**Euclid completes vacuum tests – Aroll and B-Roll and transcript**

**A-Roll**

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| Image | Text |
| 10:00:00:00 | **TITLE: Euclid completes thermal vacuum testing** |
| 10:00:08:00   * GV Exterior Thales Alenia Space Cannes - 30 October 2022 - Cannes, France (Credits: ESA) * Euclid vacuum chamber opening timelapse at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) * GV’s Euclid vacuum chamber opening at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) | **Cannes, in the south of France, at the Thales Alenia Facility the large thermal vacuum chamber opens, revealing ESA’s ground-breaking spacecraft designed to observe the dark side of the Universe, Euclid.**  **Euclid is currently in its final phase of testing and has been in this thermal vacuum chamber for about a month to test the functionality of the fully integrated spacecraft under space conditions.** |
| 10:00:36:20   * Soundbite - Alexander Short: Euclid Mission and Payload Manager, ESA - English Thales Alenia Space, Cannes, France – 30/10/22 – ESA * Soundbite - Magdalena Szafraniec: Euclid VIS-Instrument Engineer, ESA - English Thales Alenia Space, Cannes, France – 30/10/22 - ESA | **Alexander Short: Euclid Mission and Payload Manager, ESA** the point of this test is to take the whole spacecraft and cool it down to its operational temperature and then run it for about a month. Check that all the temperatures arrive at the right place where they should be, because obviously we're simulating the space environment.  **Magdalena Szafraniec: Euclid VIS-Instrument Engineer, ESA**  So the first results of the thermal vacuum campaign are very good. Everyone is very happy and satisfied how it went. Basically, all the subsystems of the telescope work really well under the different climatic conditions and there are basically no showstoppers. |
| 10:01:15:11   * GV’s Euclid vacuum chamber opening at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) * Artists impression Euclid at the L2 Langrange point – unknown date – (Credit ESA) * Animation Euclid 360° - unknown date (Credit: ESA) * Cosmic animation – 2013 - (Credits Euronews) * Zoom into the Tarantula Nebula – 2022 (Credits NASA, ESA, CSA, STScI, ESO, E. Slawik, N. Risinger, D. De Martin, D. Lennon, E. Sabbi, N. Bartmann, M. Zamani) * GV Euclid vacuum chamber Roll-out at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) * Vis and NISP instruments on Euclid payload Module – 2020 (Credits: Airbus Defence and Space) * Vis instrument – unknown date (credit: L.Godart:CEA) * NISP-instrument – unknonw date (Credit: Euclid Consortium & NISP instrument team) * GV Euclid vacuum chamber Roll-out at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) * Galaxy cluster MACS J0717(Credit: NASA/ESA) | **Over the coming weeks the spacecraft will be subjected to further mechanical, electrical and functional tests at the Cannes facility. After this, the mission should be ready for launch in the summer of 2023 and will be placed into orbit around the second Lagrangian point, approximately 1.5 million km from Earth.**  **From here Euclid will survey about one-third of the sky and will capture data from billions of galaxies, looking back more than 10 billion years in time. In order to do this, Euclid has a Payload Module comprising a 1.2 m Korsch telescope with two large area focal plane instruments: the visible instrument VIS and a Near Infrared Spectrometer and Photometer called NISP.**  **The instruments will capture the light of distant galaxies from visible to near-infrared wavelengths. With these observations scientist hope to learn more about the nature of dark matter and dark energy, which together could make up more than 95% of our Universe.** |
| 10:02:24:06   * Soundbite - Alexander Short: Euclid Mission and Payload Manager, ESA - English Thales Alenia Space, Cannes, France – 30/10/22 – ESA | **Alexander Short: Euclid Mission and Payload Manager, ESA**  So the visible instrument is specifically designed to image over a large area in the visible waveband. And it is making images where we can see the effects of dark matter spatially on galaxies across this wide, large area survey. So we see that the images of the galaxies are distorted and the distortion is caused by the dark matter in the Universe, bending the light as it comes towards us. And it's a little bit like when you look through a swimming pool and you see the bottom of the swimming pool and the bottom of the swimming pool looks distorted. But what you're seeing is the effect of the light being bent by the water or by the dark matter in the Universe. |
