

# 10. Education

The Institute for Space–Earth Environmental Research (ISEE) primarily offers graduate programs in the Science, Engineering, and Environmental Studies schools of Nagoya University. The ISEE has its own graduate course for Heliospheric and Geospace Physics in the Division of Particle and Astrophysical Science of the Graduate School of Science. ISEE also cooperates with the Department of Electrical Engineering, through the Space Electromagnetic Environment group in the Graduate School of Engineering, and the Department of Earth and Environmental Sciences, through the Chronology and Natural History, and Global Water Cycle groups, in the Graduate School of Environmental Studies, by teaching / training graduate students in disciplines related to space–earth environmental research.

Our graduate students use various methodologies and techniques, including ground observation, fieldwork, laboratory experiments, radioactive dating, numerical simulations and modeling, and theoretical research. Their work includes the development of satellite, balloon, and aircraft instruments—and the analysis of observational data. As ISEE members conduct research that involves analyzing data captured by both domestic and international instrument platforms, and / or by collaborative research with foreign researchers, our students are actively pioneering new research fields, through their involvement with other scholars in international collaborations, and in interdisciplinary research. Their studies mature as MSc or PhD theses, which are presented at international workshops and conferences, and published in academic journals. We nurture researchers who can apply their knowledge to benefit society, who have a broad perspective, and who demonstrate an international perspective.

**Staff association between the research divisions in the ISEE and the graduate schools**

		Graduate School of Science					Graduate School of Engineering		Graduate School of Environmental Studies						
		Division of Particle and Astrophysical Science					Department of Electrical Engineering and Computer Science		Department of Earth and Environmental Sciences						
		Heliospheric and Geospace Physics					Electrical Engineering Course Space Electromagnetic Environment		Earth and Planetary Sciences Course Chronology and Natural History		Hydrospheric-Atmospheric Sciences Course Global Water Cycle				
		Atmospheric and Environmental Science (AM)	Space Science – Experiment (SSE)	Solar and Space Physics - Theory (SST)	Cosmic-Ray Physics (CR)	Heliospheric Plasma Physics (SW)	Space Observation	Information Engineering	Geochronology	Environmental History	Meteorology	Cloud and Precipitation Sciences	Atmospheric Chemistry	Hydroclimatology	Oceanography
Institute for Space–Earth Environmental Research	Integrated Studies			●				●							
	Cosmic-Ray Research				●										
	Heliospheric Research					●									
	Ionospheric and Magnetospheric Research		●				●								
	Meteorological and Atmospheric Research	●					●			●	●	●			
	Land–Ocean Ecosystem Research												●	●	
	Chronological Research								●	●					
	Center for International Collaborative Research	●	●		●		●		●					●	
	Center for Integrated Data Science			●				●	●		●	●			●
	Center for Orbital and Suborbital Observations		●		●						●	●	●		●

## Number of Students supervised by ISEE Staff

(April 1, 2020–March 31, 2021)

	M1	M2	D1	D2	D3	Undergraduate Students	Non-regular students	Total
Graduate School of Science	11	9	3	2	6	-	0	31
Graduate School of Engineering	11	8	0	0	0	-	0	19
Graduate School of Environmental Studies	11	18	3	1	7	-	6 <sup>*1 *2</sup>	46
School of Science	-	-	-	-	-	7	0	7
School of Engineering	-	-	-	-	-	11	2 <sup>*2</sup>	13
ISEE	-	-	-	-	-	-	2 <sup>*2</sup>	2
Total	33	35	6	3	13	18	10	118

Cumulative total in FY 2020 \*1 Special Research Student, \*2 Research Student

## Faculty Members

(April 1, 2020–March 31, 2021)

### ■ Division of Particle and Astrophysical Science, Graduate School of Science

Field/Topics	Professor	Associate Professor	Lecturer	Assistant Professor
Solar-Terrestrial Environmental Science	Akira Mizuno	Tomoo Nagahama		
Solar-Terrestrial Interrelation Science	Masafumi Hirahara	Satonori Nozawa	Shin-ichiro Oyama	
		Yuichi Otsuka		
	Kanya Kusano	Satoshi Masuda		Akimasa Ieda
Solar-Terrestrial Physics	Yoshitaka Itow	Yutaka Matsubara	Akira Okumura	Hiroaki Menjo
	Hiroyasu Tajima	Fusa Miyake		
	Munetoshi Tokumaru	Kazumasa Iwai		Ken-ichi Fujiki

### ■ Department of Electrical Engineering and Computer Science, Graduate School of Engineering

Field/Topics	Professor	Associate Professor	Lecturer	Assistant Professor
Space Electromagnetic Environment	Kazuo Shiokawa	Nozomu Nishitani		Taku Nakajima
		Masahito Nosé		
		Martinez-Calderon Claudia		
	Yoshizumi Miyoshi	Takayuki Umeda	Shinsuke Imada	

