

COOPERATIVE AGREEMENT

Agreement established between the **National Institute for Space Research (INPE)** and the **National Space Science Center (NSSC)** for a joint cooperative effort to implement research on common scientific goals and cooperation programs on space weather through the establishment of a **China-Brazil Joint Laboratory for Space Weather** at INPE

The **NATIONAL INSTITUTE FOR SPACE RESEARCH** (hereinafter referred to as “**INPE**”), registered under CNPJ nº 01.263.896/0005-98, with headquarters at Avenida dos Astronautas nº 1.758, São José dos Campos, SP, Brazil, here represented by its Director General, Dr. LEONEL FERNANDO PERONDI, Brazilian, married, Identity nº 37.536.004-9 SSP/SP, and CPF nº 212.451.260-91, resident at Avenida Cidade Jardim 3200, apartment 1304, Bosque dos Eucaliptos, São José dos Campos, SP, in the use of his legal prerogatives as defined in Law nº 8.876/1994 and the Decree nº 4.640/2003; and the **NATIONAL SPACE SCIENCE CENTER AT THE CHINESE ACADEMY OF SCIENCES** (hereinafter referred to as “**NSSC**”), with headquarters at N.º 1 Nanertiao, Zhongguancun, Haidian District, Beijing, 100190, People's Republic of China and here represented by the Deputy Director General of the Bureau of Major Science and Technology Programs of the Chinese Academy of Science (CAS), Yu Yingjie, hereinafter jointly referred to as “**Parties**”.

PREAMBLE

Considering that the National Space Science Center (NSSC) at the Chinese Academy of Sciences (CAS), formerly known as Center for Space Science and Applied Research (CSSAR), is the key institute of China responsible for planning, selecting, developing, launching and managing the operation of China's space science satellite missions, as well as for space weather science studies;

Considering that INPE is a research unit of the Brazilian Ministry of Science, Technology and Innovation, whose main goals are fostering scientific research and technological applications and qualifying personnel in the fields of space and atmospheric sciences, space engineering, and space technology;

Recalling the Memorandum of Understanding (MoU) signed on April 16th, 2010 between INPE and CSSAR to establish the general cooperation framework between both Institutions to facilitate the identification of more specific cooperation programs, including but not limited to exchange programs, installation of research equipment from Brazil to China and vice-versa and organization of a joint research program in areas of common interest in Space Sciences and Space Weather;

Recalling also the Letter of Intent signed on March 16th, 2011 between INPE and CSSAR to implement the above mentioned MoU in a timely fashion, where the Parties demonstrated intent to support specific research infrastructure for both the International Meridian Circle Program and the Brazilian Study and Monitoring of Space Weather (EMBRACE);



Acknowledging the Minutes of the Meeting between INPE and NSSC on June 28th, 2013 when the Parties agreed to establish a Joint Office for the INPE and NSSC Cooperation, reserved to host students and research staff and to provide facilities for storing material and equipment related to the activities from the joint cooperation;

Noting the minutes of the First Working Group Meeting for Brazil-China Ten-Year Space Cooperation Plan held in Beijing, China, from July 29 to July 31, 2013, when the Parties agreed to establish a joint China-Brazil space weather laboratory based on the International Space Weather Meridian Circle Program; and

Acknowledging the views expressed during the meeting between INPE and NSSC in Beijing, China, on 13 December, 2013, when preparations for the establishment of the China-Brazil Space Weather Laboratory at INPE's headquarter in São José dos Campos were agreed;

INPE and NSSC, hereby, agree to the following:

CLAUSE ONE – PURPOSE AND SCOPE OF THE COOPERATION

The present Cooperative Agreement aims at promoting a joint cooperative effort to foster research and cooperation between the Parties in the area of space weather, facilitated by the establishment of a **China-Brazil Joint Laboratory for Space Weather** to operate in the installations of the Space Sciences Coordination at INPE's headquarter in São José dos Campos.

CLAUSE TWO – WORK PLAN

The Parties have already identified activities to be initiated upon the creation of the China-Brazil Joint Laboratory as detailed in the annexed Work Plan (Annex I), considered to be an integral part of this Cooperation Agreement. Activities beyond those defined in the annexed Work Plan, which fall under the scope of this Cooperative Agreement, will be object of specific instruments and Work Plans.