| 10:03:16:05   * instruments on Euclid payload Module – 2020 (Credits: Airbus Defence and Space) * Deep field fly-through – unknonw date (Credit: ESA) * Pillars of creation nebula – unknown date (Credit ESA/NASA) * Hublle space telescope digitized sky survey 2 – unknown date- (Credit ESA/NASA) * Redshift animation – 2022 (Credit: ESA) | **Similarly, the near-infrared instrument will observe the effect of dark energy by measuring the speed at which galaxies are moving away from us and hence how the expansion of the Universe is accelerating. This is done by observing the shift in wavelength of emitted light called the “red-shift” of the galaxies.**  **Although dark energy is believed to accelerate the expansion of the Universe and dark matter to hold cosmic structures together, scientists do not know what dark matter and dark energy actually are. Euclid will dramatically improve our understanding of the structure and evolution of the Universe.** |
| 10:03:37:07   * Soundbite - Alexander Short: Euclid Mission and Payload Manager, ESA - English Thales Alenia Space, Cannes, France – 30/10/22 – ESA | **Alexander Short: Euclid Mission and Payload Manager, ESA**  cosmology is exciting at the moment. We have dark matter, dark energy. 95% of everything out thiiere. We can't really explain. The cosmological models don't quite work. And Euclid is going to hopefully make a huge advancement in our understanding of all of these topics. |
| 10:03:57:06 Hubble sees galaxies galore (Credit: ESA/NASA)  * Zoom into the Tarantula Nebula – 2022 (Credits NASA, ESA, CSA, STScI, ESO, E. Slawik, N. Risinger, D. De Martin, D. Lennon, E. Sabbi, N. Bartmann, M. Zamani) * GV’s Euclid vacuum chamber Roll-out at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) * GV’s Euclid payload and service modules connected. Thales Alenia space, Turin Italy – March 2022 (Credit: ESA) * Animation Euclid 360° - unknown date (Credit: ESA) * Zoom into the Tarantula Nebula – 2022 (Credits NASA, ESA, CSA, STScI, ESO, E. Slawik, N. Risinger, D. De Martin, D. Lennon, E. Sabbi, N. Bartmann, M. Zamani) * Animation Euclid - unknown date (Credit: ESA) * Image of Euclid Telescope – unknown date (Credits: Airbus Defence and Space) * GV’s Euclid vacuum chamber opening at Thales Alenia Space - 30 October 2022 - Cannes, France (Credits: ESA) * Zoom into the Tarantula Nebula – 2022 (Credits NASA, ESA, CSA, STScI, ESO, E. Slawik, N. Risinger, D. De Martin, D. Lennon, E. Sabbi, N. Bartmann, M. Zamani) | **Euclid is a ground-breaking mission, built and operated under ESA leadership with Thales Alenia Space being the industrial prime contractor whereas the telescope was built by Airbus Defence and Space and the focal plane instruments provided by the nationally funded teams.**  **A Euclid Consortium of more than 1500 scientists will analyse the data produced by the spacecraft. The mission was confirmed in 2012 and is part of ESA’s “Cosmic Vision” programme.**  **With Euclid, Europe takes another leap forward in better understanding the nature of the Universe enabling astronomers to refine cosmological models and better understand the role of the mysterious dark matter and dark energy.** |
| 10:05:05:12 | **ESA OUTRO** |
| 10:05:17:13 | **END** |
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**B-Roll**

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| 10:00:00:00 | **2022.007\_ESA\_Euclid completes vacuum tests\_BR001\_Interview Alexander Short\_Euclid Mission and Payload Manager\_ESA\_EN** |
| 10:00:05:00 | **Soundbites**  **Alexander Short: Euclid Mission and Payload Manager, ESA - English Thales Alenia Space, Cannes, France – 30/10/22 - ESA**  **Alexander Short:** My name is Alexander Short and I'm the Euclid mission and payload manager. [4.4] |
| 10:00:12:10 | **Alexander Short:**Euclid is specifically designed to improve our understanding of cosmological models of the universe. So, you know, cosmology is understanding of the whole universe. And at the moment, this is a really hot topic because you'll hear people talking about dark matter and dark energy. And so the problem is there isn't enough matter that we can see in the universe to explain how everything is held together. So all the models, cosmological models, depend on gravity and general relativity and to hold everything together in the universe, that would have to be a lot more material than we can see. About 95% of the material that we need to hold everything together is invisible. So this is what we call dark matter. And as well as that, we know that the universe is expanding. We've known that for 100 years or so. But in recent decades, we also know that the universe is expanding faster and faster. So something is causing it to expand faster and faster. So there's a lot of energy that we can't see and we can't explain. And we call that dark energy. So cosmology is exciting at the moment. We have dark matter, dark energy. 95% of everything out there. We can't really explain. The cosmological models don't quite work. And Euclid is going to hopefully make a huge advancement in our understanding of all of these topics.[94.8] |