### ■ Department of Earth and Environmental Sciences, Graduate School of Environmental Studies

Field/Topics	Professor	Associate Professor	Lecturer	Assistant Professor
Hydrospheric-Atmospheric Sciences Course Global Water Cycle	Kazuhisa Tsuboki	Taro Shinoda		
	Nobuhiro Takahashi	Hirohiko Masunaga		
	Michihiro Mochida			Sho Ohata
	Tetsuya Hiyama	Naoyuki Kurita	Hatsuki Fujinami	
	Joji Ishizaka	Hidenori Aiki		Yoshihisa Mino
Earth and Planetary Sciences Course Chronology and Natural History	Masayo Minami	Takenori Kato		
	Hiroyuki Kitagawa			Hiroataka Oda

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## Undergraduate Education

Based on demand, the faculty of the institute offers numerous undergraduate courses in the School of Science, the School of Engineering, and in other departments and at other universities in the adjacent area.

### ■ During the 2020 Academic Year, The Following Courses were offered;

- Astrophysics and Space Science
- Astrophysics III
- Earth and Planetary Science Seminar I
- Electric Circuits with Exercise
- Electromagnetic Wave Engineering
- Electronic and Information Engineering
- Electronic and Information Engineering for Automobiles
- Environmental Chemistry
- Experimental Physics
- Experiments in Physics - Advanced Course
- First Year Seminar A
- Frontier of Earth and Planetary Sciences
- Geochemical Analysis II and Experiments
- Geology Experiments
- Graduation Thesis A • B
- Introduction to Electrical
- Introduction to Electrical Electronic and Information Engineering
- Introduction to Physics I
- Introduction to Physics II
- Isotope Geochemistry
- Laboratory in Physics
- Mathematics I and Tutorial A
- Mathematics I and Tutorial B
- Mathematics II and Tutorial
- Meteorology
- Physics Experiments I
- Physics Experiments II
- Probability Theory and Numerical Analysis with Exercises
- Remote sensing
- Science of Atmospheric-Hydrospheric Environment
- Solar System Science
- Topics in Advanced Physics
- View of Advanced Electrical

# 11. International Relations

## Academic Exchange

(29 in total)

Institution	Country/Region	Establishment
Indonesian National Institute of Aeronautics and Space	Indonesia	May 31, 1988
Pukyong National University, College of Fisheries Sciences	Korea	October 2, 2006
Korean Space Weather Center	Korea	December 24, 2012
Korea Institute of Ocean Science and Technology, Korea Ocean Satellite Center	Korea	April 17, 2014
Institute of High Energy Physics, Chinese Academy of Sciences	China	February 20, 2001
Polar Research Institute of China	China	November 11, 2005
Department of Atmospheric Sciences, National Taiwan University	Taiwan	October 30, 2009
Center for Weather Climate and Disaster Research, National Taiwan University	Taiwan	September 3, 2014
Bangladesh University of Engineering & Technology, Department of Physics	Bangladesh	March 4, 2008
National Institute of Water and Atmospheric Research	New Zealand	July 26, 1989
Centre for Geophysical Research, University of Auckland	New Zealand	December 7, 1992
Faculty of Science, University of Canterbury	New Zealand	July 30, 1998
Geophysical Institute, University of Alaska Fairbanks	U.S.A.	July 16, 1990
Space Environment Center, National Oceanic and Atmospheric Administration	U.S.A.	December 15, 1992
National Geophysical Data Center, National Oceanic and Atmospheric Administration	U.S.A.	January 5, 1993
Haystack Observatory, Massachusetts Institute of Technology	U.S.A.	October 24, 1994
Center for Astrophysics and Space Sciences, University of California at San Diego.	U.S.A.	December 22, 1997
Center for Space Science and Engineering Research, Virginia Polytechnic Institute and State University	U.S.A.	January 23, 2013
Chacaltaya Cosmic Ray Observatory, Faculty of Sciences, Universidad Mayor de San Andres, La Paz	Bolivia	February 20, 1992
National Institute for Space Research	Brazil	March 5, 1997
Yerevan Physics Institute	Armenia	October 18, 1996
Swedish Institute of Space Physics	Sweden	September 1, 2005 (since March 25, 1993)
Faculty of Science, UiT The Arctic University of Norway	Norway	May 3, 2019 (since October 8, 1993)
Department of Geophysics, Finnish Meteorological Institute	Finland	October 21, 1994
Institute of Cosmophysical Research and Radiowave Propagation, Far Eastern Branch, Russian Academy of Sciences	Russia	April 14, 2007
Institute of Solar-Terrestrial Physics, Siberian Branch of the Russian Academy of Sciences	Russia	October 28, 2008
Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy, Siberian Branch of the Russian Academy of Sciences	Russia	November 28, 2012
The Polar Geophysical Institute, Murmansk	Russia	March 13, 2017
Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)	International Science Council	July 30, 2019

Visitor : 1 / Going Abroad : 0

Note: The List includes the academic exchanges established in the former organizations before ISEE.

