The
G7 Research Group
at the Munk School of Global Affairs and Public Policy at Trinity College
in the University of Toronto presents the

2018 Charlevoix G7 Final Compliance Report

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Prepared by
Angela Min Yi Hou, Julia Tops, and Cindy Xinying Ou

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www.g7.utoronto.ca
g7@utoronto.ca
@g7_rg

"We have meanwhile set up a process and there are also independent institutions monitoring which objectives of our G7 meetings we actually achieve. When it comes to these goals we have a compliance rate of about 80%, according to the University of Toronto. Germany, with its 87%, comes off pretty well. That means that next year too, under the Japanese G7 presidency, we are going to check where we stand in comparison to what we have discussed with each other now. So a lot of what we have resolved to do here together is something that we are going to have to work very hard at over the next few months. But I think that it has become apparent that we, as the G7, want to assume responsibility far beyond the prosperity in our own countries. That's why today's outreach meetings, that is the meetings with our guests, were also of great importance."

Chancellor Angela Merkel, Schloss Elmau, 8 June 2015

G7 summits are a moment for people to judge whether aspirational intent is met by concrete commitments. The G7 Research Group provides a report card on the implementation of G7 and G20 commitments. It is a good moment for the public to interact with leaders and say, you took a leadership position on these issues — a year later, or three years later, what have you accomplished?

Achim Steiner, Administrator, United Nations Development Programme,
in *G7 Canada: The 2018 Charlevoix Summit*

munkschool.utoronto.ca

At Trinity College
1 Devonshire Place
Toronto, ON
Canada M5S 3K7
T: 416.946.8900 F: 416.946.8915

At the Observatory
315 Bloor Street West
Toronto, ON
Canada M5S 0A7
T: 416.946.8929 F: 416.946.8877

At the Canadiana Gallery
14 Queen's Park Crescent West
Toronto, ON
Canada M5S 3K9
T: 416.978.5120 F: 416.978.5079

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"We intend to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the poorest and most vulnerable regions of the world in order to support … infrastructure and building design"

Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities

Assessment

	No Compliance	Partial Compliance	Full Compliance
Canada		0	
France			+1
Germany		0	
Italy		0	
Japan			+1
United Kingdom			+1
United States		0	
European Union			+1
Average		+0.50	

Background

Earth observation technologies (EOs) provide academics, governments, and other decision-makers with an overview of the environmental landscape.[2986] Uses for EOs include disaster risk assessment, accurate weather reports, climate change modelling and monitoring of the air, seas, and land.[2987] If a country has leveraged EO technology for disaster prevention and response, there is an assumption that the data collected will be used for infrastructure planning and design. The importance of EOs first came to the attention of the G7 in 1984, when the G7 Working Group on Technology, Growth, and Employment created the Committee on Earth Observation Satellites (CEOS) based on a recommendation from the Panel of Experts on Remote Sensing from Space.[2988] CEOS, of which the European Commission and the European Union are currently Chairs, is the primary forum of space-based earth observations. It has been instrumental in the development of the Group on Earth Observations (GEO) and Global Earth Observation System of Systems (GEOSS).[2989]

Despite the commission of CEOS in 1984, the G7 left the topic of EOs relatively unaddressed until the G7 Tsukuba, Ibaraki Science and Technology ministers meeting on 17 May 2016.[2990] At the ministers meeting, G7 ministers reaffirmed the importance of investment in EOs, especially in the context of open data sharing, by saying: "fundamental to the progress of open science is the continued investment by governments and others … in suitable infrastructures and services for data collection, analysis, preservation, and dissemination."[2991]

[2986] Earth Observation, EC (Brussels) 14 July 2016. Access Date: 29 June 2018. https://ec.europa.eu/jrc/en/research-topic/earth-observation.
[2987] Earth Observation, EC (Brussels) 14 July 2016. Access Date: 29 June 2018. https://ec.europa.eu/jrc/en/research-topic/earth-observation.
[2988] Committee on Earth Observation Satellites: Work Plan 2018 — 2020, CEOS (Canberra) March 2018. Access Date: 29 June 2018. http://ceos.org/about-ceos/overview/.
[2989] Committee on Earth Observation Satellites: Work Plan 2018 — 2020, CEOS (Canberra) March 2018. Access Date: 29 June 2018. http://ceos.org/about-ceos/overview/.
[2990] G7 Science and Technology Ministers' Meeting in Tsukuba, Ibaraki Communique, G7 (Tsukuba, Ibari) 17 May 2016. Access Date: 29 June 2018. http://www.g7.utoronto.ca/science/2016-tsukuba.html.
[2991] G7 Science and Technology Ministers' Meeting in Tsukuba, Ibaraki Communique, G7 (Tsukuba, Ibari) 17 May 2016. Access Date: 29 June 2018. http://www.g7.utoronto.ca/science/2016-tsukuba.html.

On 8-9 June 2018, during the G7 Charlevoix Summit, G7 members adopted the Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities. The Charlevoix Blueprint recognized that open data sharing is particularly important in the context of capacity-building in developing countries, where gaps in information create difficulties for decision-makers seeking to improve infrastructure.[2992] Infrastructural improvements are necessary to create more resilient coastal communities, who are amongst the most vulnerable to climate change.[2993] Thus, members seek to use technological advances in EOs to address issues surrounding "disaster risk prevention, contingency planning, spatial planning, infrastructure, and building design, early warning systems and risk transfer mechanisms" that disproportionately affect developing countries.[2994]

G7 members will seek to scale up efforts made by CEOS and its working groups, particularly the Working Group for Capacity Building and Data Democracy (WGCapD).[2995] In partnership with the United Nations and its agencies, the WGCapD has already developed and executed a number of capacity-building activities, such as workshops, training, and the creation of "best practices" resources.[2996] Thus, there is already considerable foundation available for G7 members to build upon.

The United Nations has been actively involved in the development of EOs through a variety of partnerships in the private sector. During the UNISPACE+50 conference on 2 July 2018, Airbus and the United Nations Office for Outer Space Affairs signed a memorandum of understanding outlining the usage of Airbus EOs for climate tracking.[2997] Additionally, on 16 July 2018, the UN Environment Programme announced a collaboration with Google to use the company's cloud computing and earth observation catalogs, such as satellite imagery, to analyze changes in the Earth's environment.[2998]

Furthermore, the United Nations Statistics Division and the World Bank recently published the "Integrated Geospatial Information Framework" on 24 July 2018. The new guide promotes the proper use of geospatial data in a state's decision-making process, specifically in low and middle-income countries. The framework further supports the EO commitment of the G7 member states by encouraging the effective use of geospatial information to improve resource allocation and sustainable development.[2999]

Commitment Features

The G7 members "intend to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the poorest and most vulnerable regions of the world in order to support … infrastructure and building design (environment)."[3000] "We intend"

[2992] Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities, G7 (Charlevoix) 9 June 2018. Access Date: 29 June 2018. http://www.g7.utoronto.ca/summit/2018charlevoix/oceans-blueprint.html.
[2993] Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities, G7 (Charlevoix) 9 June 2018. Access Date: 29 June 2018. http://www.g7.utoronto.ca/summit/2018charlevoix/oceans-blueprint.html.
[2994] Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities, G7 (Charlevoix) 9 June 2018. Access Date: 29 June 2018. http://www.g7.utoronto.ca/summit/2018charlevoix/oceans-blueprint.html.
[2995] Committee on Earth Observation Satellites: Work Plan 2018 — 2020, CEOS (Canberra) March 2018. Access Date: 29 June 2018. http://ceos.org/about-ceos/overview/.
[2996] Committee on Earth Observation Satellites: Work Plan 2018 — 2020, CEOS (Canberra) March 2018. Access Date: 29 June 2018. http://ceos.org/about-ceos/overview/.
[2997] Airbus and United Nations team up for universal access to space, Airbus (Toulouse) 2 July 2018. Access Date: 25 August 2018. https://www.airbus.com/newsroom/press-releases/en/2018/07/Airbus-and-United-Nations-team-up-for-universal-access-to-space.html.
[2998] Google and UN Environment Partner on Data for Global Goals, IISD (Geneva) 19 July 2018. Access Date: 25 August 2018. http://sdg.iisd.org/news/google-and-un-environment-partner-on-data-for-global-goals/.
[2999] New UN report on geospatial data for decision-making, UNOOSA (Vienna) 20 August 2018. Access Date: 25 August 2018. http://www.un-spider.org/news-and-events/news/new-un-report-geospatial-data-decision-making.
[3000] Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities, G7 (Charlevoix) 9 June 2018. Access Date: 29 June 2018. http://www.g7.utoronto.ca/summit/2018charlevoix/oceans-blueprint.html.

is understood to mean that compliance with this commitment entails a direct action with the aim to catalyze innovation in Earth Observation technologies. "Intend" is considered to be a pledge of a goal that has a specific "plan or purpose."

This commitment is broken up into two sections: 1) "to intend to leverage innovation in the field of Earth observation technologies and related applications" and 2) "make them broadly available in the poorest and vulnerable regions of the world in order to support infrastructure and building design."

The first part of the commitment, "leverage innovation," is understood to mean the use of technological advancements to rectify gaps in Earth observation coverage. Examples of leveraging innovation include raising awareness of the value of EOs, providing support for increased access to Earth observation products and tools, and targeted training workshops for EOs.[3001] Then, "Earth observation technologies and related applications" is understood to mean remote sensing technologies with imaging devices and the systems that process/assess the earth system, such GEOSS.[3002] Earth observation relies on the use of space-based satellites.

To fulfill the first aspect of the commitment, the G7 member must advance innovation through technological advancements in Earth observation coverage by EOs. This may include unilateral, independent and group research amongst G7 members.

The second part of this commitment refers to the dissemination of innovations in EOs to a larger community of users in the developing world. It is important to increase access to EOs in these communities to fill information gaps that prevent decision-makers from accurately assessing changes in the environment and consequently, making appropriate modifications to infrastructure. For the purpose of this commitment, "poorest" nation is defined as is a country with a less developed industrial base and a low Human Development Index relative to other countries.[3003] "Vulnerable regions" will be defined as areas that "geophysical, biological and socio-economic systems are susceptible to, and unable to cope with, adverse impacts of climate change."[3004] In the context of the document in which commitment is found, there is a particular focus on coastal communities in the developing world for the purpose of improving coastal resilience to the effects of climate change.[3005]

The idea "support[ing] infrastructure and building design" is understood to mean upgrading physical and digital systems in order to adapt to the impacts of climate change. Support is defined as the act of "providing aid, assistance, or backing up an initiative, or entity."[3006] Infrastructure is defined as the system of public works of a country, state, or region and the resources (such as personnel, buildings, or equipment) required for an activity. Infrastructure in developing countries may not have the capacity to offset the impacts of climate change. Examples of support for infrastructure include the mobilization of funds, the provision of training, knowledge transfers and open data sharing.

