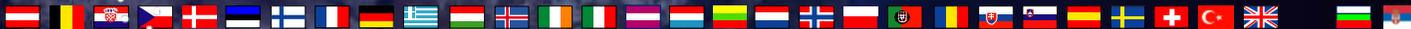


EUMETSAT'S NEW SATELLITE PROGRAMMES: SERVICE CONTINUITY, IMPROVEMENTS AND INNOVATION



J. Schmetz, R. Stuhlmann, P. Schlüssel,
D. Klaes, M. König, R. Munro, K. Holmlund,
J. Schulz, M. Cohen and S. Rota

EUMETSAT



Selected Highlights

=> 'Innovation in Science and Applications'

- Meteosat-10 is prime geostationary satellite at 0°
 - Meteosat-9 at 9.5° E => rapid scan service (5 min)
 - Meteosat- 8 at 3.5°E => back-up
 - Super-rapid scan tests with Meteosat-8, an innovation with a view toward MTG (not operational): 2.5 min scans
 - **Both Metop-A and Metop-B are in operational mode** (48 mins apart)
- => positive impact on NWP
- Examples for improvements of products: Winds (AMVs) from the two Metop satellites, tandem operations of two GOME-2instruments
 - Meteosat Third Generation: Workshop on the use of the hyperspectral geostationary sounder (IRS) for Nowcasting

Current Polar-orbiting satellites: EUMETSAT Polar System

Dual operation of Metop-A and Metop-B



Part of Initial Joint Polar System shared with NOAA

Missions and Payload

- Imagery (VIS, IR), sounding (IR, MW, UV, GPS occultation), radar (Ascat)
- direct broadcasting and data collection capabilities

Applications

- Numerical Weather Prediction and Nowcasting at high latitudes
- Marine meteorology and oceanography
- Air quality, atmospheric chemistry