## Research Projects

### ■ Major International Collaborative Projects

(85 in total)

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Study of the Onset Mechanism of Solar Eruptions	K. Kusano	Germany	1	University of Potsdam
Observational Study of the Onset Mechanism of Solar Eruptions	K. Kusano	U.S.A. China	2	New Jersey Institute of Technology University of Science and Technology of China
Study of Modeling of Solar Eruptions	K. Kusano	U.S.A.	1	Harvard-Smithsonian Center for Astrophysics
Study of Triggering Mechanism of Solar Flares	K. Kusano	U.K.	1	UCL Mullard Space Science Laboratory
Study of Magnetic Reconnection	K. Kusano	U.K.	1	University of Manchester
Radiation Belt Storm Probes Project	Y. Miyoshi	U.S.A.	1	NASA, JHUAPL
Modeling Study of Inner Magnetosphere	Y. Miyoshi	U.S.A.	1	Los Alamos National Laboratory
Collaborative Study on ERG Project	Y. Miyoshi	Taiwan	1	Academia Sinica Institute of Astronomy and Astrophysics
International Heliophysics Data Environment Alliance	Y. Miyoshi	U.S.A. Europe (Member States of ESA)	23	NASA (SPDF, SDAC, HPDE, SPASE, CCMC) European Space Agency (ESA), Centre National d'Études Spatiales
Collaborative Researches Based on Solar Radio Observations with MUSER	S. Masuda	China Korea	2	National Astronomical Observatory of China KASI
Physics of Energetic and Non-Thermal Plasmas in the X (= magnetic reconnection) Region (PhoENiX) Mission	S. Masuda	U.S.A. U.K. Switzerland Hungary Germany Austria	6	NASA, UCB, University of Minnesota, University of Colorado, New Jersey Institute of Technology, Southwest Research Institute, Princeton University Northumbria University, University of Glasgow University of Applied Sciences and Arts Northwestern Switzerland Eötvös Loránd University Leibniz Institute for Astrophysics Potsdam Austrian Academy of Sciences
Study in Cosmic Neutrinos by using a Large Water Cherenkov Detector	Y. Itow	U.S.A. Canada U.K. Spain Korea China Poland	7	Boston University, Brookhaven National Laboratory, UCI, Duke University, George Mason University, University of Hawaii, Indiana University, Los Alamos National Laboratory, University of Maryland, State University of New York, University of Washington University of British Columbia, University of Toronto, TRIUMF Queen Mary University of London, Imperial College London, University of Liverpool, University of Oxford, University of Sheffield Complutense University of Madrid Chonnam National University, Seoul National University, Sungkyunkwan University Tsinghua University University of Warsaw
Study in Interaction of Very High Energy Cosmic Rays by using Large Hadron Collider	Y. Itow	Italy France Switzerland U.S.A.	4	University of Florence, Catania University École Polytechnique CERN Lawrence Berkeley National Laboratory

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Study of Dark Matter and Solar Neutrinos using a Liquid Xenon Detector	Y. Itow	Korea	1	Seoul National University, Sejong University, Korea Research Institute of standards and Science
Study in Interaction of Very High Energy Cosmic Rays by using Relativistic Heavy Ion Collider	Y. Itow	Italy U.S.A.	2	University of Florence, Catania University Brookhaven National Laboratory
Research and Development for the Next Generation Water Cherenkov Detector, Hyper-Kamiokande	Y. Itow	U.S.A.  Korea  China U.K.  Italy  France Switzerland  Spain Poland Brazil <i>Canada, Russia Portugal</i>	13	Boston University, Brookhaven National Laboratory, UCI, Duke University, George Mason University, Indiana University, University of Hawaii, Los Alamos National Laboratory, University of Maryland, State University of New York, University of Washington Chonnam National University, Seoul National University, Sungkyunkwan University Tsinghua University Imperial College London, Lancaster University, University of Oxford, Queen Mary University of London, University of Sheffield, Rutherford Appleton Laboratory INFN Sezione di Bari, INFN Sezione di Napoli, INFN Sezione di Padova, INFN Sezione di Roma CEA Saclay, École Polytechnique University of Bern, Swiss Federal Institute of Technology Zurich Autonomous University of Madrid University of Warsaw University of São Paulo <i>and other Institutions</i>
Study of Dark Matter and Solar Neutrinos using a 2-Phase Liquid Xenon TPC Detector	Y. Itow	Germany  Italy Switzerland U.S.A.  Sweden Israel Portugal <i>France, UAE, Netherlands</i>	10	Deutsches Elektronen-Synchrotron, Albert-Ludwigs-Universität Freiburg Max-Planck-Institut INFN, Università di Bologna University of Zurich Columbia University, University of Chicago, Purdue University, UCSD Stockholm University Weizmann Institute of Science University of Coimbra <i>and other institutions</i>
Research on Origin of Cosmic Rays with CTA (Cherenkov Telescope Array)	H. Tajima	Germany  France Italy Spain  Switzerland U.K.  U.S.A.  <i>Brazil, Argentina, Poland, Armenia, Australia, Czech, Bulgaria, Croatia, Finland, Greece, Sweden Slovenia, India, Ireland, South Africa</i>	22	Deutsches Elektronen-Synchrotron, Max-Planck-Institut, Heidelberg University CENS, École Polytechnique, University of Paris INFN, IFSI University of Barcelona, Complutense University of Madrid University of Zürich Durham University, University of Leicester, University of Leeds SLAC National Accelerator Laboratory, Argonne National Laboratory, University of Washington, Iowa State University, UCLA, UCSC, University of Chicago, Smithsonian Observatory <i>and other institutions</i>