| 10:01:48:01 | **Alexander Short:**the way Euclid is going to try to advance our understanding of dark energy and dark matter and dark cosmological models is by making a survey. So it's a cosmological survey. It will survey about a third of the sky. We can't survey all of the sky because we're sitting inside the galaxy and we can't look along the galaxy. We can only look out out of the galaxy. So we can look at about a third of the sky, about 37% of the sky. So Euclid will make a survey using various wavelengths from 500 nanometres through to about two microns. So this is visible wavelength to the near infra-red and it will survey two to about z equals two. So it's looking about 10 billion years at 10 billion light years and 10 billion years back in time. So it's it's a deep survey over a wide area and specifically imaging galaxies. [68.0] |
| 10:02:56:12 | **Alexander Short:**So in order to measure the dark energy and the dark matter, the effects of the dark energy in the dark matter we have to instruments in Euclid, we have the visible instrument. So this is is measuring the effect of the dark matter on the images of the galaxies. So when you see a galaxy, a distant galaxy, the image is a little bit distorted. And this is like it's like looking through water in a swimming pool and you're looking at the bottom of the swimming pool. But you know that there's water there because you see that the images is distorted. The bottom of the swimming pool. So it's just the same. We're looking at the distant galaxies and we know that there's dark matter in between because the images of the galaxies are distorted. So the invisible instrument is doing this measurement, which is called weak lensing, to to measure the effect or to survey the effect over a large area of the sky of this weak lensing caused by dark matter. [74.5] |
| 10:04:12:08 | **Alexander Short:** So Euclid has a. A large area Korsh telescope, and the korsh telescope design is specifically chosen so that we can have a very large field of view. And this means that we can conduct a survey over a large area. So it's obviously it's obviously a telescope at the focus of the telescope. We split the image into two parts,[29.0]  **Alexander Short:**[00:05:52]So one part of this beam goes to the visible instrument, which is called VIS. And the other part goes to the NISP instrument, which is the near infra-red spectroscopy photometry instrument. So both of those instruments are like cameras, they're like detectors. And the telescope is like the the lens, it is the telescope. So the visible instrument is specifically designed to image over a large area in the visible wave band. And it is making images where we can see the effects of dark matter spatially on galaxies across this wide, large area survey. So we see that the images of the galaxies are distorted and the distortion is caused by the dark matter in the universe, bending the light as it comes towards us. And it's a little bit like when you look through a swimming pool and you see the bottom of the swimming pool and the bottom of the swimming pool looks distorted. But what you're seeing is the effect of the light being bent by the water's wrinkle or by the dark matter in the universe.[76.8] |
| 10:05:58:11 | **Alexander Short:** as well, as dark matter, we know this dark energy, something is causing the universe to accelerate. And so to understand that better, we need to measure the speed of galaxies as a function of distance from us. So if we measure the spectra of the galaxies as a function of distance, if we measure it carefully enough, then we can measure the how the universe is expanding. But even more than that, we can measure a thing called baryonic acoustic oscillations, which is vibrations within that. So as well as expanding, there are vibrations within the expansion. And, and the NISP-instrument focuses on this measurement of redshift as a function of distance from us. And the visible instrument concentrates on measuring the distortions caused by dark matter and which we see as weak lensing. And if we put all of that together, then cosmologists can really improve their models of the whole universe, their cosmological models of the whole universe, and try to understand more about this dark matter and dark energy that we can't see and maybe even find that the cosmological models are just wrong.[83.8] |
