ISSI-BJ TOOLS

January Annual Call

INTERNATIONAL TEAMS

Spontaneous Application

WORKSHOPS

FORUMS

VISITING SCIENTIST

WORKING GROUPS

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INTERNATIONAL SPACE SCIENCE INSTITUTE - BEIJING

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ANNUAL REPORT 2022

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ISSI-BJ Annual Report

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CONTENTS

MESSAGE FROM THE CHAIRMAN OF THE BOARD OF TRUSTEES

The past year is the third year of the COVID-19 pandemic. In this year, originally planned programs of ISSI-BJ were still postponed because of the ban on international travel. During these difficult times, under the leadership of Professor Ip, great efforts were made to keep ISSI-BJ moving forward.

ISSI-BJ organized many online activities in this year, which provided us an alternative solution to keep the ball rolling and get ready for the post-pandemic era. Four series of online seminars increased the visibility of ISSI-BJ in the space community, especially at the regional level. “On Things to Come” series online seminars on space missions invite PIs or famous scientists as speakers, “1001 Space Nights” outreach activities are given by female scientists, “Topical Review” invites leading researchers from Chinese and French Universities, and the “Space Science Bazaar” focuses on young scientists from the ISSI-BJ International Teams Program to present their research progress and achievements. In 2022, ISSI-BJ has organized 41 online seminars in total.

ISSI-BJ continued the cooperation with COSPAR. As the online meeting supporter to COSPAR’s task group TGCSS/SGRB, ISSI-BJ organized 20 online task group meetings of SGRB in 2022. More fruitful outcomes can be anticipated.

In this year, ISSI-BJ strengthened its services to the international involvement and increased contribution to the Chinese space science programs. ISSI-BJ organized international professors to evaluate the candidate mission proposals of Strategic Priority Program on Space Science (Phase-II) and produce recommendations accordingly.

I would like to express my special thanks to Prof. Ip for his enthusiasm and generous dedication to ISSI-BJ, to lead ISSI-BJ under the challenging situation. Finally, I would like to thank our staff DONG Xiaolong、LI Xiaoyu, EN Lijuan and LI Yinong whose efficient work contributes to a successful ISSI-BJ.

Ji WU

Beijing, June 2023

MESSAGE FROM THE EXECUTIVE DIRECTOR

Though we say time flies, the passing of the last three years has been excruciatingly slow.

We thank many space scientists and astronomers for their generosity and cooperative spirit in accepting to give online lectures on different topics and levels. These include the "1001 Space Nights" for science education which lectures were given by outstanding female researchers. The main purpose of this series of online seminars was to promote the interest of young female students to study space science, astronomy and other STEM disciplines. As the online participants could be as many as several thousands, we certainly hope that ISSI-BJ has made a difference in space science education and communication. We also organized webinars called "On Things to Come" on advanced-level lectures on space missions, testifying of the optimism of the global scientific community on what they can achieve in future.

A case in point is the China-ESA Mars School held immediately after the relaxation of the travel restrictions, as soon as possible, between May 15 and 19 in Huairou, Beijing.

Indeed, now that the pandemic is finally over, we look forward to many more new impetus and new thrusts in space science and solar system exploration. The leadership of the new Executive Director, Prof. Richard de Grijs, will ensure a very dynamic and impactful scientific program of ISSI-BJ.

I also want to take this opportunity to say that it has been my great honor and privilege to be able to serve the international space science community. I wish you all a healthy and bright future, and I very much look forward to meeting you to thank you all in person.

Wing-Huen Ip

Beijing, June 2023

ABOUT ISSI-BJ

The International Space Science Institute Beijing (ISSI-BJ) is a non-profit research institute jointly established by the National Space Science Center (NSSC), China, and the International Space Science Institute (ISSI), Switzerland, with the support of the International Cooperation Bureau and the Strategic Priority Program on Space Science. ISSI-BJ is a close cooperation partner of ISSI in Bern. Both institutes share the same Science Committee, the same study tools, and other information of mutual relevance and interest. However, both use independent operational methods and different funding sources.

The main mission of ISSI-BJ is to contribute to the achievement of a deeper scientific and technological understanding of future space missions as well as of the scientific results from current and past missions through multidisciplinary research, possibly involving, whenever appropriate, ground-based observations and laboratory experiments. The Program of ISSI-BJ covers a wide spectrum of space science disciplines, including solar and space physics, planetary science, astrobiology, microgravity science, and earth observation. It complements the ISSI program with special emphasis on future scientific opportunities.

History

In October 2011, Professor Ji Wu, the Director General of the National Space Science Center (NSSC), visited the International Space Science Institute (ISSI) and the Executive Director Roger Maurice Bonnet. They proposed to establish an International Space Science Institute in Beijing (ISSI-BJ) during his visit.

In February 2012, Simon Aegeter, Chairman of ISSI's Board of Trustees and Roger-M. Bonnet, Executive Director of ISSI, visited NSSC for further discussion. Both parties exchanged opinions and signed the Memorandum of Understanding (MoU) which was approved by the ISSI Board of Trustees (BoT) in June 2012. On April 19, 2013, the BoT of ISSI signed the Agreement of Cooperation with NSSC and approved the implementation plan of cooperation between ISSI and ISSI-BJ. It was decided, for the first time in the history of ISSI, to share the name with another institution. This decision was made because it was convinced that NSSC is an extremely trustworthy partner. According to this decision, ISSI and NSSC moved forward on the implementation plan for establishment of ISSI-BJ.

The inauguration ceremony of ISSI-BJ was held at the NSSC in Beijing on July 16, 2013. Professor Rafael Rodrigo, the new Executive Director of the International Space Science Institute, and Professor Wu Ji, Chairman of the BoT of ISSI-BJ and Director General of NSSC, jointly inaugurated the new institute located on the 3rd floor of the NSSC building.

A brainstorm forum on the strategy of ISSI-BJ was held in November, 2014, and an international visiting assessment committee was established to evaluated the performance of ISSI-BJ. The international visiting assessment reports gave ISSI-BJ a very good credit and concluded that ISSI-BJ had a good start and had been gaining excellent reputations from the international science communities. Based on the evaluations, NSSC and ISSI agreed to continue their cooperation on ISSI-BJ. The Board of Trustees of ISSI-BJ and ISSI approved the assessment report and the new agreement in April and June, 2015, respectively. Therefore, on October 23, 2015, Professor WU Ji, director-general of NSSC and chair of the Board of Trustees of ISSI-BJ, and Professor Rosine Lallement, representative and vice chair of the Board of Trustees of ISSI in Bern, Switzerland, signed a new agreement, which confirmed the cooperation of the two sides on continuation of ISSI-BJ. According to the new agreement, the cooperation will last for at least three years and after the specified period of three years, the agreement can be extended or a new agreement will be signed to continue the cooperation. This new agreement ensures the continuation of ISSI-BJ for at least three years.

ISSI-BJ SCIENTIFIC PROGRAM

The International Space Science Institute in Beijing (ISSI-BJ) is the only institute to share the name, the same scientific committee, the same study tools, and other information of mutual relevance and interest with the International Space Science Institute (ISSI) in Bern, Switzerland. ISSI-BJ mission's objectives are quite unique, since it is an institute to serve the space science communities in multi-lateral and multi-disciplinary activities. ISSI-BJ is open to support projects from any Asia or international scientists or institutes; therefore, ISSI-BJ is able to attract Asia as well as international scientists to work together in Beijing

WORKSHOPS

Workshops are study projects on specific scientific themes, selected in consultation with the Science Committee. The duration of Workshops is typically one week. Workshops are organized by a group of conveners who define the theme, set up the program, and list the group of participants. Participation is by invitation only. The size of any Workshop is usually limited to a maximum membership of 45 including a few young scientists. The results of the Workshops are published as refereed papers in issues of Space Science Reviews and in parallel as volumes of the Space Science Series of ISSI (SSSI).

FORUMS

Forums are informal and free debates among 20- 25 high-level participants on open questions of scientific or science policy nature. A Forum may lead to formal recommendations or decisions depending upon the topic or issues addressed in the Forum. The TAIKONG magazines constitute the output of the Forums organized at ISSI-BJ. It reports the contents of the Forums and reflects in a neutral way the Forum discussions and advises from all the participants.

WORKING GROUPS

Working Groups are set up by the Directorate for specific tasks, often of technical nature. Their life time can be of several years. The results of the Working Groups are published as volumes of ISSI-BJ Scientific Report Series (SR) or in the scientific literature.

INTERNATIONAL TEAMS

International Teams follow a strict bottom-up approach whereby in response to a specific call issued every year at the beginning of January, scientists can propose projects corresponding to topics, which are broadly identified in the Call. The reviewing and ranking process is the responsibility of the Science Committee. International Teams are composed of about 5-15 scientists from different institutions, nationalities, and expertise. They meet at ISSI-BJ for one or several periods of time of typically one week. They are active for 12-18 months. Their project, often involves data or modelling work. Their activity is directed and organized by a team leader, generally the initiator of the proposal. Teams are largely independent in the execution of their project, but maintain close contact with ISSI-BJ.

UNDERSTANDING SCIENCE

Understanding Science is organized by the UK Royal Society of Chemistry, the Institute of Physics and ISSI-BJ. Its goal is to make a broader public aware of today's accomplishments in research through short scientific lectures in English (popularization talks) as well as to have an opportunity to talk with either international or Chinese scientists currently carrying out research in China, in a relaxed atmosphere.

VISITING SCIENTISTS

Senior and Junior Visiting Scientists carry out scientific work in collaboration with, or under the supervision of the ISSI-BJ scientific staff on matters directly or indirectly connected with the ISSI-BJ projects. They contribute to the scientific environment at ISSI-BJ in complement to the ISSI-BJ scientific staff.

SPACE SCIENCE BAZAAR

Space Science Bazaar is a webinar series started in 2021 that aims to invite young scientists from the ISSI-BJ International Teams Program to present the development and achievement of their research projects.

TOPICAL REVIEW

In order to foster cooperation in space science and technology in the international academic community, ISSI-BJ is organizing a series of online seminar series starting with topical reviews by leading researchers in universities in China and France.

SPACE SCIENCE SCHOOL

ISSI-BJ Space Science School: It is intended to promote a biennial School on space sciences and space science missions for international students. The School will teach the students to develop the connections between scientific objectives and requirements, mission and spacecraft design and mission cost. The aim is to develop a comprehensive approach for designing a space science mission. The students will be provided with the required scientific background relevant to produce a report, outlining a possible space science mission concept.

ON THINGS TO COME

On Things to Come online seminars, started in September 2020, aim to introduce to the scientific community ongoing as well as new space missions organized by different space agencies and it will allow the audience to interact with the speaker and ask questions about the projects. The seminars are held in English.

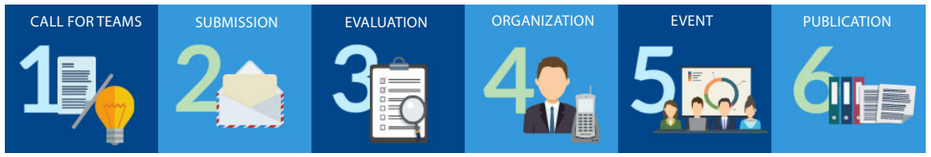
1001 SPACE NIGHTS

1001 Space Nights (天 芳 夜 谭) online seminars, started in January 2021, intend to introduce the research and scientific achievements of outstanding female Chinese scientists to the public. The lectures are held in Chinese.

Statistics

In 2022, ISSI-BJ organized 12 On Things to Come online seminars, 11 1001 Space Nights online seminars, 9 Topical Review online seminars and 9 Space Science Bazaar online seminars. Furthermore, 4 new International Teams, 1 workshop and 3 forums were selected.

How to use ISSI-BJ Tools



International Teams (IT)

1. A joint call for proposals is released by ISSI/ ISSI-BJ every year in January.

2. Submit your proposal corresponding to the topics identified in the Call.

3. The proposals are evaluated, prioritized, and recommended to ISSI-BJ by the ISSI/ ISSI-BJ Science Committee.

4. The activity is managed and organized by a team leader who is also the initiator of the proposal at ISSI-BJ.

5. The IT holds a series of two to three oneweek meetings over a period of time of 12 to 18 months.

6. The results of the IT research are published in scientific journals.

Workshops, Working Groups, and Forums

1. There is no annual call. The scientific community can put forward suggestions for future activities at any time.

2. Submit a summary of max. one page, explaining the proposal topic, the rationale to organize the event at ISSI-BJ, and the list of proposers.

3. The proposals are evaluated, prioritized, and recommended to ISSI-BJ by the ISSI/ ISS-BJ Science Committee.

4. The activity is organized by the conveners.

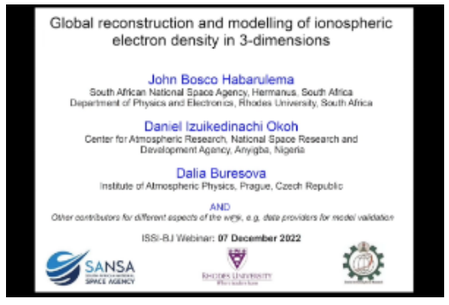
5. The activity is held at ISSI-BJ.

