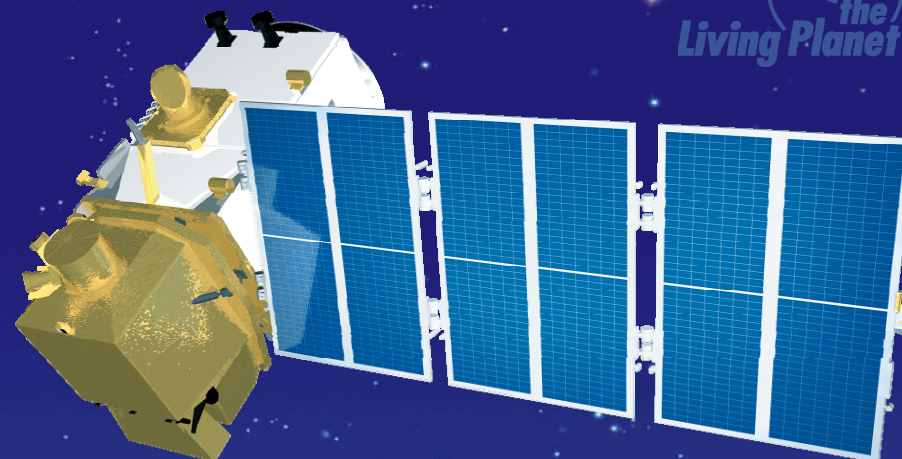




GMES Sentinel-2

Projekt-Status und Möglichkeiten der Zusammenarbeit

Name: Heinz Sontag

ASTRIUM SATELLITES

Earth Observation, Navigation & Science

**DLR - Raumfahrt-Industrietage in Friedrichshafen
13./14. Mai 2009**

All the space you need



Global Monitoring for Environment and Security

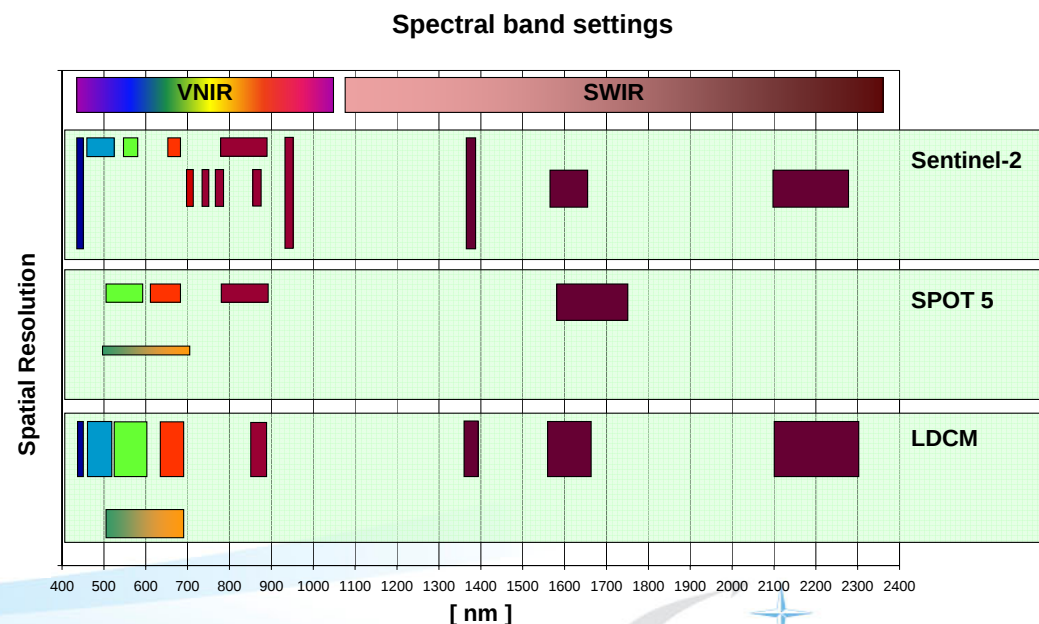
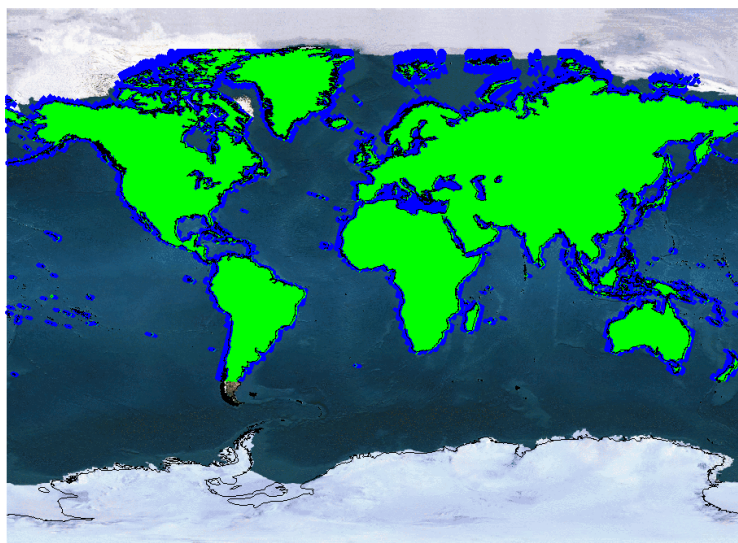


