

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 offers the graduate course for the space-earth physics in the Department of Physics (Division of Particle and Astrophysical Science before the 2021 Academic Year) 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 Natural Science					Department of Electrical Engineering		Department of Earth and Environmental Sciences					
		Department of physics (space-earth physics group)					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
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 Intergrated Data Science		●	●	●		●	●		●	●			●
	Center for Orbital and Suborbital Observations		●		●					●	●	●		●

*Before the 2021 Academic Year : Heliospheric and Geospace Physics, Division of Particle and Astrophysical Science

Number of Students supervised by ISEE Staff

(April 1, 2022–March 31, 2023)

	M1	M2	D1	D2	D3	Undergraduate Students	Non-regular students	Total
Graduate School of Science	8	12	1	0	2	-	1	24
Graduate School of Engineering	9	12	1	0	0	-	0	22
Graduate School of Environmental Studies	10	14	2	3	5	-	1	35
School of Science	-	-	-	-	-	6	-	6
School of Engineering	-	-	-	-	-	10	-	10
ISEE	-	-	-	-	-	-	0	0
Total	27	38	4	3	7	16	2	97

Cumulative total in AY 2022

Faculty Members

(April 1, 2022–March 31, 2023)

■ Department of physics, Division of Natural Science /

Division of Particle and Astrophysical Science, Graduate School of Science

Field/Topics	Professor	Associate Professor	Lecturer	Assistant Professor
Department of physics (space-earth physics group)	Akira Mizuno	Tomoo Nagahama		
	Masafumi Hirahara	Satonori Nozawa	Shin-ichiro Oyama	
		Yuichi Otsuka		
	Kanya Kusano	Satoshi Masuda		Akimasa Ieda
	Yoshitaka Itow	Yutaka Matsubara	Akira Okumura	Hiroaki Menjo
	Hiroyasu Tajima	Fusa Miyake		
		Shingo Kazama*		
	Munetoshi Tokumaru	Kazumasa Iwai		Ken-ichi Fujiki

*Kobayashi-Maskawa Institute for the Origin of Particles and the Universe

■ Department of Electrical Engineering, Graduate School of Engineering

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

■ 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			Hirohiko 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 2022 Academic Year, The Following Courses were offered;

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

11. International Relations

Academic Exchange

(27 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	Oct. 2, 2006
Korea Institute of Ocean Science and Technology, Korea Ocean Satellite Center	Korea	Apr. 17, 2014
Institute of High Energy Physics, Chinese Academy of Sciences	China	Feb. 20, 2001
Polar Research Institute of China	China	Nov. 11, 2005
Department of Atmospheric Sciences, National Taiwan University	Taiwan	Oct. 30, 2009
Center for Weather Climate and Disaster Research, National Taiwan University	Taiwan	Sep. 3, 2014
Bangladesh University of Engineering & Technology, Department of Physics	Bangladesh	Mar. 4, 2008
National Institute of Water and Atmospheric Research	New Zealand	Jul. 26, 1989
Centre for Geophysical Research, University of Auckland	New Zealand	Dec. 7, 1992
Faculty of Science, University of Canterbury	New Zealand	Jul. 30, 1998
Geophysical Institute, University of Alaska Fairbanks	U.S.A.	Jul. 16, 1990
Space Environment Center, National Oceanic and Atmospheric Administration	U.S.A.	Dec. 15, 1992
National Geophysical Data Center, National Oceanic and Atmospheric Administration	U.S.A.	Jan. 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.	Dec. 22, 1997
Center for Space Science and Engineering Research, Virginia Polytechnic Institute and State University	U.S.A.	Jan. 23, 2013
Chacaltaya Cosmic Ray Observatory, Faculty of Sciences, Universidad Mayor de San Andres, La Paz	Bolivia	Feb. 20, 1992
National Institute for Space Research	Brazil	Mar. 5, 1997
Yerevan Physics Institute	Armenia	Oct. 18, 1996
Swedish Institute of Space Physics	Sweden	Sep. 1, 2005 (since Mar. 25, 1993)
Faculty of Science, UiT The Arctic University of Norway	Norway	May 3, 2019 (since Oct. 8, 1993)
Department of Geophysics, Finnish Meteorological Institute	Finland	Oct. 21, 1994
Institute of Cosmophysical Research and Radiowave Propagation, Far Eastern Branch, Russian Academy of Sciences	Russia	Apr. 14, 2007
Institute of Solar-Terrestrial Physics, Siberian Branch of the Russian Academy of Sciences	Russia	Oct. 28, 2008
Yu.G. Shafer Institute of Cosmophysical Research and Aeronomy, Siberian Branch of the Russian Academy of Sciences	Russia	Nov. 28, 2012
The Polar Geophysical Institute, Murmansk	Russia	Mar. 13, 2017

