



# *Sentinel 5 Precursor*

## *First Copernicus Atmospheric Chemistry Mission ready for Launch*

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European Space Agency

## Sentinel-5 Precursor

First in a series of atmospheric observing systems within the EU – ESA  
*Copernicus* initiative

Preparatory mission for the next generation, EUMETSAT operated  
platforms

Sentinel-4                      *geo-stationary component (part of MTG-S payload)*

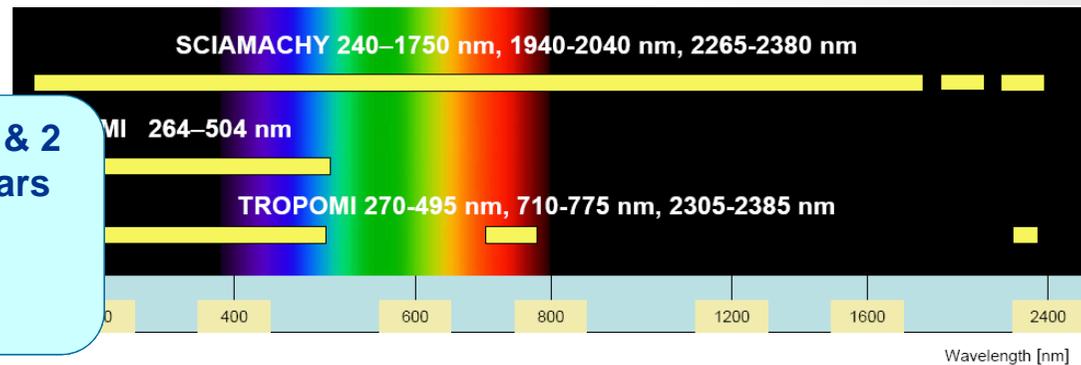
Sentinel-5                      *polar orbiting component (part of MetOp Second Generation)*

**Launch Sentinel 5P                      -> 16 August 2017**

# Mission Objectives

- *Focus on chemical composition of the Troposphere & lower Stratosphere; monitoring of air quality & climate with daily global coverage*
- *Ensure continuation of predecessor missions SCIAMACHY & OMI/AURA beyond 2012 ... 2017*
- *Enhanced radiometric sensitivity & spatial sampling (7x7 km<sup>2</sup> & 3.5 x 7 km<sup>2</sup>) -> detection of small-scale variabilities*

- **Routine dissemination of global L1B & 2 products over design lifetime of 7 years**
- **Near real time service for subsets of data products**



# S-5P Space Segment



### Satellite

- Mass: 820 Kg (TROPOMI 204 Kg)
- SA peak power 1,500 W
- Mass Memory: 480 Gbit

### Launch & Orbit

- launcher: Rockot (Plesetsk)
- Near-polar, sun-synchronous
- MLTAN: 13:30 h
- orbit height: 824 km
- Repeat cycle: 227 orbits/16 days