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Research on Origin of Cosmic Rays with Fermi Satellite	H. Tajima	U.S.A.  France Italy Sweden	4	Stanford University, SLAC National Accelerator Laboratory, GSFC/NASA, U.S. Naval Research Laboratory, UCSC, Sonoma State University, University of Washington, Purdue University, University of Denver CENS, CNRS, École Polytechnique INFN, Italian Space Agency, IFSI Royal Institute of Technology, Stockholm University
Solar Flare Research with Hard X-Ray Spectral Imaging Observations	H. Tajima	U.S.A.	1	UCB, MSFC/NASA, Air Force Research Laboratory
Solar Flare Research with Gamma-Ray Spectral Imaging Observations with Polarimetry	H. Tajima	U.S.A.	1	UCB, Lawrence Berkeley National Laboratory, GSFC/NASA
Study of Solar Neutrons	Y. Matsubara	Bolivia Armenia China Mexico	4	Research Institute of Physics, University of San Andrés Yerevan Physics Institute Institute of High Energy Physics, Chinese Academy of Sciences National Autonomous University of Mexico
Search for Cosmic-Ray Excursions in the Past by Single-Year Measurements of $^{14}\text{C}$ in Tree Rings	F. Miyake	U.S.A. Switzerland	2	The University of Arizona Swiss Federal Institute of Technology Zürich
A Search for Dark Objects using the Gravitational Microlensing Effect	F. Abe	New Zealand  U.S.A.	2	University of Auckland, University of Canterbury, Victoria University of Wellington, Massey University University of Maryland, NASA
Observations of Interplanetary Disturbances using the International IPS Network	M. Tokumaru	U.K. Russia India Mexico Australia	5	LOFAR-UK Lebedev Physical Institute Tata Institute of Fundamental Research National Autonomous University of Mexico Murchison Widefield Array
Study of 3-D Solar Wind Structure and Dynamics Using Heliospheric Tomography	M. Tokumaru	U.S.A.	1	CASS/UCSD
Study on the Application of Interplanetary Scintillation Observations to Space Weather Forecast	M. Tokumaru	Korea	1	Korean Space Weather Center
Study of the Heliospheric Boundary Region using Observations of Interplanetary Scintillation	M. Tokumaru	U.S.A.	1	Interstellar Boundary Explorer, IMAP
Research and Development of the Plasma/Particle Instrument Suite for the Mercury Magnetospheric Exploration Mission	M. Hirahara	France Sweden  U.K. U.S.A. Switzerland	5	CESR-CNRS, CETP-IPSL Institute for Solar Physics of the Royal Swedish Academy of Sciences Rutherford Appleton Laboratory Boston University University of Bern
Future Satellite Mission for the Terrestrial Magnetosphere-Ionosphere-Thermosphere Explorations by Formation Flight Observations and its Feasibility Study and Collaboration of the Satellite and Ground-Based Observations	M. Hirahara	Sweden	1	Swedish Institute of Space Physics, Swedish National Space Board
Study on Science Subjects and Developmental Techniques of Observational Instruments toward Future Spacecraft Exploration Missions for the Space-Earth Coupling System	M. Hirahara	U.S.A. Canada Sweden	3	University of Colorado Boulder, UCB University of Calgary Swedish Institute of Space Physics
PRESTO (Predictability of Variable Solar-Terrestrial Coupling)	K. Shiokawa	U.S.A., France, Germany, U.K., Italy, Canada, Australia, India, China, and other countries	30	SCOSTEP