CLAUSE THREE – COMMITMENTS

It is the duty of each Party, among others:

- (i) To implement the annexed Work Plan jointly with the other Party;
- (ii) To work under the principle of consensus through mutual consultation;
- (iii) To jointly define the Chinese personnel, students, and staff to work temporarily or more permanently in the China-Brazil Joint Laboratory, in accordance with the Brazilian legislation and availability of working space to ensure adequate research conditions;
- (iv) To bear the responsibility for any consequences and losses caused by itself while implementing the activities defined in the Work Plan;
- (v) To jointly discuss the distribution of data, results, products, or any related element derived from this Cooperative Agreement to any third party, after the monitoring system is fully or partially implemented and the joint observations are launched accordingly;

- (vi) In case of scientific publications derived from the results of this Cooperative Agreement, the Joint Laboratory Managers referred to in Clause 6 shall jointly agree on the contents and authorship, including the order of listing, of such publications; and
- (vii) To share all documentation relevant to the implementation of the activities in the Work Plan, including those related to equipments, materials, components and parts, in English.

CLAUSE FOUR – RESPONSIBILITIES

- 4.1. INPE will be responsible for the provision of the infrastructure for the operation of the China-Brazil Joint Laboratory, including an adequate working office with internet access, and telephone connections;
- 4.2. INPE and NSSC will implement a Data Center as indicated in the annexed Work Plan;
- 4.3. NSSC will provide the research equipments to be installed at INPE's facilities in Santa Maria, following the broad specifications and scheduled detailed in the Work Plan;
- 4.4. INPE will conduct all efforts to provide transportation for the researchers and for the equipment necessary for the implementation of the activities in the Work Plan, in particular those in Santa Maria; and
- 4.5. INPE will provide the space necessary to storage the research equipments in any of its installations.
- 4.6. INPE will be responsible for the routine operation of the equipments, daily maintenance, troubleshooting, equipment management and laboratory upkeep, and other routine operations, as necessary.

CLAUSE FIVE – FINANCIAL ARRANGEMENTS AND LEGAL AUTHORIZATION

- 5.1. The Parties shall be responsible for funding their respective activities under this Cooperative Agreement.
- 5.2. Obligations under this Cooperative Agreement shall be subject to the availability of funding obtained through each Party's funding procedures.
- 5.3. Should either Party encounter budgetary problems that may affect the activities to be carried out under this Cooperative Agreement that Party shall notify and consult with the other Party in a timely manner in order to minimize the negative impact of such problems in the implementation of this Agreement.

CLAUSE SIX – JOINT LABORATORY MANAGERS

- 6.1. The Joint Project Managers are responsible for the implementation of this Cooperative Program as detailed in the annexed Work Plan.
- 6.2. The Joint Project Managers, one from each Party, are responsible for the joint coordination, technical support, data service, personnel exchange, support staff necessary for the construction and operation of the China-Brazil Joint Laboratory.

6.3. The Joint Project Managers will manage the funding mentioned in Clause Five, in such a way that both Joint Laboratory Managers are perfectly aware and in accordance with the proposed expenditures, regardless of the source of the funding.

6.4. INPE and NSSC may change their representatives at any time by giving each other prior written notice. The designated representatives are not entitled to legally represent their respective Institutions.

CLAUSE SEVEN – LICENSES, TAXES, REVENUES AND CUSTOMS TARIFFS

7.1. Each Party shall be responsible for seeking all the information for obtaining licenses and authorizations in its respective country required to export and import equipments, materials, components and parts necessary for the development of the activities described in the Work Plan, as well as those related to making payments.

7.2. In accordance with its national laws and regulations, each Party shall seek to ensure free customs clearance and waiver of all applicable duties, fees, and taxes for the import or export of goods necessary for the implementation of this Cooperative Agreement. In the event that any duties, fees, or taxes of any kind are nonetheless levied on such goods, such duties, fees, or taxes shall be borne by the Party of the country levying them, unless agreed otherwise by written communication.

CLAUSE EIGHT – PERSONNEL EXCHANGE

8.1. Each Party shall pay all international expenses for its participants, including those that result from the permanence of the researchers/students/technical staff for extended periods of time in Brazil or China, unless otherwise mutually agreed by written by the Parties.

8.2. Subject to their respective laws and regulations, the Parties shall facilitate, on a fully reciprocal basis, the provision of the appropriate documentation for the other Party's nationals to enter, exit or reside within its territory in order to carry out activities within the scope of the Work Plan, and try its best to solve any problems experienced by the other Party.

CLAUSE NINE – LAWS, WARRANTIES, RIGHTS, AND LIABILITY

The activities under this Cooperative Agreement will be conducted in accordance with the applicable laws and regulations of the Parties' countries, respectively, and shall be subject to the availability of appropriate funds.

