



# Space Activities 2020

## Netherlands Space Office



# **Space Activities 2020**

Netherlands Space Office



# Table of Contents

	Preface.....	7
<b>1</b>	Developing the Dutch space sector .....	9
<b>2</b>	Coordinating national and international space programmes.....	13
	<i>Interview: “I get to live out my childhood dream every single day”</i> .....	16
<b>3</b>	Making better use of space technology and satellite data .....	19
	<i>Interview: “If you look carefully, you will discover space activities in the world around you”</i> .....	22
<b>4</b>	Utilising satellite data for food security .....	25
	<i>Interview: “Satellites have led to great advances in the field of meteorology”</i> .....	28
	<i>Interview: “Satellite data offer an incredible wealth of opportunities.”</i> .....	30
<b>5</b>	Stimulating international trade .....	33
<b>6</b>	Communicating and inspiring.....	35
	<i>Interview: “Space piques my curiosity every single day”</i> .....	38
	News overview 2020.....	40
	2020 in numbers .....	48







## Preface

# Investing in space activities gives the Netherlands a head start

The Netherlands Space Office is proud to present this overview of the Space Activities in 2020. It makes for a wonderful showcase of the latest highlights and developments in the Dutch space sector. While Mars rovers and astronaut recruitment campaigns obviously make headlines, our goal is to shine a spotlight on some of the amazing things that were developed in the Netherlands with the support of the Netherlands Space Office.

Space has a lot to offer to our country. It paves the road for future earning capacity. It allows us to conduct scientific research in or from space. It makes an important contribution to some of the major social challenges we face, such as climate change and food security.

In 2020, a new issue arose that has affected each and every one of us: the outbreak of the coronavirus. Like every other field of industry, the Dutch space sector had to adjust to a new and uncertain situation. Together, we found new ways to keep doing our jobs. Online events, expedited procedures at ESA and NSO, faster pay-outs from ESA to support the industry. Despite the global pandemic, these and other measures enabled us to realise many of our original goals after all.

The Dutch space sector is characterised by the passion of the people who work in this field. This annual overview includes interviews with some of them, ranging from an award-winning startup entrepreneur to a famous weatherman from TV who underscores the importance of using satellites to study the weather and our climate.

In the Netherlands, political interest in the space sector has grown in recent years - and rightly so. Space forms part of the newest dimension of our foreign and security policies. It leads to important insights about the state of our planet. Above all, our space activities boost our innovative strength and our future earning capacity. Investing in space activities gives the Netherlands a head start in the rapidly growing global market for commercial space services.

Following NSO's recommendations from 2019, the Dutch House of Representatives examined the importance of space activities in and for the Netherlands in 2020. A report drawn up by Dialogic shows that the Dutch space sector has been growing significantly in recent years. This growth also creates new job opportunities and added value further along the chains.

In short: there are plenty of reasons to put the Dutch space sector in the spotlight. I hope you enjoy reading the highlights and interviews in this annual overview. I would also love to hear your opinion: what aspect of the Dutch space sector do you feel deserves more attention and growth in the years ahead?



Harm van de Wetering  
Director Netherlands Space Office

1

# Developing the Dutch space sector





# 1 Developing the Dutch space sector

The Netherlands is becoming increasingly decisive when it comes to its space activities. We do not participate in everything, but whatever we do, we do well. For example, Dutch businesses and institutions are earning global recognition with e.g. laser communication technology, the development of small satellites and innovative satellite applications. Wherever possible, NSO supports the growth of the Dutch space sector by utilising its knowledge, network and various financial schemes designed to stimulate technology development. It also contributes to the development of a new European space hub - NL Space Campus - that is being built in Noordwijk.

## Highlights

### → The impact of COVID-19

Working at the kitchen table or in your home office. Holding meetings via a video connection. Digital networking when all major international events and conventions are cancelled. NSO staff found new ways to support the space sector during the coronavirus pandemic. During this unprecedented time, even more businesses than usual called on NSO's various technology development schemes. This goes to show that the Dutch space sector continues to innovate, even when times are tough.

### → New satellite applications

The market for satellite applications in e.g. agriculture, infrastructure and defence has been growing for years. Many Dutch businesses therefore call on such schemes as InCubed and BASS, which are funded out of the Dutch budget for space policy. Every year, NSO supports anywhere from twenty to thirty projects that stimulate the use of space. In 2020, these projects included the development of a service that utilises artificial intelligence to compare vast quantities of satellite data and an application that tells farmers when and where to irrigate their land based on satellite data on drought.

### → Defence discovers the possibilities of space

Together with NSO, the Dutch Ministry of Defence is examining the possibilities of space for the Dutch armed forces. For example, satellites can be used to make the Netherlands safer and protect troops while they are out on a mission. The first concrete results were achieved in 2020. In collaboration with ISIS, the Ministry of Defence built its first satellite: the Brik-II. The Ministry has also teamed up with TNO to invest in the development of laser technology that will make communication with and in space faster and safer.

### → Green light for area concept space campus Noordwijk

Three years ago, the national government, the province of South Holland and the municipality of Noordwijk began work on the development of a space campus in Noordwijk.

In 2020, the municipal council of Noordwijk approved the area concept for the campus, paving the way for the next series of concrete steps towards the realisation of an international space hub. The campus already includes ESTEC, the Galileo Reference Center and space incubator SBIC. The plans for the future include a base camp with facilities for students, startups and businesses, various live events and physical involvement from the universities of Leiden, Delft and Eindhoven. The official name of the campus has also been announced: NLSpace Campus.

### → Promising future for small satellites

In recent years, there has been an important trend in the field of satellite development: satellites are becoming ever smaller and more compact. That creates new opportunities for the Netherlands. The Dutch space industry had already obtained an important position in the field of sensors, solar panels and subsystems. Added to this is a focus on the development of complete small satellites (100-500 kg) and their instruments. As a result of the excellent (digital) facilities that our country has to offer and our reputation when it comes to international collaboration, knowledge institutions and businesses are garnering international attention.

### → Cubesats are taking off

The Vega Small Spacecraft Mission Service was the first ESA launch that was dedicated entirely to the smallest possible satellites: cubesats. For this mission, various Dutch businesses built rocket components (an interstage and igniters), cubesats and the dispenser that delivered these satellites to space at the exact right moment. In the future, Dutch businesses will further expand their expertise in the field of cubesats. For example, ATG and Airborne received an GSTP subsidy to develop a composite structure for the launch of cubesats that is thirty percent lighter than anything currently available on the market.

### → Laser communication new Dutch focus

Satellites that use laser beams to communicate with each other or the ground. Optical communication is a hot topic in the space sector and the Netherlands plays a leading role in the developments in this field. Some of these developments are funded via NSO using the space budget (ARTES). Other funding options, such as the National Growth Fund, are also being explored. A major investment can expedite the development of new hardware for satellites, as well as the ground stations that can receive laser communication back on Earth. Among others, TNO and Airbus - together with their supply chain that includes such companies as VDL, Demcon, Hyperion and Celestia STS - view optimal communication systems as the next domain in which the Netherlands can distinguish itself on an international level.

*The launch of Vega flight VV15, packed full of  
Dutch technology for small satellites. ►*





# 2 Coordinating national and international space programmes



## 2 Coordinating national and international space programmes

The goal of NSO, which coordinates national and international space programmes and advises the Dutch cabinet about space-related matters, is to create added value with and for the Dutch space sector. How does it do that? By collaborating with parties in and outside the space sector that can make a valuable contribution to the realisation of this goal. Think of e.g. developing new satellite instruments and satellite applications, formulating a joint strategy for world-class science or working together with other ESA member states on programme councils.

### Highlights

#### → Scientists band together

The Netherlands is a world-class player in the field of earth observation research. Nevertheless, many scientists working in this field believe that more can be achieved. They decided to work together to develop a strategy for the coming years. NSO facilitated the realisation of the document while also working on its own comprehensive long-term strategy for the space sector. The earth observation researchers' plans will be incorporated into this strategy. A joint vision will lead to more coherent policies and a stronger position in e.g. ESA's research programmes.

#### → Dutch earth observation instruments as popular as ever

The Netherlands has acquired an international reputation as a leading developer and manufacturer of earth observation instruments. Hyperscout 2, the first earth observation instrument to utilise artificial intelligence, was launched in 2020. Furthermore, the finishing touch was put to SPEXone, a spectrometer that will be measuring particulate matter on board the American-built climate satellite PACE. NSO contributed to the development of both instruments. In 2020, the Netherlands also signed off on the continuation of the OMI mission. The Royal Dutch Meteorological Institute (KNMI) will continue to support this Dutch satellite instrument designed to study the ozone layer - which was launched in 2004 and built to have a minimum lifespan of five years - until at least 2023.

#### → Knowledge networks stimulate successes in space

The close collaboration between researchers, engineers and the government lies at the foundation of the Netherlands' successes in the field of earth observation. That goes for the development of satellite instruments, but certainly also for how the resulting data are used. NSO initiated two knowledge networks to bring Dutch expertise together. The first studies show how radar data from space can be used in the agricultural sector. The second network researches how satellite data can be used to further improve the air quality for people here on Earth. Both networks were launched in 2020 with the NWO in charge of their implementation.

◀ After a successful launch, the Dutch instrument Hyperscout 2 sent back the first promising images.

### → Dutch in key positions in the European space sector

As in previous years, the Netherlands is once again well represented this year on the programme councils of the European space organisation ESA. Programme councils are the ESA's highest executive body; they make the overall decisions about how the ESA's budget is to be spent. In 2020, Joost Carpay stepped down as chairman of the programme council for Earth Observation and Jasper Wamsteker's term as chairman of the advisory committee for education also came to an end. Bert Meijvogel, Michael Wise (director of SRON) and Wouter Pont respectively took on the position of vice chairman of the council for satellite communication, vice chairman of the council for scientific programmes and chairman of the council for administrative and financial affairs. The fact that so many Dutch people hold key positions on the programme councils is neither unusual nor a given. It is indicative of the constructive and balanced view that the Dutch have on Europe's interests in space.