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
High-Sensitive Imaging Measurements of Airglow and Aurora and Electromagnetic Waves in Canadian Arctic	K. Shiokawa	U.S.A. Canada	2	University of California, Augsburg College, Virginia Polytechnic Institute and State University University of Calgary, Athabasca University
Magnetic Conjugate Observations of Midlatitude Thermospheric Disturbances	K. Shiokawa	Australia	1	IPS Radio and Space Service
Comparison of Dynamical Variations of the Mesosphere, Thermosphere, and Ionosphere between Asian and Brazilian Longitudes	K. Shiokawa	Brazil	1	INPE
Ground and Satellite Measurements of Geospace Environment in the Far-Eastern Russia	K. Shiokawa	Russia	1	Institute of Cosmophysical Research and Radiowave Propagation, Far Eastern Branch, RAS
Observations of the Equatorial Ionosphere in South-East Asia and West Africa	K. Shiokawa	Nigeria	1	National Space Research and Development Agency, Federal University of Technology Akure, Tai Solarin University of Education
Observations of Waves and Particles in the Inner Magnetosphere in the Siberian Region of Russia	K. Shiokawa	Russia	1	Institute of Cosmophysical Research and Aeronomy/SB RAS, ISTP/SB RAS
Collaborative Research and Operation in the Field of Space Weather Observations	Y. Otsuka	Indonesia	1	LAPAN
Observations and Researches of Ionosphere and Upper Atmosphere in Thailand	Y. Otsuka	Thailand	1	Chiang Mai University, King Mongkut's Institute of Technology Ladkrabang
Study on the Occurrence Characteristics of Ionospheric Irregularity and its Day-to-Day Variability over Southern China and Southeast Asia Regions	Y. Otsuka	China Indonesia Thailand	3	Institute of Geology and Geophysics Chinese Academy of Sciences LAPAN King Mongkut's Institute of Technology Ladkrabang
Study of the Polar Upper Atmosphere using the EISCAT Radars and Other Instruments	S. Nozawa	Norway Sweden, Finland, Germany, U.K., China	6	UiT The Arctic University of Norway EISCAT Scientific Association
Derivation of Substorm Index from Low-Latitude Geomagnetic Field Data	M. Nosé	Australia Turkey Germany Spain Denmark U.S.A.	6	Geoscience Australia Boğaziçi University Ludwig-Maximilians-Universität München Universitat Ramon Llull Technical University of Denmark United States Geological Survey
Study of the Polar/Midlatitude Ionosphere and Magnetosphere using the SuperDARN HF Radar Network	N. Nishitani	U.S.A. U.K. France South Africa Australia Canada Italy Russia China	9	JHUAPL, Virginia Polytechnic Institute and State University University of Leicester LPC2E/CNRS University of KwaZulu-Natal La Trobe University University of Saskatchewan IFSI ISTP/SB RAS Polar Research Institute of China
SDI-3D Project: Development of SDI	S. Oyama	U.S.A. Finland Sweden	3	Geophysical Institute of the University of Alaska Fairbanks University of Oulu, Finnish Meteorological Institute, Sodankylä Geophysical Observatory, Lappeenranta-Lahti University of Technology The Swedish Institute of Space Physics, KTH Royal Institute of Technology
Study of Auroral Energetic Electron Precipitation (EEP) Impacts on the Upper/Middle Atmosphere	S. Oyama	Finland New Zealand U.K. Norway U.S.A.	5	University of Oulu, Finnish Meteorological Institute University of Otago British Antarctic Survey University Centre in Svalbard University of Alaska Fairbanks



Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Study of Aerosols and Atmospheric Trace Gases by using SAVER-Net Observation Network in South America	A. Mizuno	Argentina Chile Bolivia	3	CEILAP, Servicio Meteorológico Nacional University of Magallanes, Dirección Meteorológica de Chile University of La Frontera, Universidad Mayor de San Andrés
High Energy Particles in Geospace: the Acceleration Mechanism and the Role in Earth's Climate	A. Mizuno	U.S.A. Norway Sweden	3	University of Colorado Boulder, UCLA, University of Arizona UiT The Arctic University of Norway EISCAT Scientific Association
Source Apportionment of Organic Aerosols in Beijing	M. Mochida	China	1	Tianjin University
Characterizing Organics and Aerosol Loading over Australia (COALA)	M. Mochida S. Ohata	Australia  U.S.A. U.K.	3	University of Wollongong, Commonwealth Scientific and Industrial Research Organisation, Australian Nuclear Science and Technology Organisation, NSW Department of Planning, Industry and Environment Georgia Institute of Technology, UCI Lancaster University
Tropical Rainfall Measuring Mission	N. Takahashi	U.S.A.	1	NASA
Global Precipitation Measurement Mission (GPM)	H. Masunaga N. Takahashi	U.S.A.	1	NASA
Tropical Cyclones-Pacific Asian Research Campaign for Improvement of Intensity Estimations/Forecasts (T-PARCII)	K. Tsuboki T. Shinoda	Taiwan	1	National Taiwan University Atmospheric Sciences
Advanced Study on Precipitation Enhancement in Arid and Semi-Arid Regions	M. Murakami	United Arab Emirates	1	National Centre of Meteorology, Khalifa University
Study on Tropical Convective-radiative Interactions	H. Masunaga	France	1	Laboratoire de Meteorology Dynamique/ CNRS
Study on Topical-subtropical Atmospheric Dynamics	H. Masunaga	U.S.A.	1	University of Miami
Observational Study on Convective Self-Aggregation	H. Masunaga	U.K.	1	City University of New York
Satellite Algorithm Development for Tracking Precipitating Clouds	H. Masunaga	U.S.A.	1	NASA Jet Propulsion Laboratory
Development and Validation of a Satellite-Based Scheme to Estimate In-Cloud Vertical Velocity	H. Masunaga	U.S.A.	1	City University of New York
Long-Term Observation of Black Carbon Aerosols in the Arctic	S. Ohata	Norway U.S.A.  Canada Russia	4	Norwegian Polar Institute National Oceanic and Atmospheric Administration Government of Canada Arctic and Antarctic Research Institute
Continuous Observation of Methane at a Paddy Field in Northern India	Y. Matsumi	India	1	University of Delhi
Observation of PM2.5 in Ulan Bator	Y. Matsumi	Mongolia	1	National University of Mongolia
Observation of PM2.5 in Hanoi	Y. Matsumi	Vietnam	1	Hanoi University of Science and Technology
Validation of GOCI Products and Application to Environmental Monitoring of Japanese Coastal Waters	J. Ishizuka	Korea	1	Korea Institute of Ocean Science and Technology
Sea Surface Nitrate and Nitrate Based New Production - Two Innovative Research Products from SGLI on board GCOM-C	J. Ishizaka	U.S.A.	1	Columbia University