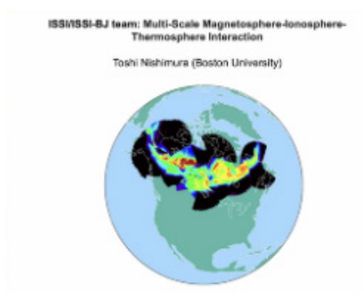
6. The activity's outcome is prepared and published

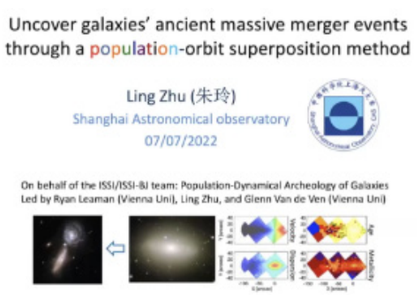
ONLINE SEMINARS

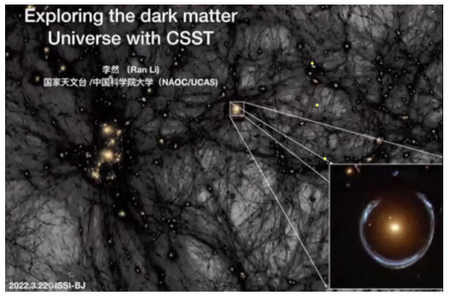
On Things to Come

Dec. 7	John Bosco Habarulema - Global reconstruction and modelling of ionospheric electron density in 3-dimensions
Nov. 3	Toshi Nishimura- Multi-Scale Magnetosphere-Ionosphere-Thermosphere Interaction
Oct. 27	Taichi KAWAMURA- Mars Seismology as seen by InSight
Jul. 7	Zhu Ling - Uncover Galaxies' past merger events through a population-orbit superposition method
Jun. 30	Martin Ward - The Changing Universe: variable nuclei of galaxies
May 19	Francesca Zuccarello - Solar eruptive events: an overview
Apr. 28	Dominique Langevin - Foams and bubbly liquids in microgravity
Mar. 31	Guenther Hasinger - ESA Science Program Strategic Planning: Voyage 2050
Mar. 24	LI Ran - Exploring the dark matter universe with CSST
Mar. 1	ZHANG Xuemin -The application research based in CSES and Swarm Satellite
Jan. 19	Therese Encrenaz - From Solar System Planets to Exoplanets: What can we learn from infrared spectroscopy?
Jan. 5	Kathrin Altwegg - Deciphering the origin and evolution of our solar system from the chemical composition of 67P



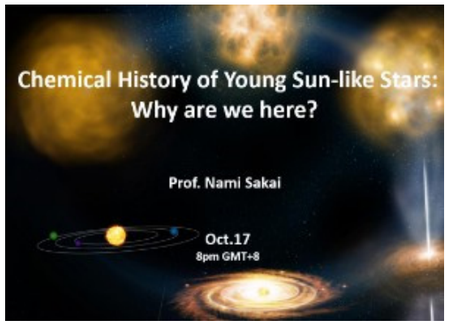


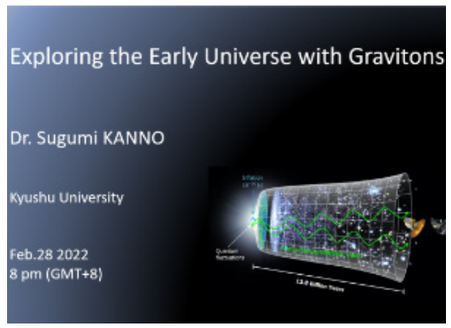


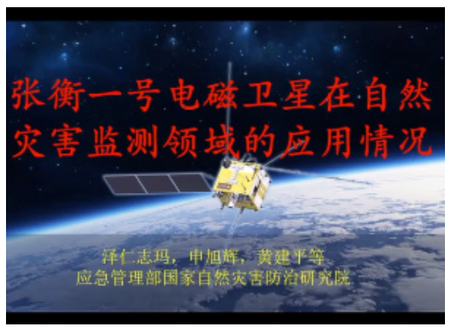


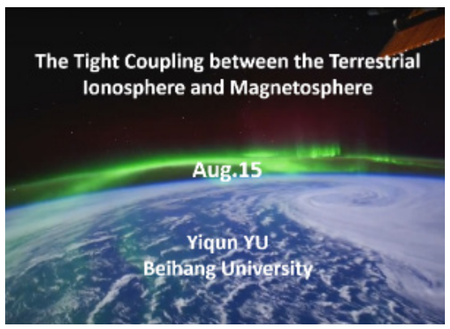
1001 Space Nights

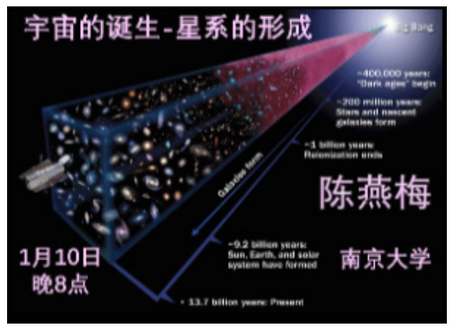
Nov. 21	Weiling Tseng 曾瑋玲 冰冻世界的地下海洋
Oct. 17	Nami SAKAI 坂井南美 Chemical History of Young Sun-like Stars: Why are we here?
Sept. 12	Zerenzhima 泽仁志玛 张衡一号卫星自然灾害监测应用情况
Aug. 15	YU Yiqun 於益群 The Tight Coupling between the Terrestrial Ionosphere and Magnetosphere
Jul. 11	CHAI Lihui 柴立晖 火星空间与火星水的丢失
Jun. 13	Yoko KEBUKAWA 癸生川陽子 Organic Matter in Meteorites - Origins, Evolution, and Link to Emergence of Life
May 9	FENG Li 封莉 莱曼阿尔法望远镜中的太阳长啥样
Apr. 11	GUO Jingnan 郭静楠 Space Weather Challenges for Future Human Missions to Mars
Mar. 14	WANG Xiaobin 王晓彬 穿过流星雨，带你去看多姿多彩的小行星世界
Feb. 28	Sugumi KANNO 菅野優美 Exploring the early universe with gravitons
Jan. 10	CHEN Yanmei 陈燕梅 宇宙的诞生 - 星系的形成

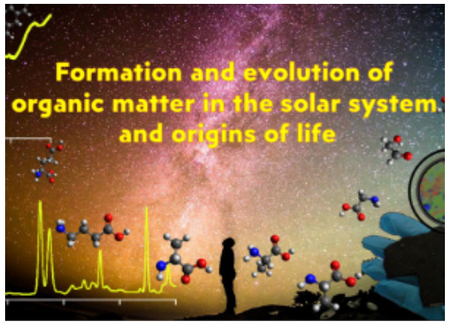






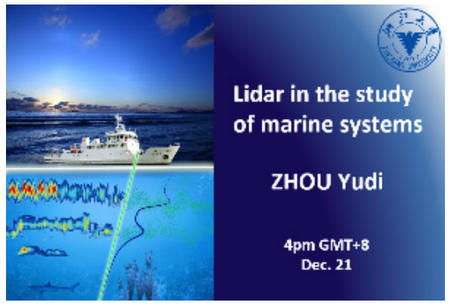


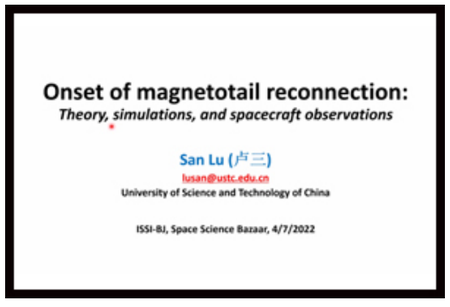


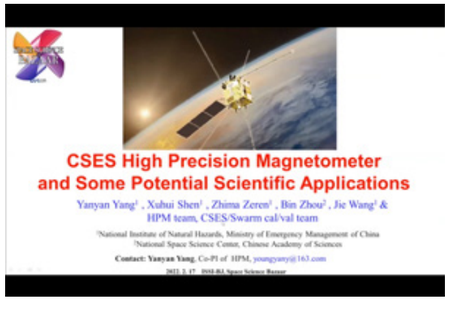


Space Science Bazaar

Dec. 21	ZHOU Yudi - Lidar in the study of marine systems
Oct. 12	Roberto Susino - Investigations of the solar corona with the Solar Orbiter/Metis coronagraph
Sept. 29	William Dunn - X-raying Uranus and Jupiter
Sept. 7	Andrea Francesco Battaglia - Hard X-ray Solar Flare Observations by Solar Orbiter/STIX: Overview and New Science Opportunities
Aug. 31	Ying Beili - Study of coronal mass ejections with ultraviolet and white-light coronagraphs
Apr. 7	LU San - Onset of magnetotail reconnection from an electron-only phase
Mar. 3	Iiro Virtanen - Modelling Space Weather and Total Solar Irradiance over the Past Century
Feb. 17	Yang Yanyan - CSES High Precision Magnetometer and Some Potential Scientific Applications
Jan. 27	Sebastiano Lauro – Searching for Subglacial Water on Mars with Orbiting Ground Penetrating Radars

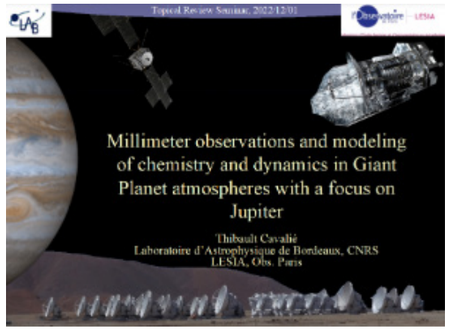


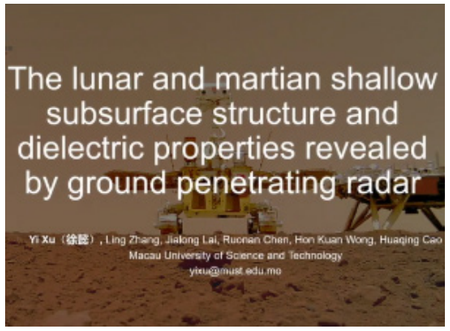


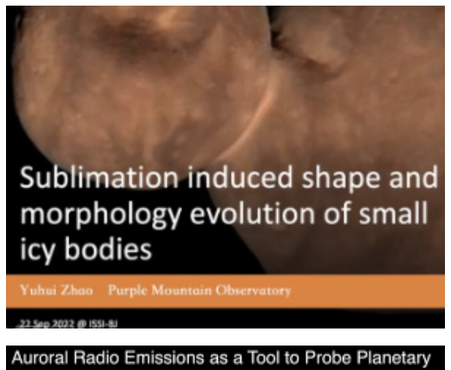


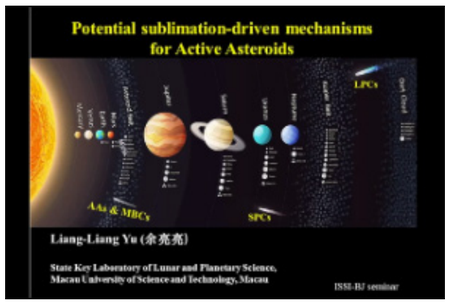
Topical Review

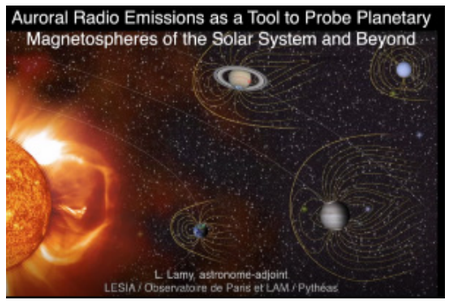
Dec. 1	Thibault Cavalie - Chemistry and dynamics in giant planet atmosphere from millimeter obervations
Nov. 10	XU Yi - Shallow subsurface structure and material properties observed by the lunar ground penetrating radar
Sept. 22	ZHAO Yuhui - Sublimation induced shape and morphology evolution of small icy bodies
Jul. 21	Yu Liangliang - Potential sublimation-driven mechanisms for active small bodies
Jun. 9	Laurent Lamy - Auroral radio emissions as a tool to probe planetary magnetospheres of the solar system and beyond
May 26	YANG Jun - Habitable Zone: Definitions, Estimations, and Recent Advances
Apr. 21	Pierre Vernazza - Constraints on the formation and evolution of the largest main belt asteroids
Mar.17	Daniel Koll - Beyond the habitable zone -- Hot rocky exoplanets in the JWST era
Feb. 24	Olivier Mousis - Key atmospheric signatures for identifying the source reservoirs of volatiles in the giant planets

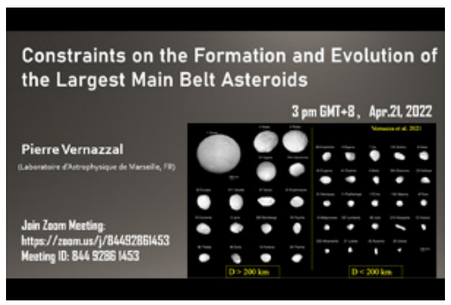












COSPAR TGCSS/SGRB MEETING

New cooperation opportunities between ISSI-BJ and COSPAR were explored. Since October 2021, ISSI-BJ is acting as the online meeting supporter to COSPAR's task group TGCSS (The Task Group on establishing a Constellation of Small Satellites) /SGRB (Sub-Group on Radiation Belt). Till now, 32 online task group meetings of SGRB have been organized successfully.

WOMEN IN SPACE EXPLORATION AND INNOVATION

On 23 Nov. 2022, ISSI-BJ organized a side event on Women in Space Exploration and Innovation successfully in Haikou, China. The side event is an integral part of the United Nations/China 2nd Global Partnership Workshop on Space Exploration and Innovation. It was fully supported by United Nations Office for Outer Space Affairs (UNOOSA) and China National Space Administration (CNSA). Dr. Jie JIANG, a professor from Beihang University and a Discipline scientist of ISSI-BJ, chaired the online meeting.

Four inspirational female leaders in space worldwide were invited to share their experience in space exploration and innovation. Chinese astronaut, Ms Yaping WANG shared her inspirational experience of being a female astronaut. Russian engineer and cosmonaut, Ms Anna Kikina, delivered a video message from the International Space Station and encouraged more women to pursue their dreams. Prof. Zeren Zhima from the National Institute of Natural Disaster of the Chinese Ministry of Emergency Management gave a presentation on “Surpassing previous yourself to fulfill your potential”Prof. Graziedlla Branduardi-RAYMONT from University College London (UCL) shared her story in pursuing a career in space.

The side event, aiming to encourage more women and girls to pursue their dreams in space exploration and innovation, attracted more than 2700 audiences both onsite and online.