[3001] Committee on Earth Observation Satellites: Work Plan 2018 — 2020, CEOS (Canberra) March 2018. Access Date: 29 June 2018. http://ceos.org/about-ceos/overview/.
[3002] Earth Observation, EC (Brussels) 14 July 2016. Access Date: 29 June 2018. https://ec.europa.eu/jrc/en/research-topic/earth-observation.
[3003] What is Developing Countries, IGI Global. Access Date: 28 August 2018. https://www.igi-global.com/dictionary/developing-countries/7401.
[3004] Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability, ipcc 2007. Access Date: 28 August 2018. https://www.ipcc.ch/publications_and_data/ar4/wg2/en/ch19s19-1-2.html.
[3005] Charlevoix Blueprint for Healthy Oceans, Seas and Resilient Coastal Communities, G7 (Charlevoix) 9 June 2018. Access Date: 29 June 2018. http://www.g7.utoronto.ca/summit/2018charlevoix/oceans-blueprint.html.
[3006] Compliance Coding Manual for International Institutional Commitments, Global Governance Program (Toronto) 27 September 2017. Access Date: 20 July 2018.

To fulfill the second aspect of the commitment, the G7 member must make these innovations explicitly available to the poorest and most vulnerable countries. The recommendation needs to support infrastructure or building design for these developing countries.

Thus, to achieve full compliance, the G7 member must have leveraged innovation in the field of Earth observation technologies and related applications, while also making them broadly available in the poorest and vulnerable regions of the world in order to support infrastructure and building design. Successful implementation of both parts to this commitment will gain the G7 member a score of +1 for full compliance.

Partial compliance is scored when the G7 member has fulfilled the former or the latter half of the commitment. This means that the G7 member has successfully leveraged innovation of Earth observation technologies and related applications or makes them available to the poorest and most vulnerable nations. G7 members will receive a score of −1 for non-compliance if they have not successfully leveraged innovation of Earth observation technologies and related applications, nor made them available to the poorest and most vulnerable nations.

Scoring Guidelines

−1	Member does NOT intend to leverage innovations in the field of Earth observation technologies NOR makes them broadly available for vulnerable coastal regions to support infrastructure nor support building design.
0	Member takes action to leverage innovations in the field of Earth observation technologies BUT does not make them broadly available for vulnerable coastal regions to support infrastructure or support building design.
+1	Member takes action to leverage innovations in the field of Earth observation technologies AND makes them broadly available for vulnerable coastal regions to support infrastructure or support building design.

Authors: Jiyoon Han and Julia Tops
Lead Analyst: Sofia Louise Lopez
Compliance Director: Harrison Myles

Canada: 0

Canada has partially complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 21 June 2018, the government revealed the next generation of Radarsat satellites and announced the launch date of November 2018.[3007] The Radarsat Constellation Mission (RCM) is a collection of three satellites developed by the Canadian Space Agency (CSA) and a private company, MDA.[3008] Once launched, the RCM will pursue three main objectives of maritime surveillance, environmental monitoring, and disaster monitoring.[3009]

[3007] Next generation of Radarsat satellites to 'cover 90% of the globe', Global News (Vancouver) 21 June 2018. Access Date: 4 September 2018. https://globalnews.ca/news/4289785/next-generation-of-radarsat-satellites-csa/.
[3008] Next generation of Radarsat satellites to 'cover 90% of the globe', Global News (Vancouver) 21 June 2018. Access Date: 4 September 2018. https://globalnews.ca/news/4289785/next-generation-of-radarsat-satellites-csa/.
[3009] Next generation of Radarsat satellites to 'cover 90% of the globe', Global News (Vancouver) 21 June 2018. Access Date: 4 September 2018. https://globalnews.ca/news/4289785/next-generation-of-radarsat-satellites-csa/.

On 3 October 2018, the CSA, the Australian Space Agency, and the United Kingdom Space Agency signed a memorandum of understanding to enhance trilateral cooperation.[3010] The agreement will build upon Canada's ongoing cooperation with Geoscience Australia in Earth observation technologies.[3011]

On 22 October 2018, exactEarth Ltd reported that the government will invest CAD7.2 million over a three-year period to support the expansion of exactView RT.[3012] ExactView RT consists of a system with more than 60 satellites that observe environmental impact, maritime safety, and navigation.[3013]

From 29 October to 2 November 2018, Canada renewed its annual CAD100,000 contribution to the GEO Trust Fund.[3014] The fund will support GEO's main Earth observations activities regarding climate change, sustainable development, and emergency management.[3015]

On 15 November 2018, NorthStar Earth and Space Inc. announced partnerships with the federal government and the provincial government of Quebec.[3016] Each will contribute CAD13 million to the NorthStar project, a platform based on 40 satellite constellations used to collect data on pollution and environmental changes.[3017]

From 20-22 November 2018, the CSA hosted a two-day National Forum on Earth Observation from Space.[3018] The forum gathered national space stakeholders from industry, academia, and government to celebrate Canadian EO achievements and collaboratively discuss a "forward-looking national

[3010] Australia signs space agreements with the UK and Canada, ZDNet (San Francisco) 3 October 2018. Access Date: 31 October 2018. https://www.zdnet.com/article/australia-signs-space-agreements-with-the-uk-and-canada/.
[3011] Australia signs space agreements with the UK and Canada, ZDNet (San Francisco) 3 October 2018. Access Date: 31 October 2018. https://www.zdnet.com/article/australia-signs-space-agreements-with-the-uk-and-canada/.
[3012] Government of Canada to invest $7.2M in exactEarth, Space Daily (Sydney) 22 Oct 2018. Access Date: 14 December 2018. http://www.spacedaily.com/reports/Government_of_Canada_to_invest_7_2M_in_exactEarth_999.html?fbclid=IwAR3en2vURksXkjIVbpSxLAhE_UlvoxU1EVRciHqv-r1k07FQFe95BfBQMd8.
[3013] Government of Canada to invest $7.2M in exactEarth, Space Daily (Sydney) 22 Oct 2018. Access Date: 14 December 2018. http://www.spacedaily.com/reports/Government_of_Canada_to_invest_7_2M_in_exactEarth_999.html?fbclid=IwAR3en2vURksXkjIVbpSxLAhE_UlvoxU1EVRciHqv-r1k07FQFe95BfBQMd8.
[3014] Canada renews contribution to GEO, GEO (Geneva) 13 November 2018. Access Date: 10 December 2018. https://www.earthobservations.org/article.php?id=331.
[3015] Canada renews contribution to GEO, GEO (Geneva) 13 November 2018. Access Date: 10 December 2018. https://www.earthobservations.org/article.php?id=331.
[3016] NorthStar Earth and Space Inc. announces partnerships, $52 million in additional financing for global environment information platform, Newswire (Montreal) 15 November 2018. Access Date: 14 December 2018. https://www.newswire.ca/news-releases/northstar-earth-and-space-inc-announces-partnerships-52-million-in-additional-financing-for-global-environment-information-platform-700597581.html?fbclid=IwAR3A6BNd67HCfDWtT9cGI-6qLaHZGvCu-IPPlOp2Swv-K2oWsOoRBSH5tDU.
[3017] NorthStar Earth and Space Inc. announces partnerships, $52 million in additional financing for global environment information platform, Newswire (Montreal) 15 November 2018. Access Date: 14 December 2018. https://www.newswire.ca/news-releases/northstar-earth-and-space-inc-announces-partnerships-52-million-in-additional-financing-for-global-environment-information-platform-700597581.html?fbclid=IwAR3A6BNd67HCfDWtT9cGI-6qLaHZGvCu-IPPlOp2Swv-K2oWsOoRBSH5tDU.
[3018] National Forum on Earth Observation from Space, Canadian Space Agency (Longueuil) 19 November 2018. Access Date: 28 February 2019. http://www.asc-csa.gc.ca/eng/events/2018/national-forum-on-earth-observation-from-space.asp.

vision for space-based EO in Canada," including how Canada might further its involvement in the EU's Copernicus system.[3019]

On 11 February 2019, Stratodynamics Aviation announced the successful test flight of its HiDRON Autonomous glider.[3020] Funded in part by the CSA, the HiDRON is a new type of EO technology that collects high altitude atmospheric data.[3021] It provides an integrated data collection system that gives real-time data to ground stations.[3022]

On 22 February 2019, the CSA hosted InvestmentSpace 2019 with the Business Development Bank of Canada, the Creative Destruction Lab, and the Ontario Center of Excellence.[3023] This inaugural event brought together venture capital investors, space entrepreneurs, and start-up companies seeking investors, including EO-related firms.[3024] The central objective of this event and the associated institutions was financing space exploration and innovation.[3025]

On 1 April 2019, the CSA and the Canada Centre for Mapping and Earth Observation made 36,500 RADARSAT-1 synthetic aperture radar images of Earth freely available to researchers, industry and the public.[3026] This will allow Canadians to better observe trends and correlations regarding sea ice cover, deforestation, seasonal changes, the effects of climate change on the Canadian North and more.[3027]

Through its development and investment in new Earth observation satellites and cooperation with other national space agencies, Canada has leveraged innovation to enhance the capabilities of EO technology. However, Canada yet to make this advancement of Earth observation technologies available to poor and vulnerable regions.

Thus, Canada receives a score of 0.

Analysts: Harrison Myles and Reema Bazzi

[3019] National Forum on Earth Observation from Space, Canadian Space Agency (Longueuil) 19 November 2018. Access Date: 28 February 2019. http://www.asc-csa.gc.ca/eng/events/2018/national-forum-on-earth-observation-from-space.asp.

[3020] Stratospheric Unmanned Glider HiDRON Completes Real-Time Remote Earth Observation, SpaceQ (London) 11 February 2019. Access Date: 28 February 2019. http://spaceq.ca/stratospheric-unmanned-glider-hidron-completes-real-time-remote-earth-observation/.

[3021] Stratospheric Unmanned Glider HiDRON Completes Real-Time Remote Earth Observation, SpaceQ (London) 11 February 2019. Access Date: 28 February 2019. http://spaceq.ca/stratospheric-unmanned-glider-hidron-completes-real-time-remote-earth-observation/.