Metop-A launched in 2006

Metop-B launched in 2012

Metop-B is prime satellite since April 2013

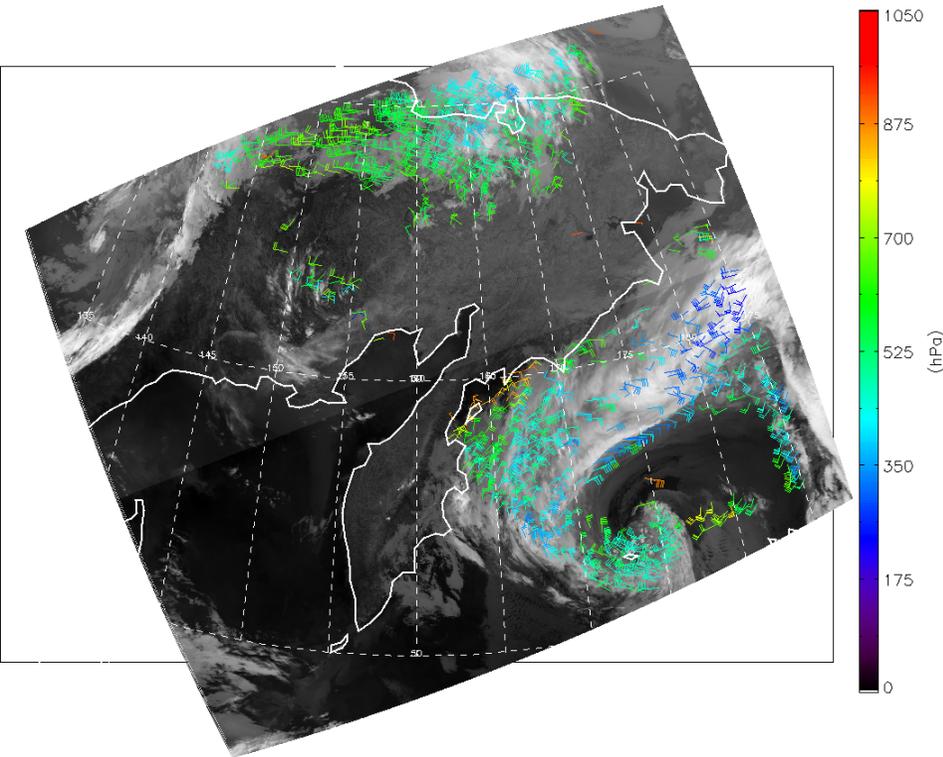
Metop-C launch planned for 2018



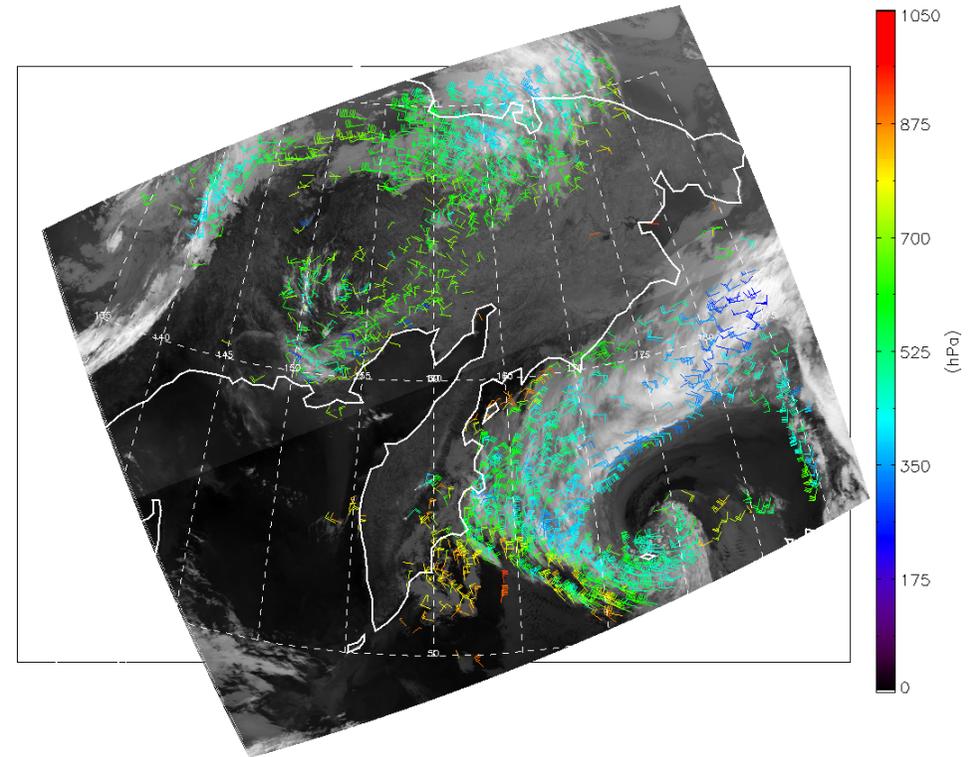
Increased coverage with AMVs over higher latitudes and reduction the temporal separation of products

AMV - Pressure, 01/09/2013 at 09:40:03 - 01/09/2013 at 09:43:03

AMV - Pressure, 01/09/2013 at 09:40:03 - 01/09/2013 at 09:43:03



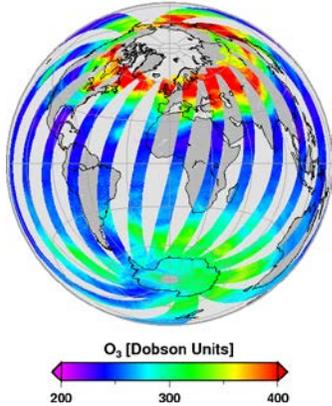
Single Metop; all winds
(~100 min gap)



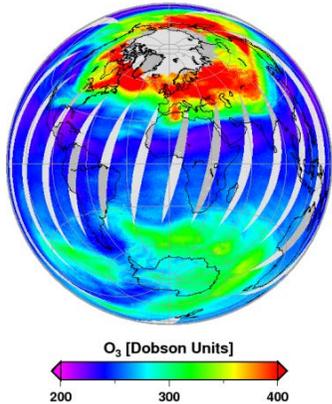
Dual Metop; all winds
(~50 min gap)