### → Around the Earth and to the Moon

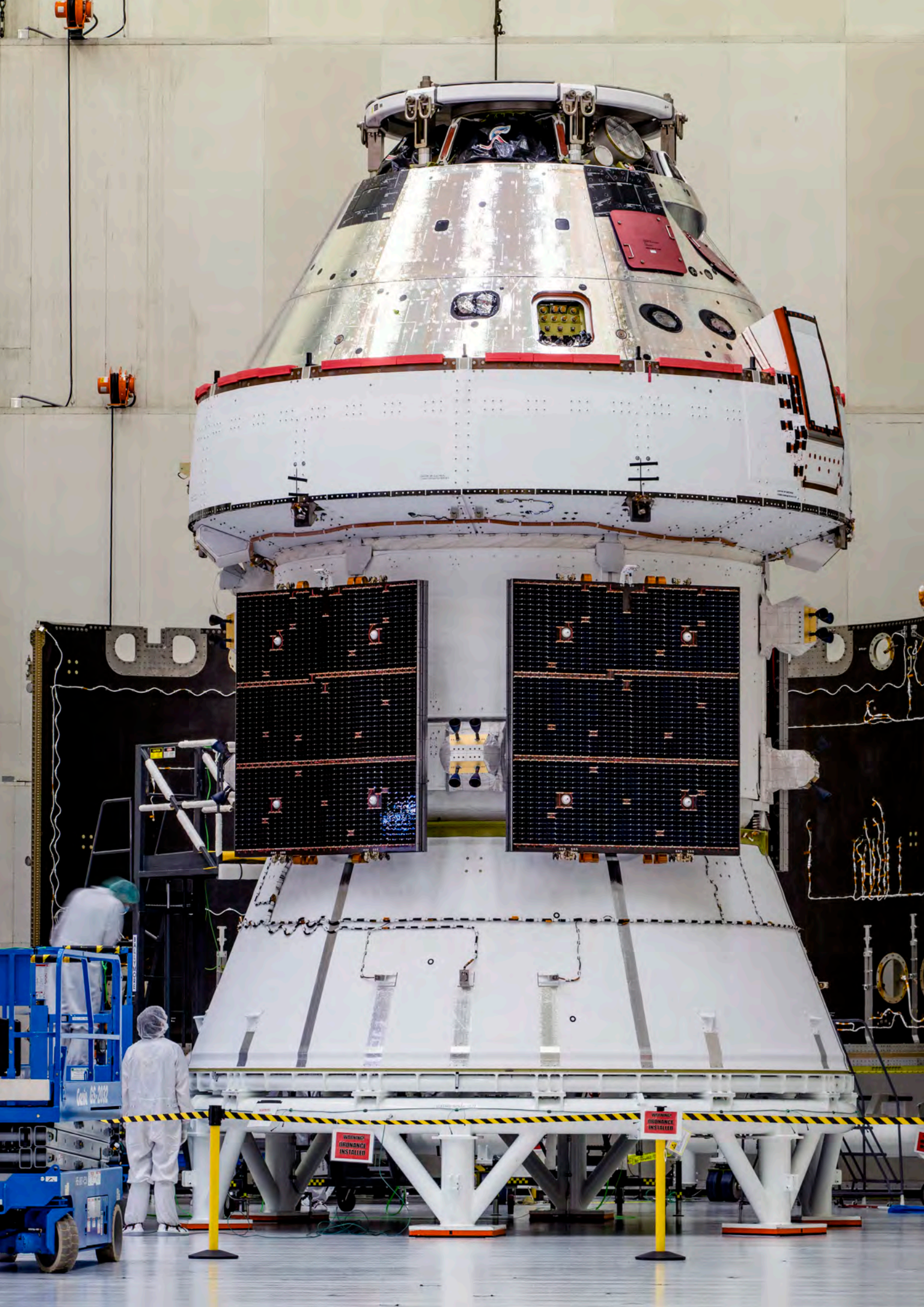
For years, the Netherlands has been playing a small yet important role in the field of manned space flight. In 2020, work continued on two projects that are sure to garner widespread attention in the years to come. The European robotic arm ERA, built by a Dutch consortium of businesses under the supervision of Airbus Defence and Space Netherlands from Leiden, was made ready to be launched to the International space station ISS. From 2021, the arm will be used to support activities on the Russian part of the space station. Furthermore, the Dutch company Airbus delivered the solar panels for NASA's first Orion capsule. In this manner, the Netherlands contributes to new manned missions to the Moon.

### → Scientists get to work with the GO programme

NSO was tasked by the Dutch Research Council (NWO) to execute the User Support Space Research GO programme. This programme stimulates the use of infrastructure in space for the purpose of scientific research. It is one of the most important and popular NSO programmes: every year, scientists submit so many research proposals that it would be impossible to accept them all. In 2020, nine out of forty-five proposals were accepted. All accepted studies are socially relevant in some way, as they concern the relationship between our society and changes to our climate and the natural environment.

*The Orion capsule that will be sent to the Moon ►  
in 2021 with its Dutch solar panels.*





WARNING  
OBSTACLE  
INSTALLED

WARNING  
OBSTACLE  
INSTALLED



### **Rob van Hassel**

Expert solar panels at Airbus Defence and Space Netherlands



## “I get to live out my childhood dream every single day”

When he was seven, Rob van Hassel saw a rocket fly to the Moon.

He had a room full of space posters and a head full of questions. How does a rocket work? How does it stay in one piece in outer space? How do you even begin to build something so incredibly complex?

As a space engineer, he now works on solar panels for NASA and ESA's new missions to the Moon: “I have come full circle.”

### **Let's start at the beginning: you had space posters in your bedroom as a child?**

“I was about seven years old. That was around the time that Apollo 8 flew to the Moon for the first time. In my room, I had posters of the Saturn V rocket, the Apollo command module and a lunar lander and the space suit that the astronauts wore when they explored the Moon's surface. I could daydream for hours looking at those images.”

### **What can you remember about the first Moon landing in 1969?**

“That I got to stay up late, of course. You don't forget something like that. I could hardly comprehend the idea of man landing on the Moon. How was it even possible for us humans to achieve something like that? The landing itself was a bit of an anticlimax for me. The way I remember it, it took forever before Neil Armstrong finally descended those steps. When it finally happened, the picture was blurry. I remember being disappointed that I could hardly see anything.”

### **Many children wanted to become an astronaut during that time. Did you?**

“During the time of the lunar landings, I became completely obsessed about space. Still, I had no desire to become an astronaut. What interested me most was the technology that made these achievements possible. For my classmates and I, there was absolutely no question about what I would do when I grew up: I would build things for outer space. That didn't change all throughout secondary school, so there was only one possible study programme for me: Aerospace Engineering at Delft University of Technology. I was truly passionate about technology during that time and I still am to this day.”

### **Why are you so fascinated by space technology in particular?**

“For starters, everything you want to send out into space has to survive the launch. After that, it has to be able to withstand both extremely high and extremely low temperatures. It must be rigid and durable, while also being as light as possible. All those parameters have a major impact on your design. Therein lies an incredible challenge. Disasters such as those with the space shuttles Challenger in 1986 and Columbia in 2003 only reinforced the feeling that the design can and must be improved.”

### **To save human lives?**

“Astronauts must be able to perform their duties safely. However, our space activities encompass so much more than the missions to the ISS or the Moon alone. They are a means to benefit all of humanity. I did not care about that much as an eight-year-old child, but I certainly do today.

Space is an enabler. Satellites have become a vital aspect of our ability to solve a wide range of societal issues; from navigation and communication to food supply and the climate. I am eager to contribute to these efforts with my work.”



### **What challenges are you currently working on at Airbus Defence and Space in Leiden?**

“We are working hard on the development of flexible and compact solar panels. Instead of the rigid panels of old, our design is more like a blanket that is launched in a compact form and then unfolded out in space. We are also working on small, affordable solar panels. Just like you can choose a variety of extras from a brochure when you are buying a car, we have developed a catalogue for small solar panels. In other words, we are industrialising our operations with new and more affordable technology and processes.”

### **Meanwhile, you are also involved in the development of the solar panels for NASA and ESA's new missions to the Moon?**

“We are developing the solar panels for the European service module that will take the Orion spacecraft to the Moon. Those panels have to fold away when the craft begins to accelerate in its low Earth orbit in order to reach the Moon. We have developed the so-called ‘bird manoeuvre’ for this. This represents an entirely new challenge and it is an absolute joy to work on. We have a good chance of being selected to contribute to future missions as well: a large lunar lander and even a complete lunar base. This base is to be built on the Moon's south pole, an area that is exposed to extremely low temperatures and long periods of darkness. The base's solar panels must be able to fold in and out and remain operational under the most extreme conditions. I am sixty years old now and in a way I get to live out my childhood dream almost every day: coming up with technical solutions for new missions to the Moon.”



# 3

## Making better use of space technology and satellite data



## 3 Making better use of space technology and satellite data

There are myriad space applications that are important to science, our society and the economy. NSO therefore stimulates the development of new and innovative space applications in various ways. In the years to come, the successful Satellite Data Portal will continue to make satellite data available free of charge to businesses, researchers and other users who wish to use that data. The SBIR programme challenges businesses to come up with solutions for the challenges that the government faces. New partnerships lead to new ideas, as do the European competitions for young talent in the space sector.

### Highlights

#### → Satellite Data Portal extended until 2024

Since 2012, the national government has been purchasing satellite data pertaining to the Netherlands. Via the Satellite Data Portal, these data are made available free of charge to Dutch residents, such as businesses that use the data to develop new applications. This portal is a truly unique initiative and its popularity has been growing for years. The project will therefore continue until at least the year 2024. This gives (potential) users the certainty that they can count on a continuous stream of high-quality satellite data for years to come. After a European tender in 2021, the portal's functionalities will be expanded further, e.g. with regard to social media and timelapse videos.

#### → Competition stimulates the use of satellite data

With its SBIR competition, NSO challenges entrepreneurs to solve societal issues with the help of satellite data or space technology. Winning businesses receive a subsidy to further develop their idea into a prototype application. In 2020, two SBIR projects were completed successfully. One project centred around monitoring subsidence in rural areas, while the other had to do with the automatic detection of landscape elements. Furthermore, three new SBIR development projects were launched. Businesses will compete with each other to solve challenges presented by water authorities, the Inspectorate SZW and the Ministry of Defence with an application based around satellite data. NSO assists the businesses with its network and expertise.

