**ESA’S ZERO G SCIENCE**

Suggested webcopy:

The European Space Agency is taking advantage of Novespace’s latest Zero G aircraft to perform a number of experiments in microgravity. Twelve experiments - which include six by professional scientists and six by students as part of ESA’s Fly Your Thesis programme - took to the skies for three series of 31 parabolas off the coast of France. Conditions of microgravity, or weightlessness, are unique for research ranging from fundamental physics, testing Einstein’s weak equivalence principle, to psychology, neuroscience and the deployment of a balloon that may one day make measurements while falling through Mars’ atmosphere.

**A-ROLL**

TAPE STARTS: 10:00:00

VT STARTS: 10:00:10

10:00:00

[ZERO G PLANE EXTERIOR & INTERIOR SHOTS]

An ordinary plane but on an extraordinary mission…Because Novespace’s latest Airbus A310 Zero-G aircraft is being used by the European Space Agency for research in conditions of microgravity - which is why all the passengers are scientists.To obtain zero G the plane must perform a series of parabolas. Before each parabola, on the pull-up, people experience almost 2G so their bodies will feel twice their normal weight. The pilot calls out the increasing angle and when it reaches a specific point they ‘inject’ the plane into the parabola. Everyone on board is then in microgravity as the plane freefalls up and over the top of the curve.

10:01:02

[INSET CLIP: Sue NELSON] SCIENCE JOURNALIST

*“He’s now called out the angle. It’s 40 degrees. At 50 - injection. That is weightlessness. Here I go. The scientists have twenty seconds of weightlessness to do their experiments behind me but there will be 30 of these parabolas so they have plenty of time, ten minutes in fact, to do their experiments. Time to get down now because there’ll be a nasty thud. There we go.”*

10:01:33

[EXPERIMENT GVS ON BOARD THE PLANE]

There are 12 experiments on board - including six by students as part of ESA’s Flying Thesis programme. The experiments cover everything from fundamental physics and neuroscience to psychology, looking at body image and perception.

This experiment is examining the effect of microgravity on the brain. This is important for astronauts doing long duration stays on the ISS but there are also wider applications.

10:02:03

[INSET CLIP: Timo KLEIN, German Sport University/University Of Sunshine Coast]

*“We’re also interested in people with diseases for example Alzheimers disease or dementia. If we know the mechanisms which are linked with reduction of cognitive performance and brain activity and where that comes from we might be able to better design strategies to then help these people.”*

10:02:28

[HEAT PIPE EXPERIMENT AND INTERNAL SHOT]

Inside here is a pulsating heat pipe - potentially a new way of managing the thermal conditions of satellites - or components on board the ISS. The copper pipe - seen here showing the flow of a condensed vapour - also has a section made of sapphire that is transparent to visible and infrared radiation.

10:02:50

[INSET CLIP: Marco MARENGO, University of Brighton]

*“In this experiment we are using the infrared camera of the European Space Agency. It’s a new camera, high speed infrared camera, that will be used also on the International Space Station for the next experiment.”*

10:03:03

[ZERO G PLANE DESCENT GVS, INTERIOR AND EXTERIOR]

After each parabola there is another 20 seconds of 2G as the plane pulls-out to level flight. A few minutes later…

10:03:13

[EXPERIMENT GVS]

… and the next parabola begins. In between each one, scientists must quickly reset their experiments and prepare for the next bout of microgravity.

10:03:22

[INSET CLIP: Neil MELVILLE Parabolic flight coordinator , ESA]

*“This is the only microgravity platform where the scientists get to interact with their own experiment while it is in zero gravity rather than doing it by remote on a robotic capsule or sounding rocket. OR on the ISS. It’s humans of course, but then it’s astronauts doing it and they can’t possibly be as in-tune with the scientific needs as the scientists themselves. So this is the only platform that really allows that kind of access and as such it’s unique.”*

10:03:46

[EXPERIMENT GVS]

In the final few parabolas, every one works hard to finish their science. For the German Mars Society experiment, however, there’s only one shot to get this right as it involves testing the initial deployment of a densely packed balloon that they hope - one day - will carry instruments for studying Mars’ atmosphere.

Whether it’s preparing for Mars or helping life on board the Space Station and on Earth, the Zero G plane offers a unique environment for research - and the closest conditions possible to simulate being in space.

[ENDS 10:04:24]

**B-ROLL**

**10:04:24**

**[TITLE] Professor Marco Marengo [Italian]**

**University of Brighton**

An explanation of the heat pipe experiment. (In Italian)

Why it is important to do experiments in microgravity (In Italian)

**10:06:07**

**[TITLE] Timo Klein [English]**

**German Sport University/University of Sunshine Coast**

*“We’re also interested in people with diseases for example Alzheimers disease or dementia. If we know the mechanisms which are linked with reduction of cognitive performance and brain activity and where that comes from we might be able to better design strategies to then help these people.”*

**10:06:43**

**[TITLE] Timo Klein [German]**

**German Sport University/University of Sunshine Coast**

An explanation of what the experiment is doing and why. (In German).

The applications of this research for dementia. (In German).

10:08:32

[TITLE] **Novespace Airbus A310 Zero G aircraft**

**Parabola exteriors**

**10:10:52**

**[TITLE] Novespace Airbus A310 Zero G aircraft**

**Cockpit interiors**

**10:12:48**

**[TITLE] Novespace Airbus A310 Zero G aircraft**

**Weightlessness GVs**

10:14:05:20 end of b-roll