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Collection of Validation Dataset of GCOM-C Coastal Products	J. Ishizaka	Korea U.S.A. Taiwan Thailand China  Estonia	6	Korea Institute of Ocean Science and Technology Columbia University, East Carolina University National Cheng Kung University Burapha University First Institute of Oceanography, Nanjing, University of Science and Technology University of Tartu
Validation of Ocean Color Products in the Western North Pacific and Japanese Coastal Waters: Collaboration with JAXA GCOM-C Project	J. Ishizaka	Member States of EUMETSAT: Germany, U.K., France, Italy, Spain, Netherlands <i>and others countries</i>	30	European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT)
Investigating the Optical Characteristics of Red Tides in the Upper Gulf of Thailand	J. Ishizaka	Thailand	1	University of Burapa, Kasetsart University
Integrated Land Ecosystem - Atmosphere Processes Study (iLEAPS), one of the Global Research Projects (GRPs) of the Future Earth	T. Hiyama	U.K., India, Finland, New Zealand, China, Korea <i>and others countries</i>	6	iLEAPS/Future Earth
Observational Study of Vegetation, Energy and Water in Eastern Siberia Towards Elucidation of Climate and Carbon Cycle Changes	T. Hiyama	Russia	1	Institute for Biological Problems of Cryolithozone/SB RAS
Arctic Challenge for Sustainability II (ArCS II) Project	T. Hiyama	U.S.A.	1	International Arctic Research Center of the University of Alaska Fairbanks
Estimating Permafrost Groundwater Age in Central Mongolia	T. Hiyama	Mongol	1	Institute of Geography and Geoecology of the Mongolian Academy of Sciences
Study of Methane Flux Observation in Eastern Siberia and the Obtained Data Analysis	T. Hiyama	Russia	1	Institute for Natural Science, North Eastern Federal University
Study of Equatorial Waves in the Atmosphere and Ocean	H. Aiki	Germany	1	GEOMAR Helmholtz Centre for Ocean Research Kiel
An International Study on Precipitation Variability in High-Altitude Areas of the Himalayas in Nepal	H. Fujinami	Nepal	1	Kathmandu University, Nepal Academy of Science and Technology, International Centre for Integrated Mountain Development
Asian Precipitation Experiment (AsiaPEX)	H. Fujinami	India  Nepal  China  Korea Bangladesh	5	India Meteorological Department, Indian Institute of Tropical Meteorology, University of Rajasthan International Centre for Integrated Mountain Development, Nepal Academy of Science and Technology, Kathmandu University Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Tsinghua University Pusan National University <i>and other institutions</i>
International Continental Scientific Drilling Program - Dead Sea Deep Drilling Project (ICDP-DSDDP)	H. Kitagawa	Israel U.S.A. Germany  Switzerland	3	Geological Survey of Israel, Hebrew University of Jerusalem Columbia University, University of Minnesota Twin Cities GFZ Helmholtz Centre Potsdam, Max Planck Institute for Chemistry University of Geneva
Climate Change Reconstruction of the Central Highlands in Vietnam	H. Kitagawa	Vietnam	1	Vietnam Academy of Science and Technology
Climate Reconstruction using Travertine from Takht-e-Soleyman Area in Kurdistan, Iran	M. Minami	Iran	1	University of Kurdistan