Number of exchanges: visitors:9, going abroad:5

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

Other Exchange

Institution	Country/Region	Establishment
Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)	International Science Council	Jul. 30, 2019

Observation Sites and Foreign Collaborative Institutions

(As of February 2023)

Name	Country/Region	Institution	Obs. Site	Latitude	Longitude
SuperDARN Executive Council	(U.K.)	●		—	—
Syowa Station	Antarctic		●	-69	39.59
Atmospheric Observatory of Austral Patagonia	Argentine		●	-51.62	290.8
Lasar Application and research Center	Argentine		●	-33.5	301.9
Rio Gallegos	Argentine		●	-51.6	290.8
Darwin	Australia		●	-12.44	130.96
Kakadu Observatory, Geoscience Australia	Australia	●		-12.7	132.5
Athabasca University	Canada	●		54.7	246.7
Athabasca	Canada		●	54.6	246.36
Resolute	Canada		●	74.73	265.07
Eureka	Canada		●	80	274.1
Kapuskasing	Canada		●	49.39	277.81
Nain	Canada		●	56.5	298.3
Atacama highland	Chile		●	-23	292.3
Nyrola	Finland		●	62.34	25.51
Sodankyla	Finland		●	67.4	26.6
Kevo	Finland		●	69.76	27.01
University of Oulu	Finland	●		65.1	25.5
VLF receiver at Oulujarvi, Finland (OUJ)	Finland		●	64.51	27.23
Husafell	Iceland		●	64.67	338.97
Decan College	India	●		18.55	73.9
Radio Astronomy Centre, Tata Institute for Fundamental Research	India		●	18.9	72.8
Observation Site for Methane in Sonapat, India	India		●	29	77
Kototabang	Indonesia		●	-0.2	100.32
University of Kurdistan	Iran	●		35.2	46.6
Mexican Array Radio Telescope, Universidad Nacional Autonoma de Mexico	Mexico		●	19.32	261
Top of the Sierra Negra volcano, National Institute of Astrophysics, optics, and electronics	Mexico		●	18.98	262.7
Institute of Geography-Geoecology, Mongolian Academy of Sciences	Mongol	●		47.63	108.3
Kathmandu University (KU)	Napal	●		27.62	85.54
International Centre for Integrated Mountain Development (ICIMOD)	Napal	●		27.65	85.32
Nepal Academy of Science and Technology (NAST)	Napal	●		27.66	85.32
The Rolwaling valley in the Himalayas (six places)	Napal		●×6	27.9	86.38
National Space Research and Development Agency	Nigeria	●		8.99	7.38
Abuja	Nigeria		●	8.99	7.38
University Centre in Svalbard (UNIS)	Norway	●		78.2	15.63
Alta	Norway		●	69.9	23.3
Tromsoe	Norway		●	69.59	19.227
Institute for Biological Problems of Cryolithozone, Siberian Branch of Russian Academy of Sciences	Russia	●		62.25	129.2
Pushchino Radio Astronomy Observatory, Lebedev Physical Institute	Russia		●	54.82	37.63
Istok	Russia		●	56.78	60.88