GOME-2 on Metop-A & Metop-B Tandem Operations

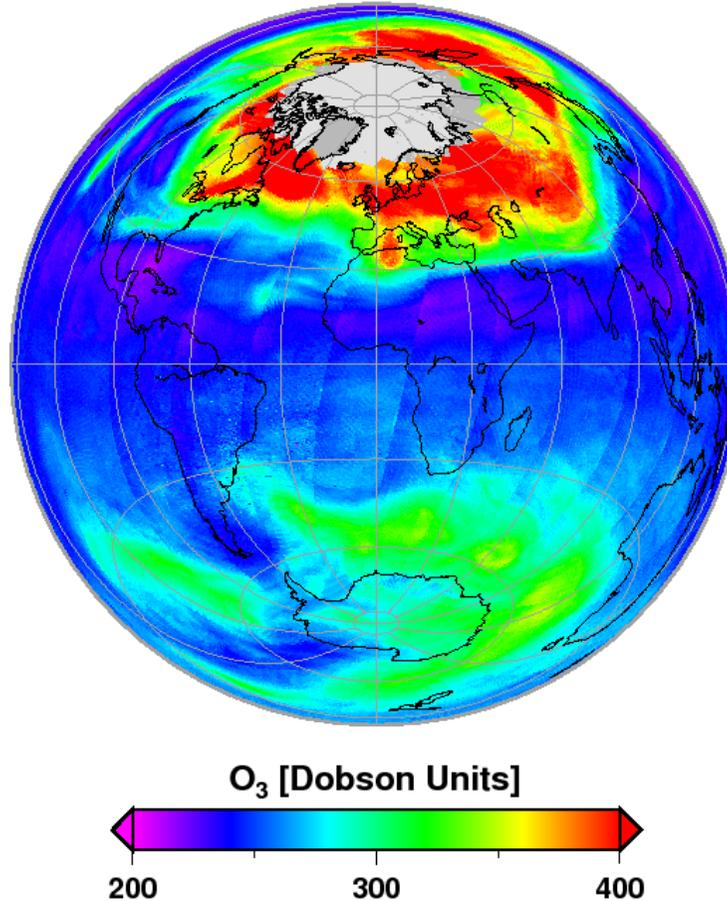
GOME-2 Metop-A
960 km (2013-JAN-20)



GOME-2 Metop-B
1920 km (2013-JAN-20)



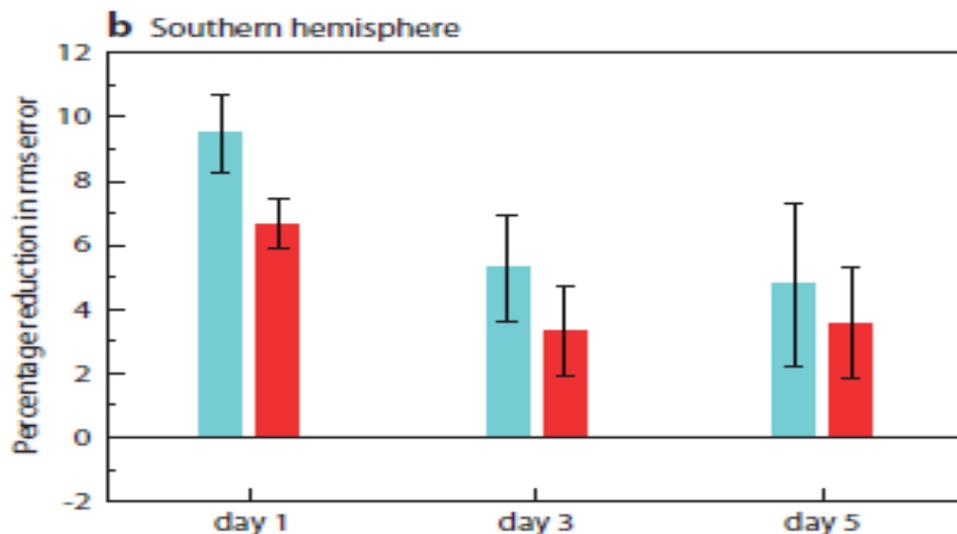
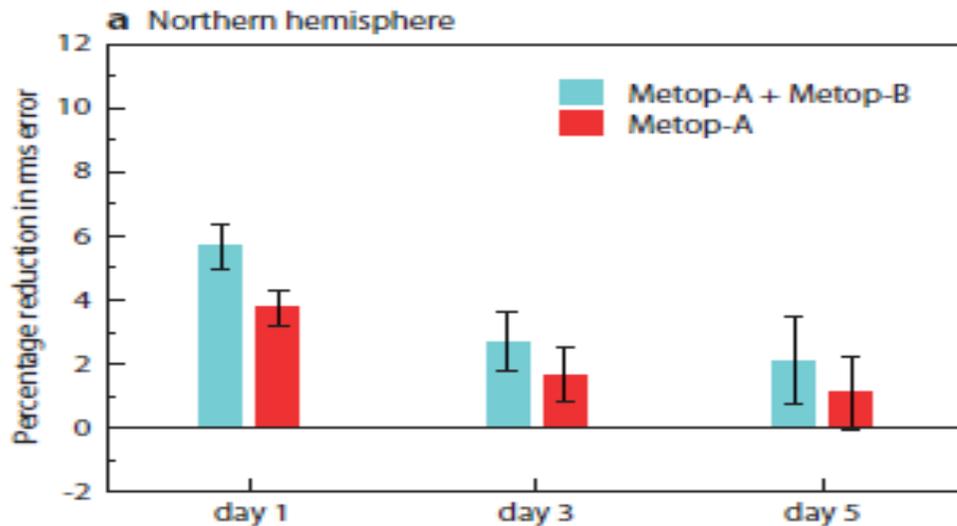
GOME-2 Metop-A & Metop-B
960km & 1920km (2013-JAN-20)