- GMES is an EC lead E.O. operational programme co-funded by ESA to **ensure European independence** for operational Earth monitoring.
- Sentinel-2 focuses at delivering **operational GMES land & security services: global, systematic, medium/high resolution optical imagery with very high revisit.**
- Sentinel-2 secures continuity & further enhancement of **SPOT & Landsat-type multi-spectral data** : land cover, land use, change detection maps and geophysical variables maps over a 15 years minimum period
- Total GMES budget currently **>1 B€**, covering development of 3 land and sea missions (Sentinel-1 to 3) with 2 satellites each, ground segment, and preparatory activities (S4 and S5) for atmospheric missions



Key requirements

- Global mapping of all land surfaces with up to 10 m spatial resolution in 13 multispectral bands, visible to shortwave infrared spectral range
- Image size: 290 km swath, up to 29.000 pixels per line
- Image data volume 800 GByte per day (compressed)
- Lifetime 7 years design qualification, 12 years for consumables



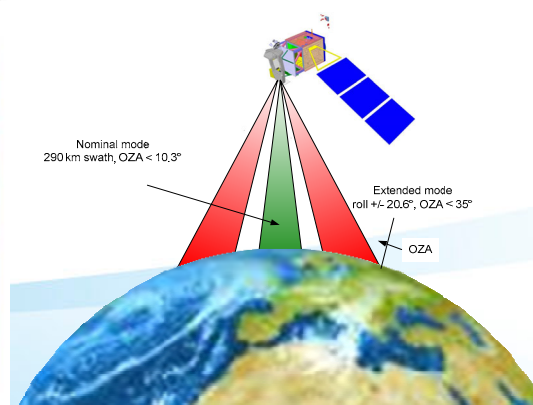
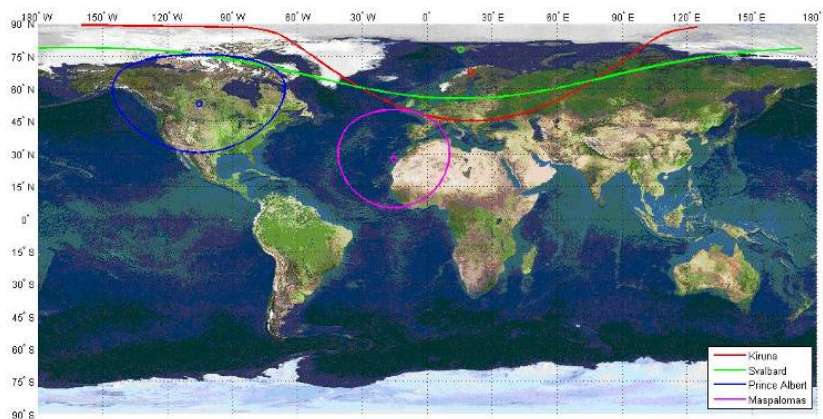
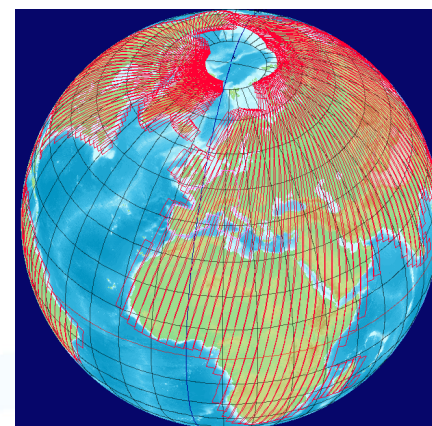
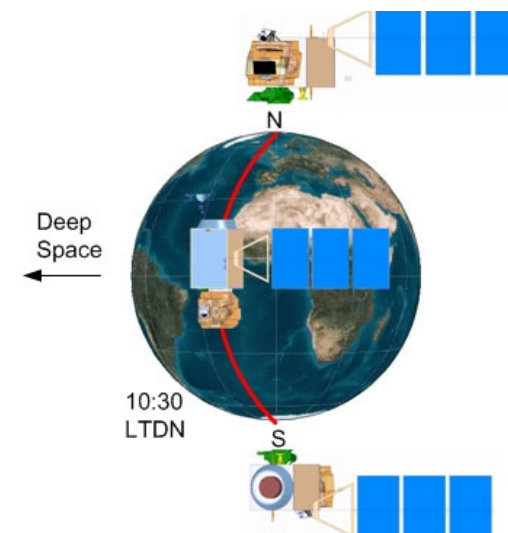
Key design features