#### → Climate change calls for smart applications

Climate mitigation and climate adaptation are important issues for politicians and policy makers. How can we mitigate the extreme effects of climate change? How can we help our society adapt to new circumstances? By order of NSO, Geobusiness Netherlands organised the first of two workshops in 2020 about the added value that satellite data can offer when it comes to solving these issues. Next, a challenge will be issued to businesses in the form of an SBIR competition: look beyond monitoring climate change from space using satellites; also use satellite data for applications that will allow people back on Earth to take concrete action.

### → Another success for Tropomi

On board the European Sentinel-5P satellite, the Dutch satellite instrument Tropomi maps out the composition of the Earth's atmosphere on a daily basis. In 2020, the instrument once again exceeded the expectations of the researchers working with the data. Tropomi's data showed a drastic decrease in the emission of nitrogen dioxide as a result of the coronavirus pandemic. It also showed that the percentage of this decrease differed significantly per region. Tropomi also proved itself to be capable - under ideal conditions - of detecting the emissions of individual ships out at sea. The continuous stream of high-quality data presents many more possibilities to policy ministries. NSO is therefore eager to play the role of matchmaker. Tropomi's data can potentially play a role in the nitrogen crisis, the issue of ammonia and various other policy challenges that the Netherlands faces.

### → Satellite data for joint agricultural policy

For years, NSO has been supporting the agricultural experts of the Netherlands Enterprise Agency (RVO) with regard to the added value of satellite data. A focal point in the years to come is the joint agricultural policy. How can we use satellites to monitor sustainable agriculture? What can satellite data contribute to Europe's agricultural policy? RVO, NSO and the Netherlands Food and Consumer Product Safety Authority (NVWA) worked together in 2020 to raise awareness of the importance of satellite data and they will continue to do so in the years to come.

### → Growing interest in secure navigation signal

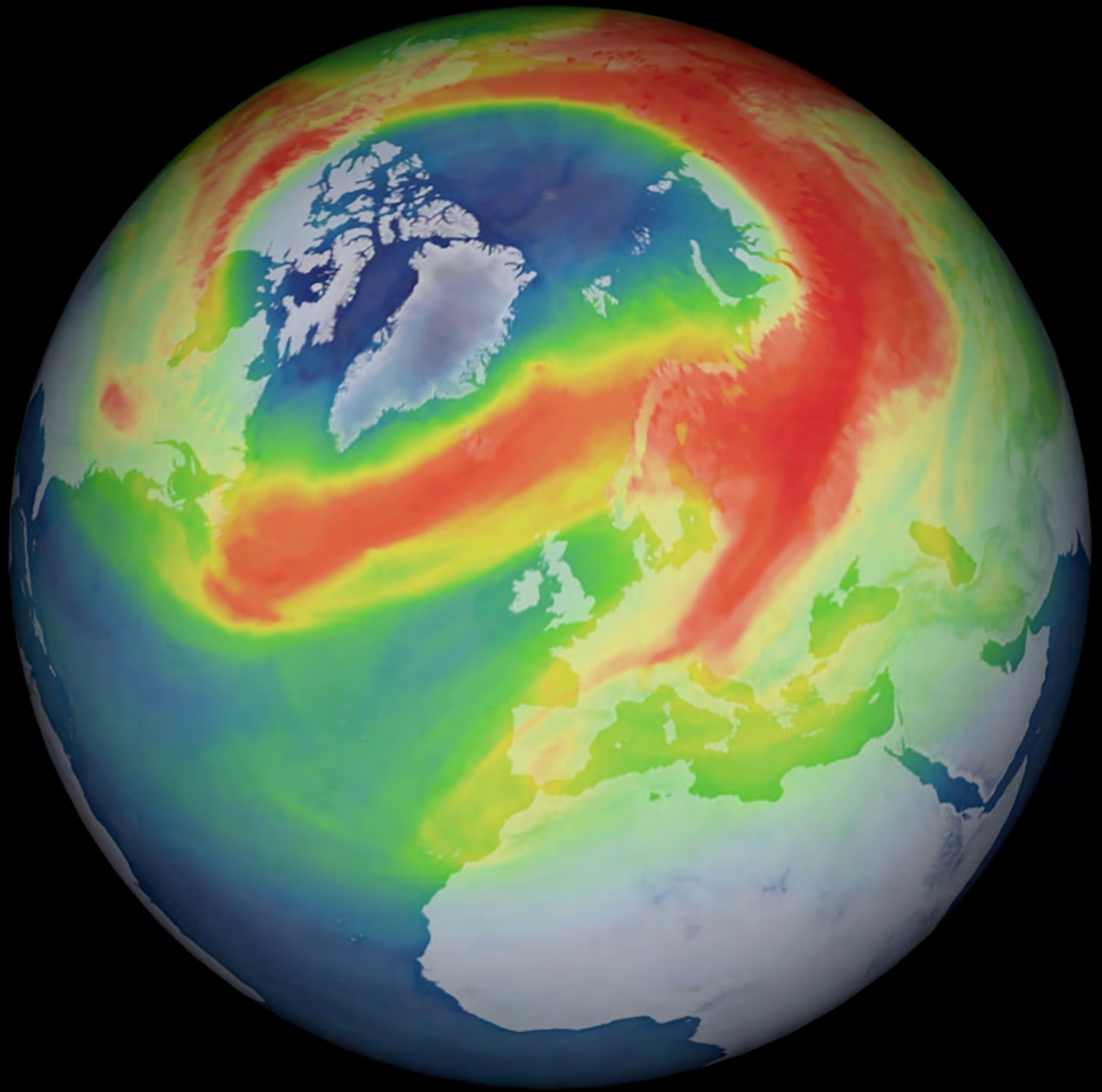
Anyone can make use of satellite navigation such as GPS and its European (and civilian) counterpart Galileo. Governments, armed forces and other select users can utilise another - even more accurate and secure - signal from Galileo: Public Regulated Service (PRS). In 2020, it became clear that there is a growing interest in this secure signal. PRS is used by the Marechaussee, among other organisations. It is now being examined how PRS can be used by the police force, when transporting money, prisoners or valuable goods, in the financial services sector and the energy sector and to monitor whether fishermen are not breaking their quota. NSO met with representatives from various government organisations to explain the features and possibilities of this service. PRS is less susceptible to jamming and spoofing (creating an alternative, false signal), which makes it potentially interesting for myriad applications by the government and other organisations.

### → European Championship for space applications

In 2020, the Netherlands won the grand prize of the Copernicus Masters competition - something like the European Championship for space applications - for the second year in a row. Our country also achieved success in the Galileo Masters competition (for satellite navigation applications). The winners came up with ways to monitor the health of coral reefs, assist farmers in Africa and facilitate accessible precision agriculture - all with the help of satellite data. Every year in December, these competitions give a boost to the innovative ideas of students and startups. The participants have a chance to make free use of satellite data, earn renown throughout Europe and obtain a place in SBIC, ESA and NSO's the space incubator.

*The Dutch satellite instrument Tropomi detected an exceptionally large hole in the ozone layer above the North Pole. ►*





**Alexandra Zevenbergen**  
Galileo PRS-specialist at CGI



# “If you look carefully, you will discover space activities in the world around you”

She studied Communication and Digital Media, but ended up working in IT in the space sector. Today, Alexandra Zevenbergen discusses the use and importance of Galileo's secure navigation signal as a PRS specialist. “Space activities may not seem that important, but we all rely on them every single day and we can truly benefit from them.”

### **You have worked in the space sector for six years now. What makes this “your” world?**

“When I told them that I would be working in IT in the space sector, the people around me were surprised but also very curious. Space speaks to the imagination of many. My work is mostly about making the connection between technology and people. It is about answering the question of how that amazing infrastructure we have out in space can help us in our daily lives down here on Earth?”

### **What do you tell people about your work at a birthday?**

“I work with satellite navigation. Everyone uses that on their phones, so that part is easy. Then I tell them that I started out working on the infrastructure of the Galileo system, the European satellites that transmit navigation signals to Earth, before switching to the application side - and not the application of the signal you use on your smartphone, but rather Galileo's secure signal: the Public Regulated Service or PRS for short.

### **How can that PRS signal benefit people here on Earth?**

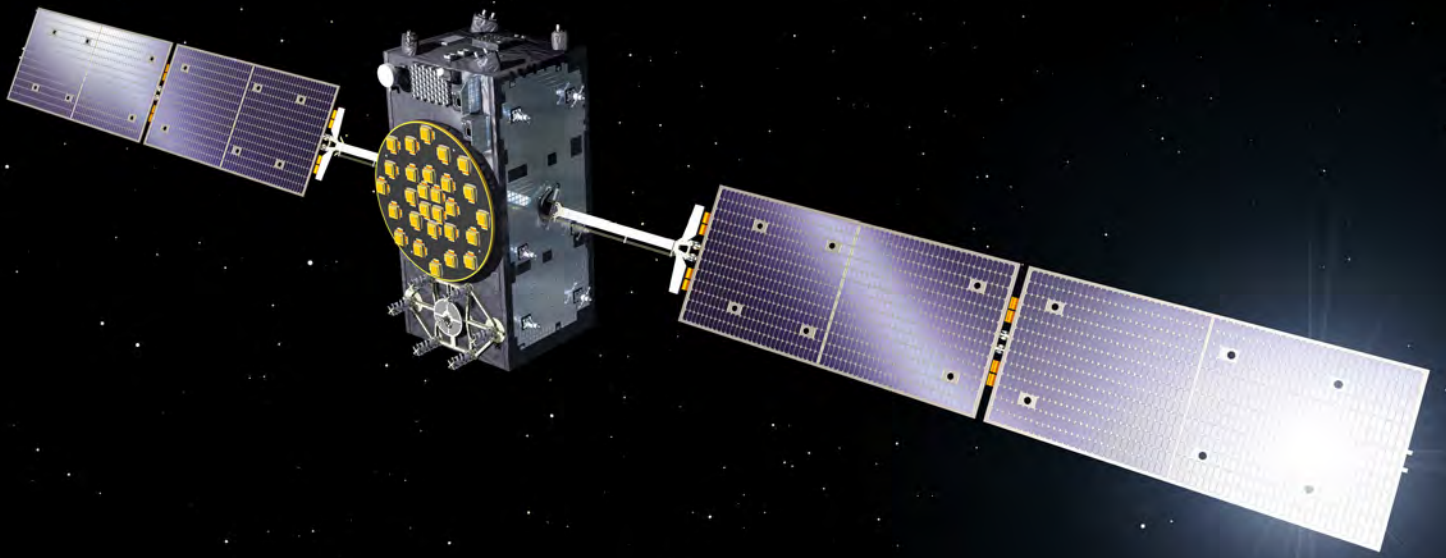
“Satellite navigation is used for an incredible number of activities on Earth. We all use satellite navigation in one way or another; ordinary people in the street, as well as the government and businesses. It is used during the transportation of valuable or hazardous goods and to keep our country safe, which is a job for the armed forces and the police. Banks also use satellite signals to add a time stamp to their transactions. Especially when it comes to security, it is important to make sure that people cannot jam or spoof your navigation signal. The PRS signal has more protections against such intrusions.