INTERNATIONAL TEAMS

Since 2014, every year in January ISSI-BJ and ISSI release a joint Call for International Teams in Space and Earth Sciences to encourage proposals for study projects from internationally collaborating teams of scientists from different institutions. The Call is open to scientists of any nationality actively involved in the following research fields: 1. Space Sciences (Solar and Heliospheric Physics, Solar-Terrestrial Sciences, Space Plasma and Magnetospheric Physics, Planetary Sciences, Astrobiology, Cosmology, Astrophysics, and Fundamental Physics in Space) 2. Earth Sciences using space data.

Teams Selected in 2019

1.Orsolini Y. (NILU, NO) and He S. (University of Bergen, NO)

Dynamical Signatures of Energetic Particle Precipitation in Atmospheric Re-analyses

Upcoming Session: April, 2024

Scientific Rationale: The goal of the proposed team is to re-assess the ozone, temperature, and potential dynamical signatures of energetic particle precipitation (EPP) from the stratosphere down to the troposphere in existing, state-of-the-art global atmospheric re-analyses. While some studies attributed large surface temperature anomalies to geomagnetic activity in re-analyses, these findings remain highly controversial. The team will primarily focus on re-analyses with high vertical extension and relevant satellite data assimilation. Supporting model studies will help quantify the impact of extreme geomagnetic activity on atmospheric composition, temperature, and dynamics, and to provide an envelope for what could be found in re-analyses. The main objective is the quantitative estimation of these signatures, including their temporal and spatial statistical significance. A secondary objective is to provide guidelines for next-generation reanalysis development, in particular concerning assimilation and treatment of ozone.

2.Shen X. (China Earthquake Administration, CN), Hulot G. (IPGP, FR), and Zhang X.N (China Earthquake Administration, CN)

The Electromagnetic Data Validation and Scientific Application Research Based on CSES Satellite

Last ISSI-BJ Session: Sept.11-15, 2023

Scientific Rationale: China SeismoElectromagnetic Satellite (CSES, also named Zhangheng-1 or ZH-1), the first space-borne electromagnetic monitoring platform in China, has been launched successfully on February 2, 2018. There are eight scientific payloads installed onboard, including HPM and SCM for magnetic field observation, EFD for the electric field, LAP and PAP for in-situ plasma parameters, HEPP for high-energy particles, and TBB and GOR for electron density profiles below the satellite. Based on this satellite, the team proposed the investigation of the near-Earth space plasma dynamics and the electromagnetic environment by multi-parameter analysis from a variety of payloads. This study aims to construct the chain of lithosphere-atmosphere-ionosphere processes associated with major natural disasters: earthquakes, tsunamis, typhoons, and volcanoes.

3.Li G. (University of Alabama in Huntsville, US) and Wang L. (PKU, CN)

Using Energetic Electron and Ion Observations to Investigate Solar Wind Structures and Infer Solar Wind Magnetic Field Configurations

Upcoming Session: Sept.18-Sept.22, 2023

Scientific Rationale: Solar electron events are a common phenomenon observed in interplanetary space. A majority of these events are related to small flares and they have no fast coronal mass ejections (CMEs) associated with them. Recent observations from multiple spacecraft (e.g. STEREO-A/B, Wind, and ACE) showed that electrons and ions in many of these events can be observed over a longitudinal separation of > 90 degrees or larger. What causes these large separations?

4.Pevtsov A. (National Solar Observatory, US)

Modeling Space Weather and Total Solar Irradiance over the Past Century

Upcoming Session: TBD

Scientific Rationale: Observations of magnetic fields on the Sun are ingrained into modern modeling of solar outer atmosphere and solar wind, the conditions throughout the heliosphere, and space weather effects near Earth and around other planets. Unfortunately, the systematic direct magnetographic measurements began in the mid-1960s. This lack of magnetograph data for early solar cycles severely restricts the development of a comprehensive understanding of solar activity and its space weather effects in the past, and their prediction for the future.

5.Yao Z. (University of Liège, UK) and Shi Q. (Shandong University at Weihai, CN)

The Morphology of Aurora at Earth and Giant Planets: Characteristics and their Magnetospheric Implications

Upcoming Session: TBD

Scientific Rationale: Over the last two decades, auroral measurements at Earth, Saturn, and Jupiter have become regularly available. Since late 2016, a wealth of observations of Jupiter's aurora from the NASA/Juno mission and the Hubble Space Telescope (HST) and other multi-waveband observatories (e.g., Chandra, XMM-Newton, IRTF) have provided a unique opportunity to understand the Jovian polar aurora. Similarly, NASA/Cassini's orbital configuration from late 2016 to the end (during the Cassini Grand Finale phase) offered the best opportunity to investigate Saturn's polar aurora. Benefiting from the unprecedented large dataset of aurora at giant planets, the team is committed to a detailed investigation including data analysis and modeling, which will compare auroral features at Earth and the giant planets over multiple temporal and spatial scales. The goal is to understand the fundamental driving mechanisms that generate similar features despite the uniqueness of each planet's system.

6.Ward M. (Durham University, UK)

Active Galaxies in Crisis: A Statistical Study of Ultra-Violet Variability

Upcoming Session: TBD

Scientific Rationale: Much progress has been made in our understanding of active galactic nuclei (AGN) in the 85 years, and mass accretion via a hot rotating disc onto a supermassive black hole is now the well-accepted picture. Mass accretion via a hot rotating disc onto a supermassive black hole is now the well-accepted picture. However, much is left to be explored. This has been highlighted by the increased use of the time domain as a new tool to investigate the inner regions of AGN that we cannot spatially resolve.

Teams Selected in 2020

1.Toshi N. (Boston University, US)

Multi-scale Magnetosphere-ionospherethermosphere Interaction

Upcoming Session: July, 2024

Scientific Rationale: Localized structures in the Magnetosphere-Ionosphere-Thermosphere (M-I-T) system in space have major adverse impacts on radio communications and satellite operations. Although the existence of such structures has been known, efforts for understanding their quantitative properties and formation processes are severely limited. It is a scientific challenging issue because coupling processes across scales (multi-scale) have to be handled.

2.Leaman R. (Max-Planck Institute for Astronomy, DE); Zhu L. (Shanghai Astronomical Observatory, CN)

Population-Dynamical Archeology of Galaxies

Upcoming Session: TBD

Scientific Rationale: Galaxies show a huge diversity of structure and stellar populations, reflecting a complex and unknown mixture of star formation episodes and hierarchical merging events in their past that are impossible to observe directly. Promising new methods to recover the distribution of stellar orbits within a galaxy can reveal its dynamical 'skeleton', which in turn sets the spatial distribution of its baryons. However, to reconstruct the assembly history of the galaxy, we must simultaneously infer ages for the recovered orbits of stars and star clusters. Age dating these stellar tracers provides a dynamical memory for the galaxy, as the orbits are imprinted by discrete events (galaxy mergers, starbursts) in the galaxy's history. We have begun the first steps towards this novel combination of stellar population and orbit based dynamical modeling.

3.Li R. (National Astronomical Observatories of China, CN)

Strong Gravitational Lensing Studies with CSS-OS and EUCLID

Upcoming Session: Sept.11-15, 2023

Scientific Rationale: Strong lensing systems provide a unique laboratory in which to study the fundamental physics of the Universe and the evolution of galaxies. Two next-generation space-based surveys, the Chinese Space Station Telescope survey (CSS-OS) and the ESA Euclid mission, will increase the number of known strong lenses by over two orders of magnitude, and survey them all with high-resolution imaging in near-UV to infrared wavelengths.

4.Brasseur G. (Max Planck Institute for Meteorology, DE); Granier C. (Laboratoire d'Aérologie, FR)

Use of Geostationary Satellites to Improve Air Quality Characterization and Forecasts

Upcoming Session: Spring of 2024

Scientific Rationale: We propose to assemble an international team of experts in air quality studies, atmospheric chemistry modeling, and remote sensing to make the best use of the most recent and forthcoming high spatial and temporal resolution satellite instruments dedicated to atmospheric composition. Space observations of the chemical composition of the atmosphere are a primary source of information on the formation and fate of large-scale and regional air pollution. In the very recent period, there have been major advances in space observations of chemical species, with the launch of the Sentinel-4 satellite, which includes the TROPOMI instrument. This unique instrument observes several key air pollution species at a much higher spatial resolution than earlier instruments. Furthermore, in February 2020, a geostationary satellite, GEO-KOMPSAT-2, was successfully launched, which includes the GEMS spectrometer (Kim et al., 2020), the first geostationary instrument measuring air pollution from space. GEMS is the Asian element of a constellation of three geostationary satellites, which will include in a few years the Sentinel-4 European component and the TEMPO component for North America.

5.Feng W. (IGG, CAS, CN)

Time-variable Gravity Field Modeling and Simulation from Present and Future Gravity Satellite Missions

Upcoming Session: November or December of 2023

Scientific Rationale: The team proposes to assemble an international team for gravity field modeling in the context of the GRACE and GRACE-FO missions. These missions are dedicated to determining gravity field variations, hence mass transfers on the Earth, at a daily to monthly periodicity. Besides, the numerical simulation for possible synergistic observing of gravity satellites from Europe and China will be investigated for retrieving mass changes with higher spatiotemporal resolutions and accuracy shortly

6.Bemporad A. (INAF, IT); Feng L. (PMO, CAS, CN)

Solar Eruptions: Preparing for the Next Generation Multi-Waveband Coronagraphs

Upcoming Session: July 10-14, 2023

Scientific Rationale: Space- and ground-based coronagraphs, together with EUV space-based imagers, are the only instruments capable of providing observations of Coronal Mass Ejections (CMEs) from their early acceleration phases to interplanetary propagation. As the study of these phenomena is key for our understanding of how the Sun interacts with planets and modulates the whole Heliosphere, coronagraphs will be onboard the recently launched and upcoming solar missions, such as the ESA Solar Orbiter and PROBA-3 missions, the Chinese ASO-S mission, the Indian Aditya-L1 mission. These future coronagraphs will provide a new capability that was almost unexplored so far: the acquisition of coronagraphic images in multiple narrow-band spectral ranges, from visible light (VL) to ultraviolet (UV). Moreover, next space- (Aditya-L1/VELC) and ground-based coronagraphs (UCoMP, CorMAG) will acquire spectro-polarimetric observations to measure the weak coronal magnetic fields. The analysis of these innovative data will require the development and testing of new diagnostic techniques to determine not only the CME plasma densities (usually done from broad-band VL images), but also other parameters such as the electron temperature, line optical thickness, filling factors, and magnetic fields.

7.Bosco Habarulema J. (South African National Space Agency, South Africa); Qian W. (National Center for Atmospheric Research, US)

Long Term Ionospheric Effects and Their Associated Modeling During Extreme Space Weather Events over the African Secto

Upcoming Session: March, 2024

Scientific Rationale: The study of ionospheric dynamics and electrodynamics over the African region is complicated due to two main factors. The first one is largely logistical due to the scarcity of ground-based instrumentation dedicated to providing vital observations for utilization in different scientific investigations. The second challenge has to do with different Physics exhibited at different latitude regions given that the African sector comprises mid-latitudes in both northern and southern hemispheres as well as low/ equatorial regions. The first challenge prohibits the accurate handling of the second problem. As a result, the ionospheric behavior over the African sector is less understood and there remain several outstanding questions. Thus, the comprehensive understanding of different phenomena over the African sector is only based on the physical process performed only through a combination of measurements with existing sparsely located ground-based and satellite-based instruments. On the other hand, the demand for precise ionospheric correction for communication and navigation application in the region has grown up dramatically. However, to correct the impact of the ionosphere on the commination/navigation radio signals, understanding the physics behind each ionospheric phenomenon in the region is essential. This requires continuous observations of ionospheric parameters and their internal (due to lower thermosphere-ionosphere coupling) and external (due to solar wind–magnetosphereionosphere coupling) drivers, which become complex during both quiet and extreme space weather events.

Teams Selected in 2021

1.Jamet C. (Univ. Littoral Côte d'Opale, Univ. Lille, FR); Dionisi D. (CNR – ISMAR, IT)

Toward a 3-D Observation of the Ocean Color: Benefit of Lidar Technique

Upcoming Session: 2024

Passive ocean color space-borne observations began in the late 1970s with the launch of the Coastal Zone Color Scanner space mission. An uninterrupted record of global ocean color data has been sustained since 1997. These passive observations have enabled a global view of the distribution of phytoplankton and marine primary productivity. However, these measurements are limited to clear sky, day-light, high Sun elevation angles, ice-free oceans and are exponentially weighted toward the ocean surface. Moreover, the processing of the ocean color images requires the knowledge of the atmospheric components (gases, air molecules and aerosols). Lidar (Light Detection and Ranging) is a "laser radar" technique that has been used for a wide range of atmospheric and ocean applications. As an active remote sensing technique, it can overcome some of the above-mentioned limitations of passive observations. Despite several cases that demonstrated oceanic applications of ship-, air- and space-borne lidars, this tool has not received significant attention from the ocean color remote sensing community. Recently, it has regained interest from the ocean community as new studies used the lidar signal from the space-borne CALIOP/CALIPSO and ATLAS/Ice-Sat-2 instruments to estimate the ocean particulate backscatter and showed the feasibility of using both lidars to provide accurate estimates of the ocean color over the globe and in the polar regions (and over the water column for ATLAS). Thus, satellite lidars are a natural complement to passive ocean color radiometric remote sensing, operating under thin clouds, between holes in broken clouds, and in polar regions, providing vertical measurements both during day and night. However, as those space-borne lidars are primarily dedicated to atmospheric and land measurements, several issues need to be

considered for being able to optimally use them in oceanic applications. Among them, we propose to tackle the following issues: 1) Validation of CALIOP and ATLAS retrievals including inter-comparison of the results obtained with both retrievals and 2) Analysis of the limitations of the current space-borne lidars. The outcomes of this International Team work will help to define a scientific roadmap for a future dedicated space-borne oceanic profiling lidar.