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Study of Grand-Water Circulation Based on $^{14}\text{C}$ Ages of Underground Water and Hot-Spring Water Samples from Korea	M. Minami	Korea	1	Korea Institute of Geoscience and Mineral Resources
Establishment of Master Dendrochronological Calibration Curve Around 660 BC using Annual Tree Ring Samples from Poland	M. Minami	Poland	1	Silesian University of Technology
Measurements of Cosmic-Ray-Produced $^{14}\text{C}$ in Iron Meteorites	M. Minami	U.S.A.	1	UCB
Geochronological Research on the Basement Rocks in Japan and Korea	T. Kato	Korea	1	Korea Institute of Geoscience and Mineral Resources
Development of New Analytical Techniques and Accurate Quantification of Electron Microprobe Analysis	T. Kato	Korea	1	Pusan National University
International Ocean Discovery Program (IODP) Expedition 379: Amundsen Sea West Antarctic Ice Sheet History	M. Yamane	U.S.A.  Germany  U.K.  France Sweden Norway China  Korea  India  New Zealand	10	University of Houston, Texas A&M University, Appalachian State University, U.S. Army Engineer Research and Development Center, University of Massachusetts, University of South Florida, Montclair State University, University of Florida, Northern Illinois University, Colorado College Alfred Wegener Institute for Polar and Marine Research, University of Bremen, University of Kiel, Museum für Naturkunde University of Southampton, University of Birmingham, British Antarctic Survey Université de Perpignan Stockholm University UiT The Arctic University of Norway China University of Geosciences, Tongji University Korea Institute of Geoscience and Mineral Resources National Centre for Antarctic and Ocean Research GNS Science

## Visitors from Foreign Institutes

(April 1, 2020–March 31, 2021)

Country/Region			
Asia (3)	India	1	5
	Korea	2	
	China	2	
Europe (2) (Including New Independent States)	England	1	2
	Sweden	1	
Total	5	7	

Funding Source	
Government-funding	2
Nagoya University	1
Self-funding	4
Total	7

Purpose	
Joint Research	7
Total	7

**Online Seminars by Foreign Scientists****(14 in total)**

Date	Name	Affiliation	Title	Number of Participant
July 20, 2020	Ilya Usoskin	University of Oulu, Finland	2nd SCOSTEP/PRESTO Online Seminar/ Extreme solar events: A new paradigm	168
September 10, 2020	Joe Borovsky	Space Science Institute, U.S.A.	3rd SCOSTEP/PRESTO Online Seminar/ Developing a highly predictable geomagnetic index to gauge magnetospheric activity and space weather	19
September 28, 2020	Abraham Chian	University of Adelaide, Australia INPE, Brazil	Solar Seminar/ Nonlinear dynamics of space plasmas	15
November 17, 2020	Thomas Immel	UCB, U.S.A.	4th SCOSTEP/PRESTO Online Seminar/ The ionospheric connection explorer - Results from the first year on orbit	96
January 14, 2021	Qiugang Zong	Peking University, China	5th SCOSTEP/PRESTO Online Seminar/ Magnetospheric response to interplanetary shocks: ULF wave-particle interaction perspective	100
January 18, 2021	KD Leka*	NorthWest Research Associates, U.S.A.	Solar Seminar/ Improving the inputs (and outputs) for MHD models: how do we know what we know?	20
January 19, 2021	Mateja Dumbović	University of Zagreb, Croatia	6th SCOSTEP/PRESTO Online Seminar/ Utilizing galactic cosmic rays as signatures of interplanetary transients	65
January 22, 2021	David G. Sibeck	GSFC/ NASA, U.S.A.	1st SCOSTEP Online Capacity Building Lecture/ Motivation for soft X-ray imaging and plans for the STORM global imaging mission	40
February 3, 2021	Chio Zong Cheng*	Princeton University, U.S.A.	62nd ISEE/CICR colloquium (online)/ Physics of magnetic reconnection	27
March 5, 2021	Ulrich Taubenschuss	Institute of Atmospheric Physics, AS CR, Czechia	2nd SCOSTEP Online Capacity Building Lecture/ Processing of electric and magnetic signals onboard the THEMIS spacecraft and applications of polarization analysis	47
March 8, 2021	Ondrej Santolik	Institute of Atmospheric Physics, AS CR, Czechia	PWING School on the inner magnetosphere/ Spacecraft measurements of whistler mode waves as a tool for investigation of the inner magnetosphere	107
March 8, 2021	Esa Turunen	Director Emeritus of Sodankylä Geophysical Observatory, University of Oulu, Finland	PWING School on the inner magnetosphere/ High-energy particles - atmosphere interaction	107
March 9, 2021	Vania Jordanova	Los Alamos National Laboratory, U.S.A.	PWING School on the inner magnetosphere/ Inner Magnetosphere Plasma and Field Dynamics	100
March 29, 2021	Jacob Bortnik	UCLA, U.S.A.	3rd SCOSTEP Online Capacity Building Lecture/ Machine-learning based reconstruction of the inner magnetosphere	50