| 10:07:23:23 | **Alexander Short:** in fact, when Euclid was selected, there were two proposals for missions before Euclid was selected. One of them was called June. And one of them was called Space. So June was the weak lensing proposal to make the measurements looking for dark matter with weak lensing. And space was the infra-red mission measuring the redshift. And both of those proposals were very attractive. And it was very hard to choose one, the right one for the cosmological community. And in the end, it was decided if we combine both of those techniques, you can do much more. So then you have all of the information and you can combine it. So Euclid is actually the combination of these two different proposals, which gives you all the information. For redshift measurement and for weak lensing measurements.[55.7] |
| 10:08:23:01 | **Alexander Short:** So the optical bench and the structure of the telescope and all of the mirrors and all of the hardware that holds the mirrors. It's all made of silicon carbide. And silicon Carbide is quite a new material. There was a previous machine called Gaia, which so we have the heritage of that mission, and that was all made of silicon carbide. But it's still quite a new, relatively new material to work with. It's quite, quite fragile, quite difficult to machine. And we've had various problems with breakages along the way. But now but now it's all it's all good. [38.0]  **Alexander Short:** We use silicon carbide because it's has very, it's very stiff material. It's very stable. It doesn't expand and contract much with temperature. So it's really ideal for making a telescope. [13.5] |
| 10:09:17:24 | **Alexander Short:** So one of the challenges of Euclid is extremely high data rate, so that the visible instrument has 36 CCD detectors, a large focal plane like this, the infra-red instrument has 16 infra-red detectors. And between them, they're going to generate about seven or 800 gigabits of data every day. And transmitting that data from one and a half million kilometres away to Earth is is a big challenge. And so this was not possible until we had K-band communications as an option. And it's an interesting fact that that Euclid actually generates and transmits to us more data in one day than Hubble has generated in its entire lifetime.[48.3] |
| 10:10:09:02 | **Alexander Short:** So another challenge that we have with Euclid is combining these two instruments into one telescope. So we have to take the beam from the telescope and we have to split it into two instruments. And that uses a thing called a dichroic. But then we have these two instruments, which really are a little bit different. So the visible instrument operates a lot warmer than the Infra-Red instrument, which means that we, we need a cold telescope to work with the Infra-Red instrument. But the visible instrument is not so comfortable in such a cold telescope. So this makes a technical challenge in terms of the thermal design. [37.0 |
| 10:10:49:11 | **Alexander Short:** So we're in Cannes today with Euclid because this is where the the spacecraft, the whole combined spacecraft is undergoing all of its environmental testing. So the environmental testing is vibration, acoustic and this test, which is the Thermal vacuum test. So the big event right now is that we've just finished thermal vacuum test of the entire Euclid spacecraft. It's been in this chamber for about a month. And the point of this test is to take the whole spacecraft and cool it down to its operational temperature and then run it for about a month. Check that all the temperatures arrive at the right place where they should be, because obviously we're simulating the space environment. But then we also have heaters and radiators and we need to know that all the different parts of the spacecraft will reach the correct temperatures in that environment, but also when we're in that that realistic environment. We then need to test all the elements of the system and make sure that they all function correctly at those correct temperatures. And so when we finish this test, it's really the last the last real test of the spacecraft.[81.5] |
| 10:12:14:08 | **Alexander Short:** This was the thermal vacuum test of Euclid. It's the last real test of Euclid in a flight like environment. So the Euclid has been in this facility for about a month. It's been cooled down to the same temperatures that it will see during the mission. We've checked that all the temperatures reach the values that are expected and modelled. And so we understand the thermal design and the thermal operation of the whole system. And at the same time, the spacecraft has been operated, the instruments have been operated all in the the real flight like environment. And so this is a big milestone because this is actually the last time that we make any kind of test like this before launch. So the next time it gets into the real environment will be the real environment.[48.6] |