2.Krucker S. (University of Applied Sciences and Arts Northwestern Switzerland, CH); Jeffrey N. (Northumbria University, UK)

Measuring Solar Flare Hard X-ray Directivity using Stereoscopic Observations with Solar Orbiter/STIX and X-ray Instrumentation at Earth

Upcoming Session: TBD

Scientific Rationale: The hard X-ray (HXR) imaging spectrometer STIX on board Solar Orbiter gives us the first opportunity to systematically perform stereoscopic X-ray observations of solar flares with a new X-ray fleet: ASO-S/HXI, Aditya-HEL1OS, GECAM, and potentially with PADRE, a CubeSat proposed for this task and carrying STIX cross-calibrated detectors. These observations will provide the first reliable measurements of HXR directivity, our link to the angular distribution of flare-accelerated electrons, and constrain the processes that can accelerate electrons in the corona and in other astrophysical objects. However, such observations must be compared with theory and state-of-the-art modelling taking into account various transport effects and realistic plasma conditions, all of which can change the properties of the measured HXR directivity. Further, measurements of HXR directivity with confidence intrinsically rely on the calibration accuracy of the independently developed detector systems of the different HXR telescopes. In our ISSI team, we propose to bring together experts of each of the different instruments with theorists. The goal of our meetings is to establish requirements on the calibration accuracy derived from simulations so we can distinguish between different theoretical models, and then work out a joint calibration approach of the different detectors to reach the required accuracy. Additionally, the first joint observations between STIX and instruments at Earth (Aditya-HEL1OS and GECAM solar data) will be available in 2021 so it is vital to bring our team together in 2022

3.LU San (USTC, CN)

Interaction between Magnetic Reconnection and Turbulence: from the Sun to the Earth

Upcoming Session: August, 2024

Scientific Rationale: Magnetic reconnection is an important process in space plasmas, which converts magnetic energy to particle acceleration and heating through topological changes in magnetic fields. It is therefore believed to be responsible for explosive phenomena in space, especially solar flares and geomagnetic storms/substorms. Turbulence shaped by linear/nonlinear waves and coherent structures on magnetohydrodynamic (MHD) and kinetic scales (frequencies) is a fundamental component of space plasma. It is natural to consider the interaction between these two important aspects of space plasma. Recent studies have shown that magnetic reconnection can produce waves and coherent structures to form turbulence. On the other hand, turbulence can provide and enhance dissipation to allow and accelerate magnetic reconnection. In addition, in plasmas that are already turbulent, magnetic reconnection can play a major role in the dissipation of turbulent energy. Recently, new observations have opened up new windows into turbulence and reconnection occurring in different heliospheric plasma contexts, from the Earth's environment (THEMIS, ARTEMIS, MMS) to the solar wind and inner heliosphere (Parker Solar Probe, Solar Orbiter, Bepi Colombo). Thus, it is timely to establish an ISSI-BJ team with a balanced mix of theoretical, simulation, and observational expertise to study the interaction between magnetic reconnection and turbulence. The team will focus on four important space plasma regimes, the solar corona, the solar wind, Earth's magnetosheath, and Earth's magnetosphere. The team aims to answer the following questions: What waves and coherent structures are produced by magnetic reconnection to form turbulence? (2) What are the effects of turbulence on the process of magnetic reconnection? (3) What is the role of magnetic reconnection in dissipation of turbulent energy in turbulent plasmas? To answer these questions, the team will perform MHD, Hall MHD, hybrid, particle-in-cell simulations, which will be guided by and compared with in-situ and optical observations from the Sun to the Earth

4.N. Pedatella (National Center for Atmospheric Research, US)

Data Assimilation in the Ionosphere and Thermosphere

Upcoming Session: TBD

Scientific Rationale: Specification and forecasting of the Earth's ionosphere and thermosphere (IT) is of critical importance owing to its impact on, for example, navigation signals (e.g., GPS) and satellite orbital drag. Following the path of troposphere numerical weather prediction, the IT community has recently adopted data assimilation techniques in order to improve specification and forecast capabilities. In addition to operational space weather applications, data assimilation models are a valuable tool for addressing fundamental IT scientific questions. In particular, physics-based data assimilation models enable investigation of the predictability of the IT system, including the physical mechanisms controlling the predictability. By providing the best estimate of the IT state, data assimilation models further enable improved understanding of the processes driving IT variability, making them a valuable resource for the scientific community.

5.Zuccarello F. (University of Catania, IT) LUO Bingxian (NSSC, CAS, CN)

Step forward in Solar Flare and Coronal Mass Ejection (CME) Forecasting

Upcoming Session: TBD

Scientific Rationale: The genesis of solar flares and coronal mass ejections (CMEs) in solar active regions (ARs) is still not well understood, despite the capital importance of these eruptive events in various aspects of the Sun-Earth connection. A central pursuit of contemporary solar and space physics is to protect our technologically-dependent society that can find itself at considerable risk from impulsive radiation flux and relativistic charged particles streaming from the Sun. The occurrence rate of the most energetic eruptions traversing the entire Solar System follow the 11-year solar cycle, although outliers in terms of both timing and size are known to exist; e.g., the Carrington-event. At the peak of the cycle, several hazardous high-intensity flares and very fast CMEs may occur, even multiple times each month. Major flares and CMEs associate with complex sunspot groups. Indeed, the sources of the most intensive solar eruptions are mixed-polarity ARs; their complexity, reflected in their morphological properties, plays a decisive role. A key question of contemporary Space Weather (SW) research is how to optimize flare and CME forecasts. To date, there are no unique markers known to reliably indicate whether an AR will erupt within a certain time window and how strong the eruption will be. With this coordinated research proposal, we wish to make a step forward by assembling a remarkably international team consisting of i) members with complementary expertise on SW research underpinned by strong track records and ii) additional early-stage researchers who have just embarked on flare, CME and overall SW forecasting.

6.LI Bo (Shandong University Weiha, CN); Nakariakov V. (University of Warwick,UK)

Magnetohydrodynamic Wavetrains as a Tool for Probing the Solar Corona

Upcoming Session: TBD

Scientific Rationale: Magnetohydrodynamic (MHD) wave-caused perturbations abound in the highly structured solar corona, with their measurements key to the flourishing field of coronal seismology. However, these perturbations are seldom as ideal as canonically theorized. Rather, they tend to appear as isolated or intermittent sequences of wavetrains (WTs), here broadly taken to refer to wave motions localized in time and space with or without envelope modulation. While already heavily involved in the establishment of coronal seismology, WTs have been shown

to be ubiquitous only in the past decade. This stride was made possible largely due to the availability of cutting-edge instruments with ever-increasing temporal and spatial resolution. WTs are now known to be associated with a diverse set of eruptive activities, ranging from microflares to miniature jets to fully-fledged flares and coronal mass ejections (CMEs). Likewise, WTs have been identified in post-flare loops, quiescent active region loops, polar plumes, as well as the flanks and wakes of CMEs. On the theoretical side, WTs are known to encode a rich set of information not only on their exciters and host media, but also on the processes that shape their hosts. Nonetheless, available studies on WTs remain to be conducted largely on an individual basis by disparate groups with their own focuses/emphases. The objective of this project is therefore to assemble an ISSI-BJ team of top-notch observers, theorists, and numerical experts to examine WTs in a synergistic way such that the diagnostic potential of WTs can be exploited to a much fuller extent than before.

Teams Selected in 2022

1.Baptiste Chide (Los Alamos National Laboratory, US)

Planetary Acoustics: A Brand New Sense with which to Explore Atmospheres in our Solar System

Upcoming Session: First semester 2024

Scientific Rationale: After more than 60 years of planetary exploration, the very first sounds from Mars were recorded very recently by the two microphones onboard the NASA Perseverance rover. A few months later, the CNSA Zhurong rover also landed with a microphone, showing the rising interest in acoustics for the exploration of Mars. Besides Mars, the use of acoustic is even more favorable on denser atmospheres like Venus and Titan, as will be experienced by the Dragonfly's microphones heading to Titan in the 2030's and the acoustic projects under study for Venus. Indeed, acoustic can provide key insights to understand interactions planetary surfaces and atmosphere.

2.Primož Kajdi (Geophysics Institute, UNAM, MX) and Xóchitl Blanco-Cano (Geophysics Institute, UNAM, MX)

Impact of Upstream Mesoscale Transients on the Near-Earth Environment

Upcoming Session: February or March 2024

Scientific Rationale: One of the outstanding questions in the field of solar-terrestrial relations concerns how the solar wind transfers energy, momentum and mass into our planet's magnetosphere. This transfer leads to magnetospheric and ionospheric disturbances that form part of the phenomena known as space weather. Some of them may interrupt the proper functioning of our technological systems, such as electric grids, GPS signal and artificial satellites.

3.Wladimir Neumann (Technische Universität Berlin, GER)

Timing and Processes of Planetesimal Formation and Evolution

Upcoming Session: TBD

Scientific Rationale: Accretion processes in protoplanetary disks produce a diversity of small bodies that contribute to the composition of planets and can survive as asteroids or comets. There is a predominant paradigm that small bodies played a crucial role in potentially multiple reshuffling events throughout the solar system and in both early and late accretion of terrestrial planets. Despite a high scientific attention paid to these bodies, their early evolution is not well understood, in particular, the timescales of accretion and thermal processes at different heliocentric distances, as well as the nature of planetesimal populations that produced various groups of present planetary objects.

4.Xiaoshuai ZHU (National Space Science Center, Chinese Academy of Sciences, CN) and Chifu Iulia (Institute for Astrophysics and Geophysics, Univ. of Göttingen, GER)

Magnetohydrostatic Modeling of the Solar Atmosphere with New Datasets

Upcoming Session: July 10-14, 2023

Scientific Rationale: Gaining insight into the magnetic fields and plasma in solar active regions is very important for studying various solar activities. So far the main approach to obtaining the three-dimensional (3D) magnetic field structure of active regions is to extrapolate the magnetic field from magnetograms measured in the photosphere. A basic assumption in the past was to completely neglect all plasma effects and to perform the so-called force-free field (FFF) extrapolations. A couple of methods (e.g PFSS, linear FFF, nonlinear FFF) are available. Among these methods, till now, the NLFFF performed the best when compared with observations. While the force-free assumption is well justified in the solar corona, it is not the case in the photosphere and chromosphere. New approaches that take into account plasma forces (e.g., plasma pressure and gravity) developed rapidly in the last decade, for example magnetohydrostatic (MHS) extrapolations. It was found that the MHS extrapolation when applied to simple test cases performs better than the NLFFF extrapolation in terms of the accuracy of the reconstructed magnetic field. To calculate the plasma forces correctly, the MHS extrapolation requires a very high-resolution magnetogram (<100 km) which could not be obtained regularly in the past. However, such regular measurements of the magnetic field are possible with the advent of the Daniel K. Inouye Solar Telescope (DKIST). Moreover, the Solar Orbiter (SolO) provides an additional view angle which helps to constrain the magnetic field modelling.

INTERVIEW

Interview with Ms Qi YU

Ms. Yu Qi, born in 1965, Chinese citizen, is working as the Secretary-General of Asia-Pacific Space Cooperation Organization(APSCO) since November, 2020. She works closely national space agencies and international organizations, and takes an active role in the diplomats' community.

She is enthusiastic to work in capacity-building for Member States in the field of space technology and application. She has been working with United Nations Office of Outer Space Affairs(UN-OOSA), by taking part in cooperative activities and multilateral discussion of space treaties and regulations, and accumulated with rich experience with international space cooperation. She served as the Deputy Director-General of International Cooperation Department of China National Space Administration (CNSA); Deputy Director of Center for Earth Observation Data, CNSA, and long commitment as the management level with Institute of Remote Sensing Application, Chinese Academy of Science. She has made publication of "Modern Remoter Sensing Science and Technology System and Theoretical Method in 2013, joint with other authors. She is given Special Award in Science and Technology Advancement of CAS and the 2nd praise of National Award in STA in 1992 and 1993 respectively.

1. It is very impressive that APSCO covers a wide geographical region from Bangladesh all the way to Peru and more. Can you briefly describe its structure and main goals?

APSCO currently have eleven Member Countries, that include eight Full Member: Bangladesh, China, Iran, Mongolia, Pakistan, Peru, Thailand, Turkey, one Signatory Member: Indonesia, one Associate Member: Egypt and two Observers: Mexico and ISNET (Inter-Islamic network on Space Science and Technology). China is the host country for APSCO and the Headquarter of the organization is located in Beijing, China. APSCO also has cooperative partnerships with ESA, Argentina and Russia on satellite data sharing and capacity building in space related fields.

It was granted the status of a Permanent Observer on the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) in 2009. APSCO also holds Observer status at Group on Earth Observation (GEO) and the International Committee on Global Navigation Satellite Systems (ICG).

2. Can you also tell us how would you describe APSCO's achievement since its established?

APSCO, as the Multilateral Inter-Governmental Organization, provides a platform for cooperative activities and capacity building in Member States in the field of space science, technology and its applications. The main purpose of APSCO is to provide a cooperative mechanism and support for countries in the Asia-Pacific region, particularly the developing countries, to be able to mainstream peaceful uses of space as a driver of their socio-economic development. By pooling up and sharing financial, technological and human resources in space science, space technology and space application, APSCO can effectively promote multilateral cooperation to facilitate capacity building for its members. Over the past decade, APSCO has benefited its members through different cooperative activities to make full use of its uniquely wide geographical coverage area and effectively share its resources.

APSCO has established six Cooperative Networks in its Development Plan of Space Activities; these are: Data Sharing Network, Space Segment Network and Inter-Connection of Ground Systems, Ground-Based Space Object Observation Disaster Monitoring Network, Space Application Network, and Education and Training Network. There is other 13 cooperative projects currently running to explore and exploit outer space through peaceful uses, covering the domains of space science, space technology, and space applications. APSCO continues to peruse all above activities with more rigorous initiatives in line with the New Development Plan of Cooperation Activities of APSCO (2021-2030), which is strategic document approved by the Council of APSCO for next decade activities.

