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**Review of international mechanisms for cooperation in the
peaceful exploration and use of outer space**

**Summary of international cooperative mechanisms
utilized by Canada in the peaceful exploration and use
of outer space**

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This summary is intended to illustrate the breadth and diversity of the cooperative mechanisms utilized by Canada. The specific mechanisms referenced within are merely illustrative; this is not an exhaustive list.

**I. MULTILATERAL AND BILATERAL LEGALLY BINDING
AGREEMENTS**

1) Bilateral cooperation with the United States

a) Bilateral agreements for specific cooperative projects (1962-2009)

As a result of cooperation between Canada and the United States of America, Canada's first satellite and the first satellite to be designed and built by a country other than the United States and the USSR, Alouette-I was launched by the National Aeronautics and Space Administration (NASA) on 29 September 1962. Alouette-I was used to monitor and study the ionosphere and its ten-year mission inaugurated the ongoing and long-standing bilateral cooperation between Canada and the United States on the exploration and use of outer space for peaceful purposes. Following the successful launch of Alouette I, Canada and the United States signed an agreement to launch further satellites under a new programme called "International

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Satellites for Ionospheric Studies” (ISIS): under that programme, the Alouette back-up model was refurbished and launched in 1965 as “Alouette-II” and two new satellites, named ISIS-I and ISIS-II, were designed and built in Canada and successfully launched by NASA in 1969 and 1970 respectively.

This agreement was followed until 2009, by many bilateral agreements on specific projects that followed the pattern inaugurated with the Alouette satellites and the ISIS programme. Examples of these agreements include the following:

i. Radarsat-1: On February 27, 1991 the Canadian Space Agency, NASA and the National Oceanographic and Atmospheric Administration (NOAA) entered into a Memorandum of Understanding on Radarsat-1: Canada and the United States, through their respective agencies, agreed that Canada would design, build and operate Radarsat-1, the first Canadian Earth Observation satellite, and that the United States would launch it into orbit. Over the term of this Memorandum of Understanding, both Canada and the United States would acquire, receive and use data from Radarsat-1;

ii. SciSat: On October 24, 2000 the Canadian Space Agency and NASA entered into a Memorandum of Understanding on the SciSat-1 Atmospheric Chemistry Experiment Mission, pursuant to which the Canadian Space Agency designed, built and operates SciSat-1. SciSat-1 is a satellite whose mission is to study the chemical processes involved in the depletion of the ozone layer with emphasis on the processes occurring over Canada and the Arctic. NASA provided the launch and also data from its own Total Irradiance Monitor experiment. More than 10 years after launch, SciSat-1 is still in operation;

iii. CloudSat: In September 2005 Canada and the United States entered into an agreement on the CloudSat mission, pursuant to which Canada, through the Canadian Space Agency, provided two Extended Interaction Klystrons and the receiver portion of CloudSat’s Radio-Frequency Electronics Subsystem. In exchange, the United States, through NASA, allowed Canadian scientists to be part of the CloudSat science team. Launched in 2006, CloudSat uses radar to measure the altitude and properties of clouds, adding to information on the relationship between clouds and climate in order to help resolve questions about climatic change;

iv. James Webb Space Telescope: On July 16, 2007 the Canadian Space Agency and NASA entered into an Agreement for Cooperation on the James Webb Space Telescope Program. As part of a larger international cooperation involving also the European Space Agency, the Canadian Space Agency will provide two scientific instruments (the Fine Guidance Sensor and the Near-Infrared Imager and Slitless Spectrograph or NIRISS);

v. The Phoenix Mars Scout Mission: Also on July 16, 2007 the Canadian Space Agency entered into an Agreement for Cooperation on the Phoenix Mars Scout Mission. Under this Agreement, the Canadian Space Agency provided the meteorological station, including an innovative Laser-based atmospheric sensor, to NASA’s Phoenix Mars Mission. The Mission was launched on August 4, 2007 and the Phoenix Mars Lander itself, carrying the Canadian contribution, landed on Mars on May 25, 2008. The Lander ended operations in 2010.

