

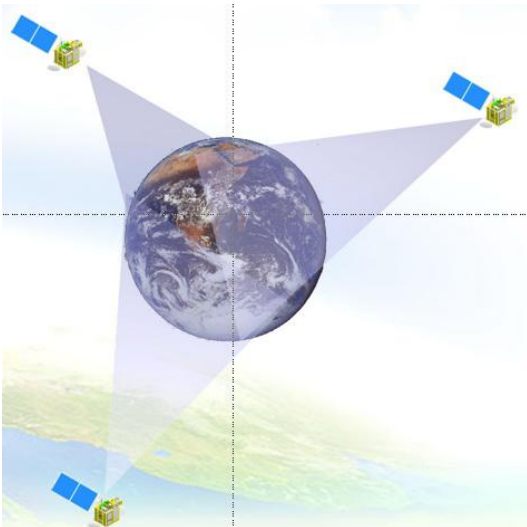


International Atmospheric Composition Missions

Potential Collaboration

Ernest Hilsenrath
NASA HQ

GEO-CAPE Workshop
Columbia, MD
September 23, 2009





Europe: Sentinel-4

- **ESA/EU Sentinel 4 (Flown with MTG-Eumetsat)**
 - Coverage: 30W- 45E, 30N- 65N
 - Time: 0.5-2 hour intervals.
 - Instrument types
 - UV/VIS/NIR: 5-20 km
 - IR Sounder and Imager on MTG 5-20 km
 - Measurements: O₃, SO₂, NO₂, HCHO, BrO, CH₄, HNO₃, CO, Clouds, aerosols, UV dose
 - In or about to go into Phase A
 - Launch: ~ 2018

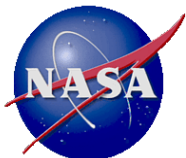
esa MISSION REQUIREMENTS DOCUMENT

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GMES SENTINELS 4 AND 5

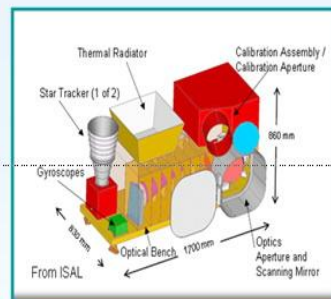
MISSION REQUIREMENTS DOCUMENT

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Korea: MP-GEOSat

- AQ and OC along with Metsat
- Proposed by MEST and ME to KARI (Space Agency)
 - AQ relies heavily on NASA technology and DA
 - IR is TBD
 - Coverage: 60S- 60N, ~120 E
 - Instruments:
 - AC: Same as GEO-CAPE
 - Met imager and OC radiometer
- Launch: ~2017 (*unlikely before G-C*)
- 10/2009 Launch of GEO Met/OC/Com



- Heritage from OMI
- Completed technical feasibility thru NASA IIP

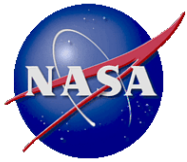
(Bhartia, 2009)

Spectral Range	300-500 nm (Resolution: 0.8 nm)
Spatial Resolution	5 km(N-S)×15 km(E-W)
Vertical Resolution	3~6km
Global Coverage	1 hour
SNR	1500:1 at 430nm
Specification	Power <100 Watts
	Weight < 50 Kg
	Volume 0.5 x 0.5 x 0.25 m ³



Eight band OC imager

- 412-865 nm
- 10-40 nm resolution
- 500x500 meter



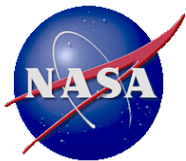
Japan: NA

- Proposed by Japan Society of Atmospheric Chemistry.
- JAXA provides technology and launch
- Metsat (GMS)??
- Mission Design Review 12/2009 → Phase A
- Launch 2018