3. Will APSCO expand its membership? What are the conditions to join?

Establishment of the Asia-Pacific Space Cooperation Organization (APSCO) is a long-desired outcome of the efforts of people of this region to harness space for peaceful purposes, and capitalize on the regional cooperation. Since its operation, under the leadership of the APSCO Council through ministry-level Council Meetings, the Secretariat of APSCO has improved its internal administration, diligently pushed forward the cooperative programs among Member States in the area of space applications, space technology and space science, as well as Education/Training programs including organizing the International Symposiums. APSCO has established respectable reputation in the international space community. In order to benefit more nations in Asia-Pacific region through the space-activity cooperation, APSCO continuously explored all possibilities on expansion of Membership and APSCO is open to all countries in the Asia-Pacific Region.

4. What kind of cooperative relationship and projects has APSCO developed with ISSI-BJ so far? And what are the major milestones in the APSCO-ISSI-BJ cooperation?

The cooperation between the two organizations has been initiated in the year 2015. The primary goal of the cooperation was formulating a joint Space Science School series for development of the future generation and to attract more active involvement of the Asia-Pacific talents in space science research. The 1st Space Science School was jointly organized in Oct. 2016 in Thailand with the theme of"How to design a Space Science Mission" and it was very much welcome by the participants. The 2nd Space Science School was jointly organized in Oct. 2018 in China with the theme of "Study Space Weather Effects: from the Sun to the Ground". The arrangement of the 2nd school was in a way that the participants could join a team and do practical scientific data analysis. This made the school more attractive to and highly valued by the participants. There has also been a joint brainstorming Forum and a training on "Science Missions using CubeSats" in 2019. The final outcome of this activity was published as a journal paper. In summary, there has been a good record of cooperation with meaningful purpose and fruitful outcome.

5. In Europe, ISSI and ESA have been in close collaboration. ISSI provides all kinds of service to ESA's space programs, like, data digging and enhancing the missions' scientific output. It also undertakes some training programs from ESA. Do you think ISSI-BJ and APSCO can build a similar relationship?

ISSI-BJ and APSCO can develop similar cooperation on training programmes and also joint effort on science missions like the one being developed by the COSPAR on cubesat constellation for scientific research.

6. ISSI-BJ is developing several online seminar series in English at different levels (i.e., from general public to specialists). It would be very nice if there is interest and active participation in the APSCO members.

How can it be achieved?

APSCO can publish announcement of a selected number of such seminars based on the interest of the Member States.

7. What additional opportunities would you like to provide for the cooperation between APSCO and ISSI-BJ?

There are some ideas for further consideration and possible future cooperation:

First, we suggest both organizations could join the Universe Adventure program which is initiated in APSCO and UK Universities and focuses on space science satellites data analysis. Second, we would be glad to be part of the cubesat constellation program of COSPAR, the third, we propose to construct space science e-lessons, shot series classical e-lessons, help developing countries universities students to get space science knowledge. And the fourth, we propose to joint effort on younger generation development to help teenagers get familiar with space science. It could be realized with programs such as space related science experiment design and textbook development for the children, arouse their interest on aerospace.

Interview with Prof. Len Fisk

Prof. Lennard A. Fisk is the President of the Committee on Space Research (COSPAR) . A solar physicist by training, Fisk is currently the Thomas M. Donohue Distinguished University Professor of Space Science at the University of Michigan. He joined the university faculty in 1993 after 6 years serving as NASA Associate Administrator for Space Science and Applications. A member of the National Academy of Sciences (NAS), he served as chairman of the National Research Council's Space Studies Board (SSB) from 2003-2008. (The National Research Council is the operating arm of the NAS, National Academy of Engineering and Institute of Medicine — collectively called The National Academies.)

1. When did you first learn of COSPAR? Had you ever thought that you would one day become its President? It must be a very exciting and challenging job.

Answer: I went to my first COSPAR Assembly in 1970 in Leningrad. It was only my second international trip; the first one was as a student. My wife was with me, and we have many stories to tell about traveling to the Soviet Union at that time. In the ensuing years, I attended many Assemblies, but was not in any way engaged in COSPAR until about 2006, when my longstanding friend and colleague Roger Bonnet, who was President of COSPAR at the time, asked me to chair his newly formed COSPAR Scientific Advisory Committee, and from that point on I have been involved and committed to COSPAR. At no point did I aspire to be President of COSPAR; in fact, up until my election as President in 2014 there had never been an American President. The original construct was an American Vice President, a Soviet Vice President, and a European President. After the Cold War ended in the late 1980s, it was possible for an American to be President, but the tradition was maintained for many years thereafter. Ed Stone ran for President in 2010 but was defeated by Giovanni Bignami. I was asked to run for President, and was elected at the Moscow Assembly in 2014.

As for the Presidency being an exciting and challenging job, there have been opportunities to increase COSPAR's impact, and to ensure its financial sustainability. This is the normal leadership expected of the President. However, there have also been unusual challenges. The Assembly in Istanbul scheduled for 2016 was ruined by terrorism in Europe and was cancelled due to a military coup in Turkey. There was an ongoing challenge to COSPAR's important role in setting the international standards for planetary protection. And then there is the pandemic, which forced the COSPAR Assembly in Sydney that had been scheduled for August of 2020 to be entirely virtual in January 2021.

2. COSPAR was first established in 1958 soon after Sputnik. After so many years it is still going strong. Do you think its role in promoting peaceful international cooperation in space science will become even more important in the coming years, once the pandemic is over?

Answer: I think COSPAR's role in

encouraging and facilitating the peaceful use of outer space through international cooperation is more important than ever. We are seeing the increased militarization of space. It is the natural consequence of satellites in space becoming an essential component of our civilization, whether it is to support the global economy or a requirement of any modern military. As a result, nations feel obligated to protect and defend their assets, or may choose to use their capabilities in space to inflict harm on their enemies. Unfortunately, space is a lawless place regulated only by peer pressure and self-interest. One action we can take, and COSPAR can very much encourage, is to assist all nations, large and small, who seek to use space for peaceful purposes, to be able to do so. And by doing so, make space a global commons in which all nations have a vested interest, and no nation would risk its standing in the world by damaging the interest of all other nations.

3. The COVID-19 pandemic has played havoc on all walks of life including scientific research and international meetings that are crucial to information exchange and mutual understanding. How can we repair the damages or exercise damage control from your point of view?

Answer: What the pandemic has taken from us has been the opportunities for inperson interactions, especially when such interactions require international travel. We have still interacted through electronic means, e.g., zoom, and thus coordination of research and sharing of results has been possible. However, what has been missing are the informal, unstructured interactions that are essential to real understanding and the building of bonds and trust that lead to international cooperation. These in-person interactions determine the pace of progress. Their absence does not set us back, it only retards progress. And so, if the absence of in-person interactions is temporary, the impact will be minor. If in-person interactions do not return in the next few years, we will have to find some creative way to overcome this loss.

I should point out that the upcoming COSPAR Assembly in Athens is intended to be an in-person Assembly. We are committed to restoring in-person interactions.

4. You must know ISSI in Bern very well. It has been an influential player in promoting international cooperation based on scientific excellence and neutrality. ISSI-Beijing should be the same in principle though with its structure and operation are somewhat different. How can we work better?

Answer: ISSI-Bern is funded primarily by ESA to, as you note, coordinate space research in Europe and to tie it closely with research from other nations. The United States has an important role in ISSI-Bern, providing the largest number of international visitors, and many of the workshops and team meetings rely upon data from NASA missions. I assume that ISSI-BJ is funded primarily and probably entirely by the Chinese Academy of Sciences, who I would imagine expect you to help coordinate space research in China with Asian and western nations. Cooperation between the United States and China is very difficult these days, but it may be that ISSI-BJ can be seen as sufficiently neutral that work-shops and team meetings that involve the researchers from the United States will be possible. Should that be the case, ISSI-BJ will serve a unique and important role in promoting comprehensive international co-operation.

5. Do you see anything obviously missing in ISSI-BJ (apart from in-per- son meetings) that should be implemented from a strategic point of view?

Answer: No additional thoughts beyond answer to question No. 4.

6. To tell the truth, we are always awed by your achievements in scientific leadership - as Associate Administration of NASA, COSPAR President and all that - in addition to your pioneering work in cosmic ray physics and heliospheric physics. How can you mix administration and research so well? From where have you learned the trick, if not from childhood?

Answer: Like many in our field, I set out only to be a scientist. There was nothing in my initial career plans that included serious administration. However, in the early 1980s, when I was on the faculty of the University of New Hampshire (UNH) and had built a nice little research group, I was offered and decided to try a relatively minor administrative position, the Director of Research. At that time there was limited re- search at UNH outside of its space activities, and it was not a demanding job. Shortly thereafter, the President of UNH quit and her Vice Pres- ident for Finance and Administration, who apparently was not well liked, also quit. The Vice President for Academic Affairs became acting President and asked me to be acting Vice President for Finance and Administration. I remember saying at the time, there was only two things wrong with this: “I am not competent, and I don’t want to do it”. But I was prevailed upon to take the position, and to my absolute surprise I was good at it and ran the university so well that the acting President became President, and then prevailed upon me to stay. I said I was getting too far from my research, and so I was made the Vice President for Finance and Research. And then when the Challenger accident happen in January 1986, all the top management of NASA were removed, including the Associate Administrator (AA) for what was then the Office of Space Science and Applications (OSSA). I was somewhat unique, an established and recognized scientist with extensive administrative experience, and in 1987 I became the OS-SA AA, and moved my family to Washington. Positions in the political environment of Washington do not last, and in 1993 I had enough of administration, and came to the University of Michigan to restart my research career. The first two years at Michigan were difficult. The thought processes for senior administration and competitive research are very different; I wasn’t sure I hadn’t made a serious mistake. But then in 1995, I had an inspiration that was the beginning of a great deal of theoretical work on the solar magnetic field and the acceleration of the solar wind. And the juices have been following ever since. I have had administrative positions at the University of Michigan and of course now COSPAR, but when you have had administrative responsibilities at the level of an Associate Administrator, it is not difficult to balance these part-time positions with an active research career.

7. The Nobel Prize in physics has recently been awarded to the major discoveries in astronomy and astrophysics multiple times and last year to climate change study. Do you expect space physics to get one soon? Won't that be a great boost to the space science community?

Answer: I would be astounded if there was ever a Nobel Prize in space physics. I always thought that Gene Parker should have received the No-bel Prize, more deserving than Hannes Alfven, but that was a long time ago. We no longer have paradigm-shifting discoveries in space physics, and frankly even when we do, much of the community does not recognize them. The heavy reliance on numerical models, which assume that only known physical processes are important and which are rarely tested against observations, precludes paradigm-shifting discoveries.

8. ISSI-BJ has started two online seminar series; one is called "1001 Space Nights" which is composed of talks by women space scientists reaching out to the young students and the general public, and the other one is called "Space Science Bazaar” with talks to be given by early career researchers from our International Teams. We hope that they will be the role models of the future generation. Do you have any advice to them to strengthen their motivations in scientific research and international co-operation?

Answer: You can motivate the next generation to pursue scientific re- search by pointing out that there are interesting and rewarding careers available. You can motivate the very best, the ones you most want, by arousing their curiosity, pointing out that there are interesting unsolved problems, the solutions to which will have impact, and that they can con-tribute to the solutions, and if they do so through international cooperation, they will be recognized worldwide for their success.

9. We have had difficulties in the last two years and there may be some more (hopefully not) in the near future. But crises also create opportunities. Therefore, ISSI-BJ

very much looks forward to the opportunity to work with COSPAR in the post-pandemic era of peaceful space exploration. Last but not least, any suggestions for possible collaboration be-tween COSPAR and ISSI-BJ?

Answer: There is now a new collaborative effort led by Wu Ji between ISSI-BJ and COSPAR's Task Group on Constellations of Small Satellites. I consider this is an excellent example of how we can collaborate. The Task Group concept is now an important tool for performing CO-SPAR's mission of the promoting international cooperation. There will be additional Task Groups and we should consider using them as a means to collaborate. COSPAR obviously has excellent relationships with China and with the United States, but these nations do not have even good relationships with each other. As in the answer to question No. 4, ISSI-BJ could serve a unique role in helping to bridge this gap.

Interview with Prof. Guenther Hasinger

Prof. Günther Hasinger took up duty as the Director of Science (D/SCI), and Head of ESAC, near Madrid, Spain, on 1 February 2018.Günther Hasinger was born in Oberammergau, Germany, in 1954. He received his physics diploma from Ludwig Maximilian University (LMU) of Munich, and in 1984, he earned a PhD in astronomy from LMU for research done at the Max Planck Institute for Extraterrestrial Physics (MPE).

After visiting lectureships in the USA, he returned to Germany to take a position at the University of Potsdam. He served as director of the Astrophysical Institute Potsdam from 1994 to 2001. In 2001, he was appointed as a scientific member of the Max Planck Society, and as the director of the High Energy Group at MPE.

In 2007, he spent four months at the Institute for Astronomy (IfA) at the University of Hawaii while on sabbatical, and in 2008 he became scientific director at the Max Planck Institute for Plasma Physics (IPP), the position he relinquished to become the Director of the IfA.

Günther Hasinger has received numerous awards for his research and scientific achievements, including the Leibniz Prize of the Deutsche Forschungsgemeinschaft, the most significant research prize in Germany, and the international Committee on Space Research (COSPAR) Award for his outstanding contributions to space science. He is a member of the Academia Europea, the Berlin-Brandenburg Academy of Sciences, and Leopoldina (the German National Academy of Sciences), and an external member of the Austrian Academy of Sciences.

