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FOREWORD

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2013 is now behind us and – just like the several years preceding – it was a very successful year for Europe in space. So, before giving a brief run-through of what is happening in 2014, let me first revisit with you the highlights and successes of 2013.

Last year we witnessed numerous launches featuring ESA satellites, astronauts, experiments, and hardware aplenty. In May, we saw the launch of the **Proba V** (for vegetation) satellite on a **Vega launcher** whose job is to map land cover and vegetation growth across the entire planet every two days. At the end of the same month, ESA astronaut **Luca Parmitano**, from Italy, took a ride to the International Space Station for a six-month mission before coming safely back to Earth on 10 November.

In June, we launched our **fourth Automated Transfer Vehicle** "Albert Einstein" on an Ariane 5 to ferry 7 tonnes of experiments, food, drinking water and oxygen to the astronauts living and working in the International Space Station. After a picture-perfect automatic docking to the ISS, its successful mission ended on 2 November with a controlled destructive re-entry into the atmosphere. This coming July it will be the turn of the fifth ATV, the last in the family.

In July 2013, a giant leap was taken in telecommunications with the launch of the high-power **Alphasat satellite** on Ariane 5. Alphasat is the fruit of several partnerships with national space agencies (CNES for the platform, DLR and ASI for new payloads) and Inmarsat within an innovative Public Private Partnership.

And to conclude an already busy year, between the end of November and mid-December we launched two spacecraft: the **SWARM** Earth observation satellite on a Rockot launcher from Plesetsk in northern Russia, and the **GAIA** scientific spacecraft on a Soyuz from Europe's spaceport in French Guiana.

SWARM will unveil the secrets of the Earth's "dynamo" and the impact of the solar wind on our planet. GAIA will make a highly accurate 3D map of our home galaxy, pinpointing the positions of one billion stars in the Milky Way so as to better understand its composition, formation and evolution.

Though launching satellites and human beings into space is certainly a very important part of what we do, gathering data and providing outstanding results to the scientific communities here on Earth is of equally paramount importance. Thanks to satellites such as Planck, Herschel and Mars Express in the science domain, or the battery of Earth observation satellites already in orbit, we have managed to harvest huge amounts of data for the benefit of thousands of scientists and researchers in Europe and all around the world.

But like all good things, all good missions must come to an end. **Planck**, our "time machine", which mapped the Cosmic Microwave Background, the relic radiation from the Big Bang, in unprecedented detail for over four years, ended its mission and was switched off on 23 October before being manoeuvred into a permanently safe configuration. The spacecraft was passivated and placed onto a disposal trajectory that will keep it in a parking orbit around the Sun well away from the Earth-Moon system for hundreds of years. This is very similar to the procedure adopted for Planck's 'sister' mission, **Herschel**, a space observatory to study the formation and evolution of stars, which was deactivated in June after a successful four-and-a-half year mission.

Our teams were also at the forefront during the **re-entry of GOCE**, which for over four years – much longer than the two years originally planned – had studied the gravity field and ocean circulation on our planet before coming back to Earth and disintegrating harmlessly in the atmosphere on 11 November.

Yet, ESA missions do not end with the completion of spacecraft operations, since the data collected during the years of operation and now stored and accessible will continue to be exploited for an even longer period of time by scientists and will continue to drive discovery and knowledge in the decades to come.

Our Mars Express probe celebrated its tenth anniversary in orbit around the Red Planet in early June. The first European mission to another planet was also the first to find water on Mars! Mars Express is paving the way for future missions like ExoMars in 2016 and 2018 in cooperation with Russia and, later on, for Mars Sample Return.

In early September, Edinburgh in Scotland was home to one of the most important symposia ever held on Earth observation. 1900 scientists from all over the world met to discuss and learn about the results of our missions focussed on Earth's environment and climate.

Again in the UK, on 5 December, the first bricks of ESA's new establishment were laid in a ceremony with UK Minister David Willetts and the first ESA Director General, Roy Gibson. The first building of the European Centre for Satellite Applications and Telecommunications (ECSAT), scheduled for completion in 2015, will be named after Mr Gibson.

2014: a landmark year

2014 is a special year for ESA because we are celebrating the 50th anniversary of European space activities. 1964 saw the entry into force of the conventions of ELDO and ESRO, the two organisations out of which ESA was formed, thereby signalling the start of a new era for Europe in space. To mark this very special year, we are organising high-profile events in key European cities (Paris, Berlin and Geneva) to emphasise the value of political cooperation, industrial success and scientific achievements throughout Europe. Important events are also being organised at ESA sites to include ESA staff, contractors and their families, as well as additional events that will take place in several other Member States.

The excitement began as early as 20 January, when we witnessed another rather unique event with our operators at ESA's control centre ESOC **waking up the Rosetta** space probe from deep space hibernation. The Rosetta comet chaser has been in orbit since 2004 and this summer it will reach its target – Comet 67P/Churyumov-Gerasimenko – to perform what is probably one of the most spectacular scientific missions attempted to date: chasing the comet on its journey through the inner solar system for a while at close distance and at very high speed before dropping a lander on its nucleus.

If all goes according to plan, Rosetta will perform a critical rendezvous with the comet in August then, in November, the **Philae lander** will be dropped on the nucleus of the comet. While the "mother spacecraft" Rosetta will conduct a huge and unprecedented analysis of the comet nucleus as it chases it, the lander will focus on the composition and structure of the comet nucleus material and will drill more than 20cm into the subsurface to collect samples for inspection by its on-board laboratory. I invite you to keep an eye on this truly extraordinary event!

