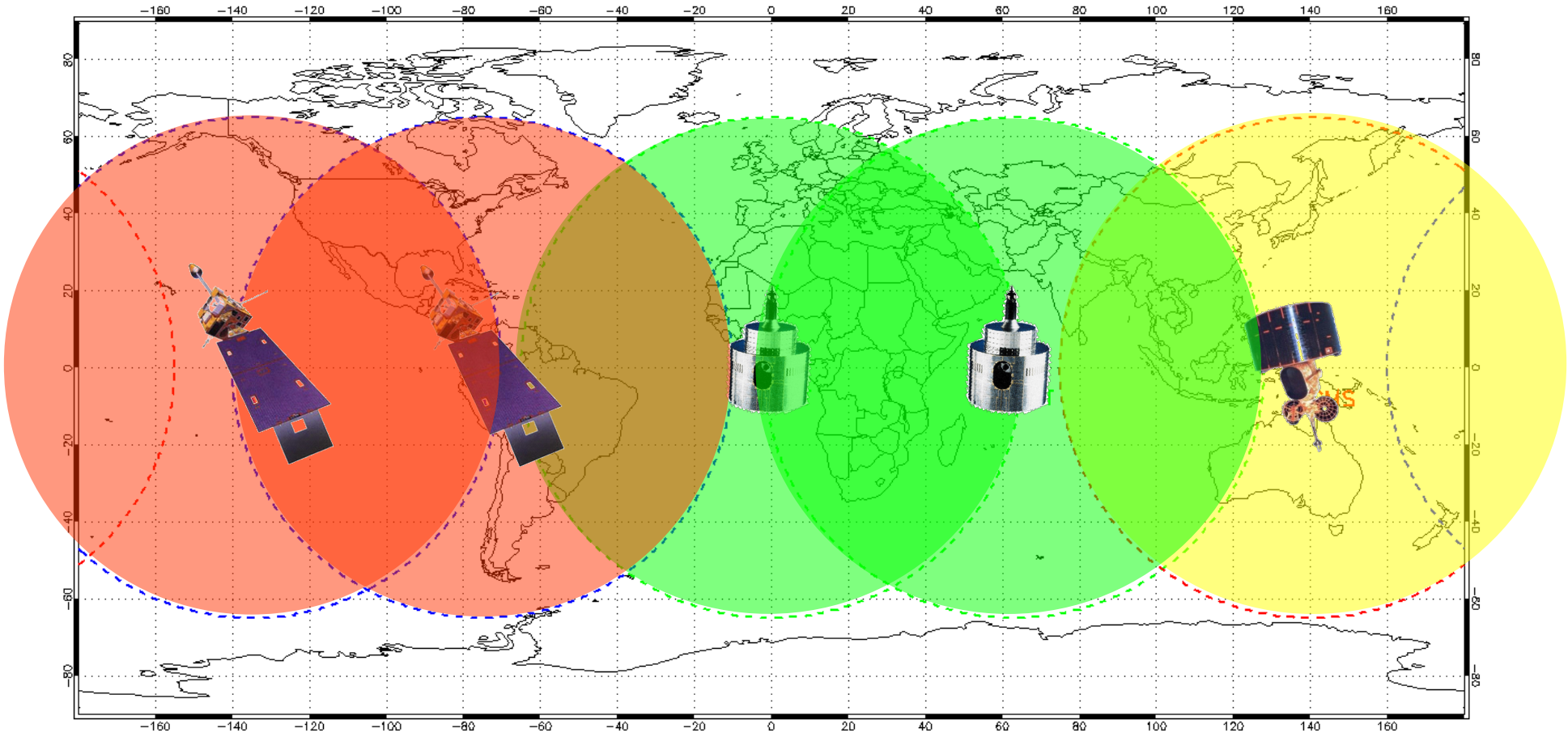
CM-SAF (Offenbach, Germany)

- Reto Stoeckli

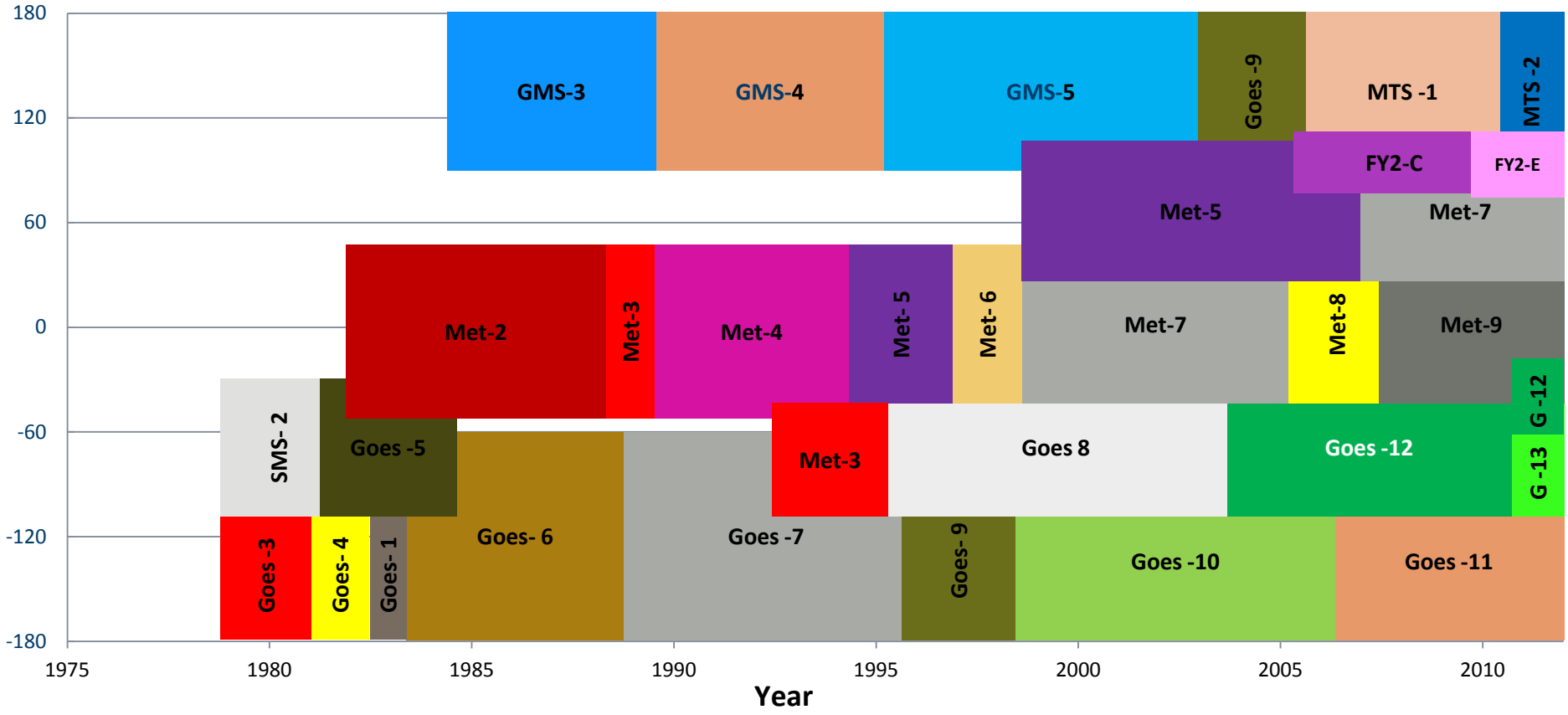
The EUMETSAT Network of Satellite Application Facilities

