



Certified Nonprofit Organization

MFRS

MOUNT FUJI RESEARCH STATION



LERMF

Laboratory for Environmental Research
at Mount Fuji

What's going on at the Mount Fuji Weather Station which has finished the 72 years manual operation in 2004?

We, NPO MFRS are doing research at the station, renting part of the station from Japan Meteorological Agency (JMA) and producing a lot of fruitful results in research and educational fields.

In 2019, LERMF was established inside the NPO for our own research performance.

Facilities of former Mt. Fuji Weather Station

The four buildings are connected by a corridor and have a site area of more than 600 m². Buildings 2 and 3 are constructed of an aluminum alloy, the same style to that used for the Shinkansen, bullet train in Japan, because of its lightness and strength.

The JMA continues meteorological observations of atmospheric pressure, temperature, and humidity in Building 2, using batteries. We now use most of the rest of the station for various research and educational projects since 2007.

1. Building 1

Used for the Mt. Fuji Radar built in 1964 and has a huge radar dome above. The radar dome was removed in 2001. This 88 m² two-story building is used for atmospheric chemistry and physics.

2. Building 2

Built in 1973, 134 m². The first floor has a dining room and traditional living rooms, which are used for medical research.

3. Building 3

Built in 1973, 76 m². We constructed a new air inlet in 2012 that is used during the summer.

4. Building 4

Built in 1964, 99 m². Mainly contains the battery system for the Mt. Fuji Radar and is disused. Houses a simple toilet during the summer.



5. Temporary Building

Built for the construction workers of Buildings 2 and 3 in 1971, 42 m². It also served as an experimental building for new buildings. Mt. Fuji summit support team stay in here during the summer.

6. Point of triangulation

7. Sunlight tower

8. GPS electron threshold

9. Wind measurement tower

Research Activities

The summit of Mt. Fuji (35.21°N, 138.43°E, 3776 m a.s.l.) is located in the path of the East Asian upper air mass, which is transported from the Asian Continent through the free troposphere. Mt. Fuji therefore provides an ideal observation site for atmospheric chemistry and physics research, such as monitoring fine particulate matter, sulfate aerosols, and mercury. Since the summer of 2007, Mt. Fuji Weather Station has been operated by the non-profit organization “Mount Fuji Research Station (former Valid Utilization of Mt. Fuji Weather Station)”, renting part of the station from the Japan Meteorological Agency. For 2 months during the summer research campaigns, the organization runs an open research station for interdisciplinary science and education.



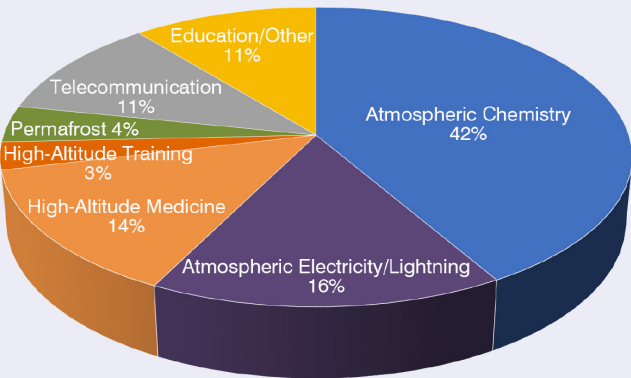
High-Altitude Mountain Medicine and Training

The altitude of Mt. Fuji is 3776 m, and the atmospheric pressure at the summit is only 60% of that at ground level. Symptoms of acute mountain sickness (AMS) occur above 2500 m and AMS accounts for about half of mountain accidents at Mt. Fuji. We are investigating the pathophysiology, prevention and treatment of AMS. In general, the first step to high-altitude acclimatization is altitude 4000 m level. We estimate acclimatization process and evaluate the effects of acclimatization training at Mt. Fuji.

(Mount Fuji Research Institute, Yamanashi Prefectural Government, National Institute of Fitness and Sports in Kanoya, Osaka City University, Biwako Seikei Sport College, Tsurumi University, Sakakibara Heart Institute, Tokyo Metropolitan Ohtsuka Hospital, Jichi Medical University)



User composition ratio according to the field



Atmospheric Electricity, Lightning, and Cosmic Ray Studies

The top of Mt. Fuji is often covered by thunder clouds, providing an ideal observation site for lightning, especially summer lightning which usually occurs at cloud heights above 4000 m. On the roof of the station, atmospheric electricity measurements are performed with field mills and other instruments to understand the relationship between the electric field and the behavior of lightning-induced radiation. Cosmic radiation intensity grows stronger as the altitude increases because the atmospheric layer becomes thinner. This has raised concerns about the effects of cosmic radiation on the health of aircraft crew. A system for cosmic radiation measurements with advanced instruments has been constructed at Mt. Fuji Weather Station to obtain real-time accurate dosimetry of cosmic radiation exposure at aviation altitudes.