■ Polar Orbiting Satellite in a sun-synchronous orbit

- altitude 786 km, 100 min/orbit
- image acquisition over all land surfaces on daylight side of orbit
- side-looking capability to access any point on Earth within 1-2 days
- 4 ground stations

■ Multispectral Instrument operating in pushbroom principle

- filter based optical system
- low noise image compression techniques





Sentinel-2 Satellite Key Features

Overall Configuration

- **Structure** Al frame/honeycomb
- **Mass** 1.1 ton
- **Dimensions** 3.4m x 1.8 m x 2.35 m
- **Fuel** 117 kg Hydrazine Monopropellant
- **Thermal Ctrl** passive with deep space radiators

Data handling Subsystem

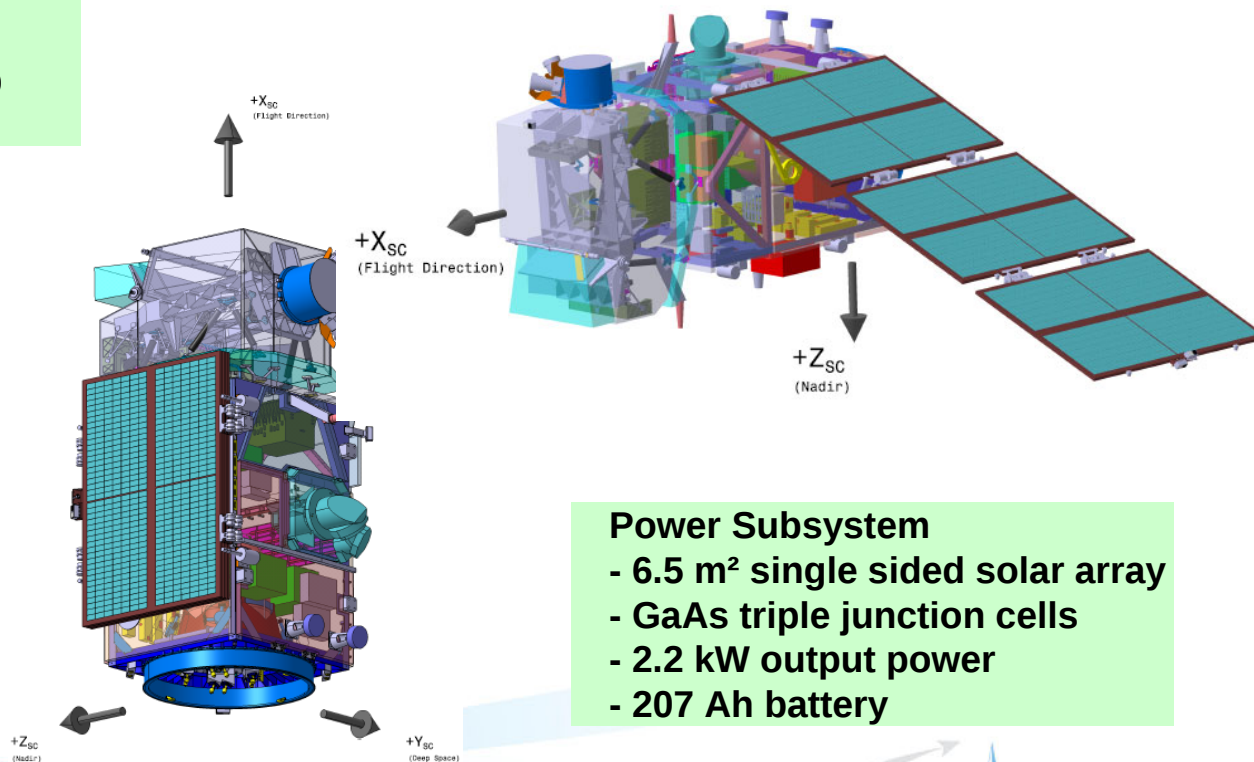
- 3 Tbit Flash memory
- 520 Mbps effective X-band downlink system-
- Laser Com Terminal Option

Attitude and Orbit Control

- Advanced APS Star Trackers for precision attitude measurement
- High Performance Fiberoptic Gyro for precision rate measurements
- dual band GPS receiver
- Low noise reaction wheels for attitude control

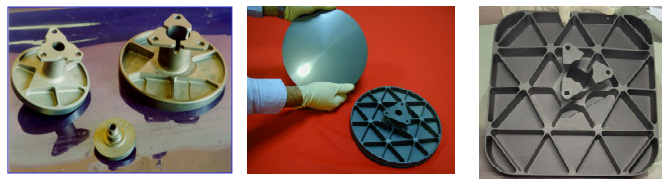
Power Subsystem

- 6.5 m² single sided solar array
- GaAs triple junction cells
- 2.2 kW output power
- 207 Ah battery