### **What is 'jamming' and 'spoofing'?**

Everyone can receive the “ordinary” satellite signal from Galileo or the American GPS. However, this signal is also easy to tamper with. Spoofing means tricking the receiver so that the location it shows is no longer accurate. Jamming is about using one signal to overpower another. That makes it harder or impossible for someone to accurately determine their position. PRS is the answer to both problems. It is a secure signal coming from the European Galileo satellite navigation system. When you use it, you can be sure that your signal is both secure and reliable.

### **How can parties gain access to this signal?**

“Every European member state that uses PRS has to give permission to parties that want to gain access to the signal. However, it is also important to allow users to experience first-hand what they can do with it. We demonstrate this technique to potential users, such as the government. In 2020, for example, we



organised a PRS user day together with NSO and the Ministry of Infrastructure and Water Management. More than thirty participants from different ministries got the chance to discover what the secure signal is and what problems it can help prevent.

**So, your job is to recruit future users of PRS in the Netherlands?**

"Yes. The Netherlands is ahead of most other countries in this regard. We have the demonstration days and a PRS user group that interested parties can join and which organises get-togethers. Furthermore, we as a sector are working on a knowledge centre, the so-called Centre of Excellence, in which we can bring the sum total of Dutch knowledge about reliable satellite navigation together and advise users and developers."

**Bringing technology and people together...**

"That's right. Many people still have no idea how incredibly useful and versatile satellite applications can be. That is as true for Galileo's PRS service as it is for open services and earth observation data from space and many other space applications. Space activities may sound terribly complex, but if you look carefully, you will discover that they are closer than you think and can be found everywhere in the world around you."



# 4 Utilising satellite data for food security



## 4 Utilising satellite data for food security

Linking development aid to (space) technology and mobile services. In short, that is the strategy of NSO's Geodata for Agriculture and Water (G4AW) programme. Through this programme, millions of small holder farmers in Africa were introduced to satellite data and financial products such as insurance policies and loans. During a time in which travelling has become harder due to corona-related restrictions, digital services present new opportunities. NSO informs and inspires parties that can make a contribution and, by doing so, continues to expand the reach and the impact of its G4AW programme year after year.

### Highlights

#### → Nearly four million farmers reached

The G4AW programme, which is funded by the Netherlands, assisted 3.8 million food producers in 2020 with reliable weather forecasts, market information and financial services such as insurance. That is twice the number of farmers of the year before. With this growth, the G4AW programme is well on its way to reaching the milestone of 4.5 million users. The final G4AW projects will be completed in 2022. After that, the programme will be carefully evaluated. The hope is that, in the future, at least half of the farmers in question will continue to use the services that were set up as part of the G4AW programme.

#### → International projects during the COVID-19 pandemic

In 2020, strict travel restrictions were put into place as a result of the coronavirus pandemic. As a result, the trainers of the G4AW programme had to bring more creativity and flexibility to the table. Normally, they would travel to (potential) users of applications to provide information in person. Now, however, these training sessions had to take place entirely online, which curbed the growth of the number of users of G4AW projects in 2020. However, the corona crisis also led to new opportunities. The digital services were complemented by information about COVID-19. This resulted in an extra channel of communication with millions of people in Africa and allowed G4AW to contribute directly to public health.

#### → Reaching 500 million application users with GCA

No one could have missed the Climate Adaptation Summit that the Netherlands organised in January of 2021. The foundation for this event was laid back in 2020 and NSO took part to work on the theme of food safety. The Netherlands established the Global Commission on Adaptation (GCA) to share knowledge about climate mitigation and adaptation. The initiative is supported by the United Nations, the World Bank and the Bill & Melinda Gates Foundation, among others. One of the GCA's action tracks concerns food safety. By 2030, 500 million food producers must have digital access to the advisory services. NSO actively contributes to the realisation of this goal and G4AW can be seen as an *early adopter*.

### → Combining information and putting the user first

Informing and inspiring; that is what NSO strives to do with the results of its long-running G4AW programme. In 2020, three analyses were conducted, the initial results of which are now becoming available. For example, farmers appreciate the weather information services the most. They can use this information to better coordinate their seed selection, sowing moment and use of fertiliser and take action against diseases and fungi. The analyses also demonstrate the importance of putting the user first as much as possible. There is also a growing tendency to bundle services together, such as weather information, seed advice and insurance. NSO is recording the knowledge it acquires from the analyses, but it will also actively disseminate it via publicly accessible webinars. Furthermore, the Netherlands Food Partnership, which was formed in 2020, will show off our knowledge and expertise regarding food security to the world.







### Gerrit Hiemstra

Director/owner Weather Impact and weather presenter at the NOS



## “Satellites have led to great advances in the field of meteorology”

His weather forecasts appear on the television screens of millions of households at the end of every NOS news broadcast. Meanwhile, Gerrit Hiemstra is also working on sending weather forecasts to poor farmers in developing countries via text message. “They may not know what satellites are, but they can certainly benefit from them.”

### As a meteorologist, do you often use satellite data?

“I do, but usually not directly; I mostly use the data indirectly. The satellite data are fed into the computer models that we use to generate weather forecasts. The data are mostly processed in what we call the “starting situation.” That is an overview of what the weather is currently like all over the planet, based on as many different data sources as possible - including satellite data. We do occasionally use satellite imagery directly, e.g. when we show the images to viewers during the evening news.”

### How have space applications affected your field?

“I have been working in the field of meteorology since 1986. Since then, we have made enormous progress. Most of that is the result of two major developments. The first is the available processing power of our computers, which has increased exponentially. The second is the volume of available data. We now have far more information at our disposal, most of which comes from satellites. Now that we have a better overview of the current weather and faster computers, we can create far more accurate and detailed weather forecasts.”

### You contribute to NSO's G4AW programme behind the scenes. What is your role in this programme?

“With Weather Impact, we take part in various consortia that provide weather forecasts to local - often poor - farmers in developing countries. That sounds easier than it is, because their situation is almost entirely unlike ours.”

### Why is it so difficult to make weather forecasts there?

“Especially in Africa, it is exceptionally difficult to gather accurate meteorological data. The necessary infrastructure is practically non-existent, nor is there any money to develop it. That is where satellite data can help. However, there are other obstacles as well. Some farmers in Africa are not familiar with maps. How can you teach those people to work with satellite data?”

### Well, how can you?

“We primarily look at the data that are most important to these farmers, such as precipitation and wind. Our complex models, which incorporate satellite data, give us information about those factors. We can then condense all that complex data into a simple text message that is sent to small farmers in Africa. That text message contains information that is important to them.”

### Can you give an example?

“Take a sesame farmer in Ethiopia. Sesame is a kind of grass with seeds growing in capsules. It should be sown when rain is coming, so it can start growing immediately. The seeds should be harvested before the wind blows them all away and destroys the harvest. Once or twice a week, we send farmers a text



▲ G4AW project CommonSense in Ethiopia.

message with the latest rain and wind predictions. That knowledge allows the farmer to increase their odds of a successful harvest.”

#### **That sounds like fulfilling work?**

“We are talking about people who, unlike us, have never seen a weather forecast before. Anything we can do for these people benefits them. We can make a truly valuable contribution that helps them make optimal use of their land.”

#### **This is an application at a relatively small scale. How can you use satellite information at a larger scale?**

“Technology keeps moving ahead. As better instruments are developed, we can gather more and more data. For example, the Dutch satellite instrument Tropomi is incredibly important in the field of meteorology. Even though a weatherman does not necessarily need data about the composition of the atmosphere, this information is invaluable to scientific research. The same goes for research into sea levels and the ice caps using the altimeters on board satellites. Without satellites, it would be almost impossible to conduct any measurements in remote areas such as the poles and the oceans.”

#### **What do you believe is the biggest challenge we will face in the near future?**

“During the Climate Adaptation Summit 2021, it was about climate change, which is a growing global problem. Summits like this are generally quite abstract. During a few sessions, I attempted to demonstrate that you can also make the issue very concrete. We can bridge the gap between the abstract global climate problem and people's everyday lives with projects such as G4AW. This programme truly serves as an example for the rest of the world. Now it is time to maintain that momentum. Many such projects end when the money runs out and then all the progress you have made is lost. We have to make sure that the practical aid we can offer continues to be used. That is where our challenge lies.”



**Elise van Tilborg**  
Founder and owner IMARA



# “Satellite data offer an incredible wealth of opportunities.”

Using satellite data to increase the impact of agricultural projects in developing countries. That is the idea that won Elise van Tilborg the Planet award during the European Copernicus Masters competition in 2020. She quit her job and is now working as an entrepreneur to find a win-win-win situation that benefits farmers in developing countries, the economy and our planet.

