

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, 2021–March 31, 2022)

	M1	M2	D1	D2	D3	Undergraduate Students	Non-regular students	Total
Graduate School of Science	11	11	0	3	4	-	0	29
Graduate School of Engineering	12	11	0	0	0	-	0	23
Graduate School of Environmental Studies	11	13	2	3	4	-	5 *	38
School of Science	-	-	-	-	-	8	0	8
School of Engineering	-	-	-	-	-	9	0	9
ISEE	-	-	-	-	-	-	2*	2
Total	34	35	2	6	8	17	7	109

Cumulative total in FY 2021 * Research Student

Faculty Members

(April 1, 2021–March 31, 2022)

■ 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 *	

* Left the Institute at August 31, 2021

■ 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

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 2021 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
- Environmental Chemistry
- Experimental Physics
- Experiments in Physics - Advanced Course
- Field work
- First Year Seminar A
- Frontier of Earth and Planetary Sciences
- Geochemical Analysis II and Experiments
- Geology Experiments
- Graduation Thesis A • B
- Introduction to Physics I
- Introduction to Physics II
- 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-Hydrospehric Environment
- Solar System Science
- Topics in Advanced Physics

11. International Relations

Academic Exchange

(28 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
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

(86 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
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 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
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
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>
A Search for Dark Objects using the Gravitational Microlensing Effect	Y. Itow	New Zealand U.S.A.	2	University of Auckland, University of Canterbury, Victoria University of Wellington, Massey University University of Maryland, NASA
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

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
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>
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}C in Tree Rings	F. Miyake	U.S.A. Switzerland	2	The University of Arizona Swiss Federal Institute of Technology Zürich
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

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Study on Science Subjects and Developmental Techniques of Observational Instruments toward Future Spacecraft Exploration Missions for the Space-Earth Coupling System	M. Hirahara	Sweden	1	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
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
Study of the low-latitude and equatorial ionosphere at Eastern Africa	K. Shiokawa	Egypt Ethiopia	2	Egypt-Japan University of Science and Technology (E-JUST) Bahir Dar University
Study of the middle latitude ionosphere at Ukraine	K. Shiokawa	Ukraine	1	Institute of ionosphere (IION)
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
Experiment of geomagnetic field with sounding rocket LAMP	M. Nosé	U.S.A.	1	NASA
Study of high-frequency geomagnetic field variations with low-latitude induction magnetometer network	M. Nosé	Australia New Zealand	2	Geoscience Australia Dr. Peter Jaquiere

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
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
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
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
Characterization of atmospheric organic aerosol over a boreal forest in northern Europe	M. Mochida S. Ohata	Finland	1	University of Helsinki
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 N. Takahashi	Taiwan U.S.A.	2	National Taiwan University Atmospheric Sciences Colorado State University
Observational Study on Convective Self-Aggregation	H. Masunaga	U.K.	1	University of Reading
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

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
Long-Term Observation of Black Carbon Aerosols in the Arctic	S. Ohata	Norway U.S.A. Canada Finland	4	Norwegian Polar Institute National Oceanic and Atmospheric Administration Government of Canada Finnish Meteorological Institute
Energetic Particle Chain -Effects on the middle/lower atmosphere from energetic particle precipitations-	T. Nakajima	Finland	1	University of Oule Finnish Meteorological Institute
High Aerosol High Ice Water Content project	M. Murakami	U.S.A.	1	Federal Aviation Administration, NASA
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. Ishizaka	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
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
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

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
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	4	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
Study of Ground-Water Circulation Based on ^{14}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}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, 2021–March 31, 2022)

Country/Region			
Asia	India	1	4
	Korea	1	
	China	2	
Europe (Including New Independent States)	Russia	1	1
Middle East	Iran	1	1
Africa	Ethiopia	1	2
	Nigeria	1	
Total	7	8	

Funding Source	
Japan Society for the Promotion of Science	2
Nagoya University	4
Self-funding	1
Government	1
Total	8

Purpose	
Joint Research	8
Total	8

Overseas Business Trips of Faculty

(April 1, 2021–March 31, 2022)

Country/Region			
North America	U.S.A.	3	3
Europe (Including New Independent States)	U.K.	1	3
	Switzerland	1	
	Norway	1	
Toal	4	6	