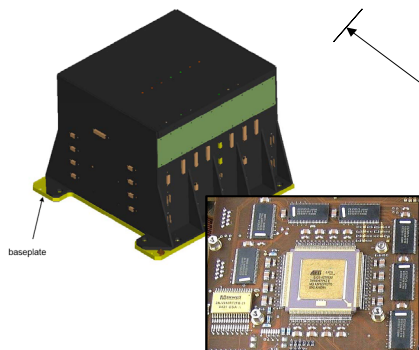


The Multi-Spectral Instrument

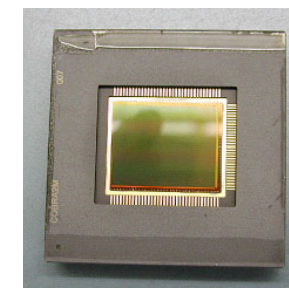
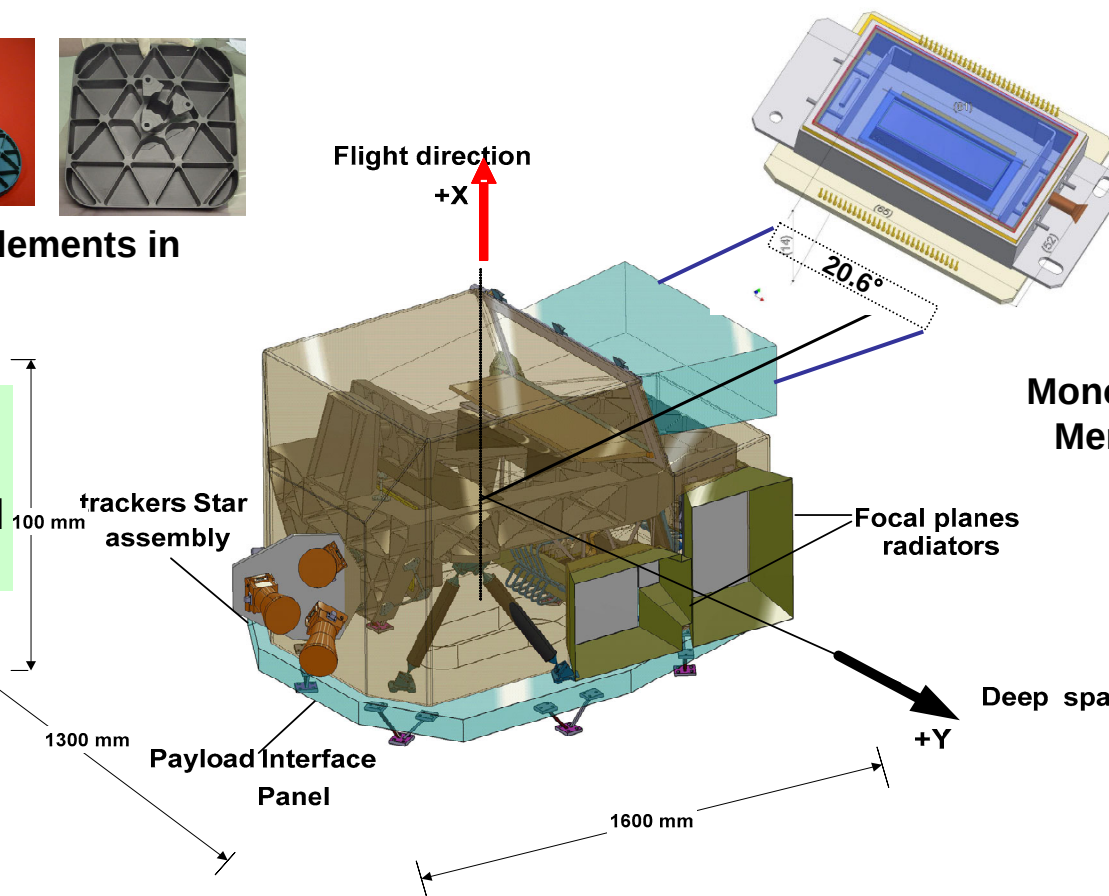


Structure and optical elements in SiC ceramics

pushbroom sensor
optical FOV 20.6°