- GOME-2 on Metop-A with a swath of 960km
- GOME-2 on Metop-B with a swath of 1920km

courtesy of O3MSAF/DLR

Metop dual operation => beneficial impact on NWP



- Impact of adding Metop-A and Metop-B to the baseline data assimilation system

- Percentage reduction in rms error of the 500 hPa geopotential heights at days 1, 3 and 5

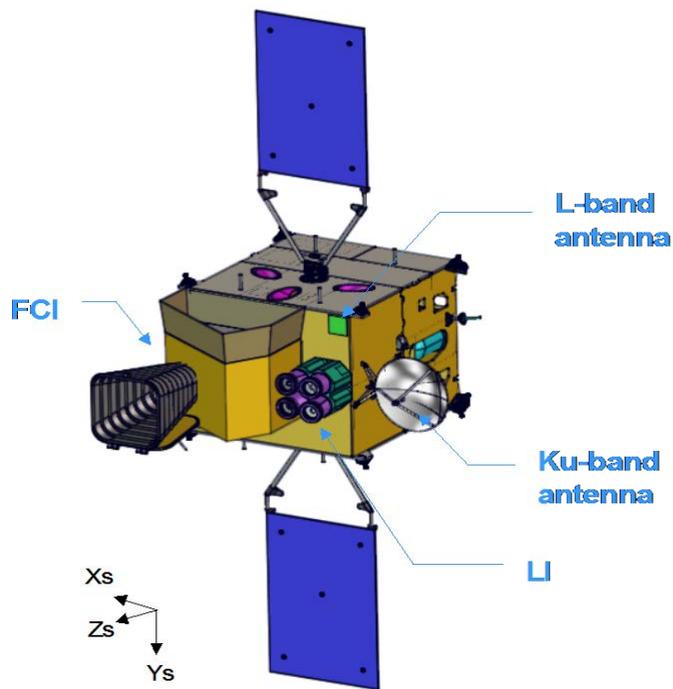
- for Northern and Southern hemisphere

- Error bars show the 95% confidence interval representing statistical significance

Healy, English et al., (2013), ECMWF Newsletter No. 137



Meteosat Third Generation (MTG) In-Orbit Configuration => An imaging and a sounding satellite