CM SAF Climate Monitoring

GEO Ring – Spatial Coverage



GEO Ring – Temporal Coverage



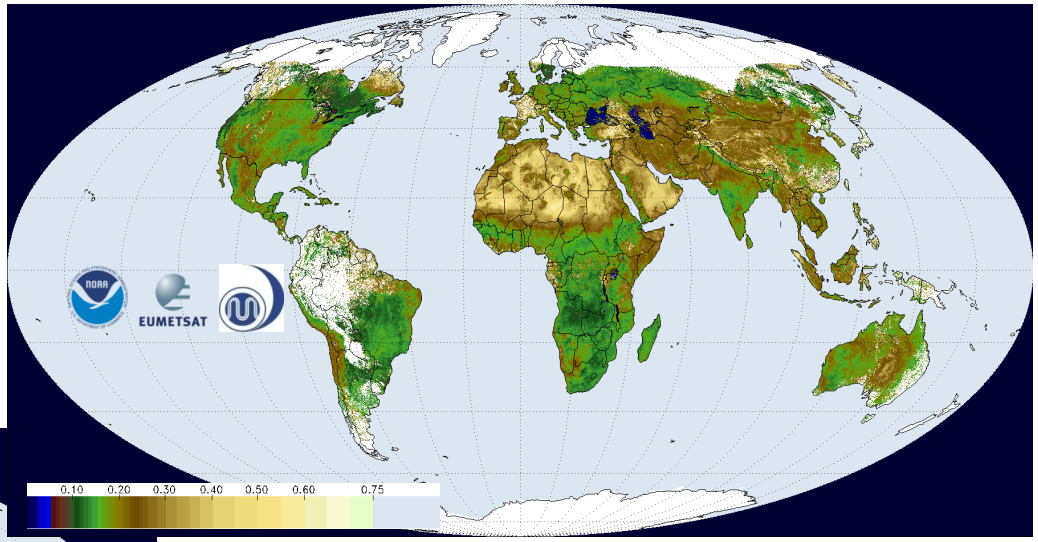
GEO Ring – Proof of Concept

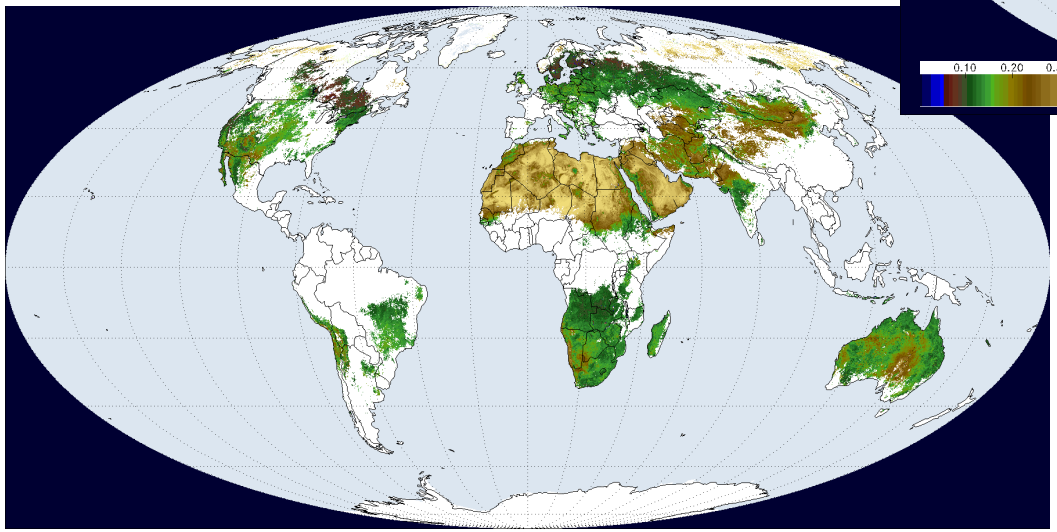
Black sky albedo (0.3-3.0 µm)

Grid: 0.25 deg

Period: 1-10 of May 2001

Satellites: GMS-5, MET-5,MET-7, GOES-8 and GOES-10





MODIS: MCD43C3 0.05 deg

quality flag 0,1

(min 75% full inversion retrieval)