Courtesy Sentinel-3



Courtesy KSAT

### Downlink ('science TM')

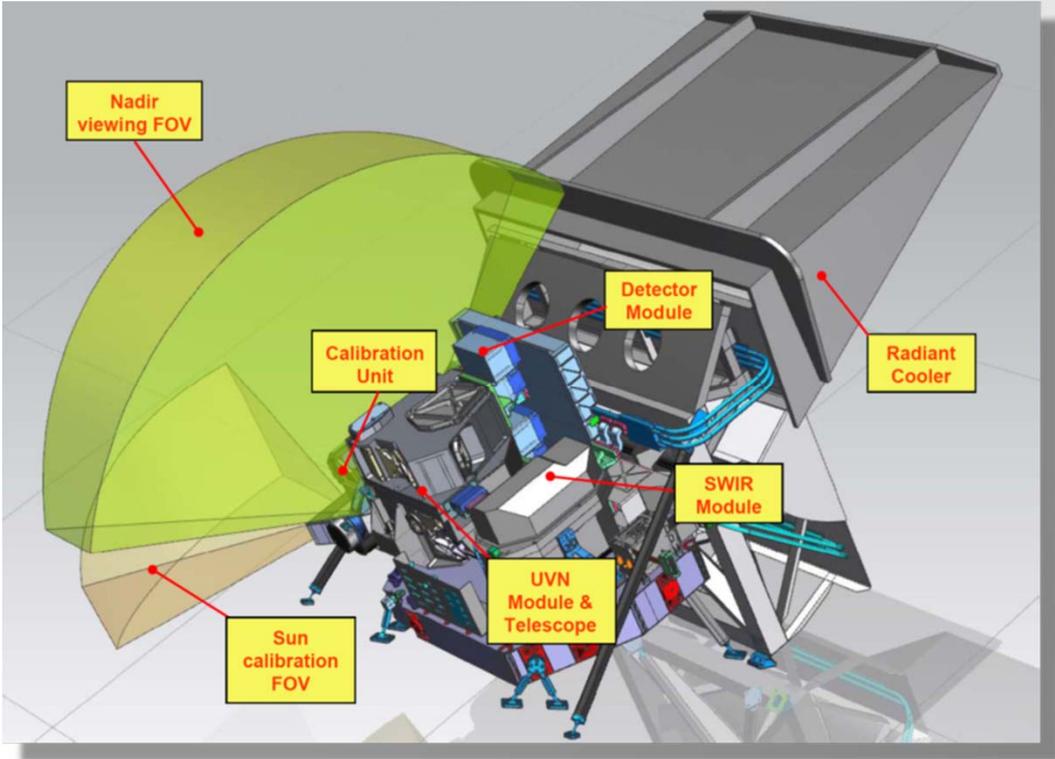
- downlink rate: 310 Mbps (X-band)
- data volume: ~ 140 Gbits / orbit
- Ground stations: Svalbard (N) / Inuvik (Ca)



***TROPOspheric Monitoring Instrument***

- *Grating spectrometer covering 8 spectral bands UV – short-wave IR*
- *common telescope for UVN & SWIR*
- *pushbroom configuration, wide swath (108° -> 2,600 km on surface)*

UV-VIS-NIR spectrometers developed by The Netherlands Space Office (NSO); contractor Airbus D&S (NL)  
 SWIR module ESA provided