In early **April** a Soyuz launcher will launch **Sentinel-1** from French Guiana. This satellite will open a new chapter in the EU flagship programme **Copernicus**, what we previously called the Global Monitoring for Environment and Security (GMES) programme. Sentinel-1 is a polar-orbiting satellite for the continuation of Synthetic Aperture Radar operational applications, building upon the heritage of ERS-1, ERS-2, Envisat and Canada's Radarsat. Sentinel-1's revisit time, geographical coverage and rapid data dissemination are key to providing essential data for Copernicus services. Sentinel-1 is expected to provide coverage over Europe, Canada and key shipping routes in 1-3 days, regardless of weather conditions. Radar data will be delivered within an hour of acquisition – a big improvement over existing SAR systems.

In the night of 28 to 29 May ESA astronaut **Alexander Gerst**, from Germany, will be launched to the ISS on a six-month mission. Alexander is the second of the new group of European astronauts to be assigned to a mission, after Luca Parmitano.

After conquering remote mountains and working in Antarctica, the 35-year-old geophysicist and volcanologist will be launched to the International Space Station aboard a Russian Soyuz spacecraft from Baikonur Cosmodrome in Kazakhstan to spend six months in orbit pushing the boundaries of knowledge and preparing future exploration missions before returning to Earth in November 2014.

After Jules Verne, Johannes Kepler, Edoardo Amaldi and Albert Einstein it is now the turn of Belgian physicist **Georges Lemaître, father of the Big-Bang theory**, to fly to the International Space Station. I am of course talking about the fifth Automated Transfer Vehicle, and the last in the family, which will be launched to the ISS in late July on an Ariane 5 from French Guiana. Since 2008, and on average once a year, an ATV has delivered about 6 to 7 tonnes of cargo some 400km above Earth. After launch on an Ariane 5 from Europe's Spaceport in French Guiana, the ATV automatically navigates to a precision docking with the Station's Russian Zvezda module. It remains attached to the ISS for up to six months for the purposes of transferring cargo and re-boosting the Station before re-entering the atmosphere and burning up in a controlled manner together with several tonnes of accumulated ISS waste.

This summer we shall be launching the first pair of **Galileo Full Operational Capability** (FOC) satellites, following on from the four In Orbit Validation satellites already in operation since 2011-2012. A second pair (FOC 3&4) will follow in the autumn with two more this winter. The performance of the four Galileo satellites already in orbit for the validation of the system – measured in terms of localisation and dating capacity – is already two times better than the requirements, and much better than current GPS performance. It is an excellent start, and delivery of the initial services – Open Service, Search & Rescue, Public Regulated Service – is expected from early 2015 onwards.

September should see the **fourth launch of Vega**, after the April launch of the DZZ high-resolution Earth observation satellite on behalf of Kazakhstan. The fourth Vega will carry **IXV** (the Intermediate eXperimental Vehicle). Launched into a suborbital trajectory, IXV will return to Earth as if from a low-orbit mission to test and qualify new critical technologies for future re-entry vehicles. It will reach an altitude of around 450km, allowing it to reach a velocity of 7.5km/s on entering the atmosphere. It will collect a large amount of data during its hypersonic and supersonic flight while being controlled by thrusters and aerodynamic flaps. IXV will then descend by parachute and land in the Pacific Ocean to await recovery and analysis. A descent and landing test with a full-scale IXV model was successfully performed in June last year off the coast of Sardinia, Italy.

At the very end of November, with Alexander Gerst completing his mission on the ISS and returning to Earth, **Samantha Cristoforetti** will take his place on the Space Station. She will work on the Station as part of the six-astronaut international crew. This will be the eighth long-duration mission for an ESA astronaut. Samantha completed basic training in 2010 and continued with specific training on the Russian Soyuz spacecraft, ISS systems, robotics and spacewalks. Samantha, formerly a captain in the Italian Air Force, has logged more than 500 hours of flight time on several types of military aircraft.

The **2014 ESA Council meeting at ministerial level** will take place at the very beginning of December in Luxembourg. On the agenda will be three items: launchers, the International Space Station and the evolution of ESA, the aim being to complete the decision-making process initiated in 2012.

By way of a reminder, in November 2012, in Naples, the Ministers in charge of space activities in Europe secured investments for the detailed definition studies for the new Ariane 6 launcher and the continued development of the adapted Ariane 5 ME (Mid-life Evolution), with the aim of developing as many commonalities as possible between the two launchers. These activities were funded for two years with a decision on continuation to be taken in 2014.

In Naples, Ministers also gave the green light for Europe to provide the service module for NASA's new Orion Multipurpose Crew Vehicle (MPCV) as an in-kind contribution (barter element) to ISS operations for 2017–20. This decision was strategically important for us, enabling ESA to cooperate with NASA on future human space transportation systems. Funding for the exploitation of the International Space Station, including the 'barter element' with NASA, was secured for 2013-14. Further resources will have to be allocated in 2014.

And finally in Naples, Ministers approved a Political Declaration "towards the European Space Agency that best serves Europe", thereby initiating a process that will define how ESA can adapt its operations to derive benefits both from its intergovernmental framework and from EU competence in space. They also stated their willingness to ensure coordination and coherence between the process initiated on the ESA side and that initiated on the EU side. A decision will be taken in 2014 on the basis of the analysis and assessments conducted on both sides.

2013 and 2014 – two years defined by success – like many that have come before. Such success for ESA equates to success for its Members States, and it is only thanks to their commitment that we have been able, collectively, to achieve such outstanding results, without forgetting the precious role played by our international partners across a range of programmes: NASA, Roscosmos and others. Likewise, recognition for success achieved is also due to European industry, which has been instrumental in making it all happen.