Project Plan: 2014-2018

Task	Year	Actors
– Updates to retrieval scheme including inclusion of common cloud mask approach, utilization of common method of inter-calibration, e.g., DCC method, implementation of common NWP data, implementation of other product output changes such as temporal resolution and format; – Adaptation of retrieval scheme to the SEVIRI and other instruments; – Set up of validation procedures for Level-2 product.	2014	EUM EUM EUM, JMA, NOAA
– Technical assessment of the improved retrieval scheme; – Implementation of updated retrieval scheme at all three agencies; – Processing of data with existing validation counterpart; – Validation of test products.	2015	EUM EUM, JMA, NOAA EUM, JMA, NOAA EUM, JMA, NOAA
– Adaptation and re-implementation of algorithm following validation exercise; – Processing of Level-2 data product for GEO tapestry; – Establish user documentation and prepare for public distribution; – Development of Level-3 product inclusive of user consultation.	2016	EUM EUM, JMA, NOAA EUM, JMA, NOAA EUM, NOAA
– Produce and validate Level-3 product and redistribute to partners; – Perform user driven studies on usage of the product to increase utilization; – Arrange distribution of L2 and L3 products from European, Japanese and US sites.	2017	EUM EUM , JMA, NOAA EUM, JMA, NOAA
– Update common calibration with results from SCOPE-CM inter-calibration project and rerun full data record; – Study product improvements with respect to utilization aspects.	2018	EUM, JMA, NOAA EUM, JMA, NOAA

Project Plan: 2014

Task	Sub-Tasks	Period	Actors
Change of Level 2 product specifications	• Generation of a daily product instead of a 10 days composite • NetCDF4 format, Climate Forecast standard compliant: full definition and implementation of data and metadata	Q1	NCDC (EUM)
Residual Cloud Removal	• Investigate different approaches for cloud detection and removal (usage of the IR channel, seasonal variation, surface type, etc.) that could be included in the GSA retrieval scheme. • Investigate available cloud mask products at the proper spatial and temporal resolution for all GEO platforms involved.	Q1-Q3	EUM, JMA, NOAA
Inter-calibration	• Apply common methods for inter-calibration of the VIS channel. Existing GSICS methodology such as Deep Convective Clouds will be examined to allow progress with the production of an albedo time series. At a later stage, results from the SCOPE-CM project on inter-satellite calibration will be used for further improvements.	Q1-Q3	EUM, JMA, NOAA
NWP Data	• Establish a common set of NWP data	Q2	EUM, JMA, NOAA
Inclusion of other GEO instruments	• Investigate available options for best usage of the SEVIRI instrument in the current retrieval scheme • Investigate potential inclusion of further instruments.	Q3-Q4	EUM EUM, JMA, NOAA
Implementation of changes to the GSA software	• Implement potential changes to the input image data ingestion due to new methods for residual cloud removal, inter-calibration and new instruments. • Develop software changes as needed.	Q4	EUM EUM, JMA, NOAA
Validation	• Start development of a common protocol for evaluation of the resulting time series (see for instance Fell et al., 2012), encompassing: methods, validation datasets, software.	Q4	EUM, JMA, NOAA
Reporting and Planning	• Report to SEP, establish web content and create work plan for 2015.	Q1,Q3 Q4	EUM, JMA, NOAA

Project Plan: tasks for 2014

Generation of daily products (Level 2): NCDC

Information from the daily inversion are already available. They only need to be stored into an output file

NetCDF4 Output format CF conventions (Level 2): NCDC

a prototype from Native to NetCDF4 has been already developed (definition of common metadata ongoing).

Cloud Mask (Level 2): EUM

Cooperation with the CMSAF for a Cloud Mask dataset for MFG and applicable to other GEO (GOES, GMS).

Investigate other methods (see following slides)

Cloud Removal (Level2 -> Level3): EUM

Currently investigating post-processing cloud removal strategies (background DHR map, seasonal variation).