Günther Hasinger has also played a key role in the operation of X-ray satellites and the development of future observatories. When the attitude control system of ROSAT, a joint German/UK/US X-ray and ultraviolet satellite, failed soon after launch in 1990, Prof. Hasinger was instrumental in developing a new control system that enabled the satellite to continue its mission.

He has also held several important national and international responsibilities, such as the chair of the Council of German Observatories and the president of the International Astronomical Union Division on Space and High Energy Astrophysics. He played a significant role in improving the financial constraints of basic space research in Germany and Europe.

In addition to writing numerous scientific papers, Günther Hasinger is the author of an award-winning book, Schicksal des Universums, which explains astrophysics and cosmology to a wider audience (with an extended English version called Astronomy's Limitless Journey: A Guide to Understanding the Universe), and the winner of the Wilhelm Foerster Prize for

public dissemination of science in 2011.

1. You were the Director of the Astrophysical Institute Potsdam (1994-2001) before assuming the leadership role of two Max-Planck Institutes, namely, MPE (2001-2008) and IPP (2008-2011), respectively. How did you manage to do that? Is there a secret recipe for scientific leadership?

My PhD supervisor Joachim Trümper, along with several other distinguished colleagues, like Riccardo Giacconi, Maarten Schmidt and Yasuo Tanaka were important mentors for me, not only supporting me through-out my career, but also entrusting me with important responsibility early on. I was made responsible for the ROSAT Deep Surveys, which practically resolved the X-ray background into discrete sources. That gave an important push for my international recognition.

2. And then you left Europe to take up the Directorship of the Institute of Astronomy, University of Hawaii, what made you do that? You must have something big in mind with optical astronomy in addition to X-ray astronomy. What could that be?

In order to identify the extremely faint sources of the X-ray background as Active Galactic Nuclei shining across comic time, we had to do spectroscopy on the largest telescopes in the world. I got my education as optical observer at the Palomar 5m telescope, and at the two Keck telescopes in Hawaii. That made me fall in love with Hawaii throughout the years 1995-2010. As soon as I had concluded my most important leadership assignment at the Max-Planck-Institute for Plasma Physics (i.e. helping that the funding of fusion research continues in Germany and Europe), I felt free to apply for my dream job at that time at the University of Hawaii. Combining multi-wavelength information to better understand cosmic X-ray sources has always been an important element of my research.

3. And now you are back in Europe serving as Director of Science of the European Space Agency since 2018. You must have something even bigger in mind. Can you tell us briefly about your vision?

While I love ground-based observing, I am a space scientist at heart. I always admired the ESA Science Programme and previously played several roles in its scientific advisory structure. For example, I had a leadership role in the genesis of the next L-class X-ray observatory ATHENA, which at earlier times started as XEUS and later IXO. To be at the helm of this programme now, and being able to shape its future, is arguably one of the most exciting and gratifying responsibilities you can imagine. I have the honor to implement a large fraction of the Cosmic Vision strategic plan. We have successfully launched BepiColombo, CHEOPS, Solar Orbiter, and now JWST. And I hope to also complete JUICE and Euclid, while advancing on PLATO and ARIEL. We were able to introduce a completely new program element, the F-mission Comet Interceptor, and also kicked off the new Voyage 2050 strategic plan. A new dream is emerging: the "inspirator" to land on an icy moon in the solar system to search for life and possibly bring back a cryogenic sample.

4. In this grand vision, how important is international cooperation? Since it is a long-term plan, how do you see the potential involvement and participation of countries on the other side of Eurasia, that is, China, India and Japan?

For ESA, and the Scientific Programme in particular, international cooperation is one of the essential backbones and founding principles. We have the luxury to be able to cooperate with any space faring nation in the world. Obviously, NASA with its very large flagship programs like Hubble, Cassini/Huygens and JWST is our prime international partner. But we also have very intense international cooperation with Japan, China and Russia. We are open to expanding these types of cooperation also to India and other upcoming international players. From experience we know, that even in a tense political climate, scientific cooperation can be very fruitful and can build important bridges.

5. As you know, ISSI-Beijing was established to promote international cooperation in space science covering different related disciplines and to take advantage of the rapid progress of the space program of China. However, it is not always easy because of cultural differences and even political considerations. Can you tell us how can ISSI-Beijing do better under these conditions since you have such rich experience in leading major projects in the context of multinational and multi-cultural environment?

From my point of view, it is extremely important to build up trustful personal relations between international partners. Many important decisions, checks and balances can only be achieved in face-to-face conversations on equal footing. One of the biggest drawbacks of the current pandemic situation is that we cannot visit our international partners. The danger is that important nuances get "lost in translation". As long as you personally know and trust your partner from former meetings, this is o.k. for a while. But it is impossible to develop new relations or to start significant new projects. Therefore, a place like ISSI-Beijing is an important cooperation hub.

6. To follow up the above question, one is led to think that ESA's support is very critical because European scientists are in a unique position to help bring different players together to ISSI-BJ, whether East and West, or North and South. We hope very much that bringing harmony to space exploration is also an important element of the Voyage 2050 program as we look towards the future. Is that right?

We are indeed in a privileged position to be able to offer a venue, where different players can come together on more neutral ground. As soon as personal travel will be less limited, we hope to continue to foster such a dialogue. Voyage 2050 will clearly be an important element here. But even cooperation among different missions currently in the pipeline, be it e.g. the Dark Energy/Dark Matter missions, or the armada planned for Venus exploration in the next decade, could bring substantial synergies.

7. Thank you so much for your valuable suggestions and wonderful ideas, Professor Hasinger. By the way, ISSI-BJ will celebrate its 10th anniversary next year in 2023. We heartily welcome you to attend the scientific symposium that is under planning with a view to reconnect and meet new friends. Many thanks in advance.

In addition, we want to specifically mention that ISSI-BJ and ESA will jointly organize the upcoming ESA-China Advanced Mars School, one of the most important events for ISSI-BJ.

Thanks for your support in this event and we look forward to the successful organization of this training program.

Interview with Prof. Saku Tsuneta

1983	Earned Ph.D. at the University of Tokyo
1983	Japan Society for the Promotion of Science Postdoctoral Fellow
1986	Assistant Professor at Tokyo Astronomical Observatory, University of Tokyo
1988	Assistant Professor at the Institute of Astronomy, the University of Tokyo
1992	Associate Professor at the Institute of Astronomy, University of Tokyo
1996	Professor at the National Astronomical Observatory of Japan (NAOJ)
2005	Director of the Advanced Technology Center, NAOJ (until 2013)
2007	Director of the Hinode Science Center, NAOJ (until 2013)
2013	Board Director of the Japan Aerospace Exploration Agency (JAXA) / Director General of the Institute of Space and Astronautical Science (until March, 2018)
2018	Director General of NAOJ / Vice President of the National Institutes of Natural Science
2022	Director General of NAOJ / Executive Director (Vice President) of the National Institutes of Natural Science

1. You must be very proud of your scientific heritage. Can you tell us was there any crucial juncture that determined your interest and direction of research interest in the Sun?

When I entered the graduate course in astronomy in 1978, Japan did not have any world-class, large astronomy facilities. I was interested in astronomical magnetohydrodynamics; and the Sun, because of its proximity, is a good target to study the interaction between the magnetic fields and plasmas.

Astronomy develops through larger photon collecting area (larger telescopes) and higher spatial resolution. Any future facilities which bring new discoveries have to go in that direction. I thought that the Sun is bright enough that we can concentrate on high spatial resolution without need of a large instrument. My strong scientific interest was to understand the magnetohydrodynamics of the Sun, such as coronal heating, solar flares, dynamos, and solar wind. I also had a strong interest in building something that no one else had ever realized. These multiple factors drove me to pursue the solar observations from space.

Incidentally the late Prof. Minoru Oda, a prominent X-ray astronomer, and his x-ray astronomy group at the Institute of Space and Astronautical Science (ISAS) developed a plan to image solar flares in hard X-rays with the modulation collimator that Prof. Oda invented. I was fortunate enough to be invited to participate in the team as a graduate student. So, pieces of the puzzle fit themselves together, and this set the stage for my career over the subsequent 40 years. That hard X-ray solar observation satellite Hinotori (firebird) was launched in 1981 and successfully imaged many solar flares in hard X-rays for the first time.

2. Your impressive scientific leadership and management roles cover both JAXA in space science and NAOJ in astronomy. You must have a very unique understanding of science making or making science. So, can you tell us if science is driving technology, or technology is driving science with the three great observatories (Subaru, ALMA and TMT) in mind?

Personally, I wanted to analyze the data to find something new from instruments that I developed myself. This is ambitious and maybe a bit arrogant on my part. Obviously, this is becoming difficult these days. It is clear to me that the big questions in science drive everything else and should come first. In this regard, science is driving technology.

But the story may not be so simple. Scientists and engineers may develop some very interesting technology and instruments, which led to new discoveries in astronomy. History tells that this is the case. It is important to have strategic technology development programs based on science questions. We also need to pay attention to seemingly unrelated developments in the private sector which may drive science.

3. JAXA's exploit of solar system exploration in a cost-effective manner is legendary. Can you tell us your secret recipes that we always want to know?

When I assumed the position of director general of ISAS, there were multiple pillars for the institute: solid booster development, planetary exploration, and astronomy. ISAS had a long history for developing solid boosters for launching the scientific satellites, and this brought the glorious success of ISAS in the 1980s - 2000s. I tried to change ISAS from an 'institute for booster development'to an'institute for planetary exploration' with an eye towards the future of ISAS and JAXA. This meant that the institute put more emphasis on planetary exploration where scientific professors and engineering professors can work together.

This led to the development of a series of planetary science missions such as Hayabusa2 for asteroid sample return, Arase for geo-space observations, SLIM for precision Moon landings, MMX for Phobos sample-return, DESTINY for 3200 Phaethon flyby with interplanetary dust-observations, and the construction of the new deep-space antenna. ISAS is becoming an institute for solar system exploration with related research areas such as astronomy, while the vehicles are mainly developed in another division of JAXA.

4. May we ask what might be the most serious crises (if any) in your scientific projects or space missions? How do you overcome them?

I happened to be in my office on one Saturday to do some paperwork. It was a sunny, comfortable afternoon. A phone rang, reporting to me that there was no telemetry signal from the newly-born X-ray astronomy satellite ASTRO-H Hitomi during the scheduled contact time, and there might be some ground system problem. Ninety-six minutes later, there was another call that there was again no signal from the satellite. With that phone call, I declared an emergency following the predetermined procedure. People tried to recover the satellite without success.

I tried to clarify the root causes of the problem, and in the process established a better system for the development of complicated, first-of-their-kind scientific satellites and probes. I do hope that as the result of this tragedy, ISAS and JAXA became stronger. While considerable money was lost, my biggest regret is the wasted time and effort of people in the US and Japan. A considerable number of people had been working on the project for more than 10 years, some of them as long as 20 years. No effort should be spared to prevent any failure in space programs.

5. It is wonderful that Japan and China are working together on the Thirty-Meter Telescope project together with the United States, Canada and India. Do you see any potential joint projects beyond TMT in near future, either on the ground or in space?

The world is advancing and changing rapidly right now. No one can predict what the future will bring. But when we look at current projects, there are certainly many examples of astronomy working across political boundaries in the Asia-Pacific region.

You mentioned the optical-infrared telescope TMT. Also, radio telescopes in China, the Republic of Korea, and Japan are working together in the East Asia VLBI Network to conduct high-resolution observations that no one partner could achieve alone. Through the East-Asian ALMA (the Atacama Large Millimeter/submillimeter Array) Regional Center (EA-ARC) located in Tokyo, scientists in Taiwan and the Republic of Korea are participating in ALMA in Chile. The East Asian Observatory (a collection of five institutions in East Asia) is now operating the James Clerk Maxwell Telescope in Hawai`i. If funding and other circumstances allow, I would certainly like to see collaborations like these continue.

6. The mutual understanding and trust among young people, especially young scientists, are the basis of long-lasting cooperation and friendship, and hence stability and sustainability in the scientific and social environments. The promotion of such spirit is the main task of ISSI-BJ. Any advice on what we should do more so that our program can be more effective in this aspect?

Science advances through the exchange of ideas. At the same time, space science is funded by national budgets as part of a national strategy. So, in this era of turbulence in the world, the relationships between nations must necessarily have an impact on space science collaboration between countries. When the international situation is such that research exchange and collaboration for the mutual benefit of both nations is possible, we appreciate such good relations that allow collaboration in space science. We first need to foster an environment conducive to such collaboration. That is how the world should be, how I feel it must be.

Toward such direction, it is important to maintain communication channels across the political boundaries. International workshops and lectures play an important role in helping young scientists to network. I have had good experiences with ISSI in Bern. I attended workshops on solar astronomy back in the 1990s -2010s. They had lasted two or three days. ISSI paid for the hotel and per diems. This was a very good arrangement for young researchers. Perhaps best of all, ISSI did not interfere with the content of the workshops at all; the organizers had total control.

I would encourage ISSI-BJ to continue to operate in the spirit of the home office in Bern. And at the same time, look for scientific opportunities unique to the Asia-Pacific region. Everyone knows that space science is important to the future of Asia; and I like to think that Asia is important to the future of space science.

7. I saw a comment in your article (Open Access Government, Issue 32, page 274, October 2021), that twenty-first century astronomy is founded on collaboration across political boundaries and traditional boundaries between research fields. This can almost be taken up as the motto for ISSI-BJ. We hope very much that with the participation of scientists in Japan, ISSI-BJ can fulfill its promise as an advanced institute for outstanding space science on the basis of international cooperation and neutrality. Thank you in advance.