All these agreements include the following key legal provisions in one form or another:

i. A cross-waiver of liability, that establishes that each party assumes its own risks in relation to the activity and that, subject to a few exceptions, neither party will make a legal claim against the other for any damage or loss that may arise from the activity;

ii. Provisions on the transfer of goods and technical data, which provide that the parties are only obliged to transfer those goods and technical data necessary to fulfil their respective responsibilities under the agreement and that all activities under the agreement will be carried out in accordance with each Party's national laws and regulations pertaining to export control. The article further provides that such goods and data will be properly marked and will be returned or destroyed at the conclusion of activities under the agreement;

iii. A provision on consultations and dispute resolution, which provides a mechanism to resolve issues starting at the technical level and then raising the issue to more senior levels of management;

iv. A Data Policy provision which, as the name implies, deals with how the data generated by the mission will be used and made available.

b) The 2009 Framework Agreement

In 2009, Canada and the United States further formalized their bilateral long-standing cooperation by entering into a Framework Agreement for Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes. Through this Agreement, Canada and the United States agreed on the general legal principles that will govern their bilateral cooperation in space exploration, space operations including human space flights, Earth and space science, civil aeronautics research, as it applies to outer space, and other relevant areas of interest mutually agreed between the two countries.

The Framework Agreement contains the provisions that were usually found in previous agreements that were mission-specific, such as the cross-waiver of liability, the provision dealing with the transfer of goods and technical data, and the provision dealing with consultation and dispute settlement, so that these provisions are already agreed upon and uniformly apply to all the activities undertaken under the Framework Agreement. Whenever specific cooperative activity or mission is contemplated by the two Implementing Agencies, i.e. NASA and the CSA, such activities are captured into an Implementing Arrangement that deals with matters that are specific to this cooperative activity or mission.

Examples of Implementing Arrangements include the following:

i. The Mars Science Laboratory (MSL) Mission: On November 1, 2011 the Canadian Space Agency and NASA entered into an Implementing Arrangement on the Mars Science Laboratory (MSL) Mission. Under this Implementing Arrangement, the CSA agreed to provide a science instrument called the Alpha Particle X-Ray Spectrometer (APXS) to the MSL Mission and to support Canadian Investigators working on the Mission.

ii. The Soil Moisture Active Passive (SMAP) Mission: On November 21, 2011 the CSA and NASA entered into an Implementing Arrangement on the SMAP Mission. Under this Implementing Arrangement, the CSA provides the SMAP scientific instrument and supports the Canadian Science Team while NASA provides the launch and operation of the satellite that will carry SMAP

2) Cooperation Agreement with the European Space Agency and related Programme Arrangements

In 1979, Canada and the European Space Agency (ESA) entered into a Cooperation Agreement through which Canada became the first non-European State to be officially recognized as an “ESA Cooperating State”.

The Cooperation Agreement between Canada and ESA was originally for a period of five years. The Cooperation was then extended in 1984 and then in 1989, 2000 and 2010. Since 1989, the Cooperation is renewed every ten years through a new cooperation agreement.

The Cooperation Agreement between Canada and ESA provides that Canada contributes annually to the General Budget of ESA for half of its share had it been a Member State of ESA. It also provides that Canada contributes to the budget of ESA’s activities and programmes in which Canada participates, in accordance with the provisions of arrangements that are concluded for each of those programmes. In exchange for these contributions, Canada benefits from industrial return from ESA’s General Budget and from the implementation of the programmes to which it participates to the same extent than the other States that participate to these programmes, and has also the right to be represented on various ESA bodies including the ESA Council itself, and to vote on matters relating to the activities and programmes to which it participates.

Throughout more than thirty years of cooperation, Canada and ESA have entered into many programme arrangements, covering a wide range of activities that include space exploration (Aurora), Earth Observation (EOEP, TerraSar), life and physical sciences (ELIPS), global navigation (Galileo), general support technology research and development (GSTP) and telecommunications systems (ARTES) to name a few examples. Since its creation in 1989, the Canadian Space Agency has been in charge of the day-to-day implementation of Canada’s cooperation with ESA.

3) International Space Station (ISS) Intergovernmental Agreement, Memoranda of Understanding, and subsidiary agreements (“Implementing Arrangements”)

The International Space Station (ISS) program’s greatest accomplishment is as much a notable and unique partnership achievement as it is a technological one — an exemplary strategy of how to plan, coordinate, and monitor the varied activities of the Program’s many organizations. The ISS is one of the most politically and operationally complex space exploration programmes ever undertaken.