Sensors	UV/VIS	NIR	MIR
Roles	•Daytime high-precision observations of total VCD of primary targets such as O ₃ , aerosols, and NO ₂ •Information on boundary layer O ₃		•24 hr observations of tropospheric VCD of O ₃ , CO and other multimolecular precursors (the VCD can be resolved to two layers)
Detection precision of O ₃	<10%		<10%
Altitude domains	- Total VCD		-Trop. VCD -Strat. VCD
Instantaneous field of view (km X km)	4 x 4 – 10 x 10		4 x 4 – 15 x 15
Expected observation time (per a day)	6 hr (25%)* *under the assumption that clear sky probability is 50% (Only daytime)		12 hr (50%)* *under the assumption that clear sky probability is 50% (day and night)
Target species (standard products) Precision for each species (TBD)	O ₃ , NO ₂ , HCHO, O ₄	O ₃ , CO, O ₄	O ₃ , CO, HNO ₃ , NH ₃ , H ₂ O HCHO, C ₂ H ₂ etc.






Sensors	UV/VIS Imaging spectrometer	IR Imaging spectrometer
Spectral domain	280-600nm	650-2300cm ⁻¹
Spectral resolution	0.4nm (0.1nm sampling)	0.60 cm ⁻¹
Sensitivity	SNR>500	SNR=100 - 1200
FOV (km)	5x5	5x5 - 10x10
Target domain	(Japan) 20-50N, 105-150E, (Asia) 15S-60N, 60-160E	
Coverage	4000 x 4000km	
Time resolution	Every 1hour (to cover 4000 x 4000km)	



Collaboration Events

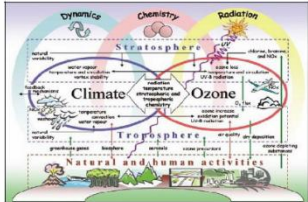
- **CEOS: Two workshops**
 - Climate Data sets, Modeling - 10/08
 - Air Quality - 6/09
 - Recommendations to CEOS
- **GEO-CAPE Workshops – 8/08, 9/09**
- **HQ/Korea Bi-Lateral Technical WS – 8/09**
- **AGU Session on AQ GEO-Stationary**
- **AGU Workshop on same -12/09**
- **EGU Session on AQ/GEO – 5/10 (TBD)**
- **CEOS Workshop on AQ/GEO - TBD**









    





Report of the Atmospheric Composition Constellation Workshop on the Impact of Data Gaps on Climate Modeling Validation and Forecasts



Recommendations to the CEOS Agencies



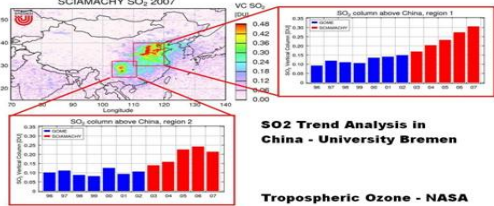
Goddard Institute for Space Studies
October 15-17, 2008

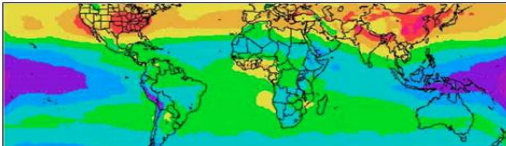
 

Report of the Committee on Earth Observation Satellites (CEOS) Atmospheric Composition Constellation (ACC) Workshop on Air Quality













SO2 Trend Analysis in China - University Bremen

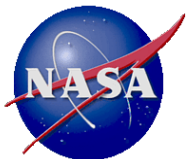
Tropospheric Ozone - NASA



Hosted by ESA-ESRIN
Frascati, Italy
June 15-17, 2009



Possible Collaboration Activities

- Measurement requirements
- Instrument specifications
- *Instrument procurement?*
- Prelaunch calibration
- Algorithms/radiative transfer
- OSSE
- Observing scenarios
- Validation and ground networks
- Data sharing
- Collaborative science and applications

Optical Depths for Typical GEO Measurement Geometry