[3022] Stratospheric Unmanned Glider HiDRON Completes Real-Time Remote Earth Observation, SpaceQ (London) 11 February 2019. Access Date: 28 February 2019. http://spaceq.ca/stratospheric-unmanned-glider-hidron-completes-real-time-remote-earth-observation/.

[3023] InvestmentSpace 2019, Canadian Space Agency (Longueuil) 18 February 2019. Access Date: 28 February 2019. http://www.asc-csa.gc.ca/eng/industry/news/2019-01-14-investmentspace-2019.asp?fbclid=IwAR1io5KOp_koGEMwCbFtl6H3481boj5NtcexqhCY04QTrT_X1ZcTIpQUFpk.

[3024] InvestmentSpace 2019, Canadian Space Agency (Longueuil) 18 February 2019. Access Date: 28 February 2019. http://www.asc-csa.gc.ca/eng/industry/news/2019-01-14-investmentspace-2019.asp?fbclid=IwAR1io5KOp_koGEMwCbFtl6H3481boj5NtcexqhCY04QTrT_X1ZcTIpQUFpk.

[3025] InvestmentSpace 2019, Canadian Space Agency (Longueuil) 18 February 2019. Access Date: 28 February 2019. http://www.asc-csa.gc.ca/eng/industry/news/2019-01-14-investmentspace-2019.asp?fbclid=IwAR1io5KOp_koGEMwCbFtl6H3481boj5NtcexqhCY04QTrT_X1ZcTIpQUFpk.

[3026] Open Data: over 36,000 historical RADARSAT-1 satellite images of the Earth now available to the public, Cision (Chicago) 1 April 2019. Access Date: 12 June 2019. https://www.newswire.ca/news-releases/open-data-over-36-000-historical-radarsat-1-satellite-images-of-the-earth-now-available-to-the-public-848482900.html.

[3027] Open Data: over 36,000 historical RADARSAT-1 satellite images of the Earth now available to the public, Cision (Chicago) 1 April 2019. Access Date: 12 June 2019. https://www.newswire.ca/news-releases/open-data-over-36-000-historical-radarsat-1-satellite-images-of-the-earth-now-available-to-the-public-848482900.html.

France: +1

France has fully complied with its commitment to leverage innovation in the field of Earth observation (EO) technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 28 June 2018, the Space Climate Observatory (SCO) was launched at the Toulouse Space Show.[3028] The SCO is an international initiative led by the French space agency, Centre National d'Etudes Spatiales (CNES).[3029] The observatory will combine satellite and in-situ data with modelling technology to advance the world's understanding of climate change and inform state strategies in light of rising sea levels, melting glaciers, and deadly droughts and floods.[3030] Countries across the world will have open access to this information, including poor and vulnerable regions in Africa and Asia.[3031]

On 20 July 2018, the President of the French space agency signed an agreement with the CEO and chair of the board of the Azerbaijan satellite operator, Azercosmos.[3032] The two countries agreed to increase their cooperation in space, with a specific emphasis on Earth observation and the effects of climate change.[3033]

On 2 August 2018, the French space agency and the Greek space agency Hellenic Space Agency signed an agreement finalizing the terms and conditions of bilateral cooperation.[3034] This cooperation will include collaboration in areas including but not limited to space sciences, Earth observation, and telecommunication.[3035] This partnership is also considering expansions to include emergency response as well, given recent wildfires in Attiki, Greece.[3036]

On 2 September 2018, the space agencies of France and Australia signed a memorandum of understanding to advance their respective space programs.[3037] The Australia Space Agency and the CNES agreed to bolster their capabilities in space operation, Earth observation, positioning systems,

[3028] Toulouse Space Show 2018- Space Climate Observatory is 'Go', CNES (Paris) 28 June 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/toulouse-space-show-2018-space-climate-observatory-go.
[3029] Toulouse Space Show 2018- Space Climate Observatory is 'Go', CNES (Paris) 28 June 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/toulouse-space-show-2018-space-climate-observatory-go.
[3030] Toulouse Space Show 2018- Space Climate Observatory is 'Go', CNES (Paris) 28 June 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/toulouse-space-show-2018-space-climate-observatory-go.
[3031] Toulouse Space Show 2018- Space Climate Observatory is 'Go', CNES (Paris) 28 June 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/toulouse-space-show-2018-space-climate-observatory-go.
[3032] France and Azerbaijan cooperate in space framework agreement between CNES and Azercosmos, CNES (Paris) 20 July 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/france-and-azerbaijan-cooperate-space-framework-agreement-between-cnes-and-azercosmos.
[3033] France and Azerbaijan cooperate in space framework agreement between CNES and Azercosmos, CNES (Paris) 20 July 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/france-and-azerbaijan-cooperate-space-framework-agreement-between-cnes-and-azercosmos.
[3034] Space cooperation between France and Greece- CNES signs first agreement with recently founded Hellenic Space Agency, CNES (Paris) 3 August 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/space-cooperation-between-france-and-greece-cnes-signs-first-agreement-recently-founded-hellenic.
[3035] Space cooperation between France and Greece- CNES signs first agreement with recently founded Hellenic Space Agency, CNES (Paris) 3 August 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/space-cooperation-between-france-and-greece-cnes-signs-first-agreement-recently-founded-hellenic.
[3036] Space cooperation between France and Greece- CNES signs first agreement with recently founded Hellenic Space Agency, CNES (Paris) 3 August 2018. Access Date: 4 September 2018. https://presse.cnes.fr/en/space-cooperation-between-france-and-greece-cnes-signs-first-agreement-recently-founded-hellenic.
[3037] Australia partners with France for space program development, ZDNet (San Francisco) 2 September 2018. Access Date: 4 September 2018. https://www.zdnet.com/article/australia-partners-with-france-for-space-program-development/.

and communications through partnerships with universities, research institutions, businesses, and communities.[3038]

On 7 October 2018, the CNES opened a new office at the French embassy in Abu Dhabi to strengthen French space cooperation with the United Arab Emirates.[3039] This will enable greater progress in the partnership between the CNES and the UAE's Space Agency, which seeks to create a joint hyperspectral Earth observation satellite program.[3040]

On 9 October 2018, the CNES signed a framework agreement with Uzbekistan's Minister of Foreign Affairs Abdulaziz Kamilov.[3041] The agreement includes collaboration in space science, Earth observation, telecommunications satellites, space applications, space research and technology, and coordination of international regulatory issues.[3042]

On 15 October 2018, the leaders of CNES, the Korean Aerospace Research Institute and the Korean Meteorological Administration signed a letter of intent concerning the SCO, an initiative to share climate change data with countries around the world.[3043] This bilateral agreement between France and Korea aims to aid the three agencies in establishing necessary infrastructure for the SCO and provide the observatory with satellite data on oceans, land surfaces and ecosystems.[3044]

From 18 to 19 October 2018, CNES, the French Alliance for Environmental Research and the French National Research Institute for Sustainable Development jointly hosted the Special Session of the UN Science-Policy-Business Forum on the Environment in Paris.[3045] The event launched an international working group that will restructure funding models, integrate artificial intelligence and big data into the field of Earth observation technologies, and creates a multi-stakeholder climate change information platform.[3046]

[3038] Australia partners with France for space program development, ZDNet (San Francisco) 2 September 2018. Access Date: 4 September 2018. https://www.zdnet.com/article/australia-partners-with-france-for-space-program-development/.

[3039] France-UAE Space Cooperation — CNES Opens Office in Abu Dhabi, CNES (Paris) 8 October 2018. Access Date: 16 October 2018. https://presse.cnes.fr/en/france-uae-space-cooperation-cnes-opens-office-abu-dhabi.

[3040] France-UAE Space Cooperation — CNES Opens Office in Abu Dhabi, CNES (Paris) 8 October 2018. Access Date: 16 October 2018. https://presse.cnes.fr/en/france-uae-space-cooperation-cnes-opens-office-abu-dhabi.

[3041] France-Uzbekistan Space Cooperation — CNES Signs Framework Agreement with Uzbekistan's Minister of Foreign Affairs, CNES (Paris) 9 October 2018. Access Date: 16 October 2018. https://presse.cnes.fr/en/france-uzbekistan-space-cooperation-cnes-signs-framework-agreement-uzbekistans-ministry-foreign.

[3042] France-Uzbekistan Space Cooperation — CNES Signs Framework Agreement with Uzbekistan's Minister of Foreign Affairs, CNES (Paris) 9 October 2018. Access Date: 16 October 2018. https://presse.cnes.fr/en/france-uzbekistan-space-cooperation-cnes-signs-framework-agreement-uzbekistans-ministry-foreign.

[3043] France-Uzbekistan Space Cooperation — CNES Signs Framework Agreement with Uzbekistan's Minister of Foreign Affairs, CNES (Paris) 9 October 2018. Access Date: 16 October 2018. https://presse.cnes.fr/en/france-uzbekistan-space-cooperation-cnes-signs-framework-agreement-uzbekistans-ministry-foreign.

[3044] France-South Korea Space Cooperation — CNES, KARI and KMA Commit Together to Space Climate Observatory, CNES (Paris) 15 October 2018. Access Date: 16 October 2018. https://presse.cnes.fr/en/france-south-korea-space-cooperation-cnes-kari-and-kma-commit-together-space-climate-observatory.

[3045] CNES hosts Special Session of the UN Science-Policy-Business Forum on the Environment, CNES (Paris) 19 October 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/cnes-hosts-special-session-un-science-policy-business-forum-environment.

[3046] CNES hosts Special Session of the UN Science-Policy-Business Forum on the Environment, CNES (Paris) 19 October 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/cnes-hosts-special-session-un-science-policy-business-forum-environment.