# Satellite

**S-5P Flight Model**  
**Satellite**  
  
*during OOB straylight measurement campaign*  
*Dec. '16 - Jan. '17*  
  
*Airbus D&S / UK*



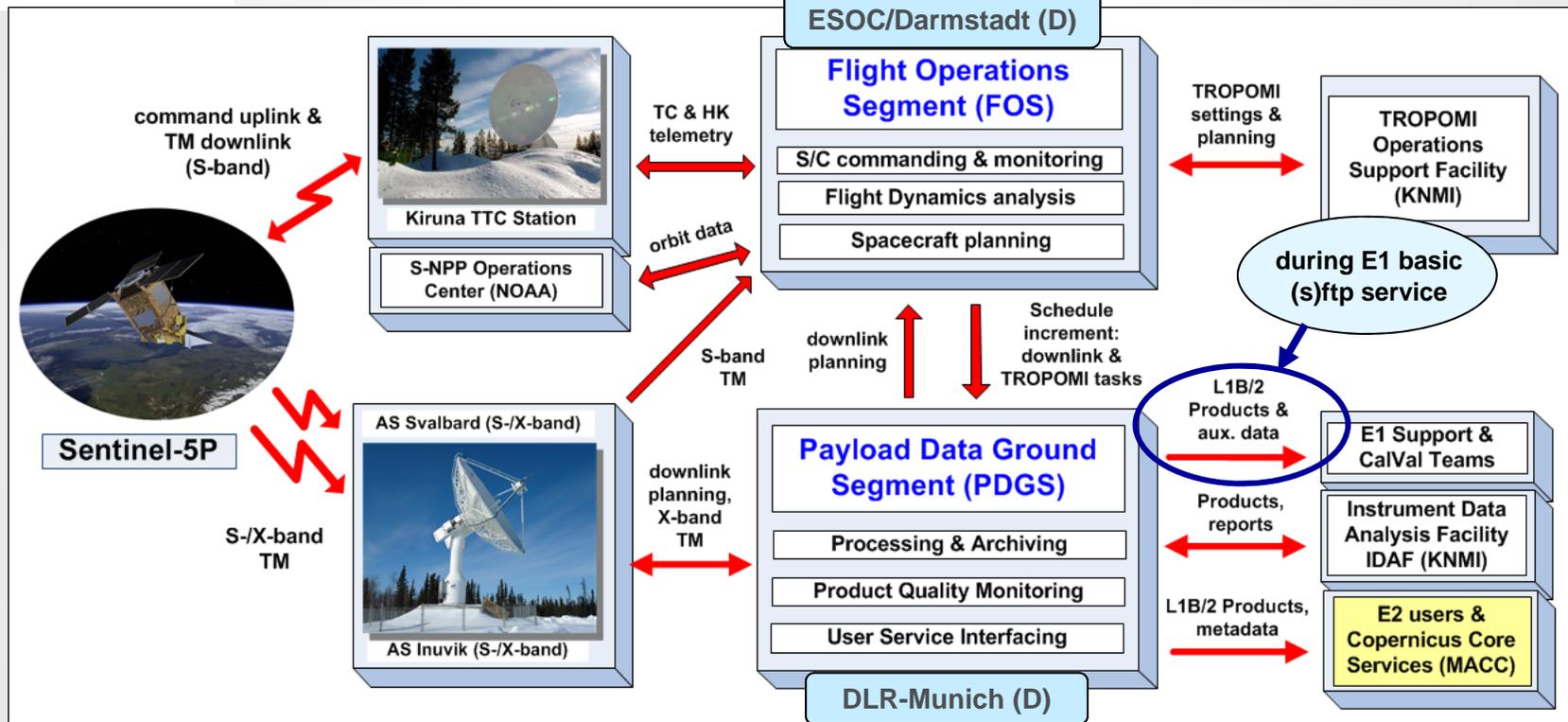
# Sentinel 5P data products

Product	Description	Remarks
Level 1B	Calibrated, geo-located Earth radiance & solar irradiance spectra in all bands	systematic processing
Level 2	<p><u>Column densities/profiles for S5P primary species:</u></p> <p><i>UVN channel products</i></p> <p>O<sub>3</sub> total &amp; tropospheric columns, profiles</p> <p>NO<sub>2</sub>, SO<sub>2</sub>, HCHO total columns</p> <p>aerosols aerosol index &amp; layer height</p> <p>clouds cloud fraction, top height, OT</p>	<p>Off-line - all products</p> <p>Near Real Time - all species except CH<sub>4</sub> &amp; tropospheric O<sub>3</sub></p>
	<p><i>SWIR channel products</i></p> <p>CO, CH<sub>4</sub> total columns</p>	