Inter-calibration (Level 2): EUM/NCDC/JMA

Cooperation with GSICS and SCM06 IOGEO project

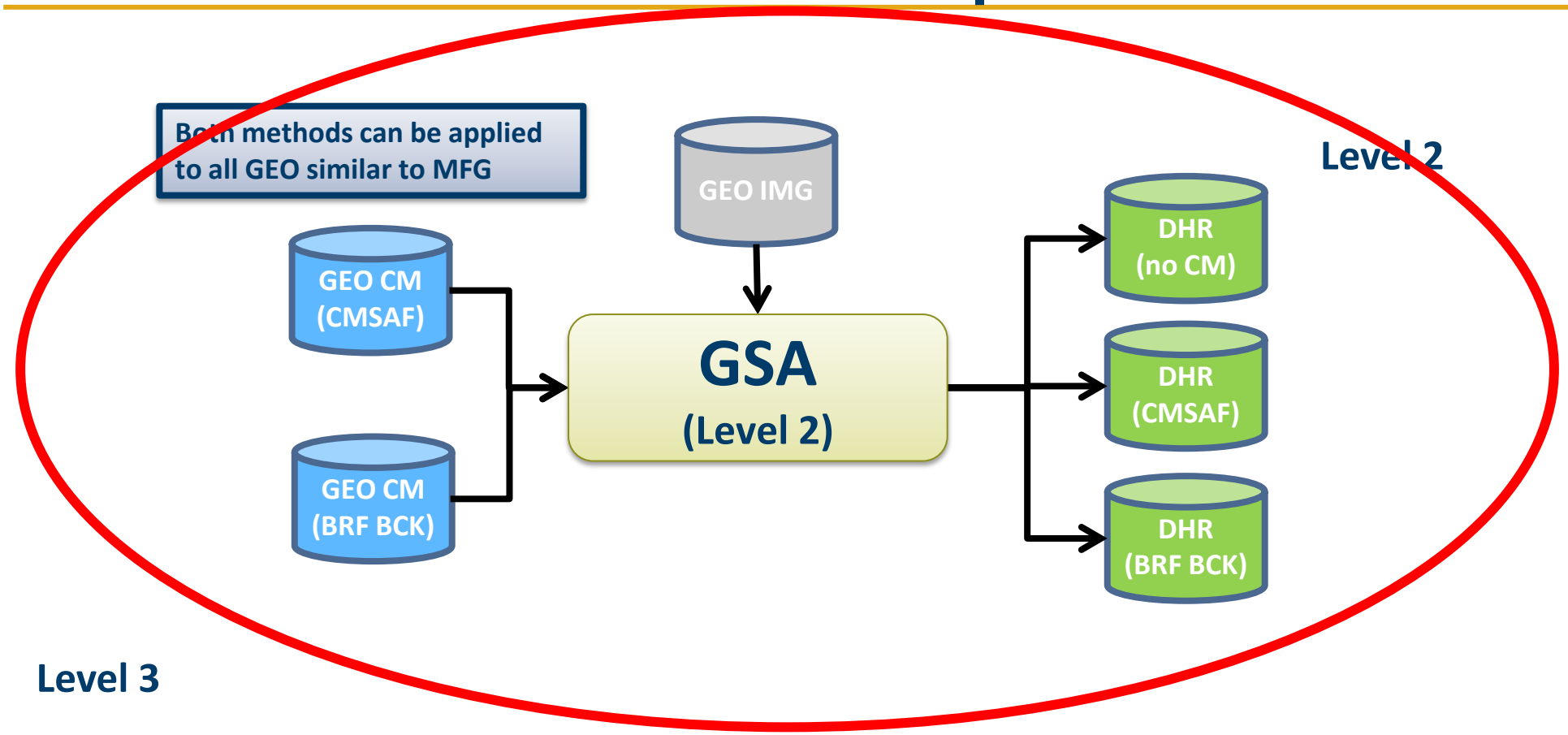
NWP Data: EUM/NCDC/JMA

Download of the same NWP (TCWV, TCO3) data from ECMWF for homogenization of input data

Validation scheme

- Validation scheme discussed during visit from J. Matthews. Following ALBEDOVAL as template.

Cloud Removal for Level 2 and pre-Level 3



Cloud detection: Pre-Level 2 1/5

Background BRF Cloud Mask

- BRF Background map from all available MVIRI VIS images (one/month)
- Usage of a simple threshold (depending on SZA) method for detecting cloud
- Enhancement : include IR information

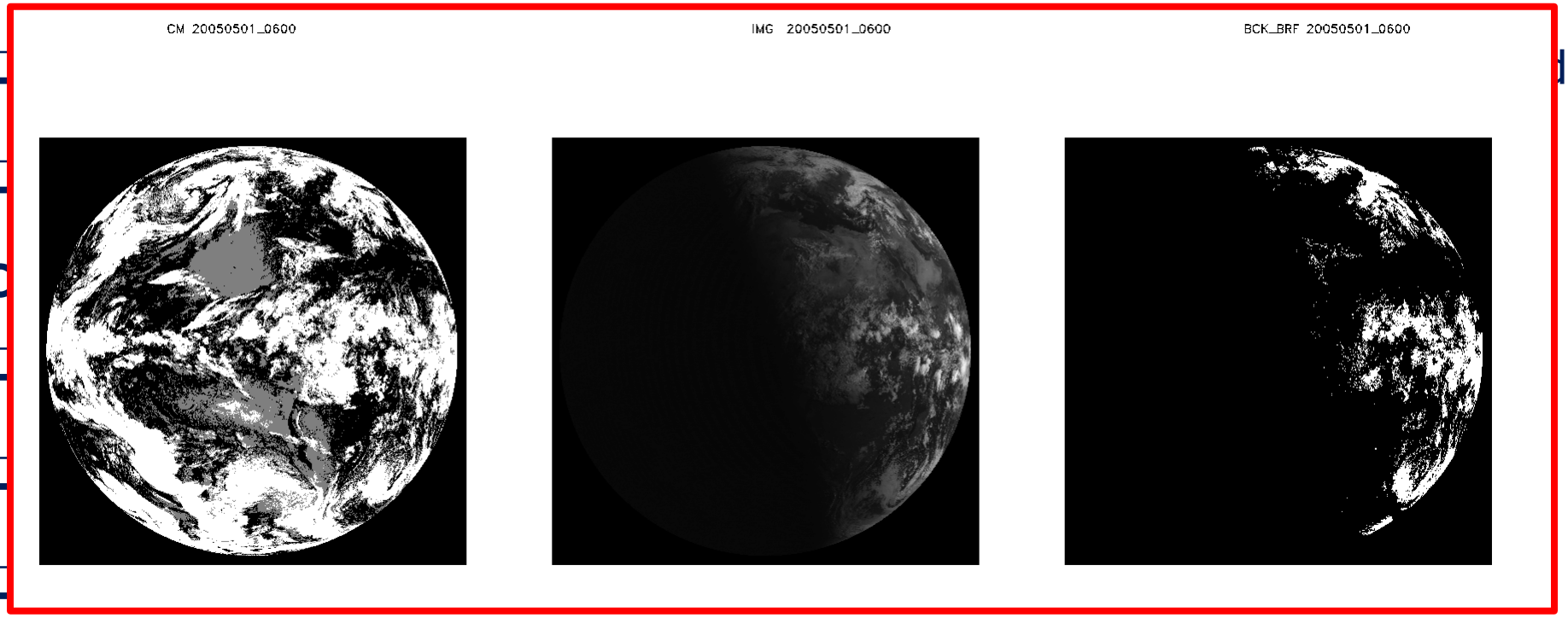
CM SAF 2 Channel Meteosat Climatological Cloud Mask