The 1998 Intergovernmental Agreement on Space Station Cooperation (IGA) was signed by the United States, Russia, Japan, Canada, and participating Member States of the European Space Agency (Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom of Great Britain and Northern Ireland). This Agreement is the foundational document

governing the ISS. It established the essential governmental level of commitment to the ISS and created binding international obligations with respect to key government-level obligations, such as a cross-waiver of liability, protection of sensitive data and hardware, and the concept that each partner would seek to minimize the exchange of funds in implementation of cooperation.

In 1998 the Canadian Space Agency also entered into a Memorandum of Understanding (MOU) with NASA. This MOU is one of the bilateral MOUs that were concluded between NASA and each of the other Cooperating Agencies (the European Space Agency (ESA), the Russian Space Agency) and with the Government of Japan. These MOUs establish a working basis for cooperation at the agency level: Developing in detail the responsibilities of the agencies and creating a number of governing boards at the operational level.

In 1998 the Canadian Space Agency also entered into an Implementing Arrangement with NASA regarding the provision, by Canada, of a Special Purpose Dexterous Manipulator and other goods and services towards the fulfilment of its Common System Operation Responsibilities for the ISS. This Arrangement provides that in consideration of the provision of the Special Purpose Dexterous Manipulator and associated goods and services, Canada received an offset of part of its responsibilities for the common system operation costs, and received also a percentage of non-Russian utilization resources of the ISS.

4) Other Bilateral Framework Agreements

In 2010 the Canadian Space Agency and the Centre national d'études spatiales (CNES) entered into a Framework Agreement (accord-cadre) on the use of outer space for peaceful purposes.

Through this Agreement, CSA and CNES agreed on the general legal principles that will govern their bilateral cooperation in space exploration, space operations including human space flights, Earth and space science, civil aeronautics research, as it applies to outer space, and other relevant areas of interest mutually agreed between the two countries.

In 2013, the Canadian Space Agency also entered into a Framework Agreement with its German counterpart, German Space Agency (DLR), on space science and technology cooperation. Through this Agreement, CSA and DLR agreed on the general legal principles that will govern their bilateral cooperation in Earth Observation, including earth science and monitoring, satellite operations, space exploration systems, including robotics, rovers and optical systems, space technology development and demonstrations, and other relevant areas of interest mutually agreed between the two Parties.

These two Framework Agreements contain also the provisions that are expected to apply to the entire bilateral cooperation such as the cross-waiver of liability, the provision dealing with the transfer of goods and technical data, and the provision dealing with consultation and dispute settlement, leaving the other questions that are specific to cooperative activities or missions to be captured into the mission-specific Implementing Arrangements that will be entered for each such mission or activity.

An example of such an Implementing Arrangement is the Implementing Arrangement signed in 2012 between the CSA and CNES on cooperation relating to a Balloon Programme. Through this Implementing Arrangement, CNES benefits from geographical opportunities that Canada can offer and that correspond to the scientific needs of CNES. The CSA, on its part, benefits from access to the expertise of CNES in carrying out balloon campaigns and also benefits from access to CNES balloon flights for the Canadian scientific community. In order to carry out this cooperation, the CSA in collaboration with CNES built and inaugurated a balloon launch base located in Timmins, Ontario, and a first balloon campaign was successfully conducted in 2013.

5) Other legally binding agreements

Throughout its history, the Canadian Space Agency entered into several bilateral cooperation agreements dealing with specific projects and activities. Examples of such agreements, in addition to the previously mentioned bilateral agreements with NASA that were signed before 2009, include agreements with CONAE (Argentina), NICT (National Institute of Information and Communications Technology, Japan) and SRON (Netherlands).

II. NON-BINDING INSTRUMENTS

Throughout its history, the Canadian Space Agency also entered into many other bilateral instruments such as Memoranda of Understanding (MOUs) and Letters of Intent that were not intended to generate legally binding obligations: Those instruments were generally intended to cover exploratory talks between the Canadian Space Agency and its foreign counterpart, either on general cooperation or on specific projects. The Canadian Space Agency exchanged such non-binding instruments with its counterparts in Australia, Brazil, Belgium, China, Egypt, Spain, Finland, India, Israel, Italy, Norway, the Russian Federation, Sweden, Thailand and Ukraine.