### **How did you end up in the world of satellite applications?**

“I was studying International Land and Water Management at Wageningen University & Research. That is where I came into contact with GIS: geographic information systems. I saw how you could not only conduct scientific research, but also apply that science in a very practical manner. For my master's thesis, I studied the success rates of different types of beans in Costa Rica. I used a model for my research that is also used in Formula 1 racing. Instead of finding the best tyre strategy for driving around a wet circuit, I studied what type of bean performs best on e.g. steep slopes in areas with heavy rain.”

### **How did you come up with that idea?**

“I love that kind of complex puzzle. Especially when the end result is something you can immediately put into practice, as was the case for that farmer in Costa Rica. After my studies, I reached out to NSO. I started there as an intern before joining the G4AW programme. This programme is about creating food security in Africa using satellite data.”

### **Development aid using satellites?**

“That is what it boils down to, yes. Farmers in Africa do not need to understand the ins and outs of satellite data. When you go out to eat at a restaurant, you do not ask about every single ingredient and the recipe before ordering. You just want to enjoy a delicious meal. Satellite data work in much the same way. There are people who work with the raw data, which in turn allows farmers to use the end result - the application - to work their own land more effectively.”

### **You have since started your own business. Why did you decide to do that?**

“I want to take things to the next level. Farmers benefit from satellite data regarding e.g. the weather and the soil. However, that tells you nothing about the exact impact of agricultural projects in developing countries. I'm not just talking about the impact on the economy, but also on people's wellbeing and the wellbeing of our planet. To examine all those different angles, you have to gather a wealth of information over an extended period of time. That is what we do - again, with the help of satellite data.”





**This idea won you an award during the Copernicus Masters competition in 2020...**

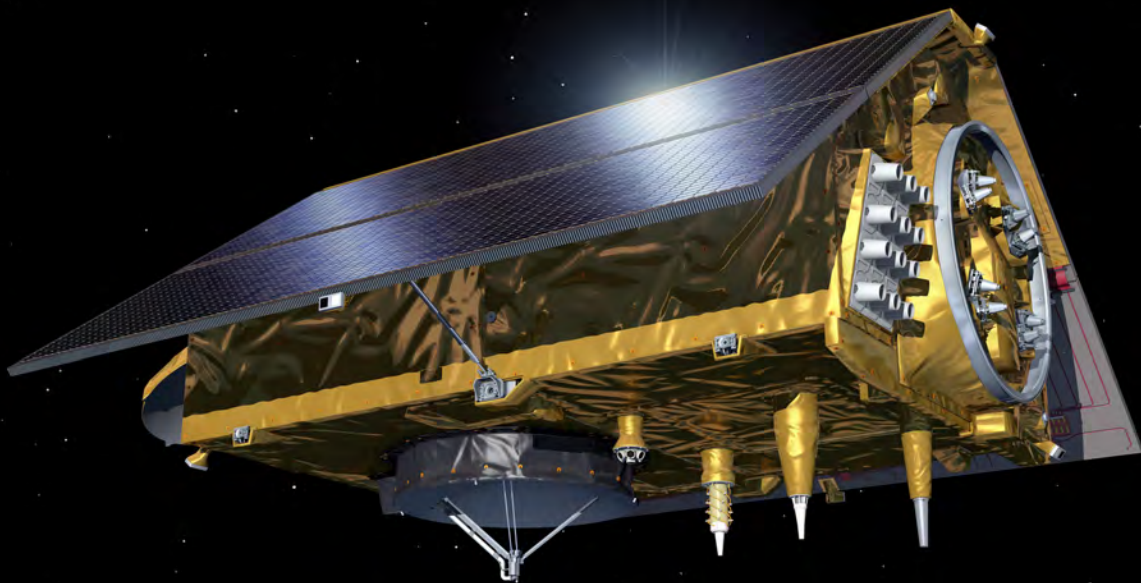
“I won the Planet award, which means - among other things - that I get to use a large quantity of commercial satellite data. The resolution of those data is higher than that of the data that are available for free. This prize will allow me to further develop my idea and examine how much value commercial satellite data can bring to the table. On top of that, it is of course a great honour and it has put my company IMARA in the spotlight. IMARA means “balanced” in Swahili. That is what we seek: the right balance between the interests of farmers, the economy and the planet.”

**Would you advise other entrepreneurs to develop applications based around satellite data?**

“Absolutely. Satellites map out almost the entire planet in an objective manner. You can use the data to look back in time and “see” wavelengths that are invisible to the naked eye. On top of that, more and better data are becoming available. The overall winner of the Copernicus Masters competition will study the health of coral reefs around the world. Other entrepreneurs help urban ecologists maintain greenery from outer space. Satellite data offer an incredible wealth of opportunities. As a result of the rapid development of this technology, the number of opportunities will continue to grow in the years to come.”



# 5 Stimulating international trade





## 5 Stimulating international trade

Nothing was the same in 2020. Major events like the Space Tech Expo in Bremen and the IAC in Dubai were postponed as a result of the coronavirus pandemic. Visits from foreign delegations were cancelled, as was a trade mission to India. Nevertheless, the Netherlands is and always will be a country of international trade and a global perspective, even during a pandemic. Despite the unique and trying circumstances, NSO was able to find different ways to collaborate with other countries on topics related to space. Important partnerships with the OECD, the UN and ESA were conducted mostly online.

### Highlights

#### → Maintaining international relations

Space is an international business if ever there was one. One of NSO's tasks therefore revolves around building and maintaining international relations, such as those with the EU, NATO and the United Nations' Office for Outer Space Affairs. One part of this international perspective is making sure that all the data we use conform to the OECD standards. Only then can they be properly compared to data from other countries. In 2020, NSO not only focused on making sure its data met the OECD standards, but also on various legal aspects such as preventing space debris and working together to treat the available space around our planet with due care.

#### → New partnership with Norway

In 2020, the Dutch Ministry of Defence initiated a new partnership between the Netherlands and Norway. NSO was in charge of implementing this partnership. The Norwegian and Dutch armed forces have been working together closely for years. In the near future, their collaboration will even extend into outer space. First up is a demonstration of Dutch laser communication technology on the Norwegian satellite NorSat. While the preparations for this mission are in full swing, NSO is assessing whether the space sector is interested in a more comprehensive collaboration with Norway.

#### → Facilitating bilateral business

As the markets for space technology and satellite services continue to develop rapidly, new opportunities arise for Dutch businesses. It often starts with a bilateral collaboration between space agencies. In 2020, NSO took further steps to facilitate bilateral international collaboration, e.g. with such countries as the Ukraine, Kazakhstan, India or the United States. A trade mission to India was turned into an online event during which businesses could meet up and present their upstream activities. At the moment, the preparations for a bilateral project centred around air quality - in which parties from both countries are taking part - are in full swing.

# 6 Communicating and inspiring



## 6 Communicating and inspiring

Space is about the universe and the major questions of our existence, but it is also about the food on our plates, the air we breathe and the dikes that protect us from the rising water. Space is about wondering whether we are alone in the universe and how you can get around the traffic jam you see forming ahead. The versatility of space makes it a fascinating topic to talk about, learn from and inspire a new generation with. Even during a year dominated by the outbreak of the coronavirus, there was plenty of space news to be found - partly resulting from NSO's (online) events, innovative projects and communication channels.

### Highlights

#### → Anticipating corona

Around March, the consequences of the corona crisis became increasingly clear, even in the space sector. Most of ESA's launch programmes were postponed. Attending trade shows and other activities became impossible. Many activities in the sector suffered costly delays. NSO did its best to support the sector however it could, all while modifying its own methods to cope with the situation. Working mostly from home, NSO's staff chose not to focus on what had become impossible, but rather on what was still possible. That led to many unique insights and initiatives.

#### → Visiting space from home via [thuisinderuimte.nl](http://thuisinderuimte.nl)

Although the schools were closed for part of the year, space education continued as a result of the excellent collaboration between NSO, Space Expo, ESERO, SpaceBuzz and Space Academy. Together, they developed the special website [www.thuisinderuimte.nl](http://www.thuisinderuimte.nl), which contains a wide range of educational activities for children to do at home. Every Friday, they even have the opportunity to pose their questions to none other than André Kuipers. The website was a major success: during the first week after launch, [thuisinderuimte.nl](http://thuisinderuimte.nl) received three times as many visitors as NSO's own website. That was reason enough for the Algemene Onderwijsbond to highlight the initiative in its newsletter.

#### → ESERO NL brings space to the classroom and online

NSO is working with ESA to bring space to classrooms via the organisation ESERO NL. This year, ESERO NL updated its website. It rebuilt lessons to suit online learning environments, organised online training sessions for teachers and lecturers, conducted the Mission X school project in an alternative manner, entered a new partnership with the Royal Dutch Meteorological Institute (KNMI) as a content partner and demonstrated what it is like to work in the space sector via a series of expert videos. It was even possible to launch the minisats that students had built as part of the Cansat competition from ASK 't Harde. Although not all cansats ultimately transmitted a signal, the launch was an important milestone for the student teams.



### → Restyling website and online development

Eagle-eyed visitors have surely noticed by now that NSO has updated the design of its website's homepage. In keeping with the ambition to demonstrate the added value of space activities, more space on the website has been reserved for beautifully illustrated news articles. This year, the website attracted 68,905 unique visitors during 112,023 visits to a total of 812,872 pages. Additionally, NSO maintained its online presence on LinkedIn (3,370 followers), Instagram (660 followers) and Twitter (2,260 followers).

