**SPACE DEBRIS - A ROLL SCRIPT**

**TITLE: Space debris: Time to Act**

**SUGGESTED WEB COPY:**

On 20 April 2021, ESA will host the 8th European Conference on Space Debris from Darmstadt, in Germany. Scientists, engineers, industry experts and policy makers will spend the virtual four day conference discussing the latest issues surrounding space debris. They will exchange the latest research try to come up with solutions for potential problems and define the future direction of any necessary action.

There are currently over 129 million objects larger than a millimetre in orbits around the Earth. These range from inactive satellites to flakes of paint. But no matter how small the item of debris, anything travelling up to 56,000 km/hour in an orbit is dangerous if it comes into contact with the many satellites that connect us around the world, be it for GPS, mobile phone data or Internet connectivity. The solution is to take action before it’s too late. This is why ESA has commissioned ClearSpace-1 - the world’s first mission to remove space debris - for launch in 2025.

This film contains interviews with ESA Head of Space Debris Office Tim Flohrer; ESA Head of Clean Space Office Luisa Innocenti; and Xanthi Oikonomidou, ESA Space Debris Office.

**TAPE STARTS: 10:00:00**

**A-ROLL**

10:00:07

[ATV RE-ENTRY SHOTS, CREDIT: ESA/NASA]

A European ATV supply ship burns up in the atmosphere over a remote part of the Pacific Ocean. This re-entry was carefully planned and controlled.

10:00:19

[ANIMATION SPACE DEBRIS COLLISION, CREDIT: ESA]

It’s the unpredictable damage that space debris could do to orbiting spacecraft that’s now a major cause for concern.

10:00:28

[ANIMATION VEGA ROCKET, CREDIT: ESA]

Space debris can be anything from the spent upper stage of a rocket and a disused satellite, to an astronaut glove or fleck of paint.

10:00:38

[ANIMATION SPACE DEBRIS, FRAGMENTS AND COLLISION, CREDIT: ESA]

There are over 129 million objects estimated to be in orbit that are larger than a millimetre. And even a coin-sized piece of debris travelling at up to 56,000 kilometres per hour will rip through a satellite faster than a bullet - with destructive force.

10:00:57

[INSET CLIP: Xanthi Oikonomidou, ESA Space Debris Office]

“At the moment the most-known encounters are between active satellites and space debris. An example of a certain event happened in 2009 where we had a collision between an active telecommunications satellite, Iridium, with an inactive space debris satellite Kosmos. So this collision resulted in thousands fragments and many of them are still in orbit.”

10:01:20

[ANIMATION SPACE DEBRIS COLLISIONS, CREDIT: ESA]

Orbiting fragments can potentially hit other objects, producing more fragments and more collisions - a dangerous chain reaction known as the Kessler effect. Suggested technologies for removing space debris…

10:01:34

[ANIMATION USING A NET TO CAPTURE DISUSED SPACECRAFT, CREDIT: ESA]

…have so far included everything from harpoons and nets to robotic arms.

10:01:40

[ANIMATION ROBOTIC ARM TO CAPTURE DISUSED SPACECRAFT, CREDIT: ESA]

Nothing is off the table. ESA has also commissioned…

10:01:45

[ANIMATION CLEARSPACE-1, CREDIT: ClearSpace SA]

… ClearSpace-1 for 2025 - it will be the first mission to actively remove a piece of space junk in the form of a Vega launch adaptor.

10:01:54

[INSET CLIP: LUISA INNOCENTI, HEAD OF CLEAN SPACE OFFICE, ESA]

“Nobody has ever removed space debris and it’s a very challenging mission. So the first stage is proving that it can be done and that’s what we’re planning to do with the ClearSpace01 mission in ESA. Then the scientists are unanimous. What you need to do is to remove the big object from the most populated orbit. Why? Because those are the objects which have the higher risk of collision and which will create a cloud of smaller debris.”

10:02:24

[ANIMATION INACTIVE SATELLITES AND SPACE DEBRIS, CREDIT: ESA]

More than 6,000 satellites currently orbit Earth. Around half of these are no longer working while many of the active satellites are essential for our modern world - be it telecommunications, weather updates, the Internet and GPS. If damaged or destroyed, the impact on society would be huge.

10”02”45

[INSET CLIP: TIM FLOHRER, ESA HEAD OF CLEAN SPACE OFFICE]

“We know space debris is a global problem and that calls for global collaboration and this collaboration is done, of course, in scientific areas but also among agencies. And one example is the Inter-Agency Debris Coordination Committee, the IADC, where they make sure space agencies work together on defining the appropriate space mitigation technologies, forecasting the evolution of the environment and also exchanging data and information.”

10:03:19

[ANIMATION CONFERENCE VIDEO, CREDIT: ESA]

ESA, a founding member and one of 13 space agencies on the committee, is also hosting the upcoming virtual European Conference on Space Debris…

10:03:31

[EUROPEAN SPACE OPERATIONS CENTRE (ESOC), DARMSTADT, GERMARY GVS]

…from its site in Darmstadt, Germany. Scientists, engineers and industry will discuss the best ways to approach the problem and how to make space more sustainable.