- Utilize Inter-Calibrated FCDR's (GSICS)
- Additive continuous scores instead of binary decision tree
- Generate own reflectance and brightness temperature background fields (independent of NWP Model input)
- Exploit time resolution of geostationary platforms

Cloud detection: Pre-Level 2 1/5

Background BRF Cloud Mask

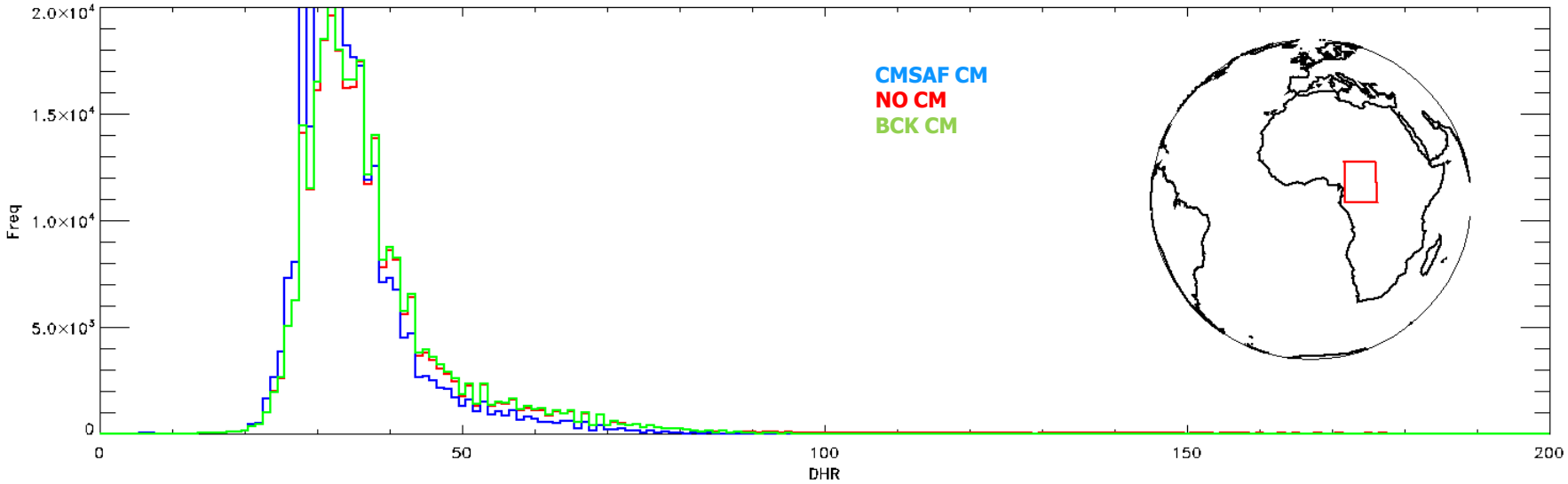
- BRF Background map from all available MVIRI VIS images (one/month)

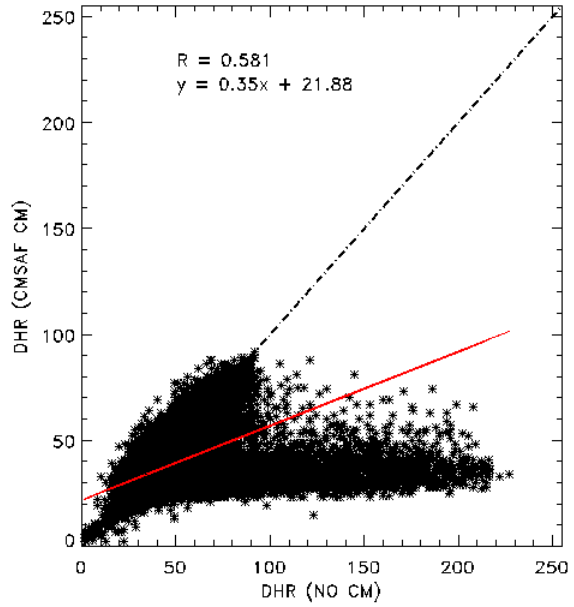


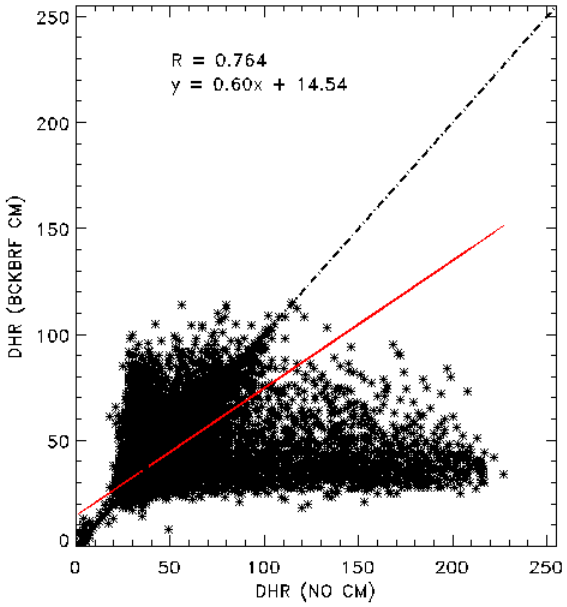
(independent of NWP Model input)

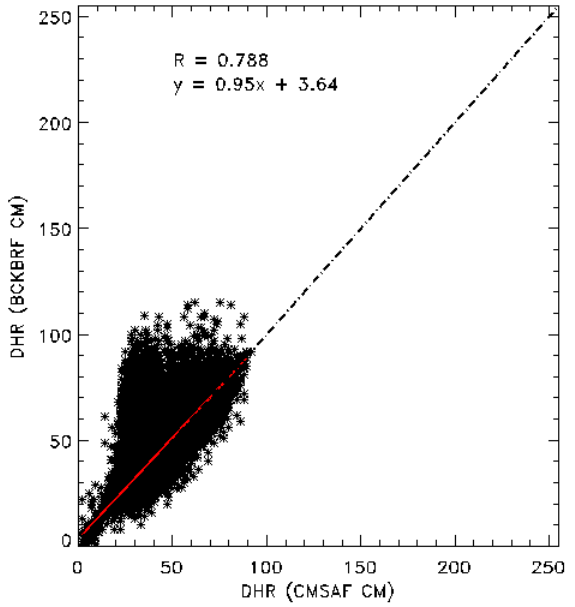
- Exploit time resolution of geostationary platforms