(National Institute of Radiological Sciences, Japan Atomic Energy Agency, Hiroaki University, The University of Tokyo, Tokyo University of Science, Tokai University, Tokyo Gakugei University, Defense Academy, University of Shizuoka, Seikei University, Ibaraki National College of Technology, Docomo CS Tokai, OTOWA Electric Co., Ltd., Weathernews Inc.)



Space Science Education

We support students of selected project teams providing funds for their study. One such project is “The Fuji-Sat Challenge Team”, which is organized by space-technology-oriented students. They use a simulated satellite on the top of Mt. Fuji in their work. They also provide valuable help with environmental conservation by removing litter.

(Tokyo Gakugei University, Soka University, Tokai University, Keio University)



Development of Scientific Education Tools

New and unique scientific education tools for junior high and high school students are being developed by utilizing Mt. Fuji's environment. For example, a high-school science teacher has been developing an experimental method intended for classroom use to teach students how to investigate low pressure, severe wind and rain, sunshine, high UV light, and natural radioactivity.

(Rikkyo Niiza Junior & Senior High School, Jumonji Junior & Senior High School, NPO Galileo studio)



Organization's History

In 2004, Mt. Fuji Weather Station was shifted to be under unmanned operation. 50 researchers gathered and organized a workshop, and it shifted to the NPO to prevent that the Station was demolished. In 2007, summer campaigns started receiving permission to use the facilities from the JMA in the summer 2 months. Now, the MFRS is regarded as a unique research facility with interdisciplinary scientific fields. The number of researchers has increased to be 260.

2005	November 27: Valid Utilization of Mt. Fuji Weather Station founded (re-organization from Mt. Fuji High Altitude Research Group).
2006	2006 March: First International Workshop/ Symposium in Tokyo, on International Valid Utilization of Mt. Fuji Weather Station. November 22-23: Second International Workshop/ Symposium at the University of Tokyo, funded by the MEXT grant for the Mt. Fuji Project for establishing a high mountain observation platform in an extreme environment.
2007	July 10 - September 5: First Summer Campaign at the Mt. Fuji Weather Station, 212 researchers participated over 58 days. July 17: World Eco-Science Network Meeting sponsored by Dentsu Ltd.
2008	July 10 - August 31: Second Summer Campaign. 379 researchers participated over 53 days.
2009	July 10 - August 30: Third Summer Campaign. 424 researchers participated over 52 days. NIES started year-round observation of carbon dioxide, using batteries.
2010	July 12 - August 30: 4th Summer Campaign. 467 researchers participated over 50 days. NIRS started year-round observation of cosmic rays. AIST and Tokyo Metropolitan University started using wireless LAN for data communication and semi-real-time data publication.
2011	March 11, East Japan Earthquake and Fukushima Daiichi Nuclear Disaster. July 12 - September 1: 5th Summer Campaign. 373 researchers participated over 53 days. Radioactivity was measured on the climbing route, live camera images of cloud were broadcast by wireless LAN to the organization members.
2012	July 13 - August 31: 6th Summer Campaign. 366 researchers participated over 54 days. A new air inlet was constructed for the third building. A 5-year contract with the Japan Meteorological Agency was signed.
2013	July 16 - August 30: 7th Summer Campaign. 427 researchers participated over 42 days. PM2.5 was observed. Sakurajima volcanic gas was detected by Dr. S. Kato during SO ₂ observations at the summit.
2014	July 1 - August 29: 8th Summer Campaign. 434 researchers participated over 60 days. September 27, 2014: Eruption of Mt. Ontake 3067-m volcano on the west side of Kiso Valley.
2015	July 8 - August 28: 9th Summer Campaign. 530 researchers participated over 22 projects in 52 days. New student programs have started.
2016	July 1 - September 1: 10th Summer Campaign. 456 researchers participated over 63 days. A Taiwan-Japan project on atmospheric mercury and VOCs was carried out by the National Central University, Taiwan and Tokyo University of Agriculture and Technology. The English name of the NPO is changed to be NPO Mount Fuji Research Station.
2017	July 1 - September 1: 11th Summer Campaign. November 6 - 10: ACPM2017 was held at Gotemba, Japan, successfully with 101 participants from 11 countries and one region, 41 oral presentations and 34(-1) poster presentations.
2018	Another 5 year lease contract was made between JMA (from September, 2018- September, 2023)
2019	Laboratory for Environmental Research at Mt. Fuji (LERMF) has started as an inner organization of NPO, which is receivable for the fund of MEXT.
2020	Because of COVID-19, summer campaign2020 was forced to the cancellation. Crowd funding was performed for the survival of the NPO.
2021	Summer campaign during July 1 to Sept. 3 was successfully performed with a complete care against the COVID-19 infection.