NRT: delivery within 3 h after sensing  
 OFL: delivery within 14 days



# S-5P Ground Segment

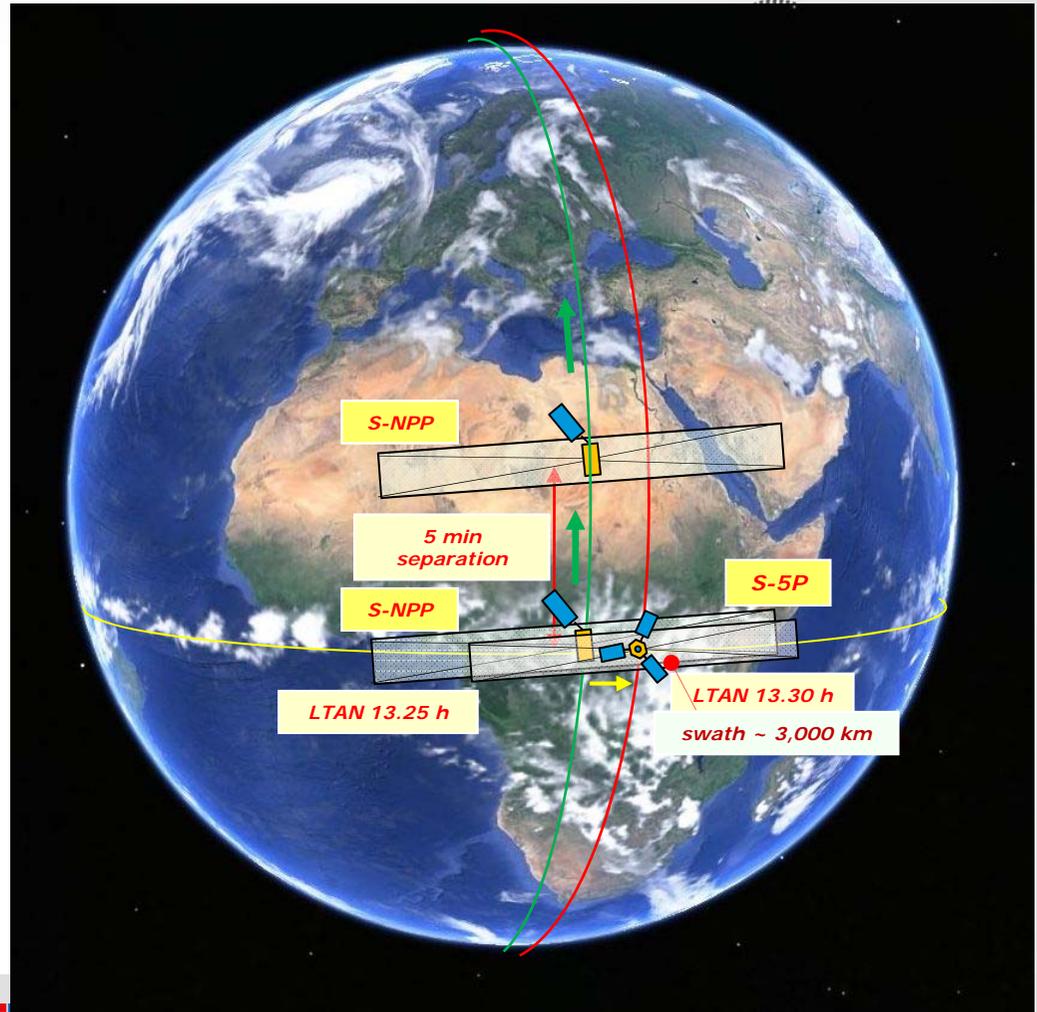


## Joint Operation S-NPP + Sentinel 5P

- $CH_4$  challenging accuracy requirement ( $< 2\%$  TC) -> select only cloud-free pixels
- Use Suomi-NPP / VIIRS cloud mask data at high resolution covering TROPOMI SWIR & NIR pixels
- 'loose' formation S5P + S-NPP -> along track separation 3.5 ... 5 min