Name	Country/Region	Institution	Obs. Site	Latitude	Longitude
Zhigansk	Russia		●	66.78	123.37
Magadan	Russia		●	60.05	150.73
Paratunka	Russia		●	52.97	158.25
EISCAT Scientific Association	Sweden	●		67.8	20.4
European Organization for Nuclear Research	Switzerland	●		46.2	6
Chiang Mai University	Thailand	●		18.79	98.92
Chiang Mai	Thailand		●	18.79	98.92
Chumphon	Thailand		●	10.73	99.37
Brookhaven National Laboratory	U.S.A.	●		40.9	287.1
The University of Arizona	U.S.A.	●		32.2	249
Gakona	U.S.A.		●	62.39	214.78
Subaru Telescope, National Astronomical Observatory of Japan	U.S.A.		●	19.82	204.52
University of Alaska, Fairbanks, Poker Flat Research Range	U.S.A.		●	65.1	213
Norikura Observatory, Institute for Cosmic Ray Research, University of Tokyo	Japan		●	36.1	137.55
Ishigaki	Japan		●	24.4	124.1
Sata	Japan		●	31.02	130.68
Shigaraki	Japan		●	34.8	136.1
Toyokawa	Japan		●	34.84	137.37
Kiso	Japan		●	35.8	137.63
Chihara Campus, University of the Ryukyus	Japan		●	26.3	127.8
SuperDARN Hokkaido East	Japan		●	43.5	143.6
SuperDARN Hokkaido West	Japan		●	43.5	143.6
Kamioka Observatoty, Institute for Cosmic Ray Research, University of Tokyo	Japan		●	36.1	137.55
Kunigami	Japan		●	26.76	128.21
Inabu Crustal Deformation Observatory	Japan		●	35.2	137
Kawatabi Observatory, Graduate School of Science, Tohoku University	Japan		●	38.75	140.8
The Shirakami Natural Science Park, Hirosaki University	Japan		●	40.52	140.2
Moshiri	Japan		●	44.37	142.27
Kagoshima	Japan		●	31.48	130.72
Fuji	Japan		●	35.43	138.64
Rikubetsu	Japan		●	43.5	143.8
Total	69	18	59*	*Including 18 domestic sites	

Research Projects

■ Major International Collaborative Projects

(86 in total)

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
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
LAMP(Loss through Auroral Microburst Pulsation)-2 sounding rocket experiment	Y. Miyoshi	U.S.A.	1	University of Iowa, University of New Hampshire, Dartmouth College
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
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
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 Project	ISEE Representative	Collaborating Country/Region	Collaborating Organization
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
Research on Origin of Cosmic Rays with MAGIC telescope	H. Tajima	Spain Germany Italy Switzerland Bulgaria Croatia	6 Institute for High Energy Physics (IFAE), University of Barcelona, Complutense University of Madrid Max Planck Institute for Physics, TU Dortmund University, University of Würzburg University of Padova, University of Siena, University of Udine CERN Institute for Nuclear Research and Nuclear Energy Croatian MAGIC Consortium
cStudy of Solar Neutrons	Y. Matsubara	Bolivia Armenia Mexico	4 Research Institute of Physics, University of San Andrés Yerevan Physics Institute 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 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	Sweden	1 Swedish Institute of Space Physics

Research Project	ISEE Representative	Collaborating Country/Region		Collaborating Organization
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 (ION)
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
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 Jaquery
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
Collaborative Research and Operation in the Field of Space Weather Observations	Y. Otsuka	Indonesia	1	BRIN
Observations and Researches of Ionosphere and Upper Atmosphere in Thailand	Y. Otsuka	Thailand	1	Chiang Mai University, King Mongkut's Institute of Technology Ladkrabang

