



*Chinese-Russian Symposium on Space and Geophysics in Kamchatka,
Paratunka, Kamchatka, September 18 – 20, 2024*

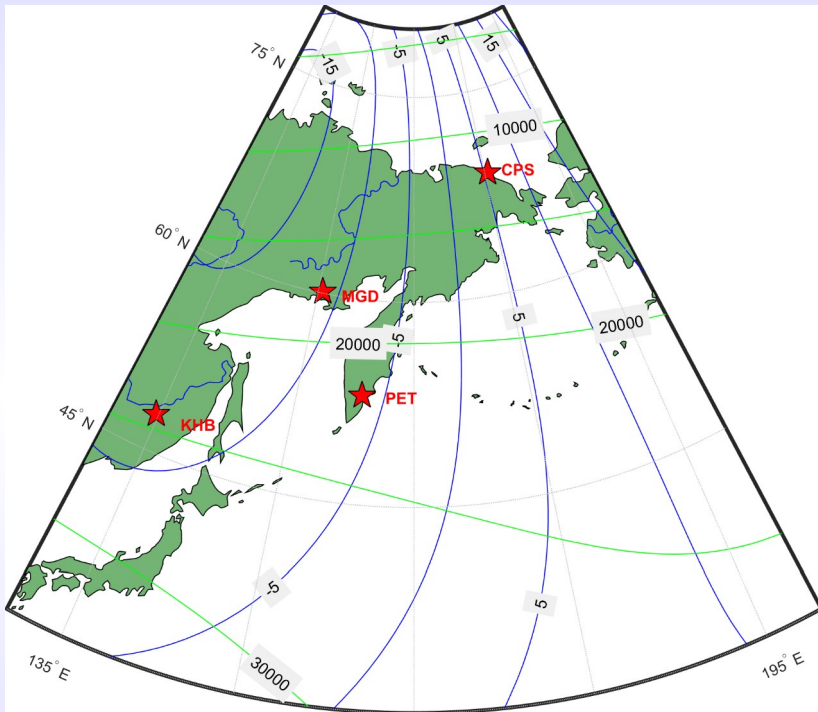
**Magnetic observatories of IKIR FEB RAS
as the Far East segment of the Russian network of
monitoring of the Earth's magnetic field: tasks, state
and prospects**

Sergey Y. Khomutov

Institute of Cosmophysical Research and Radio Wave Propagation FEB RAS, Paratunka, Kamchatka, Russia



Magnetic observatories of IKIR FEB RAS (a brief history)



- 1) International Geophysical year 1957-1958
- 2) net of the Joint magnetic-ionospheric stations — resolution of the Council of Ministers of the USSR, April 1960:

- ionosphere
- cosmic rays
- atmospheric electricity
- Earth's magnetic field

Observatory	Year	IAGA	Geogr.	Geomagn.
"Cape Schmidt"	1967	CPS	68.9 180.6	64.0 231.5
"Magadan"	1965	MGD	60.1 150.7	52.0 213.1
"Paratunka"	1968	PET	53.0 158.3	45.8 221.5
"Khabarovsk"	1968	KHB	47.7 134.7	38.4 202.5



quartz declinometer,
H-magnetometer



Bobrov's quartz sensors

The epoch of analog measurements

the beginning of the millennium



Diflux LEMI-203



scalar magnetometer POS-1



fluxgate variometer FGE



dIdD GSM-19FD

The epoch of digital measurements



Magnetic observatories of IKIR FEB RAS (equipment availability)

MGD - Magadan:

variometers – FGE + GSM-90, MagDas, FRG, dIdD GSM-19FD
absolute – Theo 020 DMI, GSM-19W, POS-1

PET - Paratunka:

variometers – FGE + GSM-90, MagDas, FRG, dIdD GSM-19FD,
POS-4
absolute – LEMI-203, Mag-01H, POS-1, GMS-19W

KHB - Khabarovsk:

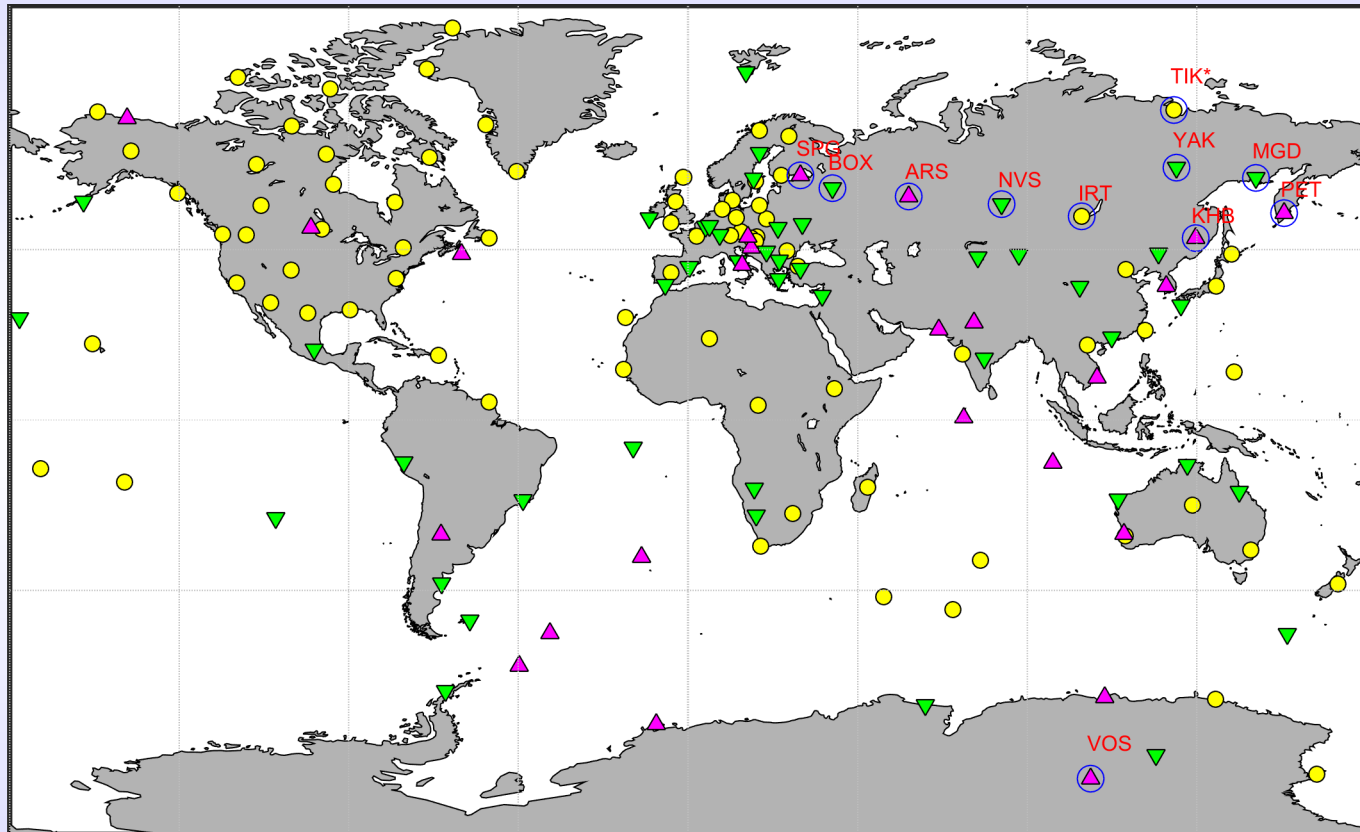
variometers – dIdD GSM-19FD, DMVS "Quartz", CAIS
absolute – POS-1

CPS — Cape Schmidt:

variometers – dIdD GSM-19FD, MagDas
absolute – Mag-01H, POS-1



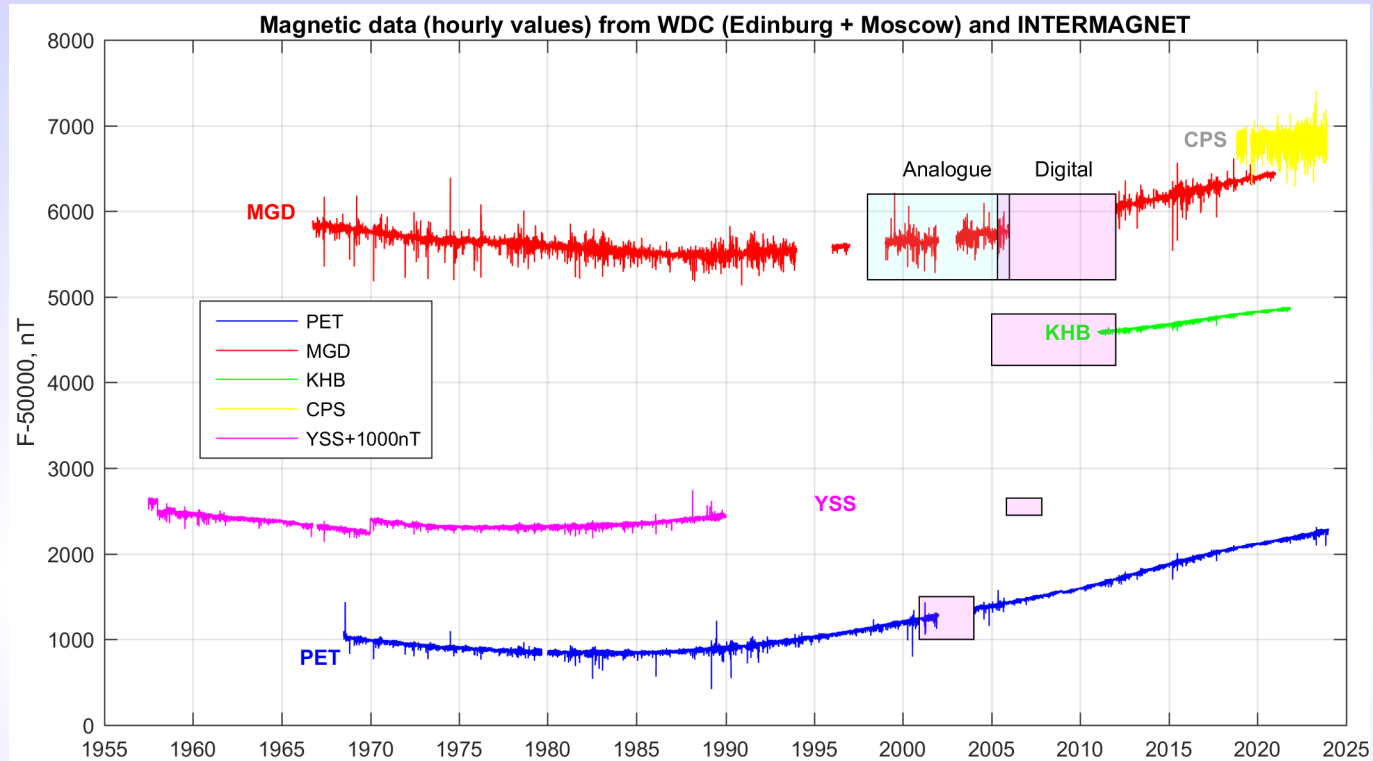
Magnetic observatories of IKIR FEB RAS (INTERMAGNET)



INTERMAGNET magnetic observatories: symbol "o" marks IMO certified before 2000, "v" marks IMO certified during 2000-2010, symbol "^" marks IMO certified after 2010. Russian observatories are marked by an additional circle. Information as at the end of 2017.



State of magnetic data of IKIR observatories



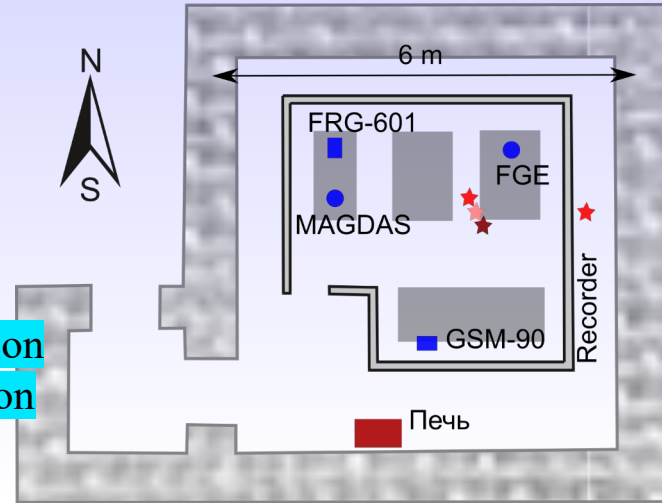
State of magnetic data of observatories of IKIR FEB RAS (hourly values of total field intensity F are shown as curves; state as of Sept 2024). Data up to 1998 are presented in the WDC (Edinburgh, Moscow), some data of KHB, MGD, PET for 2005-2023 were prepared or presented in INTERMAGNET. The pink box shows periods with digital magnetometer data (not processed), the blue box shows the presence of analog magnetograms (or their images), the gaps without boxes show the periods with an unknown data state.