Interview with of Prof.essor Clive Neal

Institute:

Department of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame

Biography:

Postdoctoral Research Associate, University of Tennessee, Knoxville - 1986-1990
Assistant Professor. University of Notre Dame. 1990-1996
Associate Professor. University of Notre Dame. 1996-2007
Professor. University of Notre Dame - 2007-Present

Areas of Interest:

My research uses petrology, geochemistry, and more recently geophysics to investigate the origin and evolution of the Moon and large igneous provinces, i.e., “supervolcanoes.” In recent years I have become more active in human space exploration, primarily on the Moon, but with the goal of getting humans further out into the Solar System. Current research areas include:

Human exploration of the Moon
Origin and Evolution of the Moon
Lunar Basalt Petrogenesis through Crystal Stratigraphy
Formation of Impact Melts
Geophysical Instrumentation and Investigations of the Moon
Origin and Evolution of Large Igneous Provinces
Evaluation of lunar resources and utilization

1.To begin with, can you tell us your interesting story of journeying from Leeds to Notre Dame all because of the Moon?

During my undergraduate degree at the University of Leicester, UK, I became really interested in mantle petrology. That led me to apply for a PhD studentship to work with Prof. Peter Nixon at the University of Leeds, UK, to work on kimberlite-like intrusives in the Solomon Islands, SW Pacific. In. fact, undertaking the fieldwork in the Solomon Islands was the first time I had actually flown anywhere and it was from London to Sydney, Australia! That study led me to apply for a multitude of post-doctoral fellowships in the United States, but at the end of 1985 the only offer I had was a temporary lectureship for one semester, at the University of East Anglia, UK. While there, I received an offer from Prof. Larry Taylor at the University of Tennessee, Knoxville, for a 2-year post-doctoral research fellowship, which was amazing because I had never applied to the University of Tennessee! I had come in second for a post-doc with Prof. Mike Drake at the University of Arizona and Larry needed a post-doc quickly and Mike gave Larry my CV. This post-doc was primarily focusing on mantle petrology with about 20% focused on Apollo samples. This was my introduction to the Moon. I arrived in Knoxville on July 2nd , 1986, and immediately fell in love with lunar petrology and all things to do with the Moon. While my intention was to return to the UK after my post-doc to go into academia, the Prime Minister at the time, Margaret Thatcher, had experimented with UK universities and reorganized geology into centers of excellence for research and teaching. I wanted to do research but the positions were very few and this was before the age of the internet so I was relying on seeing position advertisements in nature, Eos, etc. Basically, my route back to the UK was switched off. Larry extended my post-doc for another 2 years and I eventually got a job at the University of Notre Dame, where I have just completed my 32nd year.

2. Of course, I asked this because many scientists and engineers have been a part of such "brain drain" movement. Do you think this is why the USA is so successful in science and technology?

Being accessible to new ideas from multiple sources makes for robust science and exploration in science/technology programs. The United States has offered me more opportunity in space science and exploration than the UK ever could, so I would say "yes" to your question. I would also say that the United States has been very welcoming to me and now as a U.S. citizen, and I have made it my home.

3. Science is global and this is why outstanding scientists tend to congregate at places allowing ideas to flourish and cooperation to take place. You have mentioned many times that for lunar science to sustain it must be international in nature. Can you elaborate a little on this point?

I would say that for lunar science AND EXPLORATION to be sustainable, the world must go forward together. Remember – science enables exploration and exploration enables science. From what we have learned about the Moon and now with aspirations to have human permanence (as stated in the current U.S. Space Policy), no one country can afford to do this on their own. For example, lunar resources have been called out by NASA as key for a sustained/continuous human presence on the Moon, and as being foundational to stimulating a vibrant cislunar economy. However, we do not know if the resources we know are there in sufficient quantity and can be extracted, refined, and used economically – basically the term"resource" has been used when "reserve" is what is meant. And while a number of missions are scheduled to examine the poles for volatile deposits, no coordinated lunar resource prospecting campaign has been devised and implemented to show if these resources are reserves. This has to be international in nature because the Moon is, in fact, large. For example, Brown et al. (2022 – Icarus 377, Article 114874) used 10 orbital datasets to define the top ten best permanently shadowed polar regions for containing water ice, and this covers an area of >6,000 km2! That is a lot of real estate to cover and no one country/agency can do this effectively.Therefore, this campaign is perfect for international collaboration, cooperation, and diplomacy in an era that so desperately needs this!

4. What are the most important lunar science projects to be carried out within the next decade to prepare for human settlement on the Moon?

Two projects stand out, at least for the U.S. view point – returning samples from the South Pole – Aitken Basin to try and get an age of the basin, and establishing a long-lived, globally distributed geophysical network to understand the internal structure (as the Moon preserves the initial differentiation of terrestrial planetary bodies via a magma ocean). In addition, the global datasets that we now have of the Moon have indicated important areas for sample investigations, either in situ or via sample return. Sample return produces the"gift that keeps on giving" as seen by the Apollo 15 and 17 volcanic glasses, collected on the Moon in 1971 and 1972, respectively, but it wasn't until 2008 that it was shown these were derived from a relatively volatile-rich source. This discovery changed our view of the Moon! So more samples from targeted areas (e.g., the silica-rich Gruithuisen Domes) will enable many decades of scientific investigation, if the samples are in the kilogram quantities and are properly curated.

Perhaps the most important scientific project is how the human body tolerates one sixth gravity and the radiation environment. We have no data regarding how humans will react to living in partial gravity. We have a lot of data regarding how microgravity adversely affects the skeletal structure and the muscle system, so sending humans to Mars will be challenging. Is one sixth gravity enough to reverse bone density loss and muscular atrophy? This could be enabling for developing a Mars transportation system but we need humans on the Moon for months and years in order to understand this in sufficient detail to make definitive conclusions.

5. What is your vision of lunar science and exploration in the longer term, say, 20 years from now? How big a part would international cooperation play in this endeavor?

As noted above, the most immediate need is a coordinated international lunar resource evaluation campaign. If we start with polar water ice and show the resources are, in fact, reserves and space agencies commit to human permanence on the Moon, a market for life support consumables and liquid oxygen-liquid hydrogen rocket fuel will become available. This could bring the Moon into our economic sphere of influence and generate new jobs and new technologies that would show human space exploration has a direct benefit to society here on Earth. THIS is the way to make human space exploration sustainable – by showing it benefits society here on Earth.

The coordinated international lunar resource evaluation campaign also benefits multiple stakeholders as shown in the figure to the left. The basic data (green text) will inform science, exploration and commercial activities and represent the majority of the data that should be returned from any lunar prospecting mission to explore polar volatiles or any other lunar resource. Such a campaign is enabling for many new scientific investigations, developing human exploration architectures, and business plans for commercial companies.

6. You have good contacts with the Chinese lunar researchers, sometimes, better than among themselves, I think. Do you have any scientific advice or suggestions to them and to the lunar and deep space exploration program as a whole? Do you see room for building up international cooperation?

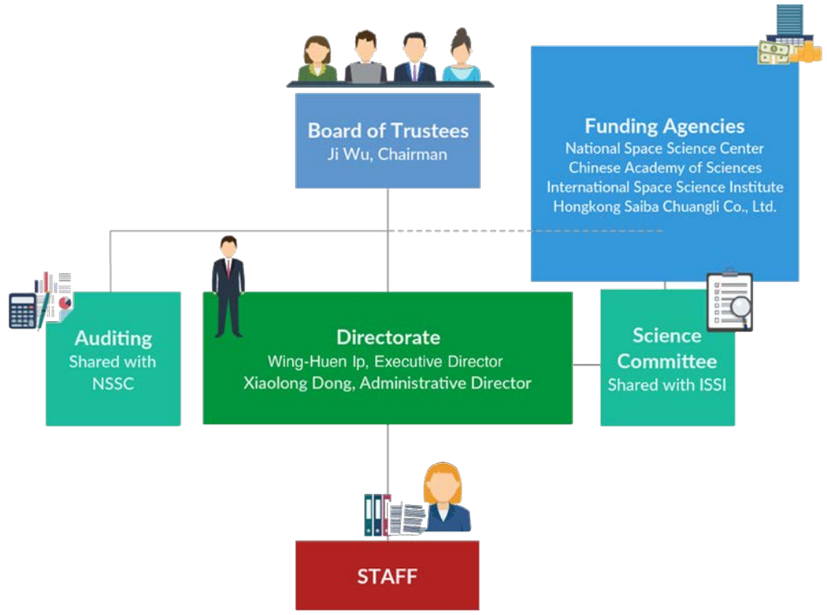
My advice to the Chinese lunar scientists is to keep communication and data sharing open. The Lunar List Serve (known as the Lunar-L) that I run has almost 1100 subscribers worldwide, many of whom are from China. This email list serve allows information regarding lunar science and exploration to be shared easily and quickly. By regularly communicating and sharing data trust can be built up and collaborations can be established. So, I would say that as humans strive to become a multi-planetary species, cooperation and collaboration are the key to success. In taking our first steps out of this planet in the 1960s and 1970s, it was done in a spirit of competition and once that competition was won, the program lasted less than four

years. The International Space Station has been conducted in a spirit of cooperation and has been going for over 20 years. I hope this new focus on the Moon will allow cooperation and diplomacy to prevail and that we can go out into the Solar System as a species rather than as individual countries.

7. The guiding principles of ISSI-BJ are to be a neutral platform in promoting excellent space science research via international cooperation. Sometimes it is easy to do so but sometimes (like now because of the COVID-19 pandemic and some other factors) it is not. Any wise words on how we can do better, perhaps, with your help?

I applaud and fully support ISSI-BJ for following cooperation, given my comments above. But I truly believe that in-person meetings are better than Zoom meetings for developing relationships, trust, and serendipitous collaborations through informal discussion over coffee breaks and dinners. I hope that in the future there will be an opportunity to have an in-person "Space Exploration Summit" where an international array of space exploration enthusiasts (from government, industry, and academia) can meet and discuss potential collaborations. Facilitating cooperation is essential as we move forward together to better understand our Solar System and become a multi-planet species.

ORGANIZATION STRUCTURE



Board of Trustees

The Board of Trustees supervises the work accomplished at the Institute, exerts financial control, and appoints the Directors. It consists of representatives of the Founder and the funding agencies. The Board of Trustees is presided over by Ji Wu.

Directorate

The Directorate is in charge of the scientific, operational, and administrative management of the Institute. It interacts with the Funding Agencies, the Board of Trustees, and the Science Committee.

Until the end of 2019, the Directorate consisted of the Executive Director, Prof. Maurizio Falanga, and the Administrative Director, Prof. Xiaolong Dong. Prof. Wing-Huen Ip is the ISSI-BJ's Executive Director since June 2020.

Science Committee

The Science Committee is shared with ISSI and is made up of internationally known scientists active in the field covered by ISSI-BJ and ISSI.

Chaired by Louise Harra, the Science Committee advises and supports the Directorate in the establishment of the scientific agenda providing a proper equilibrium among the activities and reviews and grades the International Team proposals in response to the annual call.

Science Committee members serve a three-year term with a possible extension of one year.

BOARD OF TRUSTEES & STAFF

The Board of Trustees oversees the work accomplished at the Institute, exerts financial control and appoints the Directors. The members of the Board are representatives of the funding institutions

Chairman of the Board of Trustees

· Prof. Wu Ji, National Space Science Center, CAS, China

Members of the Board of Trustees

· Prof. Georges Meylan, Ecole Polytechnique Federale de Lausanne, Switzerland

· Mr. Karl Bergquist, Administrator for the International Relations Department, European Space Agency

· Prof. Roger Bonnet, International Scientist, France

· Prof. Alvaro Gimenez, International Scientist, Spain

· Prof. Wang Chi, Director-General, National Space Science Center, CAS, China

· Prof. Yu Qi, Asia-Pacific Space Cooperation Organization

· Prof. Zhang Shuangnan, Institute of High Energy

Physics, CAS, China

· Prof. Wang Zhenyu, Deputy Director-General, Bureau of International Cooperation, CAS, China

Ms. Li Xiaoyu, Secretary, National Space Science Center, CAS, China

ISSI-BJ Current Directors

· Prof. Wing-Huen Ip, Executive Director of ISSI-BJ

· Prof. Dong Xiaolong, Administrative Director of ISSI-BJ

Staff

Wing-Huen IP, Executive Director

Xiaolong DONG, Administrative Director

Lijuan EN, Assistant to Executive Director

Xiaoyu LI, Deputy Administrative Director

Yinong LI, Acting PR & Editorial Manager

DISCIPLINE SCIENTISTS

Jie JIANG

Jie JIANG is a professor and Ph.D. advisor at Beihang University, Beijing, China. In 2007, she received her Ph.D. in Astrophysics from the National Astronomic Observatories of the Chinese Academy of Sciences. Her research focuses on the physical forecast and generation mechanism of the solar magnetic cycle, its long-term changes, and effects on the heliospheric magnetic field, as well as stellar magnetic activities. She is currently a co-leader of a pillar of the SCOSTEP/PRESTO program and co-chair of the Solar Orbiter working group on Solar Dynamo and Cycle

Takehiko Satoh

Takehiko Satoh is a professor at the Department of Solar System Sciences, Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency (JAXA). After receiving his Ph.D. from the Science University of Tokyo in 1992, he started his study of Jupiter's infrared auroras, magnetospheric, and atmospheric activities. His research interests also cover Mars and Venus and their atmospheres, in particular. Since 2001, he is involved in Japan's Venus orbiter mission, Akatsuki. He is the PI of the IR2 near-infrared camera and, since 2016, the mission's Project Scientist. He is also a senior member of the Council of Asia Oceania Geosciences Society (AOGS), currently filling the role of Assistant Secretary-General.

Jiancheng SHI

Jiancheng SHI (Fellow, IEEE) received the B.S in Hydrological Geology and Geological Engineering from the University of Lanzhou, China, in 1982, and his M.S. and Ph.D. degrees in Geography from the University of California at Santa Barbara (UCSB), CA, USA, in 1987 and 1991, respectively. He subsequently joined the Institute for Computational Earth System Sciences, UCSB, as a Research Professor. He has worked as a PI for more than ten research projects for NASA, five projects for ESA, and four projects for JAXA. In 2010, he became the Director and a Senior Research Scientist at the State Key Laboratory of Remote Sensing Science, sponsored by the Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, and Beijing Normal University, Beijing, China. He is currently the PI of the Water Cycle Observation Mission (WCOM). He has authored or coauthored more than 200 articles in journals and conferences. His current research interests include microwave remote sensing of water cycle-related components and data assimilation. Dr. Shi is a fellow of the Electromagnetics Academy and the Society of Photo-Optical Instrumentation Engineers (SPIE).