Online Seminars by Foreign Scientists**(16 in total)**

Date	Name	Affiliation	Title	Number of Participant
Apr. 29, 2021	Alphonse C. Sterling	NASA Marshall Space Flight Center, U.S.A.	4th SCOSTEP Online Capacity Building Lecture/ An overview of the Sun's structure, and a closer look at solar magnetism and activity	52
May 21, 2021	Franz-Josef Lübken	Leibniz-Institute of Atmospheric Physics, Germany	7th SCOSTEP/PRESTO Online Seminar/ Physics at the edge between Earth's atmosphere and space	114
May 31, 2021	Esa Turunen	Sodankylä Geophysical Observatory, Finland	5th SCOSTEP Online Capacity Building Lecture/ The variable geospace environment and our radio wave based modern society: basic concepts of ionosphere and recent research problems at high latitudes	108
Jun. 8, 2021	Kristof Petrovay	ELTE Eotvos Lorand University, Hungary	8th SCOSTEP/PRESTO Online Seminar/ The Sun making history. The mechanism behind the varying amplitude of the solar cycle	159
Aug. 19, 2021	Craig Rodger	University of Otago, New Zealand	7th SCOSTEP Online Capacity Building Lecture/ Energetic electron precipitation from the radiation belts: How plasma waves in space kill atmospheric ozone	49
Sep. 14, 2021	Dibyendu Nandi	Indian Institute of Science Education and Research, India	8th SCOSTEP Online Capacity Building Lecture/ Solar magnetic fields: Their origin and predictability	90
Sep. 23, 2021	Richard Eastes	University of Colorado Boulder, U.S.A.	9th SCOSTEP/PRESTO Online Seminar/ Space weather in the thermosphere-ionosphere system - observation and Insights from the GOLD (Global-scale Observations of the Limb and Disk) * mission	121
Oct. 21, 2021	Sarah Gibson	High Altitude Observatory at NCAR, U.S.A.	9th SCOSTEP Online Capacity Building Lecture/ Whole Heliosphere and Planetary Interactions (WHPI): Connecting Sun to solar wind to planets during "quiet" times of the solar cycle	40
Nov. 16, 2021	Samuel Schonfeld	Boston College, U.S.A.	10th SCOSTEP Online Capacity Building Lecture/ F10.7 and solar spectral irradiance: drivers of ionosphere models	35
Nov. 30, 2021	Tibor Török	Predictive Science Inc., U.S.A.	10th SCOSTEP/PRESTO Online Seminar/ Understanding and modeling solar eruptions: Where do we stand?	83
Dec. 2, 2021	Aleksandr Rubstov	Institute of Solar-Terrestrial Physics SB RAS, Russia	Division for Ionospheric and Magnetospheric Research Seminar/ Characteristics of Pc4-5 waves in the magnetosphere by satellites measurements	25
Dec. 16, 2021	Adhitya Pavithran	Indian Institute of Geomagnetism, India	Division for Ionospheric and Magnetospheric Research Seminar/ The study of ionospheric Alfvén resonator (IAR) at low latitude	25
Jan. 27, 2022	Michael Kosch	South African National Space Agency, South Africa	11th SCOSTEP Online Capacity Building Lecture/ The energetics of sprites: New results from South Africa	53
Feb. 10, 2022	Cora Randall	University of Colorado, U.S.A.	11th SCOSTEP/PRESTO Online Seminar/ Solar-terrestrial coupling via energetic particle precipitation	155
Feb. 17, 2022	KD Leka*	NorthWest Research Associates, U.S.A.	ISEE Solar Seminar/ The Sun is Not Divergence Free! (Not Yet)	17
Mar. 31, 2022	Martin Connors	Athabasca University, Canada	12th SCOSTEP Online Capacity Building Lecture/ Space weather geoelectromagnetic effects	39

* Foreign Visiting Staff

<Abbreviations>

AS CR:	Academy of Sciences of the Czech Republic
CASS:	Center for Astrophysics and Space Sciences
CCMC:	Community Coordinated Modeling Center
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
IMAP:	Interstellar Mapping and Acceleration Probe
INFN:	Istituto Nazionale di Fisica Nucleare
INPE:	Instituto Nacional de Pesquisas Espaciais, Brazilian Institute of Space Research
RAS	Russian Academy of Sciences
IPS:	Ionospheric Prediction Services
IPSL:	Institut Pierre-Simon Laplace
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
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
UCB:	University of California, Berkeley
UCI:	University of California, Irvine
UCLA:	University of California, Los Angeles
UCSC:	University of California, Santa Cruz
UCSD:	University of California, San Diego
UiT:	University of Tromsø

12. Outreach

Public Lectures, Open Labs, and School Visits

The ISEE organizes a variety of outreach events and activities. In continuation from FY2020, some events were canceled in FY2021 because of the COVID-19 pandemic, but many events and activities were still conducted online or in a hybrid format. Some were also conducted in-person. Specifically, seven visiting lectures, 12 online or hybrid lectures, two high-school student visits, two online open laboratory events, two online training courses for young researchers, and one virtual tour for university students, one online workshop for children were organized.

We also distributed a series of booklets in Japanese that answered 50 questions on various topics and a series of comic (manga) books. They are related to space–Earth subjects for science education and are suitable for the public and schoolchildren. We have added two new booklets this year. These booklets can also be browsed and downloaded from the ISEE website (<https://www.isee.nagoya-u.ac.jp/hscontent/books.html>). These comic books were translated into English in collaboration with SCOSTEP’s CAWSES program (<https://www.isee.nagoya-u.ac.jp/en/outreach.html>). Translations in other languages are available on the SCOSTEP website (<https://scostep.org/space-science-comic-books/>). We also published two newsletters. The research results, event reports, and English columns have been posted.

The ISEE website continues to publish the most up-to-date activities and outcomes of laboratory science to the public (<https://www.isee.nagoya-u.ac.jp/en/>).



Latest issues of the Japanese booklet series “50 questions”.

Addresses of Facilities

Name		Address	TEL/FAX
①	Institute for Space–Earth Environmental Research	Research Institutes Buildings I/II, Furo-cho, Chikusa-ku, Nagoya, Aichi 464-8601	TEL:+81-52-747-6303 FAX:+81-52-747-6313
②	Toyokawa Branch	3-13 Honohara, Toyokawa-shi, Aichi 442-8507	TEL:+81-533-89-5206 FAX:+81-533-86-3154
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
⑤	Fuji Observatory	1347-2 Fujigane, Fujikawaguchiko-machi, Minamitsuru-gun, Yamanashi 401-0338	TEL:+81-555-89-2829
⑥	Kagoshima Observatory	3860-1 ShimoHonjo Honjo, Tarumizu-shi, Kagoshima 891-2112	TEL:+81-994-32-0730