Research Project	ISEE Representative	Collaborating Country/Region	Collaborating Organization
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 BRIN King Mongkut's Institute of Technology Ladkrabang
Global study of midlatitude plasma bubbles using multi-instrument observations and models	Y. Otsuka	South Africa	1 South African National Space Agency
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
Hygroscopicity of Humic-Like Substances 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
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
Global Precipitation Measurement Mission (GPM)	N. Takahashi H. Masunaga	U.S.A.	1 NASA
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
Energetic Particle Chain -Effects on the middle/lower atmosphere from energetic particle precipitations-	T. Nakajima	Finland	1 University of Oule Finnish Meteorological Institute

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
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
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
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
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
Investigating the Optical Characteristics of Red Tides in the Upper Gulf of Thailand	J. Ishizaka	Thailand	1	University of Burapa, Kasetsart University
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>
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
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 Grand-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, 2022–March 31, 2023)

Country/Region		Number of Visitors	
Asia (7)	Bangladesh	1	32
	China	3	
	India	16	
	Indonesia	1	
	Korea	3	
	Malaysia	3	
	Taiwan	5	
North America (2)	Canada	2	18
	U.S.A.	16	
Europe (12) (Including New Independent States)	Austria	1	27
	Czech	5	
	Finland	3	
	France	1	
	Germany	6	
	Italy	1	
	Netherland	3	
	Poland	1	
	Sweden	2	
	Switzerland	1	
	Russia	1	
	U.K.	2	
Oceania (1)	Australia	1	1
Middle East (1)	Iran	1	1
Africa (5)	Egypt	1	8
	Ethiopia	1	
	Nigeria	2	
	South Africa	3	
	Uganda	1	
Total	28	87	

Funding Source	Number of Visitors
Ministry of Education, Culture, Sports, Science and Technology	4
Japan Society for the Promotion of Science	10
Nagoya University	61
Self-funding	3
Other funding sources	9
Total	87

Purpose	Number of Visitors
Conferences/Symposiums	11
Joint Research	76
Total	87

Overseas Business Trips of Faculty

(April 1, 2022–March 31, 2023)

Country/Region		Number of Travelers	
Asia (2)	Taiwan	1	2
	Vietnam	1	
North America (2)	Canada	2	18
	U.S.A.	16	
Latin America and the Caribbean (5)	Argentina	2	6
	Brazil	1	
	Chile	1	
	Paraguay	1	
	Uruguay	1	
Europe (13) (Including New Independent States)	Belgium	2	1
	Croatia	1	
	Finland	2	
	France	3	
	Germany	6	
	Greece	4	
	Italy	5	
	Norway	6	
	Poland	2	
	Spain	4	
	Switzerland	10	
	Sweden	2	
U.K.	3		
Oceania (1)	Australia	2	2
Africa (2)	Cape Verde	1	2
	South Africa	1	
Other Area (1)	Antarctica	1	1
Total	26	81	