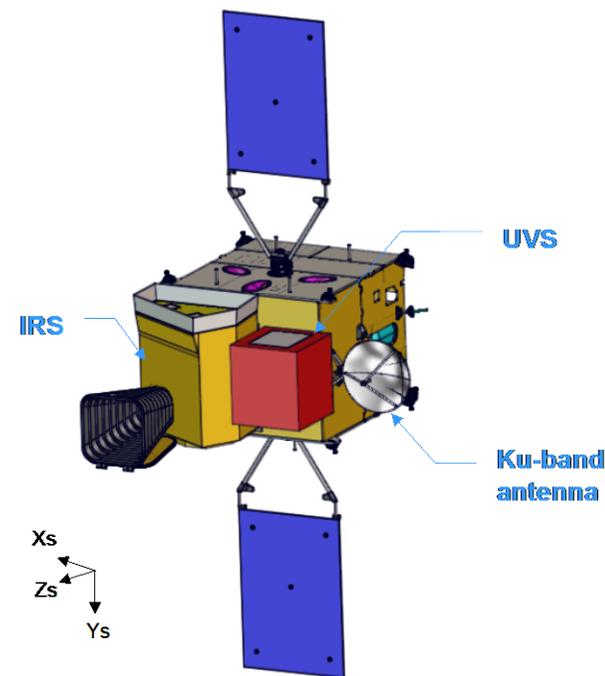
Payload of MTG-I:

- Flexible Combined Imager (FCI)
- Lightning Imager (LI)
- Data Collection System (DCS) and Search and Rescue (GEOSAR)

Payload of MTG-S:

- Infrared Sounder (IRS)
- Ultra-violet, Visible and Near Infrared Sounder (UVN).

(UVN is provided as GMES Sentinel 4 Instruments)



MTG Provides a Total of Five Missions

- ➔ FCI - Full Disk Scan Service (FCI-FDSS), global scales (Full Disk)
RC = 10 min, with 16 channels at spatial resolution of 1 km (8 solar channels)
and 2 km (8 thermal channels)
- ➔ FCI - Rapid Scan Service (FCI-RSS), local scales (1/4th of Full Disk)
RC = 2.5 min with 4 channels at high spatial resolution 0.5 km (2 solar channels),
and 1.0 km (2 thermal channels)
- ➔ **IRS => Repeat Cycle : 15 min per 1/4th of Full Disk;**
Spatial resolution : 4 km, spectral sampling at 0.625 cm⁻¹;
Two bands: Long-Wave-IR 700 – 1210 cm⁻¹ ~ 820 spectral samples
Mid-Wave-IR 1600 – 2175 cm⁻¹ ~ 920 spectral samples
- ➔ LI, continuously observing 80% of Full Disk: Integration Time ~1.5ms
detection/mapping of Intra-Cloud and Cloud-Ground strokes at ~10km spatial resolution
DE=90% (night) and DE=40% (overhead sun)
- ➔ UVN Sounding, implemented as GMES Sentinel 4 Instruments provided by ESA

MTG Programme Status

- **MTG-I Satellite:**
 - **schedule is stable with FAR (Flight Acceptance Review) in July 2018.**
 - **PDR of the LI is on-going.**

- **MTG-S Satellite**
 - **Most probable date for the MTG-S FAR is January 2021**
 - **Closure of the MTG-S PDR : October 2013**
 - **Closure of the S-4 PDR : November 2013**

Nowcasting with the MTG-Hyperspectral Sounder (IRS)

- Initiate the exchange of information between MTG-IRS science and the operational Nowcasting community
 - inform forecasters about the potential of the MTG-IRS
 - get operational NWC forecasters involved in looking at the potential of MTG-IRS
 - Agree on a way forward to further strengthen the MTG-IRS science/NWC user interrelation
 - Excellent support from operational and science community notably from US
- **Workshop took place 25-26 July at EUMETSAT with 24 external participants**

Example: 'from MSG-SEVIRI to MTG-IRS (R. Petersen)'



vertical Theta-E Difference [Theta-E@~500hPa – Theta-E@~780hPa]