On 26 October 2018, the CNES officially assumed its role as chair of the International Charter on Space and Major Disasters for the next six months on behalf of France.[3047] The Charter was created in 1999, and it has 17 member agencies operating Earth-imaging satellites with a commitment to sharing disaster imagery among affected countries.[3048]

From 2 November to 4 November 2018, the CNES signed agreements with the Vietnam Academy of Science and Technology, the University of Science and Technology of Hanoi, the Institute of Marine Environment and Resources, the Space Technology Institute and the Institute of Oceanography with the aim of bolstering French-Vietnamese space cooperation.[3049] The agreements focus on the importance of bilateral involvement in the development of climate research, specifically with regards to space geophysics, oceanography and satellite technology.[3050]

On 19 November 2018, the CNES and the Belgian Science Policy Office signed a letter of intent to increase French-Belgian space and climate change research cooperation.[3051] The two countries will create a joint working group to support Earth observation technologies, water resource management, and the SCO.[3052]

On 5 December 2018, the leaders of CNES and the National Forests Office (ONF) met in Paris to sign a five-year agreement.[3053] The framework will promote greater collaboration between the ONF and the CNES regarding Earth remote-sensing data on forestry and biodiversity management.[3054] With a heavy emphasis on forestry, this partnership highlights the role of space technologies in developing research and innovation in environmental management.[3055]

[3047] CNES Takes Over Chair For Next Six Months of International Charter on Space And Major Disasters, CNES (Paris) 26 October 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/cnes-takes-over-chair-next-six-months-international-charter-space-and-major-disasters.
[3048] CNES Takes Over Chair For Next Six Months of International Charter on Space And Major Disasters, CNES (Paris) 26 October 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/cnes-takes-over-chair-next-six-months-international-charter-space-and-major-disasters.
[3049] Prime Minister's Official Visit to Vietnam, Significant Strengthening of France-Vietnam Space Cooperation, CNES (Paris) 3 November 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/prime-ministers-official-visit-vietnam-significant-strengthening-france-vietnam-space-cooperation.
[3050] Prime Minister's Official Visit to Vietnam, Significant Strengthening of France-Vietnam Space Cooperation, CNES (Paris) 3 November 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/prime-ministers-official-visit-vietnam-significant-strengthening-france-vietnam-space-cooperation.
[3051] Space Cooperation Between France and Belgium, Supporting Research Into Climate Change and Technological Innovation, CNES (Paris) 19 November 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/space-cooperation-between-france-and-belgium-supporting-research-climate-change-and-technological.
[3052] Space Cooperation Between France and Belgium, Supporting Research Into Climate Change and Technological Innovation, CNES (Paris) 19 November 2018. Access Date: 5 December 2018. https://presse.cnes.fr/en/space-cooperation-between-france-and-belgium-supporting-research-climate-change-and-technological.
[3053] CNES and ONF Sign Framework Agreement - Space Science Serving Forestry, CNES (Paris) 5 December 2018. Access Date: 19 December 2018. https://presse.cnes.fr/en/cnes-and-onf-sign-framework-agreement-space-science-serving-forestry.
[3054] CNES and ONF Sign Framework Agreement - Space Science Serving Forestry, CNES (Paris) 5 December 2018. Access Date: 19 December 2018. https://presse.cnes.fr/en/cnes-and-onf-sign-framework-agreement-space-science-serving-forestry.
[3055] CNES and ONF Sign Framework Agreement – Space Science Serving Forestry, CNES (Paris) 5 December 2018. Access Date: 19 December 2018. https://presse.cnes.fr/en/cnes-and-onf-sign-framework-agreement-space-science-serving-forestry.

On 1 February 2019, CNES hosted the first international meeting of the SCO in Paris.[3056] 25 space agencies and four international organizations (including the European Commission, the African Union, and the United Nations) worked collectively to assess the progress and goals of the SCO in sharing Earth observation satellite data.[3057] The meeting focused on increasing access to this data and tailoring it to the study of climate change.[3058]

From 27-28 February 2019, CNES leaders signed an agreement with the Commonwealth Scientific and Industrial Research Organisation to jointly track development goals in the Pacific Islands region using Australia's Data Cube geoscience EO technology.[3059]

On 28 February 2019, CNES met with the leader of the South African National Space Agency to sign a foundational agreement between France and South Africa that will guide future space cooperation between the two countries.[3060] The agreement outlines commitments to advancing EO, space science, space operations, and research and technology, among others.[3061] This was a key moment in developing France's relations with Pan-African space agencies, and the agreement will pave the way for future developmental support in the field of Earth observation on the African continent.[3062]

On 6 March 2019, CNES leaders signed an agreement with the Indian Space Research Organization to establish a joint program and develop a maritime surveillance system using EO technologies.[3063]

Through its bilateral agreements in support of advancing Earth observation and its leadership of the SCO, France fully complied with its commitment to leveraging innovation in the field of EO technologies and making them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

Thus, France receives a score of +1.

Analysts: Harrison Myles and Gautier Boyrie

[3056] International Meeting at CNES Head Office of Space Climate Observatory (SCO), CNES (Paris) 5 February 2019. Access Date: 9 February 2019. https://presse.cnes.fr/en/international-meeting-cnes-head-office-space-climate-observatory-sco.
[3057] International Meeting at CNES Head Office of Space Climate Observatory (SCO), CNES (Paris) 5 February 2019. Access Date: 9 February 2019. https://presse.cnes.fr/en/international-meeting-cnes-head-office-space-climate-observatory-sco.
[3058] International Meeting at CNES Head Office of Space Climate Observatory (SCO), CNES (Paris) 5 February 2019. Access Date: 9 February 2019. https://presse.cnes.fr/en/international-meeting-cnes-head-office-space-climate-observatory-sco.
[3059] France-Australia Space Cooperation - Climate Change, Innovation and Exploration: CNES Signs Three Partnership Agreements, CNES (Paris) 28 February 2019. Access Date: 28 February 2019. https://presse.cnes.fr/en/france-australia-space-cooperation-climate-innovation-and-exploration-cnes-signs-three-partnership.
[3060] France-South Africa Space Cooperation - CNES and SANSA Sign Founding Agreement Outlining Future Projects, CNES (Paris) 28 February 2019. Access Date: 28 February 2019. https://presse.cnes.fr/en/france-south-africa-space-cooperation-cnes-and-sansa-sign-founding-agreement-outlining-future.
[3061] France-South Africa Space Cooperation - CNES and SANSA Sign Founding Agreement Outlining Future Projects, CNES (Paris) 28 February 2019. Access Date: 28 February 2019. https://presse.cnes.fr/en/france-south-africa-space-cooperation-cnes-and-sansa-sign-founding-agreement-outlining-future.
[3062] France-South Africa Space Cooperation - CNES and SANSA Sign Founding Agreement Outlining Future Projects, CNES (Paris) 28 February 2019. Access Date: 28 February 2019. https://presse.cnes.fr/en/france-south-africa-space-cooperation-cnes-and-sansa-sign-founding-agreement-outlining-future.
[3063] France-India Space Cooperation - CNES and ISRO Sign Agreement to Establish Maritime Surveillance Centre in India, CNES (Paris) 6 March 2019. Access Date: 10 June 2019. https://presse.cnes.fr/en/france-india-space-cooperation-cnes-and-isro-sign-agreement-establish-maritime-surveillance-centre.

Germany: 0

Germany has partially complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 29 June 2018, the German Aerospace Center (DLR) Earth Sensing Imaging Spectrometer (DESIS) was launched to the ISS from Cape Canaveral on a SpaceX Falcon 9 rocket.[3064] DESIS is an environmental and resource monitoring system developed by Germany's DLR Institute of Optical Sensor Systems. It observes the Earth and provides hyperspectral data to support scientific, humanitarian, and commercial objectives.[3065] This device will enable "an excellent degree of flexibility in response to environmental disasters or humanitarian crises through the rapid supply of information to emergency services."[3066]

On 11 July 2018, the Sentinel-5P data services operation began.[3067] The Earth observation satellite involved in these operations provides daily global measurements of "ozone, nitrogen dioxide, carbon monoxide, and aerosol and cloud properties."[3068] DLR is responsible for analyzing the satellite data and provides its findings over an open web service.[3069] Government agencies, companies, and the scientific community can "view or download the data for selected regions in different projections and data formats, or to integrate them directly into their own systems."[3070]

From 14 to 22 July 2018, Chair of the Executive Board at the German Aerospace Center Pascale Ehrenfreund and DLR Executive Board Member for Space Research and Technology Hansjörg Dittus attended the Committee on Space Research World Space Congress.[3071] The forum aims to promote international collaboration for scientific research in space, and establishes and strengthens

[3064] Hyperspectral Earth observation instrument DESIS sets off for the ISS, DLR (Cologne) 29 June 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28665/year-all/151_page-2/#/gallery/30169.
[3065] Hyperspectral Earth observation instrument DESIS sets off for the ISS, DLR (Cologne) 29 June 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28665/year-all/151_page-2/#/gallery/30169.
[3066] Hyperspectral Earth observation instrument DESIS sets off for the ISS, DLR (Cologne) 29 June 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28665/year-all/151_page-2/#/gallery/30169.
[3067] Accurate air pollution measurements—the Sentinel-5P data service commences operations, DLR (Cologne) 11 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28852/#/gallery/31346.
[3068] Accurate air pollution measurements—the Sentinel-5P data service commences operations, DLR (Cologne) 11 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28852/#/gallery/31346.
[3069] Accurate air pollution measurements—the Sentinel-5P data service commences operations, DLR (Cologne) 11 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28852/#/gallery/31346.
[3070] Accurate air pollution measurements—the Sentinel-5P data service commences operations, DLR (Cologne) 11 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28852/#/gallery/31346.
[3071] Major participation by the DLR in the COSPAR World Space Congress, DLR (Cologne) 23 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-29059/year-all/151_page-1/#/gallery/31492.

space research partnerships.[3072] Hansjörg Dittus gave a presentation outlining the current state and future requirements for space-based Earth observation systems.[3073]

On 18 July 2018, DLR initiated the Big Data Platform cross-sectoral project.[3074] The project aims to explore and improve analytical techniques that make use of data mining and machine learning, which are often used in Earth observation research.[3075] This means that "buildings, roads and even types of vegetation can be detected with far greater accuracy on the basis of aerial and satellite images."[3076] Smart data analysis using machine-learning methods has also proven useful for climate computing and obtaining a better understanding of climate mechanisms.[3077]

On 14 September 2018, the DLR F-SAR radar system began operations in Canada's Northwest Territories to record highly accurate observations of permafrost.[3078] Scientists from the DLR are working in collaboration with Canada's Centre for Mapping and Earth Observation to carry out a comprehensive analysis of vegetation and various soil conditions.[3079] This Earth observation project is one of few to provide observations with extremely high temporal and spatial resolution.[3080]

On 2 October 2018, DLR unveiled the first images from the DESIS hyperspectral Earth observation instrument to the International Astronautical Congress.[3081] The data, made available in collaboration with the Multiple User System for Earth Sensing platform, will make it possible for scientists to gain precise details about changing ecosystems and environmental monitoring.[3082]

[3072] Major participation by the DLR in the COSPAR World Space Congress, DLR (Cologne) 23 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-29059/year-all/151_page-1/#/gallery/31492.

[3073] Major participation by the DLR in the COSPAR World Space Congress, DLR (Cologne) 23 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-29059/year-all/151_page-1/#/gallery/31492.

