Canadian Statement
Agenda Item 8 – Space-system-based disaster management support
Statement delivered by: Jordan Miller, Canadian Space Agency

Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
Fifty-eighth Session, Vienna, April 19-30, 2021

Madame Chair,

Satellites and satellite-based systems play a critical role in emergency and disaster management and provide significant support to relief efforts worldwide. From predicting disasters before they occur to providing critical information and services to responders on the ground, satellites are essential to effective planning and relief operations.

Madame Chair, distinguished delegates,

Coordination of International space-based resources contribute greatly to disaster management, and the International Charter on Space and Major Disasters is an excellent example of international coordination. As a founding member of the International Charter "Space and Major Disasters", Canada has supported relief efforts in 548 disasters worldwide by providing RADARSAT satellite images. Since the Charter entered into effect in 2000, Canadian Images from RADARSAT-1 were provided 624 times, supporting 254 activations. Images from RADARSAT-2, which is still operational, have been provided 1,207 times, supporting 355 activations, and Canada's latest trio of Earth observation satellites, the RADARSAT Constellation Mission (RCM), has supported 31 activations, providing 251 images, as of December 31, 2020.

Madame Chair, distinguished delegates,

It is widely recognized that an important aspect in dealing with the dynamics of climate change is the establishment and development of effective monitoring and evaluation systems. Such systems should be capable of providing continuous, wide-area, up-to-date information of the ever changing climate and its impact on the nation's environment, its interdependence on Earth systems, its infrastructure and its communities. Innovations in the use of space based Earth Observation (EO) data, along with other complementary technologies, can form a strong basis from which to build and maintain the kind of monitoring systems required to create a robust capacity to deal with changing climate conditions. As part of its response to the growing crisis of climate change, the Government of Canada, in close partnership with the Canadian EO downstream Industry and Academia, funded the development of 25 projects within the theme of the "Climate Change Impacts and Ecosystem Resilience" (CCIER) over the past 5 years. In

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partnership with multiple government departments and academia, the Government of Canada has funded 34 projects within the theme of "Satellite Data Analyses in the Sun-Earth System Sciences" (DA-SESS).

The CCIER projects will ensure an increasing use of Canadian satellite Earth Observation missions in key policy areas of terrestrial monitoring activities supporting climate change impacts and ecosystem resilience; support the development of innovative solutions and applications that address the CCIER needs in a Canadian context; develop new advancements in the technologies and applications of earth observation data that will provide tangible solutions to evolving climate change challenges in Canada in response to emerging downstream end users and their needs; and contribute to a growing and knowledge-based Canadian economy. Furthermore, many of the DA-SESS projects will: advance understanding of the physical and chemical processes in the Earth system that are key in quantifying the changing atmosphere and Earth surface processes; develop or improve analytical and computational models of the Earth system, critical to developing predictive capabilities; and finally, use complementary ground-based, airborne or space-based datasets to stimulate research aligned with national and UN priorities. Neural networks, artificial intelligence and machine learning methods are used in various projects to achieve these stated objectives.

Madame Chair, distinguished delegates,

From space, we can continually monitor the state of our planet, enabling us to discern not only that a disaster has occurred but also that a disaster might occur in the near future. One example is the satellites that measure the state of our atmosphere – such as Canada's SCISAT satellite, which has been precisely measuring the chemical composition of the upper atmosphere since 2003. The SCISAT satellite, measuring ozone and ozone-depleting substances, continues to operate nominally long past its end of life. It remains the only satellite measuring certain ozone-depleting substances and hydrofluorocarbons and is well positioned to support monitoring efforts of the Kigali Amendment to the Montreal Protocol. It is also the only satellite able to measure all major greenhouse gases, including high quality atmospheric profiles of carbon dioxide down to 5km, which supports monitoring efforts of the UN Paris Climate Agreement.

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In 2020, SCISAT data was used to study the chemical elements that make up stratospheric aerosols in plumes arising from extreme forest fires. The research team reported on multiple possible chemical signatures and point to oxygen- and hydrogen-containing organic aerosols that may represent a characteristic by-product of biomass burning in situations where the fire is intense enough to generate smoke plume tops well into the stratosphere. SCISAT's greenhouse gas and air quality data was also used to further Canada's contribution to Arctic research by publishing data in the UN/World Climate Research Program water vapour assessment. SCISAT continues to contribute to Canada's leadership in high-resolution measurements of the atmosphere, quantifying the impact of extreme forest fires on the stratosphere, and advancing global research in greenhouse gases.

In addition, Canada's Measurement of Pollution in the Troposphere (MOPITT) instrument continues to scan the Earth's atmosphere and collect profile measurements of carbon monoxide to support air quality and climate studies. Its data contributed to a scientific discovery on the reduction of air pollution over China due to implemented COVID-19 restrictions. As a result, an important reduction in hospital admission rates was estimated quantitatively. MOPITT is the longest-running pollution monitor in space today and the longest continuously-operating space mission in Canadian history, already passing the 21-year mark.

Finally, Madame Chair, distinguished delegates,

Climate change and natural disasters are becoming more frequent and severe. In order to better coordinate emergency response activities during a disaster, authorities around the world will continue to turn to satellites to provide critical services to society. To this end, Canada strongly encourages the signatory states of the International Charter on Space and Major Disasters, to continue working together to promptly share their satellite data to assist people and protect infrastructure and populations.

Thank you for your kind attention.