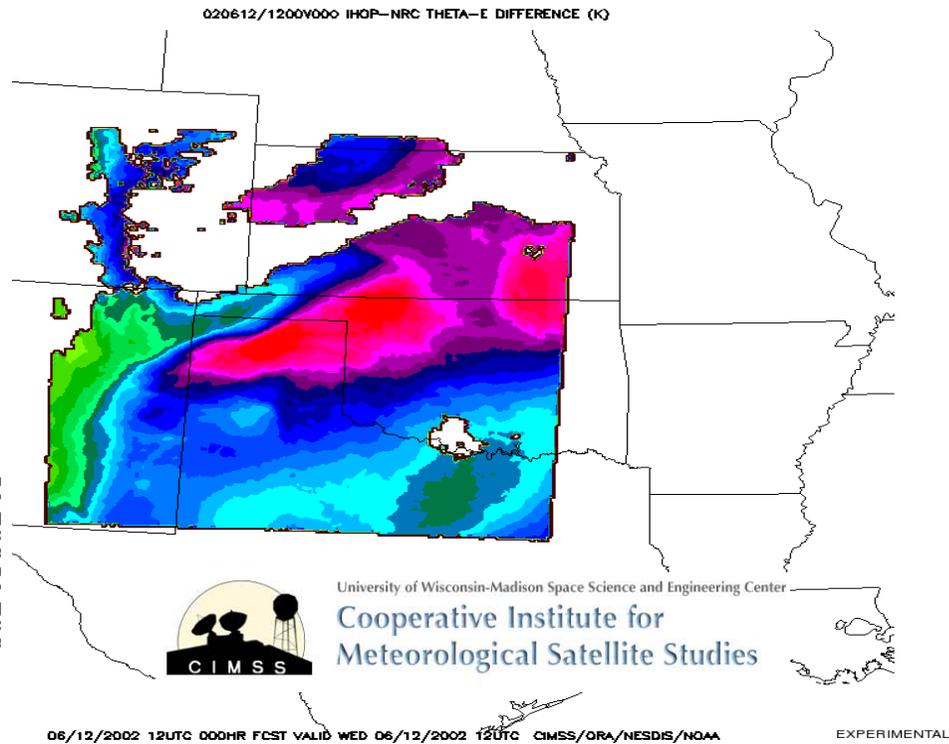
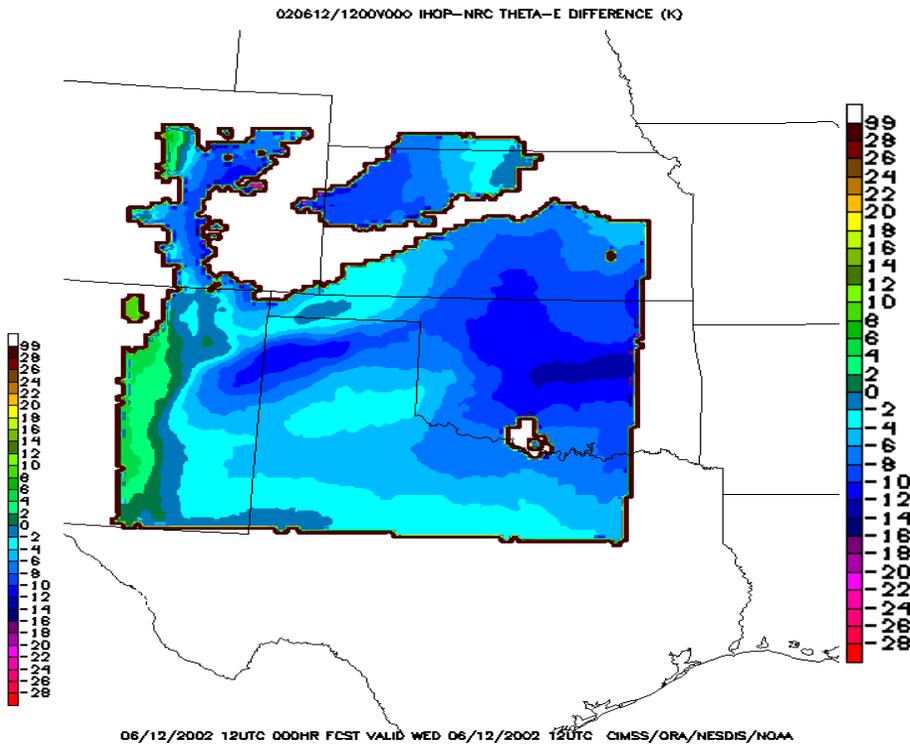
MTG-IRS provides a thinner and lower layer of Theta-E@~780hPa