10:03:41

[SPACE DEBRIS, LASER TRACKING, AI AVOIDANCE ANIMATION, CREDIT: ESA]

Agencies are currently tracking 28,000 space debris objects and ESA is also developing laser tracking technology and AI-supported automated collision avoidance systems to reduce the number of false alerts for potential collisions. The aim, however, is to act now and tackle space debris - before it’s too late.

[ENDS 10:04:05 PLUS END ESA STING]

A-ROLL ENDS 10:04:15

B-ROLL

10:04:15:10

**SPACE DEBRIS ANIMATION, CREDIT: ESA**

Animation showing debris around the Earth, the impact of collisions by debris on satellites,

10:07:56:19

**CLEARSPACE-1 ANIMATION, CREDIT: ClearSpace SA**

The capture of debris by the ClearSpace-1 mission (due for launch in 2025)

10:08:28:10

**SPACE DEBRIS REMOVAL ANIMATION, CREDIT: ESA**

Different suggested technologies for the removal of space debris.

10:09:28:14

**SPACE DEBRIS COLLISION ANIMATION, CREDIT: ESA**

10:09:57:10

**KESSLER EFFECT ANIMATION, CREDIT: ESA**

The chain reaction caused by space debris hitting other objects in orbit and producing more fragments and further collisions.

10:10:54:04

**TIM FLOHRER - HEAD OF SPACE DEBRIS OFFICE, ESA**

**APRIL 2021**

**ENGLISH**

“Space debris are basically all the non-functional objects that we have created in space and that are orbiting around our planet. And these are basically no longer used satellites and also spent upper stages and unfortunately the whole range of fragments that have been created in the past. And there’s a lot of smaller objects as well such as paint flakes or combustion residuals or even droplets from liquid coolant."

“Space debris is the result of our activities in space so we have no longer functioning satellites and we have spent upper stages and the fragments. In total we know of about 28,000 objects that we can track, that means follow up from ground. We know of about 9000 objects that are larger than a centimetre and we know about 128 million objects greater than a millimetre. That shows that the largest contributions in number are these small fragments. And unfortunately collisions and explosions are forecast to continue in space and that means that means the population will still grow.”

10:12:16:03

**TIM FLOHRER - HEAD OF SPACE DEBRIS OFFICE, ESA**

**APRIL 2021**

**GERMAN**

Why an item of space debris only a few millimetres wide is considered a threat

The biggest cause of space debris

The possibility of a collision with a working satellite

The current main methods or technologies for removing space debris

How ESA is using laser tracking technology for space debris

The ClearSpace mission

The collaboration between countries about space debris around the world

The upcoming April space debris conference

10:17:24:16

**LUISA INNOCENTI, HEAD OF CLEAN SPACE OFFICE, ESA**

**APRIL 2021**

**ENGLISH**

“The attitude towards space debris has completely changed in the past 10 years. By now there is much more awareness that in same way we have polluted the Earth and the oceans by just dropping stuff at the end of life, we have done so with some precious orbits and by now this awareness has grown now to the point that people are seriously thinking about reacting against this pollution.”

“There are different ways to approach, to minimise the space debris. One way that people are thinking about at moment is to extend the lifetime of a satellite, or to recycle them or to change pieces. That’s we call in orbit servicing. This will make satellites useful for a longer period and having said that, it still remains at end of life normally, or the extended one, we still need to manage the spacecraft in the proper way which basically means to de-orbit it or to pacivate it.”

“We are launching more and more. In the past there was only the big space nations that were launching. Right now space has been opened up to commercial activities and that’s why we see more and more satellites being launched. Is this an issue for space debris? I would like to say no if people behave properly. So if we really manage in a proper way the end of life of a satellite, it’s not going to be an issue. The point is will we manage those satellites in a proper way - yes or no. And we see that there is a tendency still to disregard how, what do I do when my satellite once it reaches the end of life and not consider it at the beginning. The situation has improved over the past 10 years but we still have to do some teaching on how important it is to be considered at the very beginning of the design of a project."

10:19:55:24

**LUISA INNOCENTI, HEAD OF CLEAN SPACE OFFICE, ESA**

**APRIL 2021**

**ITALIAN**

How attitudes towards space debris have changed

Whether improved technology can solve space debris problem

The priorities for removing space debris objects

**10:21:52:00**

**LUISA INNOCENTI, HEAD OF CLEAN SPACE OFFICE, ESA**

**APRIL 2021**

**FRENCH**

If advanced technology is the answer to space debris

The priorities for removing space debris

10:23:36:07

**XANTHI OIKONOMIDOU, SPACE DEBRIS OFFICE, ESA**

**GREEK**

The problems posed by space debris

The Kessler effect

Her project

10:25:29:21

**End B-ROLL**

10:25:39:09

**END**