Atmospheric Chemistry

The summit of Mt. Fuji is located in the free troposphere, which is the atmosphere between an altitude of 1000-2000 m and the start of the stratosphere. In this layer, air pollutants can travel long distances without being subjected to land surface friction. Air pollutants emitted at the Eurasian Continent are carried from west to east by westerly winds generated in the mid-latitudes of the northern hemisphere. Therefore Mt. Fuji, which is located at the eastern edge of the Eurasian Continent, is the ideal site for observing these air pollutants.

With the current rapid economic growth in Asia, the importance of the observations and research conducted at the Mt. Fuji station will increase because the station is located directly downwind of some of the largest combustion and other atmospheric effluent sources on the Earth. For the last 15 years, many chemical and physical studies have investigated; aerosols, including fine particulate matter and Kosa; fog/cloud water; trace gases, such as carbon dioxide, ozone, carbon monoxide, sulfur dioxide, carbonyl sulfide, nitrogen oxides and organic gases.

An International Symposium on Atmospheric Chemistry and Physics at Mountain Sites (ACPM2017) was successfully held in Gotemba, November 6th-10th, 2017, Chairperson, being Prof. S. Hatakeyama and Vice-Chairpersons: Prof. H. Okochi and Prof. K. Miura.

(National Institute for Environmental Studies, National Institute of Advanced Industrial Science and Technology, Japan Agency for Marine-Earth Science and Technology, Center for Environmental Science in Saitama, National Defense Academy of Japan, Hokkaido University, Tokyo University of Agriculture and Technology, University of Yamanashi, Kanazawa University, Tokushima University, Kumamoto University, Tokyo Metropolitan University, Ishikawa Prefectural University, The University of Shiga Prefecture, Waseda University, Tokyo University of Science, Teikyo University of Science, National Central University, Taiwan, Centre National de la Recherche Scientifique, France, Leibniz-Institute for Tropospheric Research, Germany)



Permafrost and Ecology

Permafrost had been found at the summit of Mt. Fuji in 1971. Research on special moss and lichens, which depend on the permafrost for water resource, is expected to help elucidate the effect of global warming on the distribution of permafrost (T. Masuzawa et al.). From 2010, another research group started direct monitoring of permafrost in a 10-m deep borehole near the summit (A. Ikeda et al.).

(National Institute of Polar Research, Shizuoka University, University of Tsukuba, University of Alaska-Fairbanks)



History of Mt. Fuji Weather Station

In 1895, a meteorologist, Itaru Nonaka accompanied with his wife Chiyoko spend 82 days at the summit of Mt. Fuji for the meteorological observation in a little hut built by himself.

In 1932, JMA established weather station at the summit, in which Mount Fuji RADAR was built in 1964 which saved many people from the typhoon disaster, however, in 2001, the RADAR was removed, the mission of which was replaced by Meteorological Satellite.



Mount Fuji Research Station

環境省
公衆トイレ
馬の背
ハット
NTT
ハット

ニツ山
永山

富士山

7.8合ハット

5.5合ハット

宝永第一火口

宝永山

富士宮口

宝永第二火口

宝永第三火口

Logistics and Power Supply

Mount Fuji Research Station (Elevation: 3,776 m)

Professional climbers are employed as Mt. Fuji summit supporting staffs during the summer season. They take care of the researchers and students who are susceptible to high-altitude sickness, which can be fatal. The climbers also install monitoring equipment and repair the power supply for the aging buildings.



Tarobo Base (Elevation: 1,300 m)

Tarobo at the southeast foot of Mt. Fuji is the base camp for Bulldozers which are used to carry large loads of equipment, food, and water. Tarobo is also used as one of the observation sites for atmospheric sciences as well as the base for researchers who climb to the top of mountain.



Power Transmission Line on

(Length: 10,903 m)

An advantage of Mt. Fuji Research Station is that its electricity supply comes from a commercial electric source through 3.8 km of overhead wires and 7.2 km of underground cables. Power is also supplied to a public toilet on the summit and to a parking area at the foot of the mountain. The overhead cables can be damaged by lightning, snow, wind, and fallen trees. Repair and maintenance are difficult at high altitudes.



地中ケーブル
(2.5km)

73号柱
71号柱

架空線
(3.8km)



Tarobo Base

赤塚

馬ノ頭

1号柱
責任分界点

東京電力
送電線網
(エネット)

Gotemba Base (Elevation: 446 m)

A two-story house was rented with the whole year contract in the quiet residential area of Gotemba city as the Gotemba Base of NPO, which also can be utilized as an observation site.



御殿場市 446 m

Gotemba Base

Mount Fuji Research Station

3,776 m

1,300 m

Tarobo Base

御殿場市 446 m

Gotemba Base



Certified Nonprofit Organization
Mount Fuji Research Station

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