CLAUSE TEN – EXCHANGE OF TECHNICAL INFORMATION

10.1. Technical information exchanged between the Parties will be subject to the applicable laws, regulations, and policies of the Parties' countries, respectively. In the event it is necessary to exchange technical information and the furnishing Party considers that such technical information is to be protected for proprietary or export control purposes, such information must be clearly marked with a legend indicating the country of origin, the conditions of release, that

the information relates to this Cooperative Agreement, and that it is furnished in confidence.

10.2. NSSC and INPE will take all lawful steps available to prevent disclosure of such protected or proprietary technical information without the consent of the other Party and to ensure that it is used only for the purposes of this MoU.

10.3. NSSC and INPE may release to the public other general, non-technical information regarding each other's programs or operations after ensuring, through consultation with each other when necessary, that this information is fairly and accurately represented.

CLAUSE ELEVEN – CONSULTATIONS AND SETTLEMENT OF DISPUTES

11.1. The Parties shall consult, as appropriate, to review the implementation of activities undertaken pursuant to this Cooperative Agreement, and to exchange views on potential areas of future cooperation.

11.2 In the event questions arise regarding the interpretation, application, or implementation of activities under this Cooperative Agreement, the Joint Laboratory Managers of the Parties shall endeavor to resolve the questions. If the Joint Laboratory Managers are unable to reach an agreement, then the matter will be referred to a more senior level of the Parties for joint resolution.

CLAUSE TWELVE – APPLICABLE LAW

The present Cooperation Agreement and any document or arrangement relating thereto shall be governed by general principles of law, to the exclusion of any single national system of law.

CLAUSE THIRTEEN– PRIVILEGES AND IMMUNITIES

Nothing in this Cooperation Agreement or in any document or arrangement relating thereto shall be construed as constituting a waiver of privileges or immunities of INPE to NSSC, nor as conferring any privileges or immunities of NSSC to INPE or to each other personnel.

CLAUSE FOURTEEN - INTELLECTUAL PROPERTY RIGHTS

14.1. Intellectual property rights, in particular copyright, of material such as information, software and designs, made available by NSSC and INPE to be used to carry out the activities under this Cooperation Agreement shall remain with the originating Party, unless agreed otherwise by written communication.

14.2. Copyright of the information, as well as rights to any other intellectual property, developed jointly by NSSC and INPE shall be jointly vested in both Parties.

14.3. In publications derived from data collected under this Cooperative Agreement, explicit acknowledgment to the China-Brazil Joint Laboratory is to be made, unless the Joint Laboratory Managers decide otherwise.

CLAUSE FIFTEEN – CROSS WAIVER OF LIABILITY

15.1. For the purposes of this Cooperative Program, the Parties agree to a cross-waiver of liability. Each Party hereby waives any claim against the other Party, employees of the other Party, the other Party's related entities (including, but not limited to, contractors, subcontractors, grantees, or investigators), and employees of the other Party's related entities, for any injury to, or death of, the waiving Party's employees or the employees of its related entities, or for damage to, or loss of, the waiving Party's property or the property of its related entities, arising from or related to activities conducted under this Cooperative Program, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct. This cross-waiver will apply only if the person, entity, or property causing the damage is involved in activities under this Cooperative Program and the person, entity, or property damaged is damaged by virtue of its involvement in such activities under this Cooperative Program.

15.2. Third Party Liability: Each Party further agrees to extend this cross-waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against the other Party, related entities of the other Party, employees of the other Party, and employees of its related entities, for injury, death, damage, or loss arising from or related to activities conducted under this Cooperative Program.

15.3. Nothing in this cross-waiver of liability will be construed to create the basis for a claim or suit where none would otherwise exist.

CLAUSE SIXTEEN – ENTRY INTO FORCE, AMENDMENT AND DURATION

This Cooperation Agreement shall enter into force upon signature by both Parties and will remain in force for 04 (four) years after the written notice from NSSC, and may be modified, complemented or amended, if mutually agreed by the Parties through an Exchange of Letters. The duration of this Cooperation Agreement may be extended upon written agreement by the Parties.

CLAUSE SEVENTEEN – TERMINATION

17.1. In the event that either of the Parties is unable to comply with any provision of this Cooperation Agreement, either Party, after consultation with the other, shall have the option of terminating this Cooperation Agreement, providing at least 30-day notice of such action, forwarded in writing by one Party to the other.