15 cm effective pupil
diameter



High performance video and low noise compression electronics



Monolithic Silicon and hybrid Mercury Cadmium Telluride cooled detectors

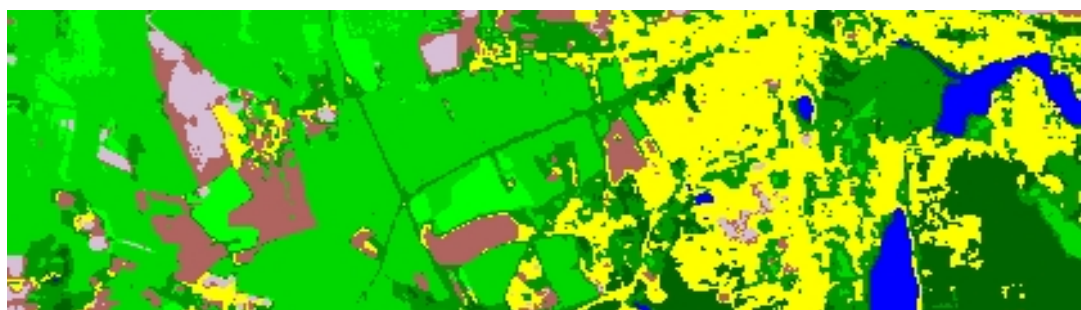
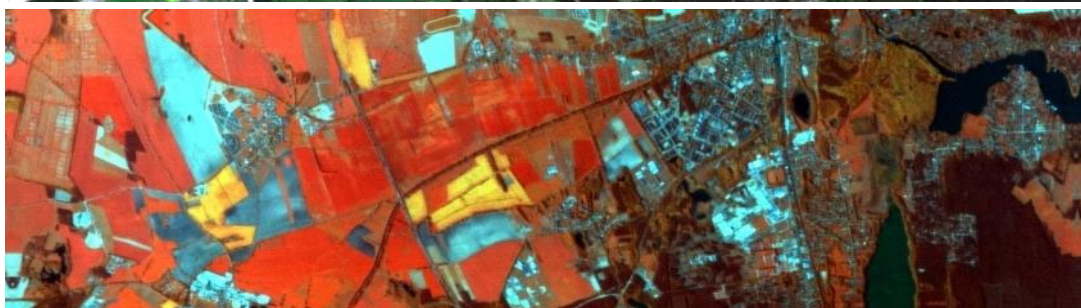