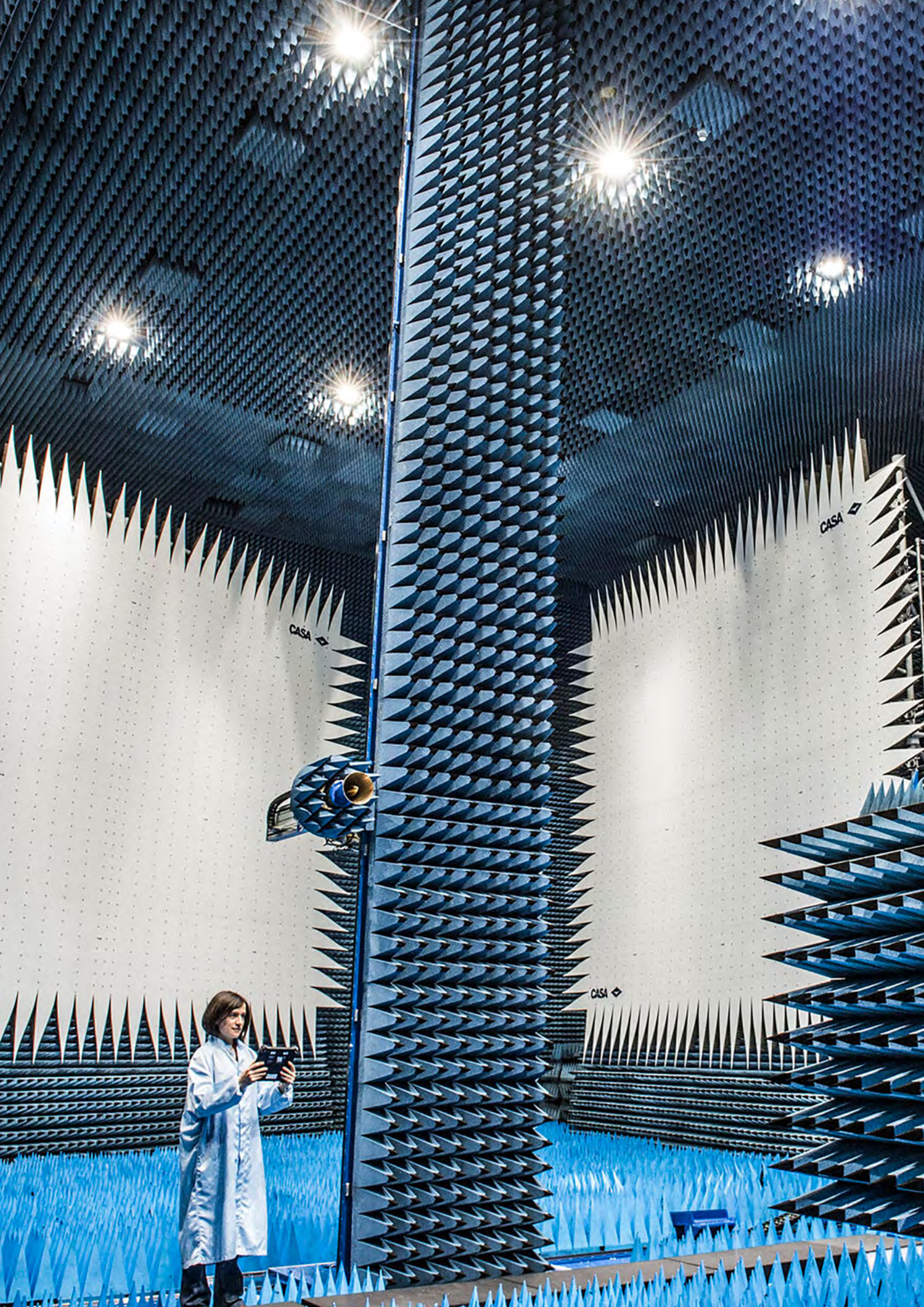
### → An ESTEC open day after all

Can you organise an open day while keeping your doors closed as a result of the corona measures? Yes, you can. ESA's technical centre ESTEC opened its doors virtually this year during the traditional open day in the first weekend of October. NSO set up a Dutch "room," where it offered visitors a varied programme that included live interviews with experts from the space sector, vlogs made by businesses and knowledge institutions and a quiz that let people test their knowledge of (Dutch) space activities.

### → Nieuwsuur is making a series about Dutch space activities

In 2020, NSO continued to invest in its ties to the media. This resulted in a tonne of attention for Dutch space activities. One notable example is the series "De economie van de ruimtevaart" that was broadcast by Nieuwsuur this summer and which featured NSO director Harm van de Wetering and the CEOs of ISIS and Airbus Netherlands. The Dutch space sector was also covered in various talk shows, news sections and podcasts, including BNR's The Big Five, NTR Focus and De Strateeg. Lastly, there was a lot of attention for Copernicus Masters winner Reefsupport and the launch of a Vega rocket with a variety of Dutch hardware on board.







**Wendy van den Putte**  
Project manager ESERO NL



# “Space piques my curiosity every single day”

Education is important to ESA and NSO. That is why they introduced ESERO NL together, an initiative for space education that ties into the Dutch educational system. With ESERO NL, Wendy van den Putte brings space activities into the classroom. She is quite good at it, too: “I can relate almost any topic to space one way or another.”

### **What makes space such an ideal topic for education?**

“Space appeals to people's sense of wonder. It is about astronauts, spacecraft and exploring distant worlds. On the other hand, you can also use it as a “gateway” to other school subjects, such as physics, biology and geography. Take whales, for example. If you fit them with a GPS receiver, you can track their movements. This gives you more insight into how whales move around and about the Earth's ecosystem. In a similar manner, students can use satellite data to discover how their own environment is changing. They can also learn about global processes such as desiccation, deforestation and climate change.”

### **What is ESERO's target group?**

“Our primary target group is teachers. We offer them workshops and training sessions. How can you look at your curriculum from a different perspective? How can you use stories and people from the space sector to make your course materials more exciting? Through their teachers, we reach an incredibly broad and diverse group of students between the ages of four and eighteen. It is about boosting their technological and scientific literacy in a fun way that requires them to work together and learn through research and design.

### **As with the Cansat competition?**

“That is one of our most amazing projects. In our society, we need people with vastly different skillsets. The Cansat competition has teams of students designing, building and launching their own satellite the size of a soda can. Each team requires people who can code or calculate how large the parachute needs to be. It also needs people who are good at planning and organising and who can talk about the project eloquently. With this project, a topic that would otherwise be just another physics class for these young students suddenly takes on real-world significance. They acquire new knowledge and put it into practice immediately. This project is a great way for students to discover whether they want to make a career out of working in a scientific or technical environment.”

### **They also get to witness a rocket launch from up close...**

“There is nothing cooler than watching something you built be shot one kilometre into the sky by a rocket.”

### **Do you have any other upcoming educational projects?**

“We have recorded a series of videos with experts from the space sector. Our goal is to introduce young people to professionals working in this field. We are also developing geography lessons using NSO's Satellite Data Portal.





▲ Teachers working during an ESERO NL workshop.

Research shows that lecturers like to work with real satellite data. Satellite imagery allows you to study how the landscape around you is changing, how we are protecting ourselves against rising sea levels and much more. We have already tested the first lesson and we have plans for more.”

### **The corona crisis forced schools to shut their doors. How did ESERO cope with that restriction?**

“We had to move all our training sessions to an online environment. We did so successfully and even discovered a benefit of this approach: it significantly lowered the participation threshold. We also worked with a number of partners to launch the website [thuisinderuimte.nl](https://thuisinderuimte.nl). Teachers, parents and children can use this website to find activities that are suitable for home education as well.”

### **You sound very excited when you talk about your job...**

“Ever since I was young, I have wanted to understand why things are the way they are. I am interested in almost anything. By diving into space, I continue to learn new things about the world around me. That piques my curiosity. I ask questions and conduct research and use what I learn to develop products for teachers and lecturers. I want them to experience the same sense of wonder that I feel and impart it on their students.”

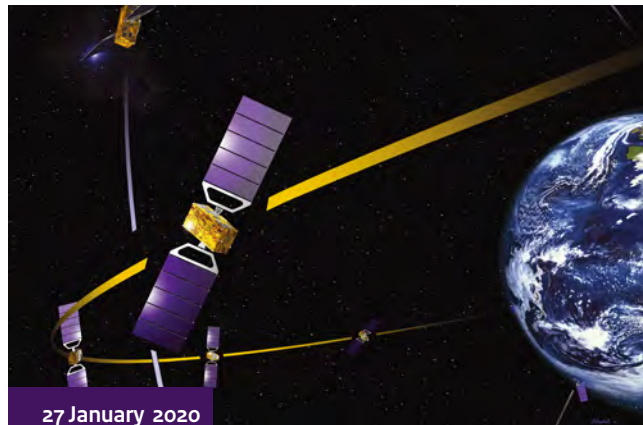
# News overview 2020



10 January 2020

## NL Space New Year's gathering: "Give broader recognition to solutions from space"

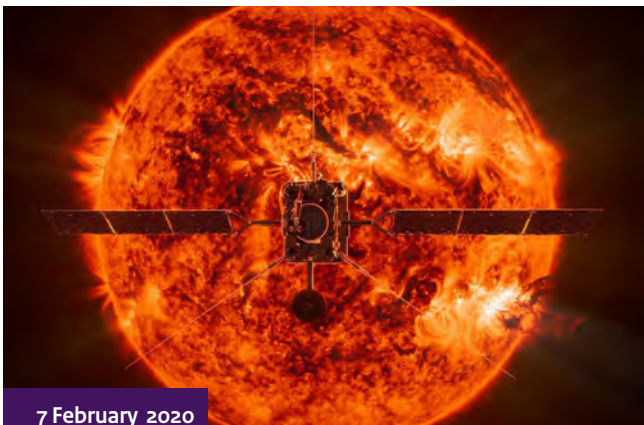
In keeping with tradition, the prominent players in the Dutch space sector came to Space Expo in Noordwijk yesterday for the NL Space New Year's gathering, organised by branch association SpaceNed and NSO. Virtually everyone agreed on one thing: space offers great added value and wonderful opportunities for the Netherlands to continue playing a prominent role in this field in the future.



27 January 2020

## Secure signal navigation satellites tested successfully

The European satellite navigation system Galileo offers a robust encrypted signal that may only be used by certified (government) parties. To demonstrate the benefits and applications of this signal, CGI collaborated with NSO and the Ministry of Infrastructure and Water Management to organise an information gathering on Friday 17 January for parties in the security, detection or enforcement sectors.