| 10:13:06:05 | **Alexander Short:** So after this thermal vacuum test, Euclid will go through its mechanical tests. So this is a vibration and acoustic test. Then we will be packing it up, ready for for shipping. We have a flight acceptance review, which is the last big review where we check that everything is, everything's good, everything's fine, and then it will be shipped to Florida. And then we have a Falcon nine launch sometime around July next year, 2023.[32.0] |
| 10:13:41:16 | **Alexander Short:**So the the visible imager on on Euclid is one of the biggest and visible imagers ever flown. Gaia had a larger focal plane, but it did not transmit all of the images to ground. So this is really going to give us some of the biggest astronomical images that we'll ever get from space, so far. So if you want to display one image from from the visible imager in Euclid, you would need more than 300 high definition TV screens just to display one image. [34.2] |
| 10:14:18:23 | **Alexander Short:**So the partners in the project are ESA for the coordinating role. Then there's the industry partners. So the prime industry partner is Thales Alenia space. And then for the building of the telescope parts, so the white part, the partner is Airbus, Airbus, Defence and Space, Toulouse. And then also we have the instrument teams. So the team who built the VIS-imager and the team that built the NISP-imager. So they are nationally funded institutes have provided those instruments. And then you have the Euclid consortium. So this is a consortium of thousands of scientists who are waiting for the data, but also building the pipelines, building the data processing, building the algorithms to analyse the data when it starts to come.[50.6] |
| 10:15:11:10 | **Alexander Short:** So the Euclid consortium will analyse the data coming from, from Euclid, combining the data from VIS, the data from NISP, and also data from ground observations which are needed to improve the redshift measurements. And they will combine all of these data to improve and build on the cosmological models that we have at the moment to understand how our universe is held together, how it's expanding, and if our models are right or wrong and and to understand the role of this mysterious dark matter and dark energy in these models.[36.6] |
| 10:00:00:00 | **2022.007\_ESA\_Euclid completes vacuum tests\_BR002\_Interview Magdalena Szafraniec\_Euclid VIS-Instrument Engineer\_ESA\_EN** |
| 10:00:05:00 | **Soundbites**  **Magdalena Szafraniec: Euclid VIS-Instrument Engineer, ESA - English Thales Alenia Space, Cannes, France – 30/10/22 - ESA**  **Magdalena Szafraniec:**So my name is Magdalena Szafraniec, and I'm the Euclid VIS-instrument engineer. [4.0] |
| 10:00:12:01 | **Magdalena Szafraniec:**[00:21:16]Sso we are in Cannes today for the thermal-vacuum testing of the Euclid telescope in its final form. So you can see behind me the Euclid telescope, which is basically formed of of a telescope, a payload module, which consists of the Euclid scientific instruments and the service module. So they have been all assembled together, and they are tested to here for the first time in conditions which simulate the conditions during the mission.[38.1] |
| 10:00:52:17 | **Magdalena Szafraniec:**This kind of testing is part of the, uh, more broad environmental testing. And it's basically to reveal any weaknesses of the design and performance, and material shortcomings, and some processes related to the spacecraft at extreme conditions, and extreme climatic conditions and in vacuum. [36.6] |
| 10:01:30:01 | **Magdalena Szafraniec:**[00:02:40]These tests are important because we are testing the spacecraft in various climatic conditions. We lower the temperature to very, very low levels, extremely low levels, that the spacecraft will see in the in flight. Then we increase the temperature to high levels and we test the spacecraft again. We make sure that it is the functionality of the spacecraft and all its components is basically everything is working together in those conditions. The air is removed from the vacuum chamber to simulate the vacuum condition. [50.8] |
| 10:02:24:03 | **Magdalena Szafraniec:**So there are two instruments on board of the Euclid spacecraft. The VIS-instrument and the NISP-instrument. The VIS-instrument is the visible light camera and the NISP-instrument is the near Infra-Red Spectrograph and Photometer.[18.6] |