High performance optical filters

spectral range 0.4 – 2.4 μm
data rate 490 Mbit/s
mass 290 kg
power 280 W



Sentinel-2 products - Land Cover / Land Use



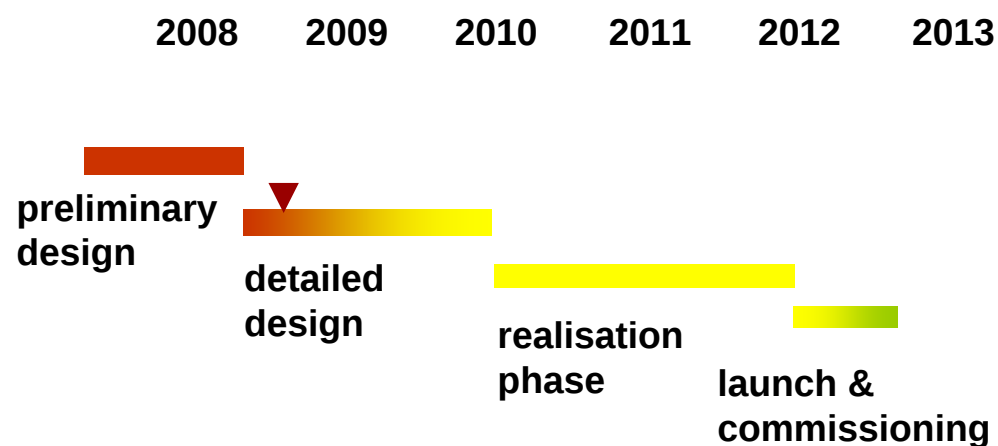
Simulated
Sentinel-2 images
(red/green/blue
bands)

and near-infrared
/red/green

Yellow	Urban
Blue	Water
Dark Green	Forest 1
Light Green	Forest 2
Purple	Bare soil1
Brown	Bare soil 2
Bright Green	Cultivated field 1
Olive Green	Cultivated field 2