7 February 2020

## Dutch solar panels will bring Solar Orbiter to the Sun

ESA's new space mission Solar Orbiter will be launched into space next Sunday from Cape Canaveral in Florida. This launch is eagerly anticipated by two Dutch parties who are closely involved in the mission. Airbus Defence and Space Netherlands helped build the unique solar panels that will be providing the spacecraft with the energy it needs to operate in the coming years. Meanwhile, the work of the Royal Dutch Meteorological Institute (KNMI) will begin once the first measurement data sent back by the Solar Orbiter reach Earth.



13 February 2020

## Satellite services help pastoralists safely traverse the Sahel

In the daily lives of pastoralists in the Sahel, satellite services can make the difference between finding water and grass for their cattle on time - or not. This is even done in such a manner as to prevent bloody conflicts with farmers who do not want herds of cattle traversing their lands.

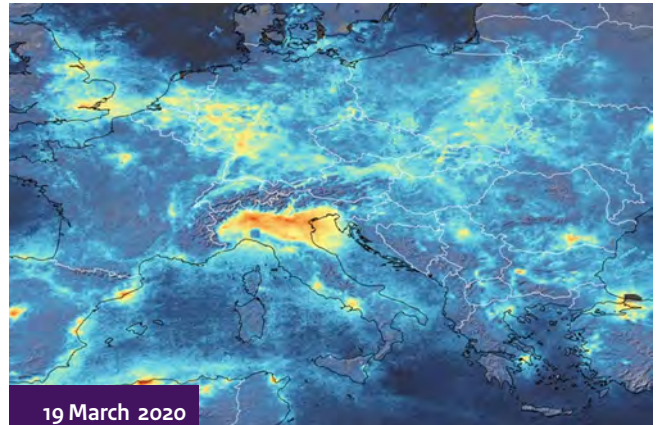




14 February 2020

## Support for candidates ISU Space Studies Program

From 22 June until 21 August, recent graduates and Young Professionals will dive headfirst into the space sector during the Space Studies Program organised by the International Space University (ISU) in Strasbourg. The programme covers a wide range of current topics from the space sector, ranging from system engineering to writing business proposals and from orbital mechanics to crisis communication.



19 March 2020

## The impact of the corona crisis on the space sector: what can you expect from NSO?

The coronavirus has forced our global society to adopt an entirely new reality almost overnight. The government's measures are primarily designed to protect people's health and curb the spread of the virus. It is also clear that businesses and entrepreneurs are hit hard by this crisis. Even during this difficult time, NSO continues to support businesses in the space sector however it can. We are waiting to hear from you.



26 March 2020

## Visiting space from home via thuisinderuimte.nl

Now that the schools are closed due to the coronavirus, many educational projects have been cancelled. Space is a topic that children, teachers and parents can also work on from home. Various Dutch organisations for space education therefore decided to join forces. Together, they developed [thuisinderuimte.nl](http://thuisinderuimte.nl), a website filled with lessons, activities and inspirational information about space and space activities.



3 April 2020

## Impact investor chooses Dutch satellite technology

Social Impact Ventures is investing in the innovative satellite technology developed by the Dutch company VanderSat, the impact investor announced earlier this morning. According to VanderSat, the investment is worth several millions of euros. The company from Haarlem is breaking new ground with its patented technology designed to measure soil moisture on a global scale with the help of satellites.



# News overview 2020



17 April 2020

## Satellite images of the Netherlands will remain available in the years to come

Satellite data are being used for an ever-growing number of applications. For the number of applications to keep growing, developers must be able to trust in the continuity of the available data. NSO has therefore guaranteed the availability of the data for years to come. Dutch users will continue to be able to access satellite data pertaining to the Netherlands free of charge via the Satellite Data Portal.



22 April 2020

## Scientists formulate joint strategy for Dutch earth observation research

Recently, Dutch earth observation researchers decided - for the first time ever - to work together on the National Earth Observation Research Strategy 2020-2025. Co-author and professor at the Vrije Universiteit Sander Houweling: "Together, you can conduct multidisciplinary research. Together, you are more visible on the global playing field. Together, you stand a better chance when applying for subsidies and you can make a greater contribution to the effort to resolve societal issues."



24 April 2020

## Royal distinction for head of ESTEC Franco Ongaro

Franco Ongaro, head of the European Space Research and Technology Centre ESTEC, was made an Officer in the Order of Orange-Nassau today. He was personally informed of this fact by phone by the mayor of Noordwijk. Due to the corona crisis, the ceremony itself will be held at a later date.



1 May 2020

## Using artificial intelligence for faster analysis of satellite imagery

Satellites are commonly used to detect changes in the environment. How can you perform this task effectively on a large scale? The Dutch company NEO can inform its clients almost in real time whether something is changing by automatically comparing large data sets with the help of artificial intelligence. NSO stimulated the development of NEO's application via ESA's InCubed programme.



25 May 2020

## Saving trees with satellites: From startup to growth business through European competition

Using satellite technology to give Mother Nature a helping hand in urban environments. That is the mission statement of geoscientist Nadina Galle. Together with three former fellow students, she founded Green City Watch. Shortly after, they won the grand prize in the Copernicus Masters competition, a competition for innovative satellite applications that is also being held this year and whose international kick-off will take place tomorrow.



23 June 2020

## Water authorities use satellites to monitor drought

In the Netherlands, we now have unprecedented insight into how wet or dry the ground beneath our feet is thanks to detailed satellite data. OWASIS recently became available to all Dutch water authorities and Rijkswaterstaat. This application gives water managers better insight into the amount of water in the ground. With this information, they can take appropriate measures, especially when extremely wet or dry situations are predicted.



15 July 2020

## Satellites assist with efficient landscape management

Rows of trees, bushes, hedges and ponds: minor elements such as these give our landscape its character and quality. The Ministry of Agriculture, Nature and Food Quality (ANF) is looking for ways to protect these small landscape elements, because they add cultural-historical value to the landscape and improve its biodiversity. To do so, however, they must first be mapped. Satellites are the answer to this problem.



28 July 2020

## Extra eyes for water managers

Water managers in the Netherlands take measures to make sure the land is neither too dry nor too wet. They do so based on their information about brooks, rivers, banks, fields, sluices, etcetera. However, these data are not always up to date. Businesses were invited to develop a software application that utilises satellite data to automatically detect changes.



# News overview 2020



3 August 2020

## Joost Carpay: “In earth observation, everything comes together”

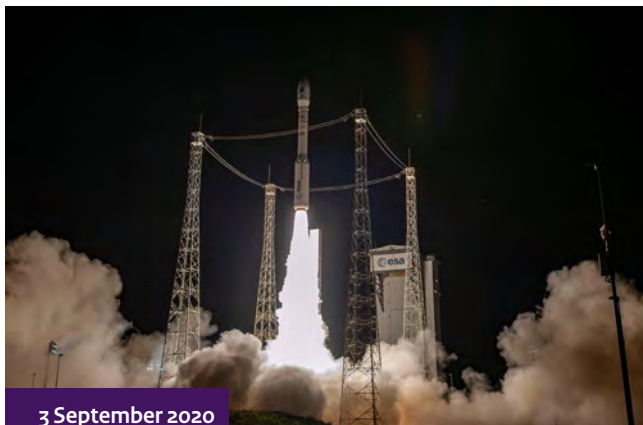
For three years, NSO's own Joost Carpay held the position of chairman of the European space organisation ESA's earth observation programme council. His term is now up, so he is passing the reins to his successor. It is an important council for the Netherlands and the rest of the world, says Carpay: “In earth observation, everything comes together.”



1 September 2020

## Vega rocket launch presents commercial opportunities for Dutch space sector

More than forty small satellites will be launched into space at the same time from French Guiana with the Vega Small Spacecraft Mission Service (SSMS). This marks the first time that a rocket launch by the European space organisation ESA is dedicated entirely to small satellites. The rocket will contain Dutch innovations and hardware, which will create new commercial opportunities in the field of smart small satellite technology.



3 September 2020

## Vega successfully launched, due in part to Dutch technology

The launch was finally able to go ahead. After already being put off for several weeks because of the weather conditions around the launch base in French Guiana, a tropical storm above a major ground station in Korea threatened to spoil everything at the last minute. At 03.51 AM Dutch time, the green light was given and flight VV15 of the European Vega rocket finally proceeded without a hitch.



9 September 2020

## NWO accepts nine new research projects pertaining to earth observation

The Dutch Research Council (NWO) has accepted nine new research proposals in the field of earth observation. The researchers involved in these projects will receive financial support via the User Support Space Research (US) programme, run by NSO by order of the NWO.



18 September 2020

## Students launch CanSats: "the satellite being launched by a rocket is a crowning achievement"

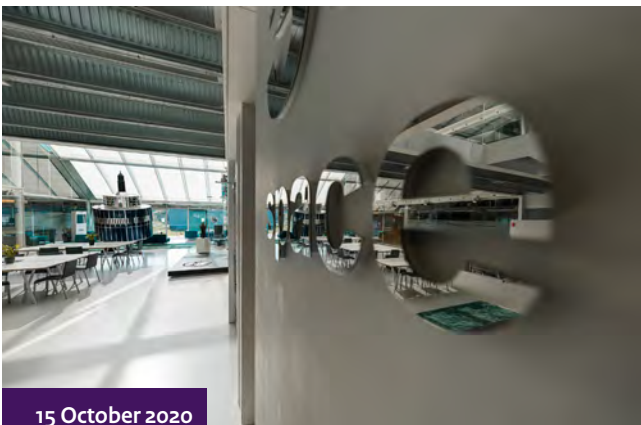
Today, teams of students launched their CanSats: mini satellites of their own design. During the launch, which was handled by the students of the rocket building society DARE from Delft University of Technology, the satellites were launched one kilometre into the air at targeting range ASK 't Harde. "It is wonderful that the launch event could go ahead despite the ongoing corona crisis. This is the crowning achievement that everyone has been looking forward to," says Jasper Wamsteker of NSO.



7 October 2020

## NASA director about Dutch solar panels used for mission to the Moon: "All panels were installed perfectly"

All four Dutch solar panels have been installed on NASA's Orion capsule. NASA director Jim Bridenstine announced the news earlier this week via Twitter and gave his compliments to the team responsible. The Dutch solar panels, developed by Airbus Defence and Space Netherlands, form part of the European Service Module (ESM). ESM is the essential machine room that the European space organisation ESA provided for the Orion capsule.