Cloud detection: Pre-Level 2 (Forest - Africa)

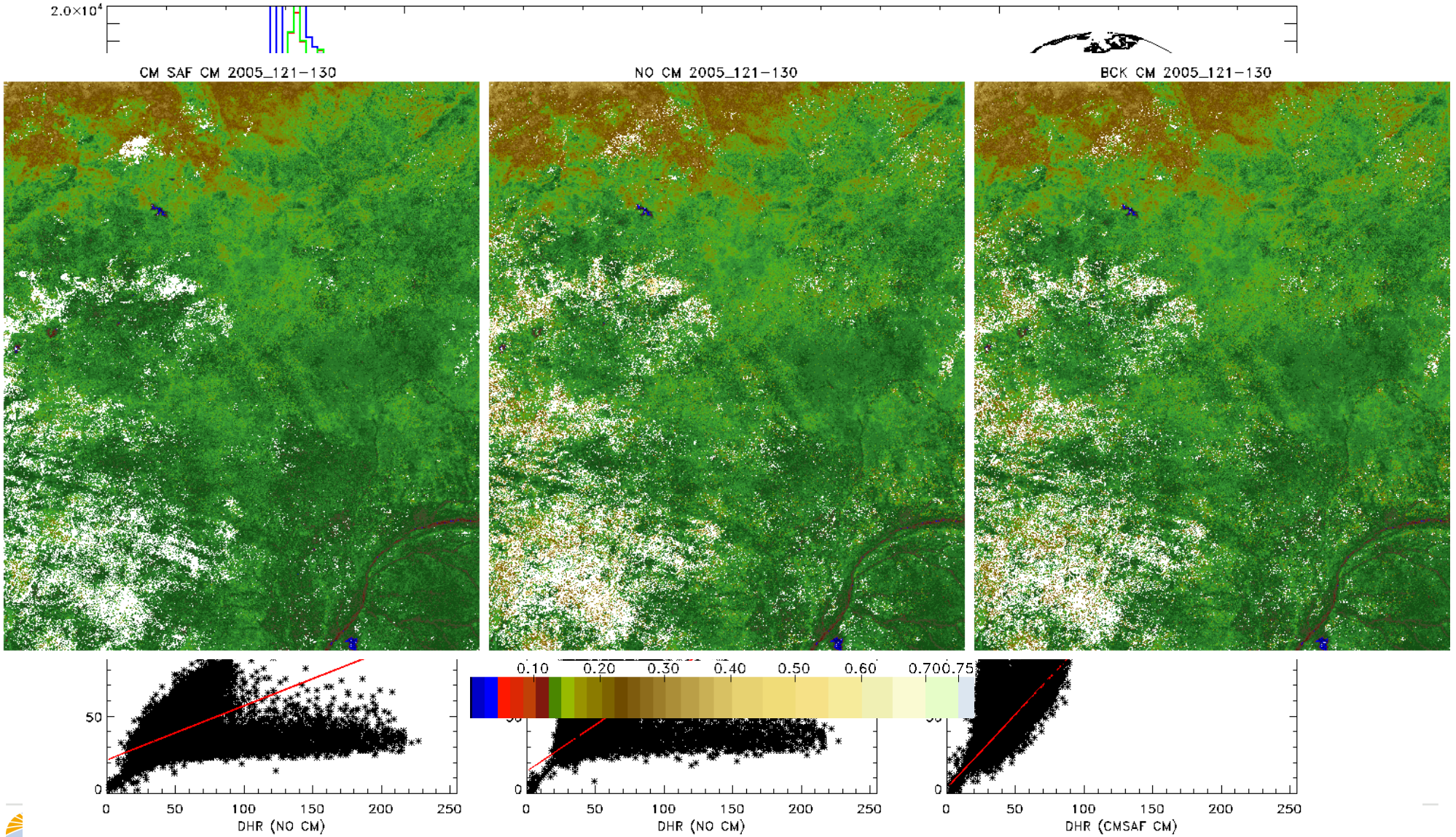




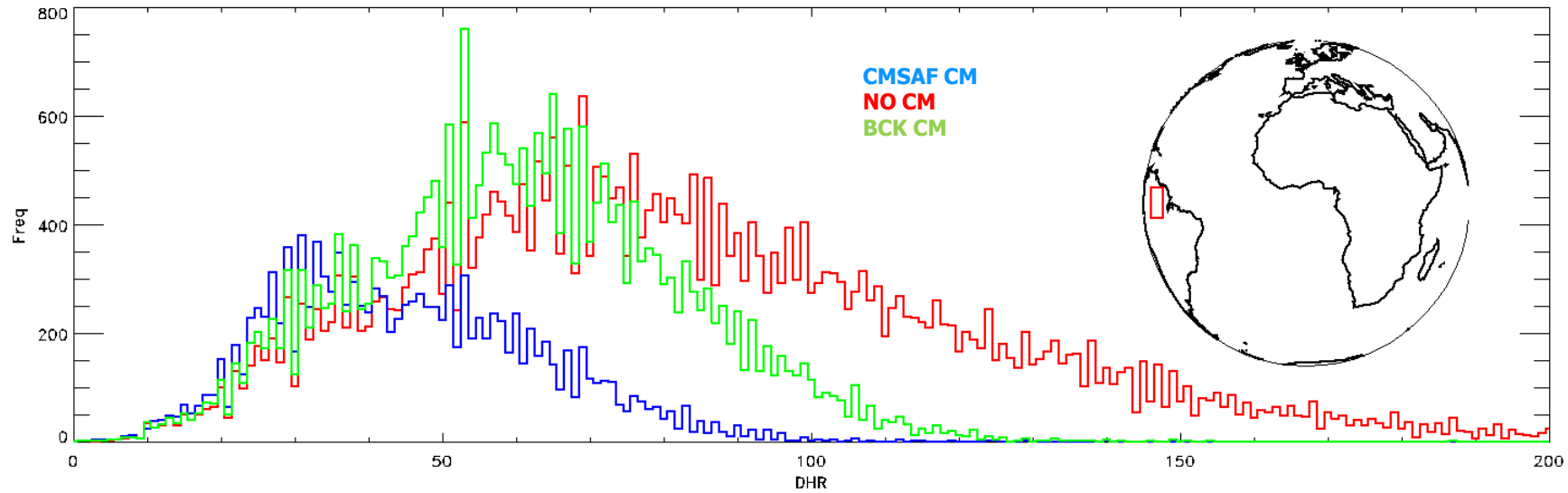


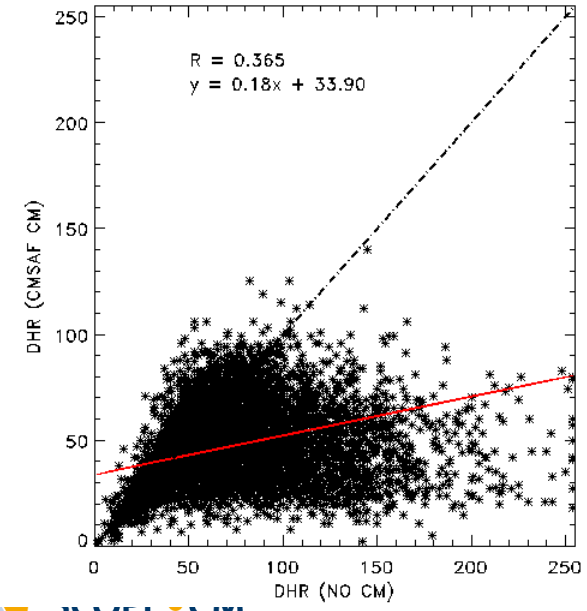