An example of such arrangements is the following:

i. MOU with the Swedish National Space Board on a Phase 0 Feasibility Study for a Scientific Atmospheric Limb Sounding Mission (2013). The purpose of this Memorandum of Understanding is to define the respective tasks of the Participants and the terms and conditions under which the Participants will undertake to jointly study a mission for scientific atmospheric limb sounding, utilizing as a minimum the instruments CATS and STEAMR, and optionally SHOW. The feasibility study will, if so agreed by the Participants, allow for the definition of a joint cooperation on a scientific atmospheric limb sounding mission. The scope of the study and the work share agreement will be defined separately.

III. LEGALLY NON-BINDING PRINCIPLES AND TECHNICAL GUIDELINES

In addition to international non-binding mechanisms for collaboration and United Nations instruments, many programmatic-level documents are signed between CSA and participating organizations relative to the detailed and technical planning of space missions. An example of such documents is:

ii. Stratospheric Balloon Program Operational Aeronautic Communications Procedures. This document describes the operational procedures concerning the communication and transfer of information between the Canadian Space Agency (CSA), the Centre National d'Études Spatiales (CNES), NAV CANADA, FSS Timmins, and Timmins Airport that will take place during the preflight, launch, and termination phases of each stratospheric balloon flight.

IV. MULTILATERAL COORDINATION MECHANISMS

Canada is party to several multilateral organizations related to space. For example:

1) International Space Exploration Coordination Group (ISECG)

The ISECG is a voluntary, non-binding international coordination mechanism through which individual agencies may exchange information regarding interests, objectives, and plans in space exploration with the goal of strengthening both individual exploration programmes as well as the collective effort.

ISECG was established in response to “The Global Exploration Strategy (GES): The Framework for Coordination”, developed by fourteen space agencies and released in May 2007. This GES Framework Document articulated a shared vision of coordinated human and robotic space exploration focused on Solar System destinations where humans may one day live and work.

The following space agencies are ISECG members (in alphabetical order): ASI (Italy), CNES (France), CNSA (China), CSA (Canada), CSIRO (Australia), DLR (Germany), ESA (European Space Agency), ISRO (India), JAXA (Japan), KARI (Republic of Korea), NASA (United States of America), NSAU (Ukraine), Roscosmos (Russia), UKSA (United Kingdom).

2) Committee on Earth Observation Satellites (CEOS)

CEOS ensures international coordination of civil space-based Earth observation programmes and promotes exchange of data to optimize societal benefit and inform decision-making for securing a prosperous and sustainable future for humankind. CEOS Members have agreed to continue to informally coordinate their current and planned systems for Earth observation from space through CEOS. Individual Members of CEOS uses their best efforts to implement CEOS recommendations in their respective Earth observation programmes. Participation in the activities of CEOS is not to be construed as being binding upon space-based Earth observation system operators, or as restricting their right to develop and manage Earth observation systems according to their needs and policies. Canada is represented by the Canadian Space Agency.

V. INTERNATIONAL FORA

And finally, Canada contributes or participates to many different initiatives and forums an example of which is:

1) **OECD Global Forum on the Space Economy**

In 2006, OECD launched The Global Forum on Space Economics under the aegis of the International Futures Programme. The objective of the Space Forum is to assist space-related agencies and governments better identify the statistical contours of the space sector, provide evidence-based analysis on the space infrastructure (evaluating data and socioeconomic indicators) and to investigate its economic importance and impacts for the larger economy.

The Space Forum Founders' meeting (contributing space agencies and the OECD) was held in February 2006. The Space Forum is supported by contributions from a number of governments and space agencies including the British National Space Centre (BNSC), Centre National d'Etudes Spatiales (CNES), Canadian Space Agency (CSA), European Space Agency (ESA), Italian Space Agency (ASI), National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), Norwegian Space Centre (NRC), and the United States Geological Survey (USGS). Other agencies and ministries from OECD and non-OECD countries can be observers and/or join. A companion Working Group is open to interested parties and representatives of the private sector during selected meetings. Canada is also represented on the Steering Group, Working Group and the IAF Technical Committee on the Space Economy.