15 October 2020

## NSO invests in programme for space startups for another six years

Together with the European space organisation ESA, the Dutch space agency NSO will continue to invest in the ESA-BIC programme for another six years. This programme provides all manner of support to startups with a solid business plan centred around the use of space technology or satellite data. Furthermore, the businesses in question can earn a place in the Space Business Innovation Centre (SBIC) at the Space Campus in Noordwijk.



19 October 2020

## Water demand viewer: a new tool for water authorities

The soil should be neither too wet nor too dry. Managing and overseeing this process is the responsibility of water authorities. These past three years, however, this has proven to be a difficult task as a result of climate change and the growing desiccation of the soil. The water demand viewer uses satellite data to help, starting with the land used by farmers.



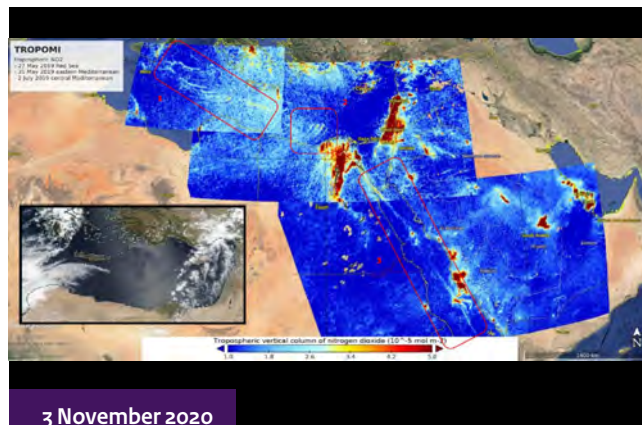
# News overview 2020



22 October 2020

## International symposium IGARSS creates opportunities for Dutch space industry

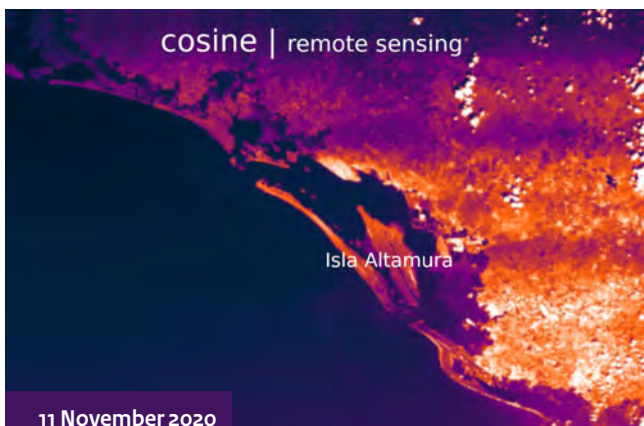
A unique opportunity for Dutch space companies, innovative startups, doctoral candidates and knowledge institutions. That is how professor Ramon Hanssen describes the International Geoscience and Remote Sensing Symposium (IGARSS) that is being held from 11 to 16 July 2021 in Belgium, the Netherlands and online.



3 November 2020

## Dutch satellite instrument Tropomi measures emissions of individual ships for the first time

The Dutch satellite instrument Tropomi is able to detect the nitrogen emissions of individual ships from space. That is the result of a joint publication of the Royal Dutch Meteorological Institute (KNMI), the Human Environment and Transport Inspectorate (ILT) and Wageningen University & Research. The observations represent a first for the field of earth observation: never before was a satellite capable of detecting the emissions of ships so accurately.



11 November 2020

## “The first Hyperscout 2 images are promising for the future of earth observation”

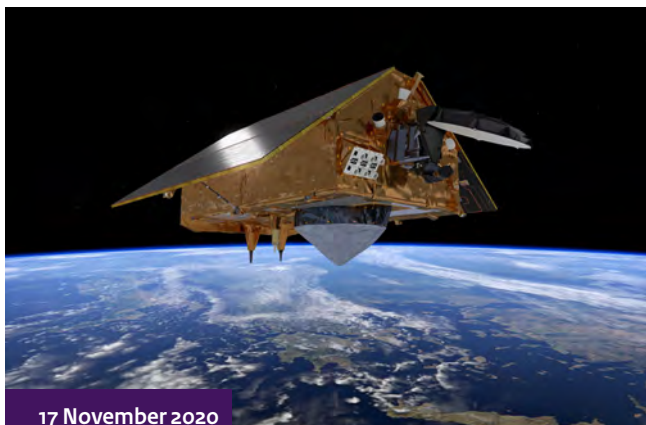
Hyperscout 2 is the world's first earth observation instrument to be equipped with artificial intelligence. The Dutch satellite instrument was launched into space in September. The first images were beamed back down to Earth earlier this month. They are certainly promising, says Marco Beijersbergen, director of Cosine.



16 November 2020

## Workshop energy transition and satellite data: “Satellites offer added value in a dynamic environment”

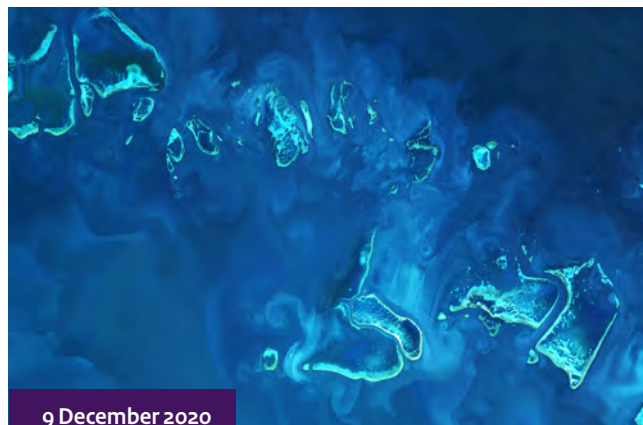
Can satellite data help the Netherlands realise its desired “green” energy transition? During a workshop that was recently organised by NSO and Geobusiness Nederland, this proved to be an intriguing question. A public tender that will lead to the development of new applications is expected soon.



17 November 2020

## The Netherlands assists with orbital calculations for and use of new European-American “sea level satellite”

On 21 November, ESA will launch its latest earth observation satellite: Sentinel-6 Michael Freilich. This satellite is crucially important to the global effort to study climate change. Delft University of Technology and the Royal Dutch Meteorological Institute (KNMI) represent the Netherlands during this mission, which will monitor the rising sea levels with greater accuracy than ever before.



9 December 2020

## Dutch students win European “Space Award” with warning system for coral reefs

It is not uncommon for students to take part in a hackathon. However, it is rare for participants to actually do something with the results. The team behind Reef Support had a different notion and decided to start a company based around their idea of monitoring vulnerable coral reefs using satellite data and artificial intelligence. Their hard work paid off: on 8 December, the idea won the grand prize during the Copernicus Masters, the annual European competition for space ideas.



10 December 2020

## School project Mission X: training like an astronaut in your own classroom!

Mission X will take place from Monday 1 March until Friday 23 April 2021. All elementary schools in the Netherlands (groups 4 to 8) can take part in this school project free of charge. The goal of the project is to introduce children to the world of space, space activities and technology. Children will also get to train like an astronaut, eat healthy food and exercise.



11 December 2020

## Final test of Dutch satellite instrument SPEXone before transfer to NASA

Starting this week, the Dutch satellite instrument SPEXone will be calibrated for three months in SRON's cleanroom in Utrecht. This marks the final critical step of the instrument's development and testing process. Once complete, it will study aerosols in the atmosphere on board the American PACE satellite.



# 2020 in numbers



**9**  
scientific earth  
observation projects  
approved via the GO programme



**37**  
ESA innovation  
projects  
supported



**527**  
new users  
Satellite Data Portal



**68.905**  
unique visitors  
NSO website



**575**  
teachers  
trained with ESERO



**2**  
SBIR  
innovation projects  
launched



**3,827,100**  
farmers in  
developing countries  
benefitted from the G4AW programme



**4**  
Dutch winners  
of the Copernicus  
and Galileo Masters

**10**  
online events

with **1019**  
visitors/participants



**32**  
news items  
published





# Colophon

## Published by

Netherlands Space Office

© June 2021

**Text:** Sander Koenen

**Design:** Studiodet, Tilburg

## Image credits per page

ESA/S&T: cover

ESA: 4, 16, 22, 35, 38 (070220), 39 (190320), 42 (030920), 43 (191020), 45 (091220)

Henriette Guest: 5

ESA | Jan Van Haarlem/Gallery Imaging bv: 6

ESA/CNES/Arianespace/Optique Vidéo du CSG | JM GUILLON: 9

Cosine: 10, 44 (111120)

NASA | Radislav Sinyak: 13

Airbus: 15

DLR/BIRA/ESA: 19

ESA | P. Carril: 21, 30

Project SMARTseeds: 25

CheeseWorks.nl: 26

Project CommonSense: 27

Digidaan: 32, 37, 43 (180920)

Gijs Weehuizen: 36

NSO: 38 (200120), 40 (220420), 44 (161120)

ESA | J.Huart: 38 (270120)

Project Stamp: 38 (130220)

ESA/NASA: 39 (260320)

ESA/ATG medialab: 39 (030420), 45 (171120)

Satellite Data Portal: 40 (170420)

ESA | G. Porter: 40 (240420)

Neo: 40 (010520)

AZO: 41 (250520)

Ministry of Agriculture, Nature and Food Quality | Wiebe Maliepaard: 41 (280720)

CERN | M. Brice: 42 (010920)

NASA: 43 (071020)

Space Business Innovation Centre Noordwijk: 43 (151020)

KNMI: 44 (031120)

Airbus DS NL: 45 (111220)







# Netherlands Space Office

**Postal address:**

PO Box 93144  
2509 AC The Hague

**Visiting address:**

Centre Court building  
Prinses Beatrixlaan 2  
2595 AL The Hague

Telephone: 088 042 4500  
Email: [info@spaceoffice.nl](mailto:info@spaceoffice.nl)  
Internet: [www.spaceoffice.nl](http://www.spaceoffice.nl)  
Twitter: [@NLSpaceOffice](https://twitter.com/NLSpaceOffice)