Online Seminars by Foreign Scientists**(24 in total)**

Date	Name	Affiliation	Title	Number of Participants
Apr. 28, 2022	Evan G. Thomas	Dartmouth College, U.S.A.	13th SCOSTEP Online Capacity Building Lecture/ Space weather monitoring with the Super Dual Auroral Radar Network (SuperDARN)	68
May 11, 2022	David J. McComas	Princeton University, U.S.A.	12th SCOSTEP/PRESTO Online Seminar/ First solar cycle of observations of our heliosphere's interaction with the very local interstellar medium	48
May 12, 2022	Jyrki Manninen*	Sodankylä Geophysical Observatory, Finland	63rd ISEE/CICR Colloquium (online)/ VLF bursty-patches – new phenomena?	35
May 13, 2022	H. N. Adithya	Scikraft Education and Engineering Design Pvt. Ltd., India	ISEE Solar Seminar (online)/ Solar soft X-ray irradiance variability using Hinode XRT images for the solar cycle 24	13
May 19, 2022	Li Xiaolong	Environmental Engineering Center, Institute of Oceanology, Chinese Academy of Sciences, China	ISEE Oceanography Seminar (online)/ Global estimation of phytoplankton pigment concentrations from satellite data using a deep-learning-based model	11
Jun. 16, 2022	Theodosios Chatzistergos	Max Planck Institute for Solar System Research, Germany	13th SCOSTEP/PRESTO Online Seminar/ Ca II observations: Exploiting historical treasures for solar activity and variability studies	32
Jun. 29, 2022	Bernard V. Jackson	University of California, San Diego, U.S.A.	ISEE Solar Wind Group Special Seminar (hybrid)/ Recent interplanetary scintillation predictions and forecast analyses from UCSD	10
Jul. 5, 2022	Christine Gabrielse	The Aerospace Corporation, U.S.A.	14h SCOSTEP/PRESTO Online Seminar/ Mesoscales and their contribution to the global response: A focus on the magnetotail transition region and magnetosphere-ionosphere coupling	30
Jul. 7, 2022	Rangaiah Kariyappa*	Indian Institute of Astrophysics, India	64th ISEE/CICR Colloquium (online)/ Solar Spectral Irradiance (SSI) variability	16
Jul. 12, 2022	Lucilla Alfonsi	Istituto Nazionale di Geofisica e Vulcanologia, Italy	14th SCOSTEP Online Capacity Building Lecture/ Space weather ionospheric effects at high latitude	61
Sep. 8, 2022	Hugh Hudson	University of Glasgow, U.K.	15th SCOSTEP Online Capacity Building Lecture/ Global properties of solar flares and some recent sun-as-a-star discoveries	99
Sep. 23, 2022	Manolis K. Georgoulis	Research Center for Astronomy of the Academy of Athens, Greece	15th SCOSTEP/PRESTO Online Seminar/ Forecasting the extreme end of solar weather: Flares, coronal mass ejections and SEP event complexes	61
Oct. 25, 2022	Pekka Verronen	Finnish Meteorological Institute/ Sodankylä Geophysical Observatory, University of Oulu, Finland	16th SCOSTEP Online Capacity Building Lecture/ Response of the Earth's middle atmosphere to solar particle forcing	66
Nov. 10, 2022	Shibaji Chakraborty	Virginia Tech, U.S.A.	Division for Ionospheric and Magnetospheric Research Seminar (hybrid)/ Ionospheric response to solar flares observed in SuperDARN HF radars	36
Nov. 21, 2022	Brian Welsch	University of Wisconsin Green Bay, U.S.A.	ISEE Solar Seminar (online)/ Coronal currents and the storage & release of magnetic energy	14
Nov. 24, 2022	Cheh Wee	Institute of Ocean and Earth Sciences, Universiti Malaya, Malaysia	ISEE Oceanography Seminar (online)/ Performance of satellite-based sea surface temperature in the Malaysian waters	11

11. International Relations

Date	Name	Affiliation	Title	Number of Participants
Dec.1, 2022	Joe Zender	ESA-ESTEC, Noordwijk, The Netherlands	ISEE Solar Seminar (online)/ Proba-3: Observe the solar corona by fine formation flying space weather geoelectromagnetic effects	11
Dec. 20, 2022	Rumi Nakamura*	Space Research Institute, Austrian Academy of Sciences, Austria	65th ISEE/CICR Colloquium (online)/ In-situ observation of magnetic reconnection: Diffusion region and outflow disturbances	22
Feb. 3, 2023	Matthew Igel	University California, Davis, U.S.A.	Prof. Matt Igel Seminar (hybrid)/ Conceptual models for tropical convective rainfall and dynamics	30
Feb. 9, 2023	Pavlo Ponomarenko*	University of Saskatchewan, Canada	66th ISEE/CICR Colloquium (hybrid)/ Towards empirical model of HF propagation at very high latitudes	38
Feb. 16, 2023	Samuel Krucker	University of Applied Sciences Northwestern Switzerland, Switzerland / University of California, Berkeley, U.S.A.	ISEE Solar Seminar (hybrid)/ Hard X-ray solar flare observations with Solar Orbiter/STIX	13
Feb. 20, 2023	Hermann Opgeoorth	University of Umea, Sweden	67th ISEE/CICR Colloquium (hybrid)/ On the origins and characteristics of three-dimensional current systems in near-Earth space and their implications for space weather	16
Feb. 27, 2023	Matthias Förster	GFZ German Research Centre for Geosciences, Germany	68th ISEE/CICR Colloquium (hybrid)/ Estimation of effective ion masses by Langmuir probes onboard the Swarm satellites	11
Mar. 30, 2023	Gary P. Zank	University of Alabama in Huntsville, U.S.A.	69th ISEE/CICR Colloquium (hybrid)/ Heating the solar corona and driving the solar wind: Are we nearing a solution?	11