[3074] DLR's Big Data Platform cross-sectoral project begins, DLR (Cologne) 18 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28966/year-all/151_page-2/#/gallery/31429.

[3075] DLR's Big Data Platform cross-sectoral project begins, DLR (Cologne) 18 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28966/year-all/151_page-2/#/gallery/31429.

[3076] DLR's Big Data Platform cross-sectoral project begins, DLR (Cologne) 18 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28966/year-all/151_page-2/#/gallery/31429.

[3077] DLR's Big Data Platform cross-sectoral project begins, DLR (Cologne) 18 July 2018. Access Date: 11 September 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-28966/year-all/151_page-2/#/gallery/31429.

[3078] Permafrost monitoring with latest radar technology in German-Canadian cooperation, DLR (Cologne) 14 September 2018. Access Date: 17 October 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-29824/#/gallery/31985.

[3079] Permafrost monitoring with latest radar technology in German-Canadian cooperation, DLR (Cologne) 14 September 2018. Access Date: 17 October 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-29824/#/gallery/31985.

[3080] Permafrost monitoring with latest radar technology in German-Canadian cooperation, DLR (Cologne) 14 September 2018. Access Date: 17 October 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-29824/#/gallery/31985.

[3081] First processed images from DESIS hyperspectral Earth observation instrument, DLR (Cologne) 2 October 2018. Access Date: 17 October 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-30091/year-all/#/gallery/32211.

[3082] First processed images from DESIS hyperspectral Earth observation instrument, DLR (Cologne) 2 October 2018. Access Date: 17 October 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-30091/year-all/#/gallery/32211.

On 8 October 2018, DLR freely released the TanDEM-X Digital Elevation Model, a global earth observation dataset that covers all 148 million square kilometres of Earth's land surfaces thirty times more accurately than any other global dataset.[3083]

On 2 November 2018, Germany contributed an initial pledge of EUR100,000 to the new GEO Land Degradation Neutrality Initiative.[3084] The initiative will coordinate data providers and governments to support global efforts to reduce and reverse land degradation.[3085] Germany's pledge will contribute to the development and accessibility of Earth observation datasets for immediate action in the field of sustainable land development.[3086]

On 29 January 2019, DLR supported crises management activities related to the dam collapse in Brazil by releasing RapidEye data and studying pre and post-event satellite data.[3087] Data was made available through the "Space and Major Disasters" International Charter.[3088]

On 6-7 February 2019, DLR launched an event dedicated to high-tech solutions in humanitarian aid.[3089] Participants included representatives from the German Remote Sensing Data Centre and the UN Platform for Space-Based Information for Disaster Management and Emergency Response.[3090] This pioneering event hosted 80 scientists, humanitarian workers, and funding organizations to solve current crises and create long-term prevention mechanisms using technology such as EO data gathering.[3091]

On 19-20 February 2019, DLR hosted the "Big Data from Space" conference in Munich, which gathered more than 650 experts to discuss the efficient and meaningful analysis of vast quantities of EO data.[3092]

[3083] Global 3D elevation model from the TanDEM-X mission now freely available, DLR (Cologne) 8 October 2018. Access Date: 17 October 2018. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-30139/year-all/#/gallery/32238.

[3084] New GEO Land Degradation Neutrality Initiative — Germany pledges an initial €100,000, UN (Bonn) 2 November 2018. Access Date: 13 December 2018. https://www.unbonn.org/node/13211?fbclid=IwAR3Z7XsSlZ7xPDu7dDJdBTOqo27PHF9c7YXZtpMZU6rJ8zLlTdBlv-P-eig.

[3085] New GEO Land Degradation Neutrality Initiative — Germany pledges an initial €100,000, UN (Bonn) 2 November 2018. Access Date: 13 December 2018. https://www.unbonn.org/node/13211?fbclid=IwAR3Z7XsSlZ7xPDu7dDJdBTOqo27PHF9c7YXZtpMZU6rJ8zLlTdBlv-P-eig.

[3086] New GEO Land Degradation Neutrality Initiative — Germany pledges an initial €100,000, UN (Bonn) 2 November 2018. Access Date: 13 December 2018. https://www.unbonn.org/node/13211?fbclid=IwAR3Z7XsSlZ7xPDu7dDJdBTOqo27PHF9c7YXZtpMZU6rJ8zLlTdBlv-P-eig.

[3087] Dam Collapse in Brazil, DLR (Cologne) 29 January 2019. Access Date: 11 February 2019. https://activations.zki.dlr.de/en/activations/items/ACT141.html.

[3088] Dam Collapse in Brazil, DLR (Cologne) 29 January 2019. Access Date: 11 February 2019. https://activations.zki.dlr.de/en/activations/items/ACT141.html.

[3089] 'DLR Humanitarian Technology Days' – UN World Food Programme and DLR sign Memorandum of Understanding: High-tech support for humanitarian aid, DLR (Cologne) 7 February 2019. Access Date: 11 February 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-32109/#/gallery/33438.

[3090] 'DLR Humanitarian Technology Days' – UN World Food Programme and DLR sign Memorandum of Understanding: High-tech support for humanitarian aid, DLR (Cologne) 7 February 2019. Access Date: 11 February 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-32109/#/gallery/33438.

[3091] 'DLR Humanitarian Technology Days' – UN World Food Programme and DLR sign Memorandum of Understanding: High-tech support for humanitarian aid, DLR (Cologne) 7 February 2019. Access Date: 11 February 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-32109/#/gallery/33438.

[3092] Big Data from space – seeking a solution for the flood of data from space, DLR (Cologne) 20 February 2019. Access Date: 1 March 2019. https://www.dlr.de/eoc/en/desktopdefault.aspx/tabid-13247/23165_read-54096.

On 3 April 2019, DLR successfully executed the first laser communications test using the Optical Space Infrared Downlink System.[3093] This technology will improve the speed of Earth observation data transmission and further assist on-the-ground disaster recovery operations.[3094]

On 6 May 2019, data acquired from DLR's TanDEM-X radar satellite mission was used to create global forest maps.[3095] The global maps show forested areas at a resolution of 50 metres, and it free of charge to "scientific users."[3096] The new map will help scientists more precisely determine forest biomass, close gaps in previous data, and provide a more uniform survey of rainforests in South America, Southeast Asia and Africa.[3097]

Germany has supported collaborative innovations through technological advancements in Earth observation coverage. However, it has yet to make these innovations available to the poorest and most vulnerable nations through open data sharing.

Thus, Germany receives a score of 0.

Analysts: David Manocchio and Michael Zusev

Italy: 0

Italy has partially complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 6 July 2018, the Italian Space Agency Agenzia Spaziale Italiana (ASI) signed a joint declaration with Virgin Galactic of the Virgin Group conglomerate.[3098] The parties agreed to collaborate on suborbital flight and microgravity education, astronaut training, and biology and biotechnology research and technology.[3099] The agreement also discussed the development of a space vehicle system by Virgin's Spaceship Company, to be used at the future Grottaglie Spaceport in Italy.[3100] This infrastructure would be used by both ASI and private customers, with the potential to launch satellites capable of Earth observation.[3101]

On 28 September 2018, the Florence Division of the Institute of Atmospheric Pollution Research, an affiliate of the National Research Council, announced the 11th International Symposium on Digital

[3093] DLR and University of Stuttgart test the transmission of Earth observation data using laser communications, DLR (Cologne) 3 April 2019. Access Date: 10 June 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-33097/year-all/151_page-2/#/gallery/33951.
[3094] DLR and University of Stuttgart test the transmission of Earth observation data using laser communications, DLR (Cologne) 3 April 2019. Access Date: 10 June 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-33097/year-all/151_page-2/#/gallery/33951.
[3095] Global TanDEM-X forest map is available, DLR (Cologne) 6 March 2019. Access Date: 10 June 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-33241/year-all/151_page-1/#/gallery/34002.
[3096] Global TanDEM-X forest map is available, DLR (Cologne) 6 March 2019. Access Date: 10 June 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-33241/year-all/151_page-1/#/gallery/34002.
[3097] Global TanDEM-X forest map is available, DLR (Cologne) 6 March 2019. Access Date: 10 June 2019. https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-33241/year-all/151_page-1/#/gallery/34002.
[3098] Italian Space Agency and Virgin Galactic sign a Joint Declaration, ASI (Rome) 6 July 2018. Access Date: 4 September 2018. https://www.asi.it/en/news/italian-space-agency-and-virgin-galactic-sign-a-joint-declaration-0.
[3099] Italian Space Agency and Virgin Galactic sign a Joint Declaration, ASI (Rome) 6 July 2018. Access Date: 4 September 2018. https://www.asi.it/en/news/italian-space-agency-and-virgin-galactic-sign-a-joint-declaration-0.
[3100] Italian Space Agency and Virgin Galactic sign a Joint Declaration, ASI (Rome) 6 July 2018. Access Date: 4 September 2018. https://www.asi.it/en/news/italian-space-agency-and-virgin-galactic-sign-a-joint-declaration-0.
[3101] Virgin Group companies sign new agreements with Italy, Geospatial World (Amsterdam) 9 July 2018. Access Date: 4 September 2018. https://www.geospatialworld.net/news/virgin-group-companies-italy/.

Earth from 24 to 27 September 2019 in Florence.[3102] The conference will discuss how digital Earth technology is changing and what future innovations are on the horizon.[3103]

From 29 October to 2 November 2018, Italy participated in GEO Week 2018, alongside 104 other member governments and 127 participating organizations.[3104] Participants discussed the future use of Earth observation technology for the benefit of humankind in relation to the Sendai Framework for Disaster Risk Reduction, the Paris Climate Agreement, and the United Nations 2030 Agenda for Sustainable Development.[3105]

On 22 March 2019, Italy successfully launched its PRISMA satellite. According to ASI, the satellite "will be operational for five years and will make available to a national and international community of users images of great scientific interest."[3106] The satellite uses hyperspectral technology to capture EO images relating to environmental change, pollution, and natural resource management.[3107]

Through its support of space infrastructure, Italy has enhanced the capacity of its Earth observation projects and encouraged innovation. However, Italy does not specifically make Earth observation technologies widely available to poor and vulnerable parts of the world.

Thus, Italy receives a score of 0.

