

DLR Contributions to Spaceborne Polar Observing Systems

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Missions and Facilities

- DLR – in cooperation with national & international partners – operates
 - missions
 - space-borne instruments
 - ground stations
 - aircraft
 - air-borne sensors
 - data systems (processors, archives, data dissemination)
- usage for polar activities can either be part of
 - regular operations
 - dedicated measurements & campaigns



Missions

➤ Past:

- CHAMP (GFZ)
- GOME (ESA)

➤ Current:

- SCIAMACHY
- TerraSAR-X
- TanDEM-X
- GRACE
- GOME-2 (EUMETSAT)

➤ Future:

- GOME-2 (EUMETSAT, MetOp-B [2012](#), MetOp-C [2016](#))
- ADM-Aeolus (ESA, [2013](#))
- EnMap ([2014](#))
- Sentinel 5 Precursor (ESA, [2014](#))
- MERLIN (DLR/CNES, [2016](#))
- TerraSAR-X2 (Astrium EADS, DLR, [2016](#))
- Sentinel 4 (EUMETSAT, [2019](#))
- Sentinel 5 (EUMETSAT, [2020](#))
- CarbonSat (ESA, phase A/B1)



SCIAMACHY

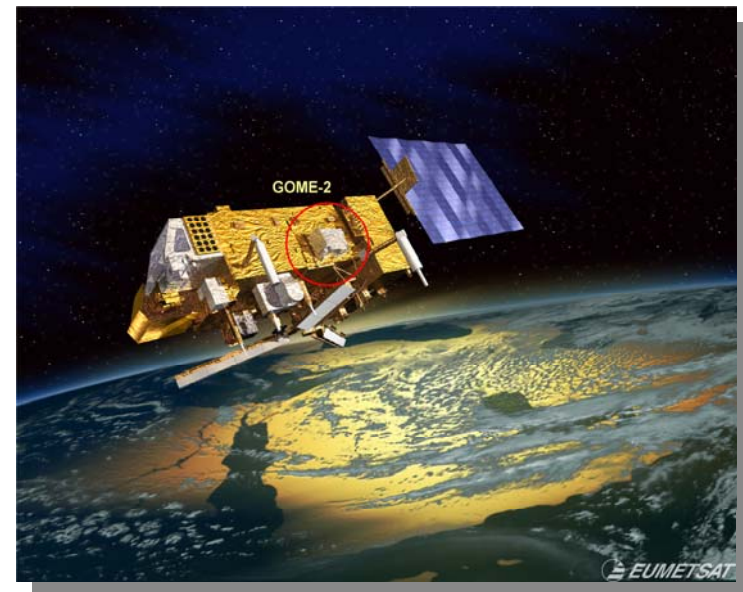
- atmospheric science instrument on ENVISAT
- German-Dutch-Belgian contribution (AO instrument)
- absorption spectroscopy: UV-Vis-NIR-SWIR (214 nm – 2386 nm)
- various measurement modes
 - nadir
 - limb
 - solar and lunar occultation
- sun-synchronous orbit
 - altitude = 800 km
 - inclination = 98.5°
 - orbital period = 100 min
 - local descending node crossing time = 10 am
- max. spatial resolution
 - 26 km × 30 km (nadir, along-track × across-track)
 - 230 km × 2.6 km (limb, across-track × height)
- continuous measurements in sunlit part of orbit





GOME-2

- atmospheric science instrument
- EUMETSAT MetOp missions (MetOp-A, MetOp-B, MetOp-C)
- absorption spectroscopy: UV-Vis (240 nm – 790 nm)
- measurement mode = nadir
- sun-synchronous orbit
 - altitude = 817 km
 - inclination = 98.7°
 - orbital period = 100 min
 - local descending node crossing time = 9:30 am
 - launch: October 19, 2006 (MetOp-A)
 - continuous measurements in sunlit part of orbit





SCIAMACHY and GOME-2

- polar regions covered each orbit
- polar measurement requirements implemented in instrument design and control
- SCIAMACHY: further adjustments for specific requirements possible
- SCIAMACHY data via ESA ground segment and science institutes (see <http://www.sciamachy.org/>)
- GOME-2 data via EUMETSAT's O3M SAF participating facilities (see <http://atmos.caf.dlr.de/gome2/>)
- trace gas species in polar atmosphere are monitored continuously, e.g.
 - O₃
 - OCIO
 - BrO
 - IO



SCIAMACHY and GOME-2

Manfred Gottwald
Heinrich Bovensmann
Editors

SCIAMACHY

Exploring the Changing Earth's Atmosphere

Springer

SCIAMACHY is particularly di
of Environme
Belgium.

SCIAMACHY
enhanced |
Ozone (O₃)
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and Belgiu

SCIAMACHY
OCIO is an
2007) strong
courtesy: S.



EnMAP (Environmental Mapping and Analysis Program)

- Earth surface mission
- science aspects: GFZ
- hyperspectral instrument: 232 channels (420 nm – 2450 nm)
- sun-synchronous orbit
 - altitude = 653 km
 - inclination = 98°
 - orbital period = 98.2 min
 - local time descending node = 11:00 am
- mission duration: 3 years
- launch 2014



MERLIN (Methane Remote Sensing Lidar Mission)

- atmospheric science mission
- developed and operated jointly by DLR and CNES
 - CNES: MYRIADE EVOLUTION platform
 - DLR: Methan Lidar (Integrated Path Differential Absorption)
- wavelength (1.645 μm)
- sun-synchronous orbit
 - altitude = 500-650 km
 - local time ascending node = 6 pm
- mission duration: 3 years
- launch 2016



TerraSAR-X and Tandem-X

see Dana Floricioiu's presentation



Data Systems

- algorithms and processors are mission specific
- data archiving and access is multi-mission item