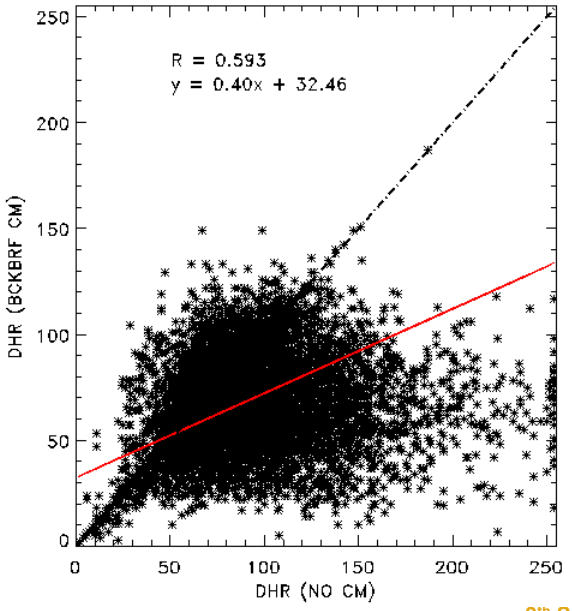
Cloud detection: Pre-Level 2 (Forest - Africa)

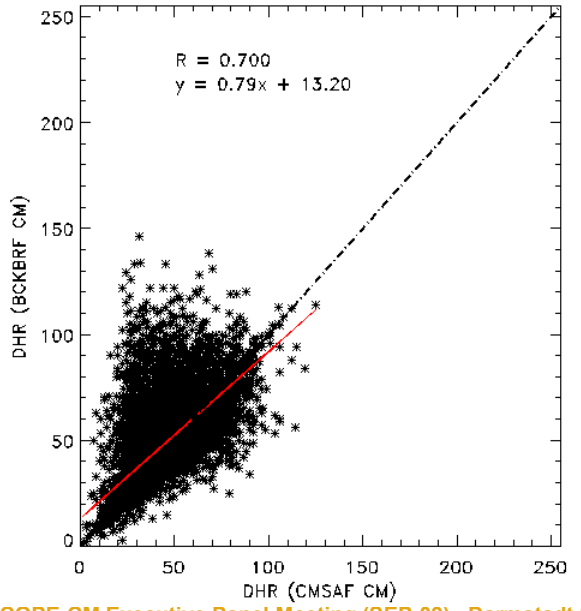


Cloud detection: Pre-Level 2 (Forest - SA)