* Foreign Visiting Staff

<Abbreviations>

BRIN:	Badan Riset dan Inovasi Nasional
CASS:	Center for Astrophysics and Space Sciences
CCMC:	Community Coordinated Modeling Center
CEA:	Commissariat à l'énergie atomique et aux énergies alternatives
CEILAP:	Centro de Investigaciones en Láseres y Aplicaciones
CENS:	Centre d'Etude Nucleaire de Saclay
CERN:	Conseil Européen pour la Recherche Nucléaire
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
GFZ:	Geoforschungszentrum
GNS Science:	Institute of Geological and Nuclear Sciences Limited
GSFC:	Goddard Space Flight Center
HPDE:	Heliophysics Data Environment
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
iLEAPS:	Integrated Land Ecosystem-Atmosphere Processes Study
IPS:	Ionospheric Prediction Services
IPSL:	Institut Pierre-Simon Laplace
JHUAPL:	Johns Hopkins University Applied Physics Laboratory
KASI:	Korea Astronomy and Space Science Institute
LOFAR:	Low Frequency Array
LPC2E:	Laboratoire de Physique et Chimie de l'Environnement et de l'Espace
MSFC:	Marshall Space Flight Center
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 national particle accelerator centreL
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

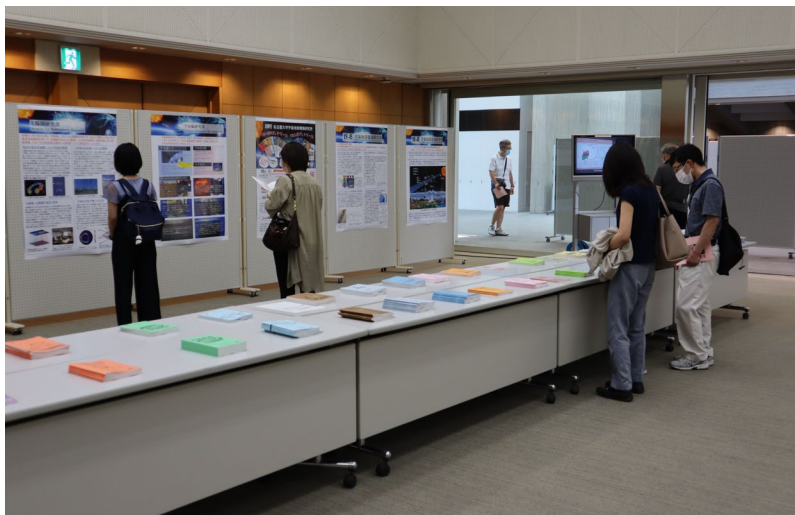
12. Outreach

Public Lectures, Open Labs, and School Visits

The ISEE organizes diverse outreach events and activities. Several events and activities are performed online or in a hybrid format. Some studies were also performed in person. Specifically, two public lectures, five visiting lectures for schools, one high school student visit, two open laboratory events, two hybrid training courses for young researchers, one five-day tour for university students, one children's workshop, and one field trip and workshop for children were organized. Additionally, ISEE members have contributed to public education through 25 public talks.

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/>).



Our Booklets were displayed and distributed at the Nagoya University Festival.

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