Maurizio Falanga

Dr. Maurizio Falanga received his degree in Theoretical Physics and Astronomy at the University of Basel, Switzerland. Afterward, he obtained his Ph.D. degree in Astrophysics from the University of Rome “La Sapienza”. After his Ph.D., he held various Post-doc positions, e.g., CEA-Saclay, Service d'Astrophysique (High Energy Division), Paris. His research interest is mostly focused on accretion and emission in neutron stars, white dwarfs, and black holes. He is also involved in the Einstein Probe mission led by CAS. Since 2009, he is the Science Program Manager at the International Space Science Institute (ISSI) in Bern, Switzerland, and starting from August 2021, he is a Director at ISSI in Bern and a Professor at the University of Bern.

Ekkehard Kührt

Dr. Ekkehard Kührt obtained his Ph.D. degree in Physics at the Humboldt-University Berlin, Germany. He held postdoc positions at the East-German Institute of Cosmic Research, at the Max-Planck Institute of Aeronomy in Lindau, and the Southwest Research Institute in San Antonio, Texas. From 1997 to 2020 he was the Head of the Asteroids & Comets Department at the Institute of Planetary Research of German Aerospace Center (DLR) in Berlin. Today he is engaged at the DLR Institute of Optical Sensor Systems and as a Senior Researcher at the China Academy of Space Technology (CAST). His main research topics are planetary physics, formation and evolution of solar systems, asteroids and comets, infrared radiometry, and environmental applications of space missions. Dr. Kührt has been involved in numerous space projects as the Russian Phobos and VEGA missions, the ESA missions Rosetta, BepiColombo, Comet Interceptor and HERA, the NASA Deep Impact mission, the JAXA Hayabusa-2, and MMX missions. As DLR project leader “Rosetta Instruments” he was responsible for all scientific contributions of DLR to this ESA cornerstone mission. As first or co-author, Dr. Kührt has published over 250 peer-reviewed papers in journals to planetary sciences. He was honored with the “Humboldt-Award” of HumboldtUniversity, the “Research Award for young scientists” of Leopoldina-Academy, the “Innovation Award” and the “Otto-Lilienthal-Award” of DLR with a research stay at ISSI Bern, the “Space Technology–Hall of Fame Award” of US Space Foundation and the “Award for Public Engagement with Planetary Science” of Europlanet. In 2019 he was a successful applicant for PIFI (President's International Fellowship Initiative) of the Chinese Academy of Sciences (CAS).

Kanako Seki

Kanako SEKI is a professor at the Department of Earth and Planetary Science, Graduate School of Science, University of Tokyo. She received her doctorate in science from the University of Tokyo in 2000. She have conducted integrated studies based on combination of observations and numerical simulations. Her research interests lies on understanding of universal space plasma processes, space weather phenomena such as aurora and geospace variation, and atmospheric escape mechanisms as well as its effects on habitable environment of terrestrial planets. She have participated in various terrestrial and planetary space missions such as Geotail, ERG, MMS, MAVEN, and BepiColombo. She is the current section president of the Space and Planetary Sciences Section of JpGU (Japan Geoscience Union) and Associate Editor for the Geophysical Research Letters.

Kevin Heng

Kevin Heng is a professor at the Faculty of Physics of the Ludwig Maximilian University (LMU) of Munich, Germany, where he leads the Chair (sub-department) of Theoretical Astrophysics of Extrasolar Planets. The Chair takes an interdisciplinary approach to the study of exoplanets (adapting and innovating methods from astrophysics, planetary science and the geosciences), focusing especially on their atmospheres as the only empirical window into the chemistry of exoplanets. He was previously the director of the interdisciplinary Center for Space & Habitability at the University of Bern, Switzerland. He obtained his Ph.D in astrophysics from the University of Colorado at Boulder, U.S.A., and spent three years at the Institute for Advanced Study in Princeton, including a year as its Frank & Peggy Taplin Member. He was the holder of an European Research Council (ERC) Consolidator Grant (2017-2023). He wrote the second textbook on exoplanetary atmospheres ("Exoplanetary Atmospheres: Theoretical Concepts & Foundations"), which was awarded the 2018 Chambliss Astronomical Writing Award of the American Astronomical Society. He maintains active conversations with geoscientists and philosophers of science.

SCIENCE COMMITTEE

The Science Committee is shared with ISSI Headquarters.

It is made up of internationally renowned scientists. Their duties include the evaluation of the scientific team proposals from the Annual Call.

MEMBERS OF THE SCIENCE COMMITTEE:

Chair: Louise Harra, PMOD World Radiation Center, Davos, Switzerland
Secretary of the Science Committee: Mark Sargent, International Space Science Institute, Bern, Switzerland

Elena Amato, INAF, Osservatorio Astrofisico di Arcetri, Firenze, Italy

Svetlana Berdyugina, Leibniz Inst. für Sonnenphysik, Freiburg, Germany

Emeline Bolmont, Obs. of Geneva, University of Geneva, Switzerland

Roberto Bruno, IAPS, INAF, Rome, Italy

Peng-Fei Chen, Nanjing University, China

Frédéric Courbin, EPFL, Observatoire de Sauverny, Versoix, Switzerland

Xiaolong Dong, International Space Science Institute Beijing, Beijing, China (ex officio)

Lisa R. Gaddis, Lunar and Planetary Institute, Houston, TX, USA (ex officio LPI/NASA)

Vladislav Izmodenov, IKI, Russian Academy of Sciences, Moscow, Russia (ex officio RAS)

Emmanuelle J. Javaux, Université de Liège, Belgium

Catherine L. Johnson, University of British Columbia, Vancouver, Canada

Karl-Ludwig Klein, Observatoire de Paris, LESIA, Meudon, France

Benjamin Koetz, ESA ESRIN, Frascati, Italy (ex officio ESA)

Philippa J. Mason, Imperial College London, United Kingdom

Mark McCaughrean, ESTEC ESA, Noordwijk, The Netherlands (ex officio ESA)

Céline Péroux, ESO (European Southern Observatory), Garching, Germany

Imada Shinsuke, University of Tokyo, Japan

Karina von Schuckmann, Mercator Océan, Ramonville Saint-Agne, France

Endawoke Yizengaw, Aerospace Corporation, Los Angeles, CA, USA

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International Space Science Institute

Chinese Academy of Sciences (CAS)

National Space Science Center (CAS)

European Space Agency

Space Research Institute (IKI) of the Russian Academy of Sciences

Asia-Pacific Space Cooperation Association

FINANCIAL OVERVIEW

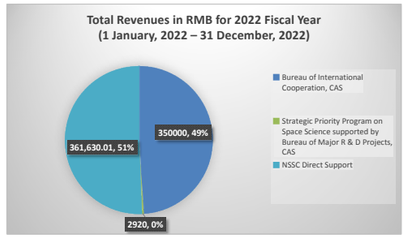
In the 2022 fiscal year, from 1 January, 2022 to 31 December of 2022, ISSI-BJ was operated with the total revenue of 714,550.01 RMB and the total expenses were 515,937.29 RMB, thus, the surplus is 198,612.72 RMB.

The funding includes: direct financial support of 350,000.00 RMB from the Bureau of International Cooperation of Chinese Academy of Sciences (CAS) as international organization project for ISSI-BJ activities; project fund of 2,920.00 RMB from the Strategic Priority Program on Space Science supported by the Bureau of Major Research and Development Programs of CAS for activities; and the direct support of 361,630.01 RMB from the National Space Science Center (NSSC) for expenses on premises facilities and 1 staff's salary. The NSSC in-kind support, including the use of premises, financial management, IT support and support for administrative director, is not included in the statistics.

The expenses include: expenses on the salary of 1 staff member; other daily operating and maintaining expenses. The expenses of premises use, administrative expenses, salary of administrative director for ISSI-BJ activities, which are in-kind support from NSSC, are not included

Total Revenues in RMB for 2022 Fiscal Year (1 January, 2022 – 31 December, 2022)

Funding Sources	Amount
Bureau of International Cooperation, CAS	350,000.00
Strategic Priority Program on Space Science supported by Bureau of Major R & D Projects, CAS	2,920.00
NSSC Direct Support	361,630.01
Total	714,550.01

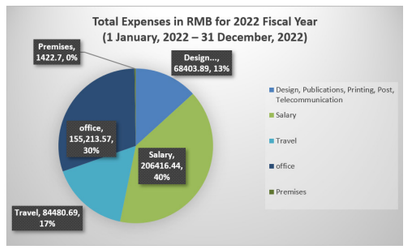


Operating Expenses in RMB for 2022 Fiscal Year (1 January, 2022 – 31 December, 2022)

Expenses	Amount
Design, Publications, Printing, Post, Telecommunication	68,403.89
Salary[1]	206,416.44
Travel	84,480.69
Premises	1,422.70
Office (water, electricity, heating, telephone, etc, NSSC Direct Support)	155,213.57
Total	515,937.29

Remarks:

1Salary includes the salaries for 1 staff (salary for administrative director is not included).



FACILITIES

ISSI-BJ office is located in the Building A at the Zhongguancun campus of the National Space Science Center, Chinese Academy of Sciences (NSSC, CAS).

The new 205 m2 ISSI-BJ facilities include one small meeting room (suitable for up to 12 participants) with a coffee break area, as well as a library with all ISSI-BJ and ISSI publications, and one big meeting room (suitable for up to 36 participants).

The three attached office rooms, equipped with laptops, fast internet connection, printer and paper shredder, offer space for the ISSI-BJ staff members, as well as for the visiting scientists.

ISSI-BJ main office space with a small meeting room and office rooms attached

Furthermore, ISSI-BJ shares its conference facilities with the National Space Science Center of the Chinese Academy of Sciences. The facilities are composed of six seminar rooms (20-30 participants each), two lecture halls (up to 100 participants each), and one multimedia conference hall (30 participants). All rooms are equipped with overhead projectors for large screen presentations and high speed wireless network connection.

Saturn Hall meeting room

Coffee break area

Small library

INTERNATIONAL SPACE SCIENCE INSTITUTE IN BERN

About ISSI

The International Space Science Institute (ISSI) was created by space pioneer Professor Johannes Geiss in Bern (Switzerland) in 1995. Since then, the institute offers scientists from all around the world a platform to work together. On average, ISSI is now hosting around 1000 scientists per year in its activities, in the framework of International Teams, Workshops, Working Groups, or Forums. ISSI is using all these tools to address, in a strict scientific framework, controversial issues and to promote a science program related directly to the most pressing issues raised by space and Earth science missions.

Activities in 2022

In April 2022, ISSI could open its door again as most travel and meeting restrictions in Europe have been lifted. This brought a record number of 1031 scientists (in-person) plus 700 remote scientists who have participated in over 100 activities in Bern. ISSI was running 150% of its capacity.

Game Changers Online Seminars

ISSI has continued its series of webinar talks that have become known as the Game Changers Online Seminars with speakers from all over the world. In 2022 there was a line of talks on “Habitability – From Cosmic to Microbial Scales”. This was followed by a series entitled “Viewing Earth from Space – the Changing Environment and Climate of our Planet” which specifically focused on science issues of our carbon-, energy- and water cycle, crucial for a deeper understanding of the Earth as integrated system, including climate and global environmental processes and impact parameters as well as related societal challenges. In the series “Captivating Cosmology: From the Big Bang to Tomorrow” the speakers addressed our current understanding of signature cosmic epochs and constituents, and looked ahead to future missions and experiments.

The space environment is traditionally associated with hazards that can have adverse effects on humans and technology. Various strategies have been developed to mitigate them or to find ways to predict their impact. The last series in 2022 on “Space Environmental Hazards” took a closer look at the close link between space science and the societal impacts of these hazards.

The webinars were recorded and are available at www.issibern.ch/publications/game-changers-seminars/ where upcoming talks are being advertised too.

International Teams

Twenty-five new International Teams, three of which are organized jointly with ISSI-Beijing, have been selected for implementation from the proposals received in response to the 2022 Call for International Teams. Details can be found here: https://www.issibern.ch/program/teams/. 88 Team Meetings took place in 2022.

Workshops

In 2022, ISSI organized the followings Workshops:

· New Vision of the Saturnian System in the Context of a Highly Dissipative Saturn (9–13 May 2022)

· Solar and Stellar Dynamos: A New Era (13–17 June 2022)

· Magnetic Reconnection: Explosive Energy Conversion in Space Plasmas (27 June - 1 July 2022)

· Strong Gravitational Lensing (18–22 July 2022)

· Challenges in the Understanding of the Global Water Energy Cycle and its Changes in Response to Greenhouse Gases Emissions (26–30 September 2022)

· Tipping Points and Understanding EO data

needs for a Tipping Element Model Intercomparison Project (TipMip) (10–14 October 2022)

Working Groups

One Working Group started their project in 2022:

· The Variability of the Airglow for the Detection of Atmospheric Dynamics

Forums

Two Forums were organized in 2022:

· Lunar Gravitational-Wave Observation (5–6 October 2022)
· Physical Links Between Weather in Space and Weather in the Lower Atmosphere (14–16 November 2022)

Operation

Three statutory bodies interact regularly in matters of strategy, operation, finance or public relations: The Board of Trustees, the ISSI Directorate and the Science Committee. The latter gives also scientific advice to ISSI-BJ. In 2022, the ISSI Directorate consisted of Tilman Spohn (Executive Director), Maurizio Falanga (University of Bern, Switzerland), Thierry Dudok de Wit and Michael Rast and is in charge of the scientific, operational and administrative management of the institute.

More detailed information about the Institute, its program, as well as its publications can be found on the web page www.issibern.ch.