\* Foreign Visiting Staff

## &lt;Abbreviations&gt;

AS CR:	Academy of Sciences of the Czech Republic
CASS:	Center for Astrophysics and Space Sciences
CCMC:	Community Coordinated Modeling Center
CEILAP:	Laser and Applications Research Center
CENS:	Centre d'Etudes Nucleaire de Saclay France
CERN:	European Organization for Nuclear Research
CESR:	Centre d'Etude Spatiale des Rayonnements
CETP:	Centre d'étude des environnements terrestres et planétaires
CNRS:	Centre National de la Recherche Scientifique
EISCAT:	European Incoherent Scatter Scientific Association
GSFC:	Goddard Space Flight Center
HPDE:	Heliophysics Data Environment
IBEX:	Interstellar Boundary Explorer
IFSI:	Istituto di Fisica dello Spazio Interplanetario
iLEAPS:	Integrated Land Ecosystem-Atmosphere Processes Study
IMAP:	Interstellar Mapping and Acceleration Probe
INFN:	Istituto Nazionale di Fisica Nucleare
INPE:	Instituto Nacional de Pesquisas Espaciais, Brazilian Institute of Space Research
IPS:	Ionospheric Prediction Services
IPSL:	Institut Pierre-Simon Laplace
ISTP:	Institute of Solar-Terrestrial Physics
JHUAPL:	Johns Hopkins University Applied Physics Laboratory
KASI:	Korea Astronomy and Space Science Institute
LAPAN:	Lembaga Penerbangan dan Antariksa Nasional, National Institute of Aeronautics and Space
LOFAR:	Low Frequency Array
LPC2E:	Laboratoire de Physique et Chimie de l'Environnement et de l'Espace
MSFC:	Marshall Space Flight Center
MWA:	Murchison Widefield Array
NASA:	National Aeronautics and Space Administration
RAS	Russian Academy of Sciences
SB RAS:	Siberian Branch, Russian Academy of sciences
SCOSTEP:	Scientific Committee on Solar Terrestrial Physics
SDAC:	Solar Data Analysis Center
SLAC:	Stanford Linear Accelerator Center
SPASE:	Space Physics Archive Search and Extract
SPDF:	Space Physics Data Facility
TRIUMF:	Canada's Particle Accelerator Centre
UCB:	University of California, Berkeley
UCI:	University of California, Irvine
UCL:	University College London
UCLA:	University of California, Los Angeles
UCSC:	University of California, Santa Cruz
UCSD:	University of California, San Diego

# 12. Outreach

## Public Lectures, Open Labs, and School Visits

ISEE contributed to the public through various means, including nine visiting lectures, 18 online lectures, six online workshops, four online training courses for young researchers, and one virtual tour for college students. We had to cancel some annual outreach events and activities or hold these online due to the COVID-19 pandemic. For example, one of the popular events, special lectures, and open laboratory to the public during the Nagoya University Festival was called off. ISEE and the former STEL have maintained a close relationship with the town of Rikubetsu in Hokkaido since 2003, after which we held visiting lectures for students of Rikubetsu Elementary School and Rikubetsu Junior High School. However, these annual visiting lectures were canceled.

We distributed a series of booklets in Japanese that answered 50 questions on various topics and informative comic (manga) brochures. They are related to space–Earth subjects for science education and are suitable for the public and school children. They can also be browsed and downloaded from the ISEE website (<https://www.isee.nagoya-u.ac.jp/>). A promotional video of our research activity to young people is also available at this site.



Left: Promotional video of ISEE. Right: Latest issue of the Japanese booklet series “50 questions”.

## Addresses of Facilities

Location		Name	Address	TEL/FAX
Nagoya	①	ISEE Research Institutes Buildings I/II	Furo-cho, Chikusa-ku, Nagoya, Aichi 464-8601	TEL:+81-52-747-6303 FAX:+81-52-747-6313
Toyokawa	②	Toyokawa Branch	3-13 Honohara, Toyokawa-shi, Aichi 442-8507	TEL:+81-533-89-5206 FAX:+81-533-86-3154
Hokkaido	③	Moshiri Observatory	Moshiri, Horokanai, Uryu, Hokkaido 074-0741	TEL:+81-165-38-2345 FAX:+81-165-38-2345
	④	Rikubetsu Observatory	Uenbetsu, Rikubetsu-cho, Ashoro-gun, Hokkaido 089-4301	TEL:+81-156-27-8103
			58-1, 78-1, 78-5, 129-1, 129-4 Pontomamu, Rikubetsu-cho, Ashoro-gun, Hokkaido 089-4300	TEL:+81-156-27-4011
Yamanashi	⑤	Fuji Observatory	1347-2 Fujigane, Fujikawaguchiko-machi, Minamitsuru-gun, Yamanashi 401-0338	TEL:+81-555-89-2829
Kagoshima	⑥	Kagoshima Observatory	3860-1 ShimoHonjo Honjo, Tarumizu-shi, Kagoshima 891-2112	TEL:+81-994-32-0730

