

**List of Scientific Equipment of the Center for Collective Use
“North-Eastern Heliogeophysical Center”**

Instrument	Model	Producer, Country	Year of production	Purpose, technical characteristics
<i>Khabarovsk Geophysical Observatory</i>				
Ionosonde SP-3		Germany	1960	Updated by modern components, PC control and digital recording, with antenna complex of 4 range vertical rhombs. Operates in 15-minute mode 24 hours a day
Transmitting complex of inclined LChM-ionosonde				(the transmitter belongs to ISZF SB RAS, antenna and feeder belong to IKIR FEB RAS) operates in 5-minute mode 24 hours a day
Overhauser vector magnetometer	GSM-19FD	GEM Systems, Canada	2011	Operates 24 hours a day with the frequency of 0.4 Hz
Fluxgate declinometer/inclinometer	Mag-01H	Bartington Instruments, Great Britain	2012	Used for manual absolute measurements, 1 time a day, 1-2 hours
Proton Overhauser magnetometer	GSM-19W	GEM Systems, Canada	2013	Operates 24 hours a day with the frequency of 0.2 Hz
Proton Overhauser magnetometer	POS-1	UGTU, Ekaterinburg Russia	2014	Operates 24 hours a day with the frequency of 0.2 Hz
Digital geomagnetic-variation station	TsMVS-6	IZMIRAN Moscow	1995	Operates 24 hours a day with the frequency of 0.1 Hz
Lightning activity monitoring	WWLLN			Operates 24 hours a day
<i>Paratunka Geophysical Observatory</i>				
Overhauser scalar sensor in coil system	dIdD DSM-19 FD (2 units)	GEM Systems, Canada (dIdD v.7.0 Instruction Manual)	2010	- dD, dI variations, F modul - F sensitivity is 0.18 nTl, resolution is 0.1 nTl - dI accuracy is not less than 1", that of dD is not less than 4" - range is 20000-120000 nTl, $\pm 180^\circ$ (D), $\pm 90^\circ$ (I) - frequency is 0.2-1.0 Hz - GPS synchronization

Overhauser scalar sensor in coil system	POS-4	NPTs of Quantum magnetometry, Ekaterinburg		- full components F, Z, Y(X) - F range is 2000-100000 nTl, that of the components is ± 20000 nTl - F sensitivity is not less than 0.05 nTl, that of the components is not less than 0.3 nTl - F absolute error is not more than 1 nTl, that of Z is not more than 3-10 nTl, horizontal component is not normalized - measurement periodicity is from 1 s and more
Overhauser sensor	POS-1	NPTs of Quantum magnetometry, Ekaterinburg (POS-1 User Manual)	2004	- module of F field (absolute values) - absolute error is not more than 1 nTl - random error is not more than 0.03 mTl - range is 20000-100000 nTl - measurement periodicity is from 1 s and more - GPS synchronization
Overhauser sensor	GSM-19W	GEM Systems, Canada (GSM-19 v7.0 Instruction Manual)	2008	- module of F field (absolute values) - resolution is 0.01 nTl - absolute accuracy is 0.1 nTl - range is 2000-120000 nTl - measurement periodicity is from 0.2 s and more - GPS synchronization
Fluxgate sensor on a nonmagnetic theodolite	LEMI-203	LC ISR, Lvov, Ukraine		- D declination and I inclination (absolute values) - range is 2000-100000 nTl - resolution is 0.01 nTl (for the range 2000 nTl) - theodolite 3T2KP-NM (UOMZ, Ekaterinburg) - scale capacity is 1" - angle count error is 5"
Fluxgate sensor on a nonmagnetic theodolite	Mag-01H	Bartington Instruments, Great Britain		- D declination and I inclination (absolute values) - range is ± 200000 nTl

				- resolution is 0.01 nTl - theodolite Wild-T1 (WILD Heerbrugg, Switzerland) - scale capacity is 6" - angle count error is 3"
Electric field strength sensor	Pole-2	Voeikov GPhO, St. Petersburg		-AEF strength (vertical potential gradient) Ez - range is ± 200 V/m (sensitive channel), ± 2000 V/m (coarse channel), ADC is 16 bit - measurement periodicity is 1 s
Electric field strength sensor	Gradient-M3	AOzt Gradient, Voeikov GPhO		-AEF strength (vertical potential gradient) Ez - range is ± 200 V/m (sensitive channel), ± 2000 V/m (coarse channel) -resolution is 0.15 V/m (sensitive channel), 1.5 V/m (coarse channel) for the ADC of 16 bit - measurement periodicity is 1 s
Electrometer (fluxmeter)	CS-110	Campbell Scientific, Inc., USA		-AEF strength (vertical potential gradient) Ez - range is ± 2200 V/m (standard mode), ± 22300 V/m (extended mode) -resolution is 0.32 V/m (standard mode), 3.2 V/m (extended mode), digital output - measurement periodicity is 1 s (and more) - GPS synchronization, WiFi connection with the sensor
Air electric conductivity sensor	Electroprovodnost-2	Voeikov GPhO, St. Petersburg		-air conductivity - range is $25 (\text{Ohm/m})^{-1}$
Meteorological station	Davis Vantage Pro2	Davis Instruments, USA		- outside and inside temperatures, 1°C - atmospheric pressure, 0.1 mbar - outside and inside humidity, 1% - precipitation (rain), 0.2 mm - wind direction and velocity, 1°, 0.4 m/s