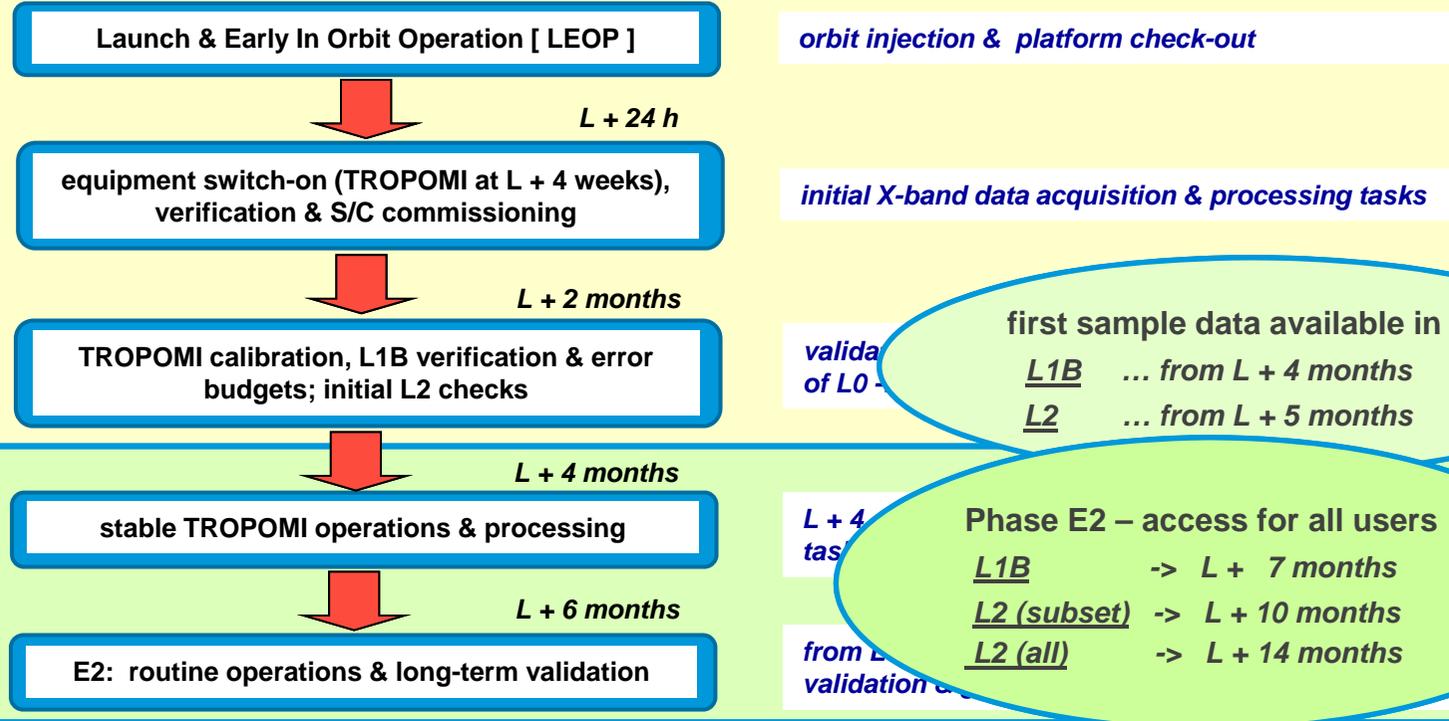
map: Google Earth

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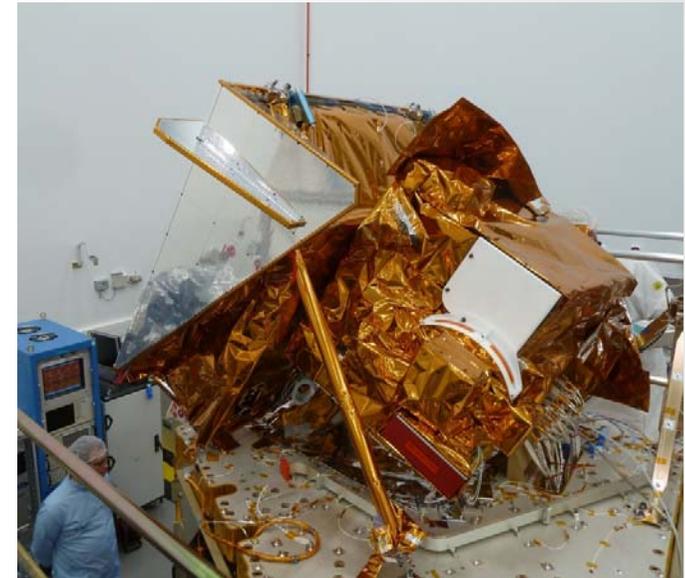
- **late L1B/L2 processors updates (Phase E1 versions)** **April '17**
- **finalize Ground Segment rehearsal tests** **May '17**
  - mission planning -> Platform & TROPOMI
  - L1B / L2 processing, archiving & data circulation
  - data access for CalVal teams
  - training of commissioning phase teams
    - FOS
    - PDGS
    - KNMI (OSF & IDAF)
- **spacecraft shipment to launch site (Plesetsk/Russia)** **L – 2 months**
- **launch campaign** **L – 6 weeks ... L**

# Sentinel-5P: Phase E1 Tasks



## Summary & Conclusions

- **Sentinel-5P will ensure availability of atmospheric products beyond predecessor missions SCIAMACHY & OMI**
- **Final acceptance reviews of Ground Segment & Space Segment in March / April 2016**
- **GS rehearsals & team training close to completion**
- **in-flight versions of all processors (Level 1B & 2) delivered & validated**
- **E1 detailed planning in place, covering GS commissioning & early CalVal tasks**
- **Launch: August '17, with 6 months commissioning phase**





# Thank you!

visit [earth.esa.int/web/sentinel/missions/sentinel-5p](http://earth.esa.int/web/sentinel/missions/sentinel-5p)