Geophysical Observatory Paratunka (Kamchatka)



Variation pavillion



Absolute pavillion



Technical pavillion





Geophysical Observatory Paratunka (Kamchatka)



Pavillion and sensor
POS-4

Pavillion and dIdD at
Paratunka

Pavillion and dIdD at
Karymshina station



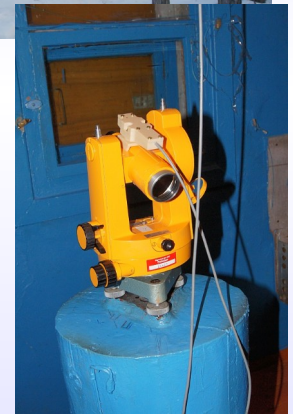
Geophysical Observatory Magadan



Technical pavilion



Variational pavilion, CMVS
Quartz and dIdD



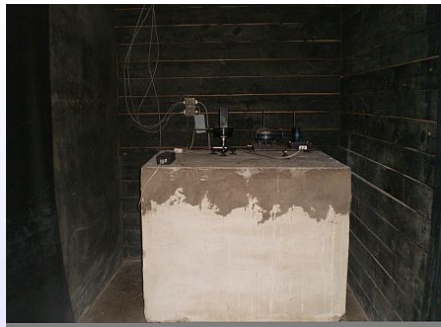
Absolute pavilion,
GSM-19W and DIM
Theo 020



Geophysical Observatory Khabarovsk



Technical pavillion



Variational pavillion, CMVS
Quartz and dIdD



New absolute pavillion,
sensor POS-1



Geophysical Observatory Cape Schmidt



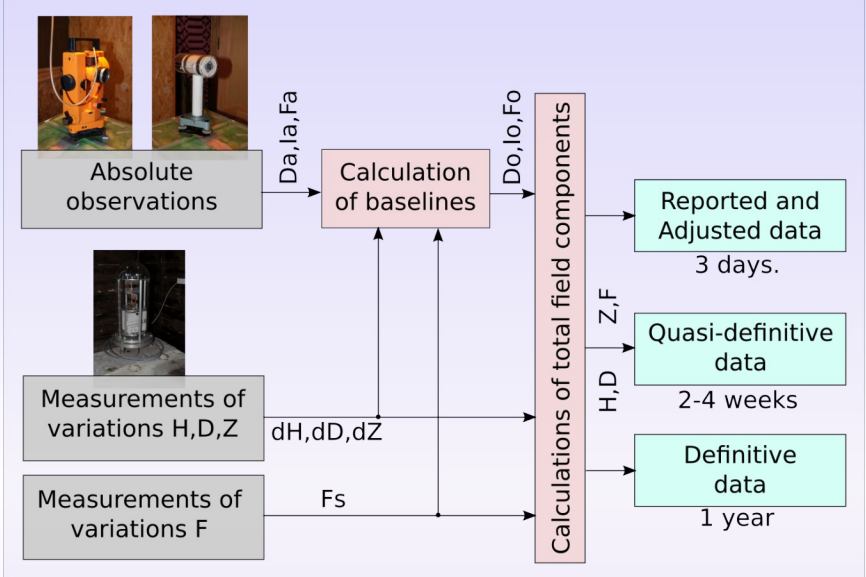
New absolute pavillion, DIM
Mag-01, sensor POS-1