Analysts: Harrison Myles and Jessica Afonso

Japan: +1

Japan has fully complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 12 June 2018, the Japanese Aerospace Exploration Agency (JAXA) and Mitsubishi Heavy Industries Ltd. launched a rocket containing an intelligence-gathering reconnaissance satellite from the Tanegashima Space Center.[3108] The IGS-Radar 6 satellite carries a radar with the capability of capturing ground-level images day or night and regardless of weather conditions.[3109] The new satellite will join the government's Information Gathering Satellite series.[3110]

[3102] 11th International Symposium on Digital Earth — ISDE 11, GEO Italy (Italy) 28 September 2018. Access Date: 31 October 2018. http://www.geoitaly.org/11th-international-symposium-on-digital-earth-isde-11/.
[3103] 11th International Symposium on Digital Earth — ISDE 11, GEO Italy (Italy) 28 September 2018. Access Date: 31 October 2018. http://www.geoitaly.org/11th-international-symposium-on-digital-earth-isde-11/.
[3104] GEO Week 2018, GEO Italy (Italy) 2 November 2018. Access Date: 5 December 2018. http://www.geoitaly.org/geo-week-2018/.
[3105] GEO Week 2018, GEO Italy (Italy) 2 November 2018. Access Date: 5 December 2018. http://www.geoitaly.org/geo-week-2018/.
[3106] PRISMA satellite successfully launched, ASI (Rome) 22 March 2019. Access Date: 27 May 2019. https://www.asi.it/en/news/prisma-satellite-successful-launched.
[3107] PRISMA satellite successfully launched, ASI (Rome) 22 March 2019. Access Date: 27 May 2019. https://www.asi.it/en/news/prisma-satellite-successful-launched.
[3108] Japan launches H-IIA rocket carrying intelligence-gathering satellite, Japan Times (Tokyo) 12 June 2018. Access Date: 9 September 2018. https://www.japantimes.co.jp/news/2018/06/12/national/science-health/japan-launches-h-iia-rocket-carrying-intelligence-gathering-satellite/#.W5h5h5NKiCV .
[3109] Japan launches H-IIA rocket carrying intelligence-gathering satellite, Japan Times (Tokyo) 12 June 2018. Access Date: 9 September 2018. https://www.japantimes.co.jp/news/2018/06/12/national/science-health/japan-launches-h-iia-rocket-carrying-intelligence-gathering-satellite/#.W5h5h5NKiCV .
[3110] Japan launches H-IIA rocket carrying intelligence-gathering satellite, Japan Times (Tokyo) 12 June 2018. Access Date: 9 September 2018. https://www.japantimes.co.jp/news/2018/06/12/national/science-health/japan-launches-h-iia-rocket-carrying-intelligence-gathering-satellite/#.W5h5h5NKiCV .

On 2 October 2018, the United Nations Office for Outer Space Affairs and JAXA announced the beginning of the fourth round of the KiboCUBE program.[3111] The capacity-building project provides developing countries with the opportunity to create cube satellites capable of Earth observation and launch them from the Japanese module on the International Space Station.[3112]

On 18 October 2018, the Vietnam National Space Center announced the December 2019 launch of the MicroDragon.[3113] The MicroDragon is a joint Vietnam-Japan EO satellite project created to mitigate the impacts of disasters and climate change.[3114]

On 29 October 2018, Japanese satellite Ibuki-2, also known as the Second Greenhouse Gases Observing Satellite (GOSAT-2), was successfully launched into the orbit.[3115] The satellite was developed by JAXA, and it will measure atmospheric concentrations of carbon dioxide, methane, and other greenhouse gases to advance the fight against climate change.[3116]

From 29 October to 2 November 2018, Japan hosted GEO Week 2018, during which member organizations and governments met to discuss Earth observation technology, the Sendai Framework for Disaster Risk Reduction, the Paris Climate Agreement, and the United Nations 2030 Agenda for Sustainable Development.[3117]

On 1 November 2018, JAXA expanded the domain of the JAXA Realtime Rainfall Watch website to include GEO-satellite data.[3118] The site provides the public with global real-time rainfall information, especially in areas lacking ground-observation networks, such as the Asian Pacific.[3119]

On 30 November 2018, JAXA announced the anticipated January 2019 launch of Epsilon-4, the fourth Epsilon Launch Vehicle with satellite technology.[3120] Epsilon rockets are designed to reduce operating costs and launch more frequently than the H-2A and H-2B rockets.[3121]

[3111] UNOOSA and JAXA open fourth round of KiboCUBE, SpaceRef (Reston) 2 October 2018. Access Date: 31 October 2018. http://spaceref.com/news/viewpr.html?pid=53154.
[3112] UNOOSA and JAXA open fourth round of KiboCUBE, SpaceRef (Reston) 2 October 2018. Access Date: 31 October 2018. http://spaceref.com/news/viewpr.html?pid=53154.
[3113] Vietnam to Launch MicroDragon Earth Observation Satellite in December, Via Satellite (Rockville) 22 October 2018. Access Date: 31 October 2018. https://www.satellitetoday.com/launch/2018/10/22/vietnam-to-launch-microdragon-earth-observation-satellite-in-december/.
[3114] Vietnam to Launch MicroDragon Earth Observation Satellite in December, Via Satellite (Rockville) 22 October 2018. Access Date: 31 October 2018. https://www.satellitetoday.com/launch/2018/10/22/vietnam-to-launch-microdragon-earth-observation-satellite-in-december/.
[3115] Ibuki-2 earth observation satellite launched, Japan News (Tokyo) 29 October 2018. Access Date: 31 October 2018. http://www.the-japan-news.com/news/article/0004927232.
[3116] Ibuki-2 earth observation satellite launched, Japan News (Tokyo) 29 October 2018. Access Date: 31 October 2018. http://www.the-japan-news.com/news/article/0004927232.
[3117] GEO Week 2018 in Kyoto, Japan, GEO (Geneva) 29 October 2018- 2 November 2018. Access Date: 10 December 2018. https://www.earthobservations.org/geo15.php.
[3118] Extension of the domain of JAXA Realtime Rainfall Watch (GSMaP_NOW), JAXA (Tokyo) 1 November 2018. Access Date: 7 December 2018. https://www.eorc.jaxa.jp/en/news/2018/nw181101.html.
[3119] Extension of the domain of JAXA Realtime Rainfall Watch (GSMaP_NOW), JAXA (Tokyo) 1 November 2018. Access Date: 7 December 2018. https://www.eorc.jaxa.jp/en/news/2018/nw181101.html.
[3120] Launch of Epsilon-4 with the Innovative Satellite Technology Demonstoration-1 on Board, JAXA (Tokyo) 30 November 2018. Access Date: 7 December 2018. http://global.jaxa.jp/press/2018/11/20181130_epsilon4.html.
[3121] Japan's Epsilon-3 rocket successfully places private NEC satellite into orbit, Japan Times (Tokyo) 18 January 2018. Access Date: 7 December 2018. https://www.japantimes.co.jp/news/2018/01/18/national/japans-epsilon-3-rocket-successfully-places-private-nec-satellite-orbit/?_ga=2.134704433.1902603116.1544196501-365853416.1544196501#.XAqRtxNKjBK.

On 18 January 2019, "RAPIS-1" was launched into space from the Uchinoura Space Center in Kagoshima, Japan.[3122] RAPIS-1 is a satellite commissioned by JAXA to perform several in-orbit experiments that will inform future satellite technology, some of which will be used for Earth observation.[3123]

Through its development of new Earth observation satellites and advancements in making Earth observation data accessible to poor and vulnerable regions in Asia, Japan has leveraged innovation to enhance the capabilities of Earth observation technology.

Thus, Japan receives a score of +1.

Analysts: Sofia Louise Lopez and Jessica Afonso

United Kingdom: +1

The United Kingdom has fully complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 27 June 2018, Avanti Communications announced the Satellite Enablement for Disaster Risk Reduction in Kenya to enhance the country's disaster planning and response mechanisms.[3124] The initiative is funded by the International Partnership Program of the United Kingdom Space Agency (UKSA) and aims to distribute Earth observation disaster data to coastline countries.[3125]

On 16 July 2018, the UK announced a partnership with Orbex and Lockheed Martin to develop new space launch technology.[3126] The UKSA provided Lockheed Martin with two grants totalling GBP23.5 million for the development of vertical launch operations in Sutherland and new systems in Reading for the deployment of satellites.[3127] GBP5.5 million was provided to Orbex to create a new rocket capable of launching small satellites into the orbit, and the satellites will have commercial and Earth observation uses.[3128]

On 26 July 2018, a multispectral imaging device research project led by the University of Strathclyde received GBP719,000 in funding from the UKSA Centre for Earth Observation Instrumentation.[3129]

[3122] JAXA launches its first startup-built satellite RAPIS-1 & 6 other satellites, SpaceTech Asia (Singapore) 21 January 2019. Access Date: 10 March 2019. http://www.spacetechasia.com/jaxa-launches-its-first-startup-built-satellite-rapis-1-6-other-cubesats/.
[3123] JAXA launches its first startup-built satellite RAPIS-1 & 6 other satellites, SpaceTech Asia (Singapore) 21 January 2019. Access Date: 10 March 2019. http://www.spacetechasia.com/jaxa-launches-its-first-startup-built-satellite-rapis-1-6-other-cubesats/.
[3124] Avanti Communications to Strengthen Kenya's Disaster Response Communications, Developing Telecoms (London) 27 June 2018. Access Date: 4 September 2018. https://www.developingtelecoms.com/business/humanitarian-comms/7885-avanti-communications-to-strengthen-kenya-s-disaster-response-communications.html.
[3125] Avanti Communications to Strengthen Kenya's Disaster Response Communications, Developing Telecoms (London) 27 June 2018. Access Date: 4 September 2018. https://www.developingtelecoms.com/business/humanitarian-comms/7885-avanti-communications-to-strengthen-kenya-s-disaster-response-communications.html.
[3126] Lockheed Martin and Orbex to launch UK into new space age, UKSA (Swindon) 16 July 2018. Access Date: 4 September 2018. https://www.gov.uk/government/news/lockheed-martin-and-orbex-to-launch-uk-into-new-space-age.
[3127] Lockheed Martin and Orbex to launch UK into new space age, UKSA (Swindon) 16 July 2018. Access Date: 4 September 2018. https://www.gov.uk/government/news/lockheed-martin-and-orbex-to-launch-uk-into-new-space-age.
[3128] Lockheed Martin and Orbex to launch UK into new space age, UKSA (Swindon) 16 July 2018. Access Date: 4 September 2018. https://www.gov.uk/government/news/lockheed-martin-and-orbex-to-launch-uk-into-new-space-age.
[3129] Lockheed Martin and Orbex to launch UK into new space age, UKSA (Swindon) 16 July 2018. Access Date: 4 September 2018. https://www.gov.uk/government/news/lockheed-martin-and-orbex-to-launch-uk-into-new-space-age.

