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### **1.Background**

In 2006 the World Meteorological Organization (WMO) and the CGMS together initiated the Gobal Space Based Inter-Calibration System (GSICS, <u>gsics.wmo.int</u>) with the aim of monitoring the quality of measurement from satellite instruments launched by member including NASA, NOAA, EUMETSAT, ISRO, CMA, KMA, and CNES.

In recent years, GSICS, via collaboration among member agencies across nations has successfully monitored instrument records for both GEO (GOES, SEVIRI, MTSAT) and LEO (AVHRR) based instruments by comparing them to in-orbit references such as IASI, AIRS and MODIS. The cross comparison products undergo stringent quality checks and standarizations and a scientific review of the theoretical bases and are assigned a GSICS maturity level. The accepted products are distributed freely as GSICS correction products.

These products have wide applications. The goal of poster is to introduce GSICS cross calibration products and their applicaton in evaluating Spectral Response Function status and providing bias corrections and monitoring.

### 2. Methods of In-Orbit monitoring

### **Step 1.** Identification of Collocated Pixels that satisfy GSICS selection criterion

Geographical locations that are observed by the reference and the monitored instrument at close to the same time under similar viewing conditions are identified.



Once collocated pixels are found, Radiances of the (reference) hyperspectral instrument are convolved with the monitored instrument Spectral Response Function to provide radiances representative of the reference instrument. These representative radiances are compared with the monitored instrument's measurements.

# **GSICS Products** and **Deliverables**

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### 3. GSICS Products

### GEO- LEO

Product Type 🔺	Algorithm Type ÷	Data Producer ≎	Maturity Level ÷	Monitored Instrument	Reference Instrument	Version \$	Data Start ≎ Date	Data End ≎ Date	Docs URL	Data URL
Near-Real Time Correction	GEO-LEO IR	NESDIS	Preoperational	GOES-13 Imager	Metop-A IASI	1	2013-01-16	Present	<u>Docs</u> 미	<u>Data</u> 리
Near-Real Time Correction	GEO-LEO IR	NESDIS	Preoperational	GOES-15 Imager	Metop-A IASI	1	2013-01-16	Present	<u>Docs</u> 미	<u>Data</u> 미
Near-Real Time Correction	GEO-LEO IR	EUMETSAT	Demonstration	Meteosat-7 M∨IRI	Metop-A IASI	3	2008-05-15	2012-03-08	<u>Docs</u> 미	<u>Data</u> 미
Near-Real Time Correction	LEO-LEO IR	EUMETSAT	Prototype	Metop-A HIRS	Metop-A IASI	3	2009-04-29	Present	Docs 🗇	<u>Data</u> 리
Near-Real Time Correction	GEO-LEO IR	EUMETSAT	Demonstration	MSG-1 SEVIRI	Metop-A IASI	3	2008-05-15	Present	<u>Docs</u> 미	<u>Data</u> 리
Near-Real Time Correction	GEO-LEO IR	EUMETSAT	Preoperational	MSG-2 SEVIRI	Metop-A IASI	1	2012-11-08	Present	<u>Docs</u> 미	Data 🗇
Near-Real Time Correction	GEO-LEO IR	EUMETSAT	Preoperational	MSG-3 SEVIRI	Metop-A IASI	1	2013-01-24	Present	<u>Docs</u> 미	Data 🗇
Near-Real Time Correction	GEO-LEO IR	JMA	Demonstration	MTSAT-2	Aqua AIRS	1	2012-01-25	Present	<u>Docs</u> 미	<u>Data</u> 미
Near-Real Time Correction	GEO-LEO IR	JMA	Demonstration	MTSAT-2	Aqua AIRS and Metop-A IASI	1	2012-01-25	Present	Docs 🗇	<u>Data</u> 미
Near-Real Time Correction	GEO-LEO IR	JMA	Demonstration	MTSAT-2	Metop-A IASI	1	2012-01-25	Present	Docs 🗖	Data 🗇
Re-analysis Correction	GEO-LEO IR	NESDIS	Demonstration	GOES-11 Imager	Metop-A IASI	2	2007-06-16	2011-11-07	Docs 🗇	Data 🗇
Re-analysis Correction	GEO-LEO IR	NESDIS	Demonstration	GOES-12 Imager	Metop-A IASI	2	2007-07-16	2011-11-07	Docs 🗇	Data 🗇
Re-analysis Correction	GEO-LEO IR	NESDIS	Preoperational	GOES-13 Imager	Metop-A IASI	1	2010-04-16	Present	Docs 🗖	Data 🗇
Re-analysis Correction	GEO-LEO IR	NESDIS	Preoperational	GOES-15 Imager	Metop-A IASI	1	2011-08-23	Present	Docs 🗖	<u>Data</u> 미
Re-analysis Correction	GEO-LEO IR	EUMETSAT	Demonstration	Meteosat-7 M∨IRI	Metop-A IASI	3	2008-06-01	Present	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	Metop-A AVHRR	MODIS	1	2007-07-07	2009-08-30	Docs 🗖	Data 🗇
Re-analysis Correction	LEO-LEO IR	EUMETSAT	Prototype	Metop-A HIRS	Metop-A IASI	3	2009-05-13	Present	Docs 🗖	<u>Data</u> 미
Re-analysis Correction	GEO-LEO IR	EUMETSAT	Demonstration	MSG-1 SEVIRI	Metop-A IASI	3	2008-06-01	Present	<u>Docs</u> 미	<u>Data</u> 미
Re-analysis Correction	GEO-LEO IR	EUMETSAT	Preoperational	MSG-2 SEVIRI	Metop-A IASI	1	2011-01-01	Present	Docs 🗇	Data 🗇
Re-analysis Correction	GEO-LEO IR	EUMETSAT	Preoperational	MSG-3 SEVIRI	Metop-A IASI	1	2013-01-10	Present	Docs 🗖	Data 🗇
Re-analysis Correction	GEO-LEO IR	JMA	Demonstration	MTSAT-2	Aqua AIRS	1	2011-08-31	Present	Docs 🗇	Data 🗇
Re-analysis Correction	GEO-LEO IR	JMA	Demonstration	MTSAT-2	Aqua AIRS and Metop-A IASI	1	2010-08-03	Present	Docs 🗇	Data 🗇
Re-analysis Correction	GEO-LEO IR	JMA	Demonstration	MTSAT-2	Metop-A IASI	1	2010-08-03	Present	Docs D	<u>Data</u> 미

Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-10 AVHRR	MODIS	1	1986-12-06	1991-01-31	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-11 AVHRR	MODIS	1	1988-12-05	1993-12-29	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-12 AVHRR	MODIS	1	1991-12-06	1998-12-13	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-14 AVHRR	MODIS	1	1995-01-08	2002-01-31	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-15 AVHRR	MODIS	1	2000-07-07	2009-08-30	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-16 AVHRR	MODIS	1	2001-03-09	2009-08-30	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-17 AVHRR	MODIS	1	2002-07-07	2009-08-30	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-18 AVHRR	MODIS	1	2005-07-07	2009-08-30	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-19 AVHRR	MODIS	1	2009-02-10	2009-08-30	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-6 AVHRR	MODIS	1	1980-01-01	1980-10-31	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-7 AVHRR	MODIS	1	1981-10-06	1985-01-31	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-8 AVHRR	MODIS	1	1983-06-07	1985-10-13	<u>Docs</u> 리	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	NOAA-9 AVHRR	MODIS	1	1985-03-09	1988-10-29	Docs 🗇	Data 🗇
Re-analysis Correction	LEO-LEO VIS	NESDIS	Demonstration	TIROS-N AVHRR	MODIS	1	1978-12-01	1980-01-31	Docs 🗇	<u>Data</u> 리

### 4. Global Use of JPSS/CrIS in inter-calibrating in-orbit instruments.

A novel method has been developed that can determine SRF by inter-comparing with a Hyperspectral instrument such as CrIS/IASI





VIIRS I5 Channel SRF retrieved by comparisons with CrIS radiances.

GOES-13 11 Micron Channel SRF retrieved by comparisons with IASI radiances.



GEO COMS instrument monitoring by using SNOs with LEO hyperspectral IR instruments.. Vertical axis units are Kelvin.

### Japanese Meteorological Agency- (JMA GPRC)



## 5. GSICS Deliverable **Ozone Mapping Profiler Suite (OMPS)**

The Ozone Mapping Profiler Suite (OMPS) onboard the JPSS is an important instrument for monitoring global Ozone. Both on-board and external methods are used to maintain the quality of UV measurements. The key monitoring requirements placed by the ozone community are:

- 1. Pre-Flight Laboratory calibration on the instrument include:
- 2. Performance of dual diffusers for OMPS for Solar Measurements (Diffuser and instrument degradation)
- 3. Comparisons to forward model results using ground targets and ground truth
- 4. Internal consistency checks
- 5. Matchup comparisons using Chasing orbits and SNOs



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Difference,

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