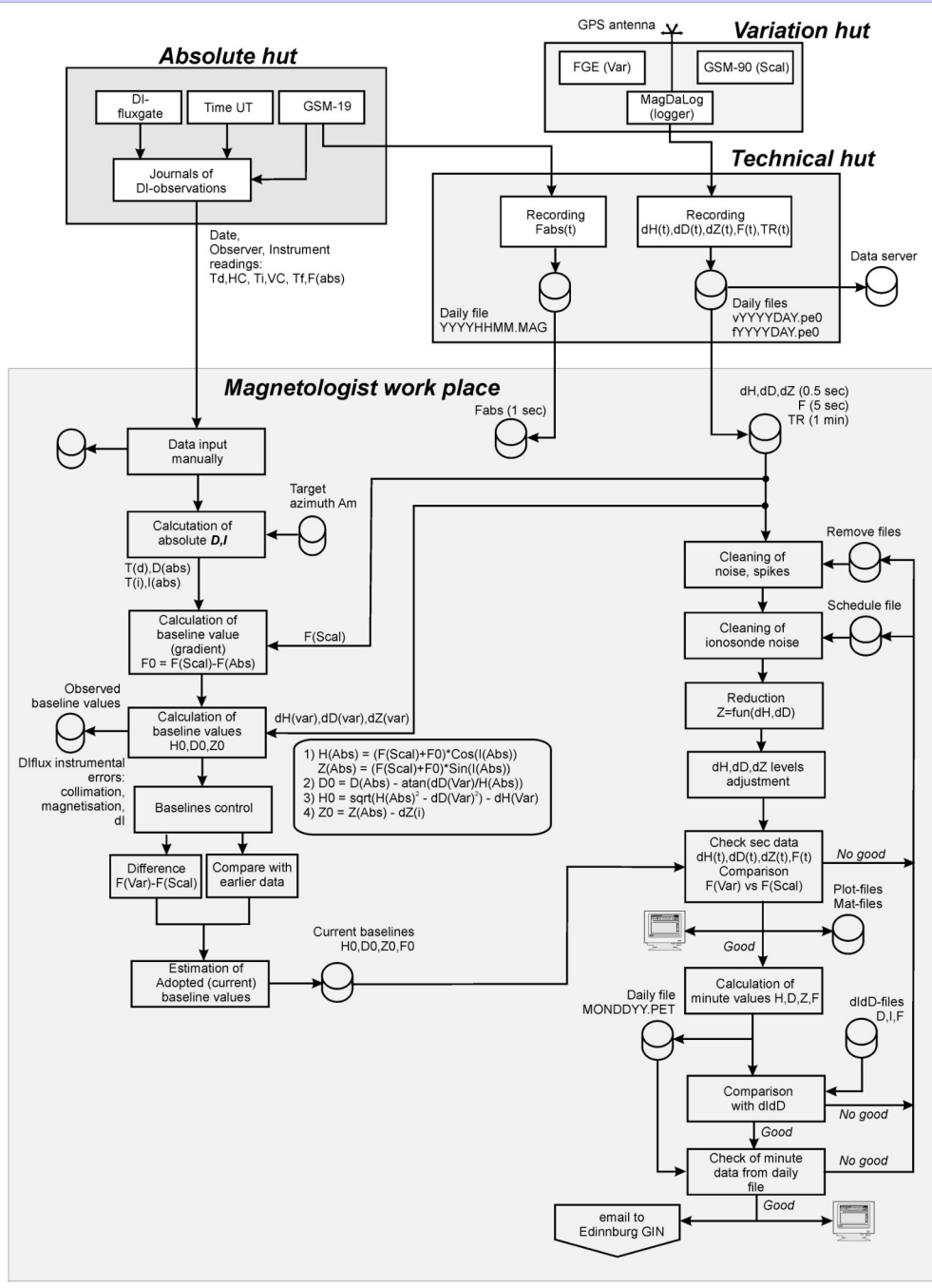
Variational pavillion, dIdD
and Magdas



New technical pavillion



To process the results of magnetic measurements according to INTERMAGNET standards, a software package has been developed at base of MATLAB or OCTAVE. Complete processing is performed with the preparation of data in the status Reported, Adjusted, Quasi-definitive and Definitive.





The main task of magnetic observatories is to obtain long-term, stable, reliable data about magnetic field

Fundamental scientific tasks in which magnetic measurements of the observatories of the IKIR FEB RAS:

- ✓ study of secular and long-period variations of the Earth's magnetic field (the development of global and regional models of field, the calibration of satellite magnetometers)
- ✓ study of processes in the magnetosphere-ionosphere-lithosphere
- ✓ investigation of electromagnetic precursors of earthquakes



Applied tasks in which magnetic measurements of the observatories of the IKIR FEB RAS:

- ✓ during magnetic surveys of various levels, for example, exploration of hydrocarbons on the shelf - observatories can be the base (reference) stations and a place for the preparation and testing of equipment
- ✓ during the observations at Repeat stations
- ✓ for compass calibrations, magnetometer intercomparisons
- ✓ for supported the direction drilling
- ✓ for estimation and checking of geomagnetically induced currents



Tasks related to the **actual activity at magnetic observatories** of IKIR FEB RAS:

- working with analog and digital measurement data that are available in archives and have not been previously processed or require the re-processing
- the study of weak physical effects in magnetic measurements, which became visible when using more accurate and sensitive magnetometers, for example, the temperature dependence of the magnetic susceptibility of the upper rocks
- development of more effective methods for noise detection in magnetic data



This is to
Certify
 that
 Magadan Observatory

Has complied with the standards set by the
INTERMAGNET Executive Council
 and is recognised as a
Full Participating Member
 of
INTERMAGNET

Signed
 Jeffrey J Love
 Chairman
 INTERMAGNET Exe
 C Council
 Dated 10 December 2013

This is to
Certify
 that
 Paratunka Observatory

Has complied with the standards set by the
INTERMAGNET Executive Council
 and is recognised as a
Full Participating Member
 of
INTERMAGNET

Signed
 Jeffrey J
 Chairman
 INTERM
 Dated 16

This is to
Certify
 that
 Khabarovsk Observatory

Has complied with the standards set by the
INTERMAGNET Executive Council
 and is recognised as a
Full Participating Member
 of
INTERMAGNET

Signed
 Jeffrey J Love
 Chairman
 INTERMAGNET Executive Council
 Dated 16 December 2013



Thank you
 for your attention !