The developing technology will fit on a nanosatellite and monitor climate change, ocean activity, forest fires, and shipping traffic.[3130]

On 17 September 2018, two large Earth observation satellites, the NovaSAR-1, and SSTL S1-4, were launched in India.[3131] The UKSA invested GBP2.1 million in the NovaSAR-1, and the satellite will "significantly boost the UK's sovereign Earth observation capabilities."[3132]

On 3 October 2018, the UK signed a memorandu of understanding with Australia and Canada.[3133] The agreement will enhance trilateral cooperation between the space agencies in areas of space science, policy, law, and the NovaSAR earth observation satellite.[3134]

On 5 November 2018, the Massive Open Online Course (MOOC) on "Monitoring Atmospheric Conditions" began to provide accessible and free information on monitoring atmospheric conditions using in situ measurements, satellite observations, and numerical modelling.[3135] The course is a collaboration between the UK's National Centre for Earth Observation, the European Union, the Copernicus Atmosphere Service, the NASA Jet Propulsion Laboratory, and other space partners.[3136] The MOOC will explore how threats to the atmosphere can affect human health, climate change, and ecosystems.[3137]

On 30 November 2018, the UKSA launched a new pilot program in Kenya, Ghana, and Zambia. The program seeks to use satellite and meteorological data such as ground and soil temperatures to predict when pests and diseases may occur.[3138] The system will allow preventive action to be taken in order to save crops.[3139]

[3130] Researchers to build spectral imaging for nanosats, Imaging and Machine Vision Europe (Cambridge) 26 July 2018. Access Date: 4 September 2018. https://www.imveurope.com/news/researchers-build-spectral-imaging-nanosats.
[3131] UK- Made Earth Observation Satellites Successfully Launched from India, The Engineer (London) 17 September 2018. Access Date: 15 October 2018. https://www.theengineer.co.uk/uk-made-earth-observation-satellites-successfully-launched/.
[3132] UK- Made Earth Observation Satellites Successfully Launched from India, The Engineer (London) 17 September 2018. Access Date: 15 October 2018. https://www.theengineer.co.uk/uk-made-earth-observation-satellites-successfully-launched/.
[3133] Britain and Australia enter into space agreement, UKSA (Swindon) 3 October 2018. Access Date: 31 October 2018. https://www.gov.uk/government/news/britain-and-australia-enter-into-space-agreement.
[3134] Britain and Australia enter into space agreement, UKSA (Swindon) 3 October 2018. Access Date: 31 October 2018. https://www.gov.uk/government/news/britain-and-australia-enter-into-space-agreement.
[3135] Monitoring Atmospheric Composition: New Online Training Course, National Centre for Earth Observation (Leicester) 15 October 2018. Access Date: 5 December 2018. https://www.nceo.ac.uk/article/monitoring-atmospheric-composition-new-online-training-course/.
[3136] Monitoring Atmospheric Composition: New Online Training Course, National Centre for Earth Observation (Leicester) 15 October 2018. Access Date: 5 December 2018. https://www.nceo.ac.uk/article/monitoring-atmospheric-composition-new-online-training-course/.
[3137] Monitoring Atmospheric Composition: New Online Training Course, National Centre for Earth Observation (Leicester) 15 October 2018. Access Date: 5 December 2018. https://www.nceo.ac.uk/article/monitoring-atmospheric-composition-new-online-training-course/.
[3138] UK aid supporting more than 18 million farmers with plant doctors and new satellite 'pest forecasts', Department For International Development (London) 30 November 2018. Access Date: 17 December 2018. https://www.gov.uk/government/news/uk-aid-supporting-more-than-18-million-farmers-with-plant-doctors-and-new-satellite-pest-forecasts.
[3139] UK aid supporting more than 18 million farmers with plant doctors and new satellite 'pest forecasts', Department For International Development (London) 30 November 2018. Access Date: 17 December 2018. https://www.gov.uk/government/news/uk-aid-supporting-more-than-18-million-farmers-with-plant-doctors-and-new-satellite-pest-forecasts.

On 11 January 2019, UKSA signed a declaration of intent in tandem with the Mexican government to provide historical, statistical, and satellite data.[3140] The data will be used by Mexican farmers and other industry stakeholders to improve crop output and optimize yield.[3141]

On 28 January 2019, the Ministry of Defence invested GBP1 million into a new generation of deployable satellite antennas.[3142] The antennas will be used in fine-resolution Low Earth Orbit Synthetic Aperture Radar imagery, which provides EO weather data.[3143]

Through its support of satellite launching and imaging technology, the United Kingdom remains committed to innovation in the field of Earth observation technologies and making them broadly available in the most vulnerable regions of the world in support of infrastructure and building design.

Thus, the United Kingdom receives a score of +1.

Analysts: Harrison Myles and Reema Bazzi

United States: 0

The United States has partially complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 27 September 2018, the National Aeronautics and Space Association (NASA) signed a contract with the University of Alaska at Fairbanks for the operation of the Synthetic Aperture Radar Distributed Active Archive Center of NASA's Earth Observing System Data and Information System.[3144]

On 28 September 2018, NASA sponsored DigitalGlobe, Planet, and Spire in a pilot program to evaluate the possibility of using commercial small-sat Earth data for scientific purposes.[3145]

On 5 October 2018, the US Geological Survey and the Earth Resources Observation and Science Center (EROS) met with the Requirements, Capabilities, and Analysis for Earth Observation project at the Joint Agency Commercial Imagery Evaluation workshop. The workshop discussed how Earth

[3140] UK Space Agency COMPASS project aims to improve crop yields for Mexican farmers, Space Daily (Australia) 11 January 2019. Access Date: 10 March 2019. http://www.spacedaily.com/reports/UK_Space_Agency_COMPASS_project_aims_to_to_improve_crop_yields_for_Mexican_farmers_999.html.
[3141] UK Space Agency COMPASS project aims to improve crop yields for Mexican farmers, Space Daily (Australia) 11 January 2019. Access Date: 10 March 2019. http://www.spacedaily.com/reports/UK_Space_Agency_COMPASS_project_aims_to_to_improve_crop_yields_for_Mexican_farmers_999.html.
[3142] £1m injection into pioneering new space technology, Ministry of Defence (London) 28 January 2019. Access Date: 10 March 2019. https://www.gov.uk/government/news/1m-injection-into-pioneering-new-space-technology.
[3143] £1m injection into pioneering new space technology, Ministry of Defence (London) 28 January 2019. Access Date: 10 March 2019. https://www.gov.uk/government/news/1m-injection-into-pioneering-new-space-technology.
[3144] NASA Awards Contract for Archive Center Operations, NASA (Washington) 27 September 2018. Access Date: 19 October 2018. https://www.nasa.gov/press-release/nasa-awards-contract-for-archive-center-operations.
[3145] NASA Evaluates Commercial Small-Sat Earth Data for Science, NASA (Washington) 4 October 2018. Access Date: 19 October 2018. https://www.nasa.gov/press-release/nasa-evaluates-commercial-small-sat-earth-data-for-science.

observation data can be collected to improve its use for scientific study.[3146] The workshop also explored the further integration of satellite systems to bolster the US's imagery capabilities.[3147]

On 5 December 2018, the SpaceX Dragon spacecraft carried NASA's Global Ecosystem Dynamics Investigation (GEDI) into space.[3148] The GEDI will provide observations of forests and topography to advance research on carbon and water cycling processes, biodiversity, habitat, and the potential for forests to absorb carbon.[3149]

On 22 February 2019, LANDFIRE staff at EROS used new Landsat imagery to produce vegetation and fuel maps that will inform wildland fire and ecological decision support systems.[3150]

On 28 May 2019, NASA released its first Ice, Cloud and land Elevation Satellite-2 (ICESat-2) observations, including more than one trillion new measurements of elevations in the polar regions.[3151] This data was made available to the public, and it will allow scientists to track sea level and sea ice changes in relation to climate patterns in the North and South poles.[3152]

The United States has strived to make innovations in the technological advancement of Earth observation coverage. However, it has not made these innovations explicitly available to the poorest and most vulnerable nations.

Thus, the United States receives a score of 0.

Analysts: David Manocchio and Michael Zusev

European Union: +1

The European Union fully complied with its commitment to leverage innovation in the field of Earth observation technologies and related applications and make them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

On 20 June 2018, Commissioner for Internal Market, Industry, Entrepreneurship, and Small and Medium-Sized Enterprizes Elżbieta Bieńkowska announced the launch of the Copernicus Data and Information Access Services.[3153] The initiative will make obtaining and downloading satellite data more accessible, simple and affordable.[3154] Copernicus satellites are used to improve responses to

[3146] EROS Leads Dialogue on Future of Earth Observation, NASA (Washington) 5 October 2018. Access Date: 19 October 2018. https://eros.usgs.gov/headlines/eros-leads-dialogue-future-earth-observation.
[3147] EROS Leads Dialogue on Future of Earth Observation, NASA (Washington) 5 October 2018. Access Date: 19 October 2018. https://eros.usgs.gov/headlines/eros-leads-dialogue-future-earth-observation.
[3148] NASA Sends New Research, Hardware to Space Station on SpaceX Mission, NASA (Washington) 5 December 2018. Access Date: 7 December 2018. https://www.nasa.gov/press-release/nasa-sends-new-research-hardware-to-space-station-on-spacex-mission.
[3149] NASA Sends New Research, Hardware to Space Station on SpaceX Mission, NASA (Washington) 5 December 2018. Access Date: 7 December 2018. https://www.nasa.gov/press-release/nasa-sends-new-research-hardware-to-space-station-on-spacex-mission.
[3150] LANDFIRE Remap Begins to Roll Out, USGS (Reston) 22 February 2019. Access Date: 1 March 2019. https://www.usgs.gov/center-news/landfire-remap-begins-roll-out?qt-news_science_products=1#qt-news_science_products.
[3151] First ICESat-2 Global Data Released: Ice, Forests and More, NASA (Washington) 28 May 2019. Access Date: 10 June 2019. https://www.nasa.gov/feature/goddard/2019/icesat-2-global-height-data-available-to-public.
[3152] First ICESat-2 Global Data Released: Ice, Forests and More, NASA (Washington) 28 May 2019. Access Date: 10 June 2019. https://www.nasa.gov/feature/goddard/2019/icesat-2-global-height-data-available-to-public.
[3153] Daily News Daily News 20/06/2018, EC (Brussels) 20 June 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4 232_en.htm.
[3154] Daily News Daily News 20/06/2018, EC (Brussels) 20 June 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4232_en.htm.