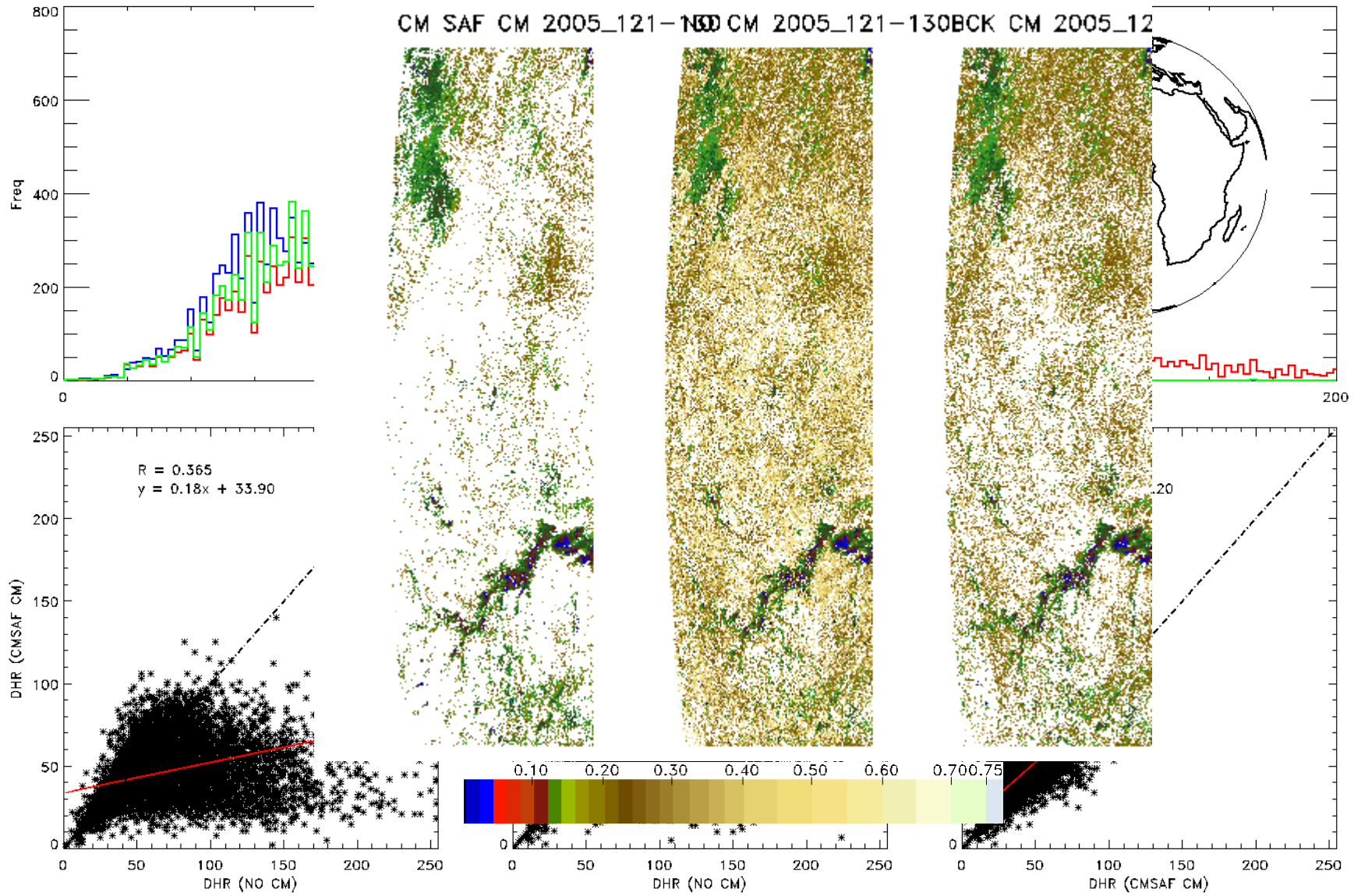








Cloud detection: Pre-Level 2 (Forest - SA)



Cloud detection: Pre-Level 2 (Summary)

	Retrieved Pixels			Above Threshold (~0.45)		
	NO CM	CMSAF CM	BCK CM	NO CM	CMSAF CM	BCK CM
Forest (Africa)	90%	+92%	+91%	1%	0%	0.01%
Desert	100%	100%	100%	47.9%	47.7%	47.9%
Forest (SA)	51%	17%	36%	15%	0.03%	1.2%

Project: External interfaces

Dependencies (input to SCM-03)		
Item	Actor	Task
Residual Cloud Removal	CMSAF (potential new member of SCM03)	• Provide a cloud mask (or CM algorithm) for MFG • Cooperate for extending the method to other GEO (GOES, GMS)
Inter-calibration	GSICS/ SCOPE-CM	• Application to DCC method for MFG,GOES and GMS (pre MODIS era)

Links (output from SCM-03)		
BRF	QA4ECV	• EUM to provide Bi-directional Reflectance Factor (BRF) with retrieval uncertainties from MFG.

Actions

Pinty, B., A. Lattanzio, J. V. Martonchik, M. M. Verstraete, N. Gobron, M. Taberner, J.-L. Widlowski, R. E. Dickinson and Y. Govaerts (2005) 'Coupling Diffuse Sky Radiation and Surface Albedo', Journal of the Atmospheric Sciences, 62, 2580-2591.

Action Number	Actionee	Action
ACTION-SEP-09-01	All	Assess product maturity
ACTION-SEP-09-02	Secretariat	To collect and generate an inter atrix between projects. To generate an overall dependency diagram between SCOPE-CM and other S, CEOS, CGMS VC, SAFs, CCI)
ACTION-SEP-09-03	All	To contribute to the ECV invent base
ACTION-SEP-09-04	All	To federate dataset generation dress the release mode
ACTION-SEP-09-05	Secretariat	To update website
ACTION-SEP-09-05	All	Inquire from SCM projects on ans to use THREDDS.
Action spec ject		
ACTION-SEP-09-06	SCM-01	Interaction with SCM-08
ACTION-SEP-09-07	SCM-02/SCM-05	To collaborate. SCM-02 to give its requirements to SCM-05
ACTION-SEP-09-08	SCM-03	To investigate the possibility to include the direct/diffuse fraction to the downward flux density in the albedo product.
ACTION-SEP-09-09	SCM-05	To organise a workshop with GSICS
ACTION-SEP-09-10	SCM-06	Investigate how to put in place a to allow the project to feedback GSICS
ACTION-SEP-09-11	SCM-07	To produce a flow-diagram to identify various contributions to the project and to point out input/outputs
ACTION-SEP-09-12	SCM-08	To inform secretariat in case of lead's change
ACTION-SEP-09-13	SCM-09	To provide an update on the project plan. To investigate the possibility of a 'global' product (LEO + GEO) interaction with SCM-05