17.2. The obligations assumed by the Parties under this Cooperation Agreement shall survive its termination to the extent necessary to permit the orderly conclusion of activities, the withdrawal of personnel, funds and property, the settlement of accounts between the parties hereto and the settlement of contractual liabilities that are required in respect of personnel.

IN WITNESS THEREOF, the respective representatives of the Parties have signed this Cooperation Agreement in English and duplicate originals in Chinese and Portuguese, all of them of the same content, for the only one and the same effect, in two copies. In case of divergence of interpretation, the English text shall prevail.



ANNEX I
to the Cooperation Agreement between
NATIONAL SPACE SCIENCE CENTER, CHINESE ACADEMY OF
SCIENCES (NSSC/CAS)
and
NATIONAL INSTITUTE FOR SPACE RESEARCH, BRAZILIAN MINISTRY
OF SCIENCE, TECHNOLOGY AND INNOVATION (INPE/MCTI)

WORK PLAN

1) Identification of the object:

INPE and NSSC will have a joint cooperative effort to foster research and cooperation in the area of space weather through the establishment of a **China-Brazil Joint Laboratory for Space Weather** to operate in the installations of the Space Sciences Coordination at INPE's headquarter in São José dos Campos.

2) Justification

Since August 2007, INPE operates a space weather program known as EMBRACE (Brazilian Space Weather Study and Monitoring program; in Portuguese, "Programa de Estudo e Monitoramento Brasileiro do Clima Espacial"). The Embrace Program collaborates with space weather centers partners and is part of a large ground base network of scientific sensors to monitor physical parameters of the Sun-Earth environment. A comprehensive database and an interface layer are under development at INPE to allow an easy and direct access to the useful information. The main purpose of the Embrace Program is to monitor the space climate and space weather from sun, interplanetary space, magnetosphere, ionosphere-atmosphere, and ground induced currents to prevent effects on technological and economical activities, especially with ground base instruments placed with countries located in South America.

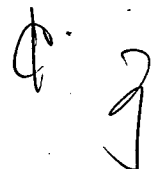
The NSSC is leading the Meridian Project, a national consortium of Chinese scientific institutions for geospace monitoring and research that aims at understanding and predicting near-Earth space environment variations using data from 94 scientific instruments set along the 120°E longitude and 30°N latitude. The cooperation with Brazil provides an opportunity for NSSC to expand the capacity of geospace monitoring to a global scale along the 120°E and 60°W longitudes. The 60°W meridian passes through the Brazilian territory and hence is of particular interest to the Meridian Project particularly due to specificities such as the opposite geographical location of China and Brazil and the presence of the South American Magnetic Anomaly (SAMA) over the South region of Brazil.

Therefore, both the International Meridian Project and the Embrace Program share common interests to monitor the space environment near the Earth using ground and space instrumentations.

3) General and Specific objectives of this Work Plan:

The present Work Plan has the following general objectives:

- a) Develop actions to ensure the installation and operation of the China-Brazil Joint Laboratory for Space Weather;
- b) Implement actions to ensure the deployment and operation of the Meridian Project's ground-based sensors at INPE's Headquarters and also at INPE's installations in in



- Santa Maria and São Martinho da Serra, RS;
- c) Carry out actions to ensure the installation and operation of scientific instruments of the Parties in regions of interest to the Embrace and Meridian programs, whether in Brazilian or Chinese territories; and
 - d) Promote actions to support the scientific goals of the parties, whether for the development of ground-base, rocket-borne and/or satellite instrumentation.

4) Planned Tasks

- a) To establish the China-Brazil Joint Laboratory for Space Weather in an office of 27 m² (with internet connection, power and telephone) located at the building of the EMBRACE at INPE's headquarters;
- b) To install a magnetometer owned by Meridian Project in São Martinho da Serra, RS;
- c) To install a digisonde DPS-4 (or a higher version from the same manufacturer) and a GNSS monitor owned by Meridian Project in an area of the Santa Maria University campus referred to as Pains;
- d) To install a Potassium-Rayleigh LIDAR at INPE's facility in Santa Maria;
- e) To deploy scientific instruments in Brazil and China; and
- f) To include the data collected under this Cooperative Agreement in the EMBRACE data center, making it available to both Parties and distributed accordingly to the data sharing policies of each Party.