natural disasters by monitoring six areas: land, ocean, atmosphere, climate change, emergency management response, and security.[3155] The European Commission also proposed expanding these services under the EUR16 billion EU Space Programme beyond 2020 to adapt to emerging needs such as carbon dioxide monitoring and polar missions to fight the effects of climate change.[3156]

On 22 June 2018, the EU Civil Protection Mechanism sent EUR400,000 in aid to Guatemala following a volcanic eruption.[3157] Such assistance included basic healthcare supplies, water, sanitation, and psychological support. The Copernicus satellite's mapping service generated 18 maps to assist in identifying the most affected areas.[3158]

On 25 July 2018, the EU launched four additional Galileo satellites, expected to generate precise signals for the EU's global satellite navigation system.[3159] Galileo provides three types of navigation services: Galileo Open Service for positioning and timing purposes (such as communicating a vehicle's location to emergency services), Galileo's Search and Rescue Service to locate distress signals, and Galileo Public Regulated Service for security purposes such as military operations and national emergencies.[3160] This recent launch brings Galileo to a total of 26 satellites and brings the EU closer to Galileo's full completion in 2020.[3161]

On 26 July 2018, the European Commission and the African Union reached a deal that will expand Copernicus data access to African researchers studying Earth observation.[3162] Through the satellites, researchers will have access to photographs of sea topography, land temperature, vegetation changes, and weather patterns.[3163] African scientists and institutions will also receive technical support from European research and space agencies.[3164] The EU intends to promote the use of satellite technology to support sustainable development, especially in Africa, which experiences more intense and frequent extreme weather events as a result of climate change.[3165]

[3155] Daily News Daily News 20/06/2018, EC (Brussels) 20 June 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4232_en.htm.
[3156] Daily News Daily News 20/06/2018, EC (Brussels) 20 June 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4232_en.htm.
[3157] Daily News Daily News 22/06/2018, EC (Brussels) 22 June 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4266_en.htm.
[3158] Daily News Daily News 22/06/2018, EC (Brussels) 22 June 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4266_en.htm.
[3159] Press release Space: 26 Galileo satellites now in orbit for improved EU satellite navigation signal, EC (Brussels) 25 July 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_IP-18-4603_en.htm.
[3160] Press release Space: 26 Galileo satellites now in orbit for improved EU satellite navigation signal, EC (Brussels) 25 July 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_IP-18-4603_en.htm.
[3161] Press release Space: 26 Galileo satellites now in orbit for improved EU satellite navigation signal, EC (Brussels) 25 July 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_IP-18-4603_en.htm.
[3162] African scientists will now access Europe's satellite data for free, Quartz (New York City) 26 July 2018. Access Date: 9 September 2018. https://qz.com/africa/1340769/african-researchers-to-have-free-access-to-europes-earth-observation-data/.
[3163]African scientists will now access Europe's satellite data for free, Quartz (New York City) 26 July 2018. Access Date: 9 September 2018. https://qz.com/africa/1340769/african-researchers-to-have-free-access-to-europes-earth-observation-data/.
[3164] African scientists will now access Europe's satellite data for free, Quartz (New York City) 26 July 2018. Access Date: 9 September 2018. https://qz.com/africa/1340769/african-researchers-to-have-free-access-to-europes-earth-observation-data/.
[3165] African scientists will now access Europe's satellite data for free, Quartz (New York City) 26 July 2018. Access Date: 9 September 2018. https://qz.com/africa/1340769/african-researchers-to-have-free-access-to-europes-earth-observation-data/.

On 6 August 2018, the EU sent aid to Sweden to fight forest fires.[3166] The EU used the Copernicus program to produce 37 satellite maps that identified the most impacted areas.[3167]

On 8 August 2018, the EU provided aid to thousands of people displaced by the earthquakes in Lombok, Indonesia.[3168] The Copernicus program was employed to assist Indonesian civil protection authorities.[3169]

On 18 September 2018, at the ITS World Congress 2018 in the Bella Centre in Copenhagen, the European Global Navigation Satellite Systems Agency unveiled the eCall emergency response system and other innovations in EO technology to make "Europe's roads smarter, greener and safe."[3170]

On 18 September 2018, the European Commission's emergency satellite mapping service Copernicus delivered data on the most affected areas of Typhoon Mangkhut in the Philippines.[3171]

On 29 September 2018, Copernicus provided mapping services to Indonesian authorities after a deadly earthquake hit the island of Sulawesi.[3172]

On 16 October 2018, following a flood in southeast France, French authorities accessed Copernicus to receive mapping data for the Herault and Aude counties.[3173]

On 29 October 2018, the EU committed EUR300 million to improve the health of the oceans.[3174] The Copernicus EO program received EUR12.9 million for maritime security and coastal environmental research.[3175]

On 5 November 2018, the European Commission's 24/7 Emergency Response Coordination Centre helped Italian authorities handle heavy floods affecting many parts of the country.[3176] The EU's Copernicus satellite mapping service was activated for affected areas in Sicily and Veneto.[3177]

On 7 November 2018, the European weather satellite MetOp-C was launched from French Guinea.[3178] The satellite was developed through a partnership with the European Organization for

[3166] Press release Record EU Civil Protection operation helps Sweden fight forest fires, EC (Brussels) 6 August 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_IP-18-4803_en.htm.
[3167] Press release Record EU Civil Protection operation helps Sweden fight forest fires, EC (Brussels) 6 August 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_IP-18-4803_en.htm.
[3168] Daily News 08/08/2018, EC (Brussels) 8 August 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4906_en.htm.
[3169] Daily News 08/08/2018, EC (Brussels) 8 August 2018. Access Date: 8 September 2018. http://europa.eu/rapid/press-release_MEX-18-4906_en.htm.
[3170] Space-driven innovation for safer roads at ITS 2018, GSA (Prague) 14 September 2018. Access Date: 9 October 2018. https://www.gsa.europa.eu/newsroom/news/space-driven-innovation-safer-roads-its-2018.
[3171] Daily News 18/09/2018, EC (Brussels) 18 September 2018. Access Date: 15 October 2018. http://europa.eu/rapid/press-release_MEX-18-5824_en.htm.
[3172] Statement on the deadly earthquake and tsunami in Indonesia, EC (Brussels) 29 September 2018. Access Date: 15 October 2018. http://europa.eu/rapid/press-release_STATEMENT-18-5950_en.htm.
[3173] Daily News 16/10/2018, EC (Brussels) 10 October 2018. Access Date: 15 October 2018. http://europa.eu/rapid/press-release_MEX-18-6133_en.htm.
[3174] European Union commits €300 million for clean, healthy and safe oceans, EC (Brussels) 29 October 2018. Access Date: 31 October 2018. http://europa.eu/rapid/press-release_IP-18-6209_en.htm.
[3175] European Union commits €300 million for clean, healthy and safe oceans, EC (Brussels) 29 October 2018. Access Date: 31 October 2018. http://europa.eu/rapid/press-release_IP-18-6209_en.htm.
[3176] Daily News 5/11/2018, EC (Brussels) 5 November 2018. Access Date: 30 November 2018. http://europa.eu/rapid/press-release_MEX-18-6304_en.htm.
[3177] Daily News 5/11/2018, EC (Brussels) 5 November 2018. Access Date: 30 November 2018. http://europa.eu/rapid/press-release_MEX-18-6304_en.htm.

the Exploration of Meteorological Satellites and the European Space Agency (ESA).[3179] The satellite will monitor weather patterns, the ozone layer, gases, wind speeds, and climate change.[3180]

From 12-16 November 2018, the ESA hosted Earth Observation Φ-week in Frascati, Italy.[3181] Events during Φ-week discussed the future of several space domains, including Earth observation.[3182]

On 20 November 2018, the ESA Vega rocket carried a Moroccan EO satellite from French Guinea into space. [3183] This satellite will assist in land-mapping, natural disaster prevention, and environmental monitoring.[3184]

On 4 December 2018, over 40 entrepreneurs were awarded EUR1.6 million to create services and products using data provided by the Copernicus and Galileo satellite systems.[3185] The award will encourage innovation in various observational fields, including wildfire alerts and farming.[3186]

On 18 January 2019, the Copernicus Climate Change Service released the ERA5 dataset that maps global climate fluctuations since 1979.[3187] ERA5 will allow researchers to accurately understand how the climate has changed and what can be done for the future.[3188]

On 23 January 2019, the European Commission granted an additional EUR96 million to the Copernicus system over the next two years.[3189] This funding will further support satellite missions and the EO program.[3190]

[3178] Europe's Third Polar-Orbiting Weather Satellite Lofted into Orbit, ESA (Paris) 7 November 2018. Access Date: 5 December 2018. https://www.esa.int/Our_Activities/Observing_the_Earth/MetOp/Europe_s_third_polar-orbiting_weather_satellite_lofted_into_orbit.

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[3185] Daily News 16/11/2018, EC (Brussels) 16 November 2018. Access Date: 10 December 2018. http://europa.eu/rapid/press-release_MEX-18-6658_en.htm.

[3186] Daily News 16/11/2018, EC (Brussels) 16 November 2018. Access Date: 10 December 2018. http://europa.eu/rapid/press-release_MEX-18-6658_en.htm.

[3187] Copernicus lance une nouvelle base de données pour l'observation du climat Mondial, Environment Magazine (Paris) 18 January 2019. Access Date: 12 February 2019. https://www.environnement-magazine.fr/politiques/article/2019/01/18/122603/copernicus-lance-une-nouvelle-base-donnees-pour-observation-climat-mondial.

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On 11 February 2019, four Galileo satellites were put into service.[3191] This brings the Galileo system to a total of 22 active satellites.[3192]

On 5 June 2019, the European Commission presented a proposal of the EU budget for 2020.[3193] The budget totalled EUR168.3 billion, of which EUR1.2 billion will go to the EU's Galileo satellite navigation system.[3194] This represents a 75% increase compared to the previous fiscal year. With this budget, the EU is aiming to reach 1.2 billion Galileo users by the end of 2020.[3195]

Through its support of satellite launches, imaging technology, and disaster prevention in vulnerable coastline states, the EU remains committed to leveraging innovation in the field of EO technologies and making them broadly available in the most vulnerable regions of the world to support infrastructure and building design.

Thus, the European Union receives a score of +1.

Analysts: Sofia Louise Lopez and Elodie Girves

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