| 10:02:44:24 | **Magdalena Szafraniec:** The VIS-instrument consists of a focal plane of 36 CCDs which are aligned in the matrix, six by six CCDs. And it consists of 600 megapixels. It will provide images, high quality images and cover a large field of view. The field of view is half a degree square. And the the VIS-instrument works in a visible wavelength range. So it covers the wavelengths between 550 nanometres and 900 nanometres. So it covers the range visible to the human eye and a little bit extended to the red wavelengths.  [61.4] |
| 10:03:46:09 | **Magdalena Szafraniec:**So the VIS-instrument team is led by the UK UCL Mullard Space Science Laboratory and the NISP-instrument is led by CNES and the astrophysics laboratory in Marseille, in France. |
| 10:04:10:22 | **Magdalena Szafraniec:**So we are just at the end of the thermal vacuum testing. And once the spacecraft will roll out of the chamber, it will then be subjected to some other environmental tests like the vibration test and and some radiation and electromagnetic compatibility tests[27.7]  **Magdalena Szafraniec:**In the meantime, we are also doing some system validation tests which are basically commanding the spacecraft and as it will be in flight and getting back data to ground. And after all this test is finished, there will be the flight acceptance review next year in the spring. And after that that will be the launch of the Euclid telescope. [30.6] |
| 10:05:11:08 | **Magdalena Szafraniec:**So the first result of the thermal vacuum campaign are very good. Everyone is very happy and satisfied how it went. Basically, all the subsystems of the telescope work really well under the different climatic conditions and there are basically no showstoppers.[21.4] |
| 10:05:36:15 | **Magdalena Szafraniec:**So the Euclid mission is a space based survey which will provide images of one third of the universe. It will basically scan the universe and provide images of the galaxies, the geometry of the universe. [23.8]  **Magdalena Szafraniec:**It will also try to answer some of the most fundamental cosmological questions, which are, you know, what is dark energy, what is dark matter, which are basically forming most of the of the universe, as we know it today.[18.2] |
| 10:06:21:11 | **Magdalena Szafraniec:** So the Euclid telescope will be placed in the second Lagrange point, which is basically a point in the sun and earth system, is basically we've got the sun, the Earth and the Euclid telescope, and it will orbit the sun together with with the earth, and it will always look outwards. So leaving the earth and the sun behind it. And so it will take very clear images of the of the universe.[32.0] |
| 10:06:57:00 | **Magdalena Szafraniec:**The dark matter and dark energy are basically forming most of the universe and both are of an unknown nature. So we would like to understand them, what they are, what are their characteristics, you know, how they influence the expansion of the universe. [27.4] |
| 10:07:26:18 | **Magdalena Szafraniec:**So the main advantage of the Euclid telescope, which is a space based telescope in comparison with the ground based observatories, is there is no atmosphere that would absorb the near infra-red wavelengths and also the ultraviolet wavelengths. So it basically it gets much clearer images of the sky.[ 29.6] |
| 10:08:00:00 | **Magdalena Szafraniec:**So the nominal mission lifetime is six years. So this is to cover the whole survey. But after this time, Euclid can still be used to as long as the performance of the subsystems and components is still acceptable.[23.6] |
| **10:00:00:00** | **2022.007\_ESA\_Euclid completes vacuum tests\_BR003\_Euclid\_vacuum chamber opening and roll-out timelapse**  **Euclid vacuum chamber opening and roll-out timelapse**  **Thales Alenia Space**  **30 October 2022 - Cannes, France**  **Credits: ESA** |
| **10:00:00:00** | **2022.007\_ESA\_Euclid completes vacuum tests\_BR004\_Euclid\_vacuum chamber opening**  **GV’s Euclid vacuum chamber opening**  **at Thales Alenia Space**  **30 October 2022 - Cannes, France**  **Credits: ESA** |
| **10:00:00:00** | **2022.007\_ESA\_Euclid completes vacuum tests\_BR005\_Alexander and Magdalena Establishing**  **GV’s Establishing Alexander Short and Magdalena Szafraniec, ESA**  **30 October 2022 - Cannes, France**  **Credits: ESA** |
| **10:00:00:00** | **2022.007\_ESA\_Euclid completes vacuum tests\_BR006\_GV's ext Thales Alenia Cannes**  **GV’s Exterior Thales Alenia Space Cannes**  **30 October 2022 - Cannes, France**  **Credits: ESA** |
| **10:00:00:00** | **2022.007\_ESA\_Euclid completes vacuum tests\_BR007\_Euclid\_vacuum chamber roll-out**  **GV’s Euclid vacuum chamber roll-out**  **at Thales Alenia Space**  **31 October 2022 - Cannes, France**  **Credits: ESA** |