5) Implementation of the Planned Tasks

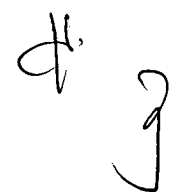
The planned tasks presented in the above item 4 will be implemented through the following set of actions:

- 5.1.1 establish and fit up the joint laboratory office infrastructure
- 5.1.2 procure the listed scientific and IT equipment
- 5.1.3 establish and fit up the Santa Maria station
- 5.1.4 purchase the listed scientific and IT equipments and conclude its entry into the Country
- 5.1.5 assemble, integrate and test the scientific and IT equipment
- 5.1.6 calibrate and run the scientific equipments
- 5.1.7 setup and run the IT equipments
- 5.1.8 establish and conclude the data transfer and database
- 5.1.9 entry in routine operational mode of all the systems.

In sequence to the actions above, the following tasks are planned:

- 5.2.1 discuss about new ground base instrumentation
- 5.2.2 discuss about expanding the coverage of the ground-based instruments, especially to the SAMA
- 5.2.3 discuss about space weather missions with onboard sensors.

Both Parties will seek to strengthen their human resources through training activities and exchange of scientists and professionals in engineering and applications.



6) Schedule

The schedule of implementation of the actions detailed in 5 above is as follows:

Action	Number of days after the Work Plan is initiated (day D)								
	D	D+180	D+360	D+540	D+720	D+900	D+1080	D+1260	D+1440
5.1.1	X	X							
5.1.2	X	X	X						
5.1.3			X	X					
5.1.4			X	X					
5.1.5				X	X	X			
5.1.6					X	X	X		
5.1.7					X	X			
5.1.8						X	X		
5.1.9							X	X	X
5.2.1								X	X
5.2.2								X	X
5.2.3								X	X

7) Financial Responsibilities

The NSSC will use funding approved in 2013 by the Chinese Academy of Sciences (CAS) for purchasing and installing the scientific instruments and the IT equipment for the data center related to this Work Plan.

The INPE will bear, through its own annual budget, the costs of operation and maintenance (energy, national phone calls and internet access in accordance with the INPE's regulations) of the China-Brazil Joint Laboratory and the scientific instruments, as well as the infrastructure required to install or store the instruments at INPE's Headquarters and other facilities, as necessary.

INPE and NSSC will each provide the financial support to their respective staff when working/travelling abroad, including accommodation, food, airline tickets, medical insurance, transportation facilities, and related issues. Exceptionally, one Party may agree to provide financial support to the other to secure the participation of a member of the staff or as appropriate, if mutually agreed.

8) Designated Joint Laboratory Managers and Technical team

INPE nominates Dr. Clezio Marcos De Nardin as INPE's Joint Laboratory Manager for issues related to the implementation of this Work Plan. INPE's technical team will consist of the following researchers, collaborators, and Brazilian members of the Advisory Board of the Joint Laboratory:

Dr. Leonel Fernando Perondi
Dr. Oswaldo Duarte Miranda
Dr. Walter Demetrio Gonzalez Alarcon
Dr. Hisao Takahashi
Dr. Joaquim Eduardo Rezende Costa
Dr. Marcelo Banik de Pádua
Dr. Barclay Clemesha
Dr. Nelson Jorge Schuch
Dra. Inez Staciarini Batista
Dr. Jose Humberto Sobral
Dr. Polinaya Muralikrishna

NSSC: nominates Dr. Yang Guotao as NSSC's Joint Laboratory Manager in China and Dr. Liu Zhengkuan as NSSC's Joint Laboratory Manager in Brazil. For issues related to the implementation of this Work Plan to serve as formal responsible for the conducting the NSSC's actions need to fully implement the present Work Plan, and to coordinate the NSSC's technical team and the listed following researchers, collaborators, and Chinese members of the Advisory Board of the Joint-Lab:

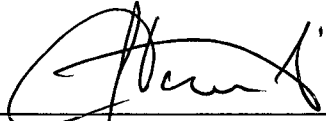
Dr. Liu Zhengkuan
Dr. Cao Jinghua
Dr. Wu Ji
Dr. Wang Chi
Dr. Dou Xiankang
Dr. Wan Weixing
Dr. Zou Xu
Eng. Wang Jihong

Both INPE and NSSC reserve the right to change the designated Joint Laboratory Managers as well as the technical team here indicated through written communication to the other Party.

Dr. J

Signed in São José dos Campos, Brazil, on August 6th, 2014.

ON BEHALF OF INPE:

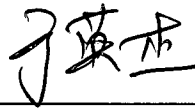


LEONEL FERNANDO PERONDI

Director General

INPE

ON BEHALF OF NSSC:



YU YINGJIE

Deputy Director General
Bureau of Major S&T Programs
CAS