



Fact Sheet

Monitoring air quality with ‘Copernicus’

On 13.10.2017 the European Space Agency ESA will launch the sixth satellite, the *Sentinel-5P*, in a series of missions, which form the Space component of Copernicus, Europe’s Global Monitoring for Environment and Security System. *Sentinel-5P* will gather data for global observations of the atmosphere, including trace gases and aerosols which influence air quality and the climate. Switzerland’s participation in the ESA programme to develop the *Sentinels* allows Switzerland to secure procurement contracts and gain access to data. In addition, because Switzerland is a member of the ESA, it is able to work with international partners and participate in decision-making at the intergovernmental level. Swiss companies were actively involved in developing *Sentinel-5P*.

Sentinel missions for Copernicus

In addition to the Earth observation satellites used for meteorology and scientific research, ESA is developing a series of missions for the ‘Copernicus’ programme, previously known as Global Monitoring for Environment and Security (GMES). The European Commission has overall responsibility for coordinating Copernicus. The aim is to establish an autonomous observation capability for a range of applications and to develop and operate geo-information services covering the domains of land monitoring, atmosphere, climate change, emergency management, security and the marine environment. Earth observation from Space will help to produce a comprehensive range of data. The data from satellite observations are added to that obtained from ground-based, sea-borne and airborne monitoring stations and national monitoring networks. Copernicus is part of Europe’s efforts to achieve social goals and address global challenges (e.g. climate change, food security, natural or man-made disasters, humanitarian aid, preserving biodiversity etc.).

The Space Component of Copernicus comprises infrastructure for observing Earth from Space. It harnesses existing national and international observation systems, as well as developing a new family of missions called *Sentinels* specifically for Copernicus. These are developed by ESA according to specifications formulated by the EU. The corresponding programme began in 2005 and involves the development of six missions: each mission focuses on observing specific aspects (e.g. oceans, land, vegetation, atmosphere, etc.) and must therefore fulfil different technical requirements. Switzerland considers Space to be a tool for analysing and producing solutions to global issues such as climate change, environmental protection and disaster prevention. It has supported the programme from the outset.



Artist's view: *Sentinel-5P* © ESA

Sentinel-5P – air quality measurements

The main task of *Sentinel-5P* is to gather data on the atmosphere. Using a highly precise multispectral instrument it will determine the distribution and quantity of pollutants such as nitrogen dioxide, sulphur dioxide, methane, carbon monoxide, ozone or formaldehyde. They influence not only the climate, but also air quality and thus human health. The data is used to map air quality and generate global forecasts on the distribution of pollutants and air quality. This information is made freely available via the Copernicus Atmospheric Monitoring Service. In addition, the data will also contribute to services such as monitoring the spread of volcanic ash so as to warn airlines, or to inform the public about high levels of UV radiation. In addition to measuring air quality, *Sentinel-5P* contributes to a better understanding of the chemical

processes in the atmosphere, including their impact on our climate. It does so by measuring potent greenhouse gases such as methane, and also aerosols and clouds, which affect the Earth's radiation balance.

Sentinel-5P's payload is TROPOMI (*Tropospheric Monitoring Instrument*). TROPOMI is a multispectral optical camera, which measures the troposphere in various spectral bands (ultraviolet and visible, near infrared and shortwave infrared). The spatial resolution of 7 km x 3.5 km enables the determination of air pollution over individual cities. The whole planet can be mapped within a day.

The launch of *Sentinel-5P* is scheduled for the 13 October 2017 (Launch time: 11:27 Swiss time) from the Plesetsk Cosmodrome in northern Russia. A Rockot launcher will carry the satellite weighing roughly 820 kg into a polar orbit 824 km above Earth. Following a test phase *Sentinel-5P* is expected to be operational for a period of seven years.

Swiss participation in *Sentinel-5P*

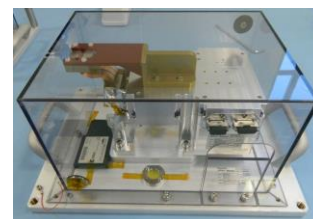
The mission is a joint enterprise by ESA and the Netherlands, which provided the TROPOMI. Airbus Defence and Space (UK and NL) is the prime contractor responsible for the development of the *Sentinel-5P* satellite.

Swiss companies contributed as follows:

- APCO Technologies SA delivered the entire structure of the *Sentinel-5P* satellite including the platform for the multispectral camera and various mountings for further components. APCO Technologies also built the container in which the satellite was safely transported to the launch site. The particular challenge was to protect the instrument from vibrations during the transport.
- Thales Alenia Space Switzerland AG (at that time the Opto-Electronics & Instruments business unit of RUAG Space Switzerland) developed the complex read-out electronics for the multispectral camera and the corresponding electronic interfaces, including a passive temperature regulation system for the read-out electronics. It prevents heat from the electronics from radiating on the sensor, thereby contributing significantly to the proper functioning of the instrument.



Sentinel-5P: Raw structure (left) and equipped (right). ©APCO (left), ADS (right)



Sentinel-5P: Detector read-out electronics. ©Ruag Space

Thanks to this involvement – made possible by Switzerland's contribution to ESA's Earth observation programme – and to the experience and expertise gained, Swiss science and industry will also be able to play an active role in future development activities in the ESA Earth observation programme.

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