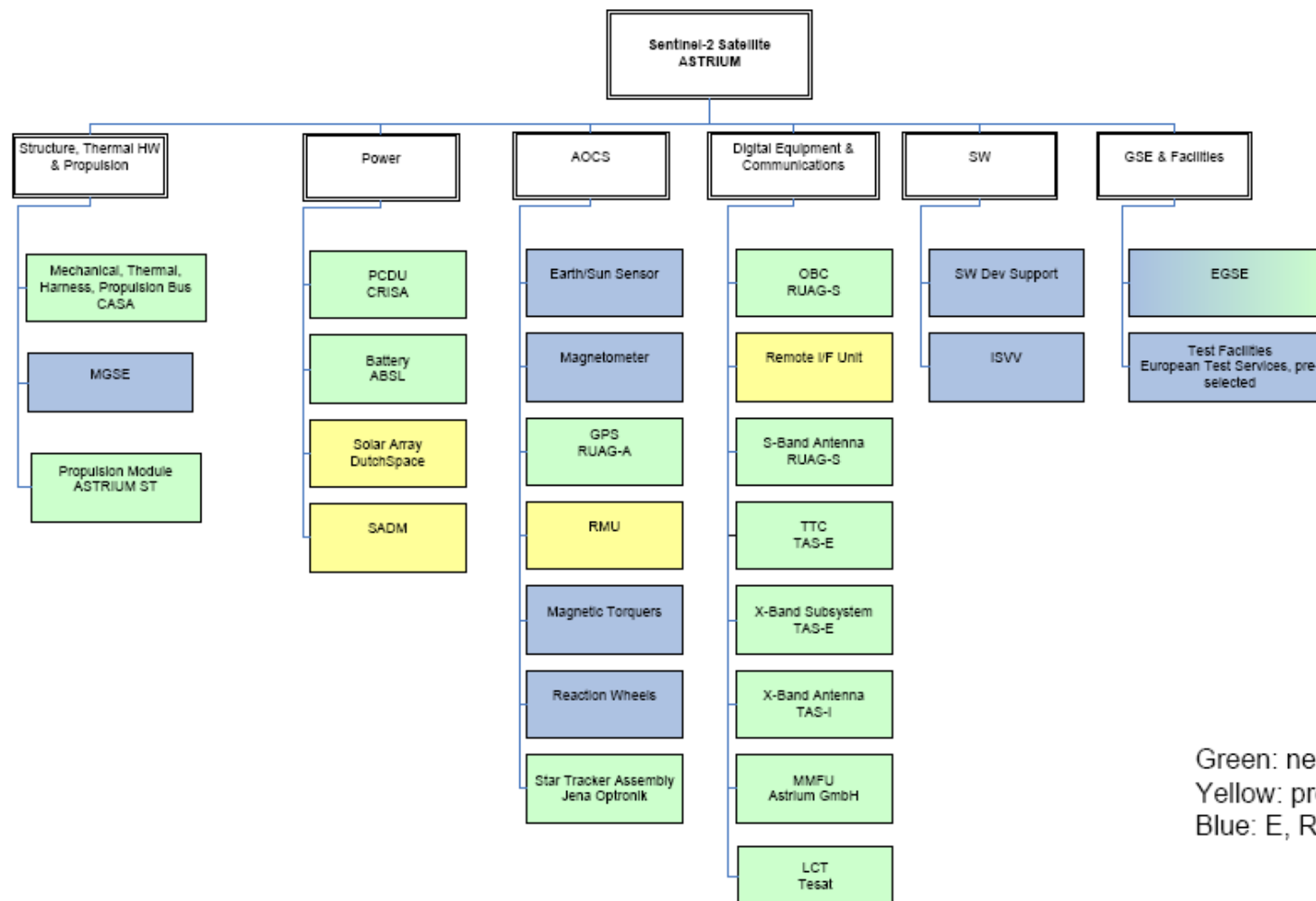
Programme Overview



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Sentinel-2 Prime Subcontractors



Green: negotiated/CCN
Yellow: proposal received
Blue: E, R & C



Sentinel-2 Status and German SME Involvement

■ Satellite Prime

Astrium GmbH

- German SMEs involvement:
 - star trackers (Jena-Optronik),
 - Laser Communication Terminal (Tesat)

■ Multispectral Instrument Prime

Astrium SAS

- procurement completed
- German SMEs involvement:
 - video-electronics (Jena-Optronik),
 - optical filter (Jena-Optronik),
 - power supply (ASP)

■ Common Procurements with EC

■ Reference design for Astrium Astrobus harmonisations



Sentinel-2 Opportunities for German SMEs

■ Flight HW

- Magnetometer
- Magnetic Torquers
- Reaction Wheels

ITT on EMITS

ITT on EMITS

ITT expected May 2009

■ Flight SW

- SW Support
- ISVV

ITT expected July 2009

ITT expected July 2009

■ Ground Support

- RF SCOE
- Power SCOE
- AIT Operations Support

ITT expected June 2009

ITT expected June 2009

2011 -2012



Sentinel-2 Contact persons

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