				- UF radiation index, 0.1 - radio connection with outside sensor block
Meteorological station	WS2000			- outside and inside temperatures, 1° C - atmospheric pressure, 0.1 mbar - outside and inside humidity, 1% - precipitation (rain), 0.5 mm - wind direction and velocity, 5°, 0.3 m/s - radio connection with outside sensor block
<i>Magadan Geophysical observatory</i>				
Overhauser scalar sensor in coil system	dIdD GSM-19FD	DEM Systems, Canada (dIdD v.7.0 Instruction Manual)	2010	- dD, dI variations, F module - F sensitivity is 0.18 nTl, resolution is 0.1 nTl - dI accuracy is not less than 1", that of dD is not less than 4" - range is 20000-120000 nTl, ±180° (D), ± 90° (I) - frequency is 0.2-1.0 Hz - GPS synchronization
Quartz Bobrov sensors with ADC	TsMVS Kvarts-06	IZMIRAN		- dH, dD, dZ variations - sensitivity is 0.1 nTl - frequency is 1 Hz
Overhauser sensor	POS-1	NPTs Quantum magnetometry, Ekaterinburg (POS-1 User Manual)	2004	- F field module - absolute error is not more than 1 nTl - random error is not more than 0.03 nTl - range is 20000-100000 nTl - measurement periodicity is from 1 s and more - GPS synchronization
<i>List of the main equipment of the lidar station</i>				
Nd:YAG laser Brilliant B		Quantel, France	2005	Frequency is 10 Hz, wavelength is 532 nm, pulse energy is 0.4 J, pulse length is 5 ns, pulse width on a half-height is 0.04 nm, beam spread is 0.5 mrad, output spot diameter is 6 mm, vertical polarization of 80%
Solid Nd:YAG laser YG982E		Quantel, France	2009	Frequency is 10 Hz, operates at the

				wavelengths of 355 nm (0.8 J/pulse), 532 nm (1.2 J/pulse) and 1064 nm (2.4 J/pulse). Pulse duration is 5 ns, pulse width on the half-height is 0.04 nm, beam spread is 0.5 mrad, output spot diameter is 9 mm
TDL-90 dye laser		Quantel, France	2009	Variable frequency (350-750 nm), energy is 10-20 % from the laser pumping energy, pulse duration is 8-10 ns, operating frequency range for a dye is ~ 10 nm, pulse width on a half-height is < 0.01 nm, beam spread is < 0.5 mrad, output spot diameter is 6 mm, vertical polarization of 98 %
Large Newton telescope		Institute of Atmosphere Optics, Tomsk	2006	- focus distance is 2 m, - mirror diameter is 60 sm - view field is 0.1-1 mrad
Spectrometer SP-2500		Pincerton Instruments, USA	2009	- changeable gratings 68x68 mm - max 1200 dashes/mm - focus distance is f=500 mm - resolution is 0.05 nm to 480 nm - measurement range is 0-1400 nm - integrated RS 232 and USB interfaces
Picosecond Camera PicoStar HR 12		LaVisison, Germany	2007	- spectrum visualization in the range of 200-900 nm - PZS matrix: 1376 x 1040, 12 bit - interfaces: Rs 232, USB, TTL-I/O
Ionospheric station AIS (on reserve, was changed by Parus A, IPG Rosgidromet		Radiozavod, Serpukhov	1950	- pulse power is 2.5 kWatt - frequency range is 1-15 MHz - frequency step is 4 kHz - length of the scanning interval of 1-15 MHz is 45 s - height step is 1.5 km (ADC record) -

<i>Laboratory of Acoustic Research</i>				
Combined hydroacoustic receiver	KGP 10 MGFK.4 06231.112	ZAO Geoakustika of FGUP VNII FTRI		- number of measuring channels of the sound pressure is 1 - number of the measuring channels of the pressure gradient is 3 - range is from 5 to 1100 Hz - sensitivity to the frequency of 1000 (transformation coefficient) is within 10-40 mV/Pa for the sound pressure channel and 1-3 mV/Pa for the pressure gradient channel