Lagrangian NearCast using Simulated ABI data from 1200 UTC 12 June 2002

Lagrangian NearCast using Simulated HES data from 1200 UTC 12 June 2002

MSG-SEVIRI like

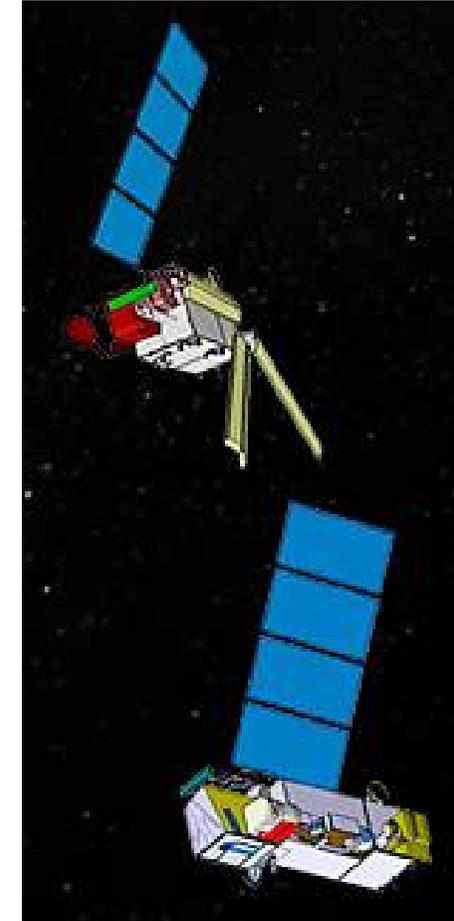
MTG-IRS like



EPS-SG (Second Generation) Payload

Satellite-A Missions	Instrument (and Provider)	Predecessor on Metop
Infrared Atmospheric Sounding (IAS)	IASI-NG (CNES)	IASI (CNES)
Microwave Sounding (MWS)	MWS (ESA)	AMSU-A (NOAA) MHS (EUM)
Visible-infrared Imaging (VII)	METImage (DLR)	AVHRR (NOAA)
Radio Occultation (RO)	RO (ESA)	GRAS (ESA)
UV/VIS/NIR/SWIR Sounding (UVNS)	Sentinel-5 (GMES, ESA)	GOME-2 (ESA)
Multi-viewing, -channel, -polarisation Imaging (3MI)	3MI (ESA)	-/-

Satellite-B Missions	Instrument (and Provider)	Predecessor on Metop
Scatterometer (SCA)	SCA (ESA)	ASCAT
Radio Occultation (RO)	RO (ESA)	GRAS (ESA)
Microwave Imaging for Precipitation (MWI)	MWI (ESA)	-/-
Ice Cloud Imager (ICI)	ICI (ESA)	-/-
Advanced Data Collection System (ADCS)	Argos-4 (CNES)	A-DCS



EPS-Second Generation (next generation of Metop satellites)

- **Metop-SG Programme was approved by ESA Council**
 - **Approval of contract proposals for phases B2/C/D expected in April 2014**
 - **Phase B2 to be kicked off in July 2014**
- **EPS-SG End User Requirements Document was approved by Council as baseline for Phase B**
 - **Nine observation missions to be implemented with a two-satellite system serving 21 years of operation, first launch foreseen in 2021**
- **EPS-SG full programme approval expected in 2014**
 - **Cooperation with NOAA on JPS, signed in 2013**
 - **ESA as main development agency for the space segment**
 - **Provision of IASI-NG (Next Generation) by CNES**
 - **Provision of future imager METImage by DLR**

International conference: “Climate research and Earth observation from space: climate information for decision-making”

Abstracts due by 15 April 2014

THE CLIMATE SYMPOSIUM 2014

Darmstadt
13-17 October 2014

Climate Research and Earth Observations from Space:

Climate Information for Decision Making

EUMETSAT

WCRP
World Climate Research Programme

Supported by the

European Commission

The poster features a central image of Earth viewed from space, framed by a magnifying glass. The background consists of concentric circles and a green sphere at the bottom. Logos for EUMETSAT, WCRP, and the European Commission are included.