The M-55 “Geophysica” aircraft is manufactured by Myasischev Design Bureau (MDB). The M-55 was first known as the M-17. Its life began in 1978, when Soviet engineers searched for ways to intercept American unmanned reconnaissance balloons. The first flight of the M-17 was 26 May 1982.

The M-17 set 25 world records for its class. However, this balloon-interceptor model was terminated in 1987 and replaced by the M-17RN, also known as the M-55 Geophysica. The first one of these flew in 1988, but as the Soviet Union collapsed, military demand dropped. In 1994, the reconnaissance version was terminated after only five aircraft built.

On March 1993 the Russian Government gave permit to the Ministry of Defense of Russia for using of M-55 aircraft for civilian purposes. One of the aircraft has got the name M-55 “Geophysica” with the number 55204 (s/n RF-55204).
Demonstration flight of M-55 “Geophysica” aircraft in Champino, Italy, November, 1993

- August 1991, scientific workshop in Sicilia, Italy.
- It was firstly proposed by L. Sokolov, General Designer of MDB to use Russian high-altitude aircraft M-55 for stratospheric research.
- November 1993, the aircraft M-55 number 55204 was presented firstly in Italy, Champino.
- Experts, including atmospheric scientists from Italy, Germany and some other European countries, were impressed by flight performances of that plane.
- Test pilot V. Arkhipenko in Champino, Italy, November 1993
Demonstration of M-55 in aviashow Berlin, Germany
May 1994

- M-55 Geophysica, s/n RF-55204 have been presented in Berlin, Germany, May 1994

- Several scientific workshops and meetings took place in Europe and in Russia during 1993-1995.

- Joint Russian – Italian project Airborne Polar Experiment has been started in August 1995. ENEA, Italy provided financial support to MDB for the aircraft modification and logistics.

- PNRA (Programma Nazionale di Ricerche in Antartide), CNR, ASI and many Italian research institutions and universities were involved in this project for developing of airborne instruments and atmospheric research.
Developing of high altitude flying laboratory, based on M-55 “Geophysica” aircraft. Airborne Polar Experiment Project 1995-1997

- Financial support of APE project:
  - ENEA, CNR, ASI, Italy
  - European Science Foundation (ESF)
  - European Commission (EC, DGXII, Science Research & Development)
- APE participants:
  - Myasischev Design Bureau, Russia
  - Central Aerological Observatory, Russia
  - Institute of Space Research, Russia
  - IROE-CNR, ISAO-CNR, INOA-CNR, Italy
  - University Roma, University dell Aquilla, Italy
  - Max-Plank Institute of Chemistry, Germany
  - Forschentrum Juelich, Germany
  - Forschentrum Karlsruhe, Germany
  - University of Cambridge, United Kingdom
  - Observatory Cantonal Neuchatel, Switzerland
  - Stockholm University, Sweden
  - Norwegian Institute for Air Research, Norway
  - Finnish Meteorological Institute, Finland
Antarctic Project ENEA. Test campaign in Pratica di Mare, Italy
October 1996

Military aeroport Pratica di Mare (Rome), Italy. October 29, 1996 - December 04, 1996

Coordinated by Giuseppe De Rossi (ENEA).

Support of ENAV (Ente Nazionale Assistenza al Volo) and RAI (Registro Aeronautico Italiano)

Test pilot V. Vasenkov

Number of flights - 4 flights

Total duration of flights - 15 hours
The Airborne Polar Experiment-Polar Ozone, Leewaves, Chemistry and Transport (APE-POLECAT), Rovaniemi, Finland, December 1996- January 1997

- APE was coordinated by Dr. Leopoldo Stefanutti (IROE, Italy),
- POLECAT was coordinated by Dr. Thomas Peter (MPI, Germany)
- Mission scientist - Dr. Rob MacKenzie (Cambridge University, UK)
- Test pilot – V. Vasenkov
- Number of flights- 9 flights
- Total duration of flights - 38 hours
Test campaign in Zhukovskii, Russia, December 02-06, 1998

- Ground and test flights with MIPAS – CTR instrument aboard of M-55 “Geophysica” aircraft.
- Principal Investigator of the MIPAS-CTR instrument Dr. Cornelius Blom (FZK, Germany)
- Test pilots- O. Shepetkov, V. Pavlov
- Number of flights – 3 flights
- Total duration of flights - 8 hours
TC-2 Extended Test Campaign, Forli, Italy
December 1998- January 1999

Ground and flight tests of new scientific instruments before APE-THESEO aircraft mission in Mahe, Seyshells.
Coordinated by Dr. Leopoldo Stefanutti (IROE, Italy),

Test pilot - O. Shepetkov

Number of flights - 7 flights

Total duration of flights - 24.5 hours

Coordinated by Dr. L. Stefanutti (IROE, Italy)

Mission scientist - Dr. Rob MacKenzie (Cambridge University, UK)

Test pilots – O. Shepetkov A. Beschastnov

Number of flights- 13 flights

Total duration of flights – 64,5 hours
mission took place in Ushuaia, Argentina
Principal Investigator
Dr. Bruno Carli,
Dr. Cornelius Blom,
Coordinated by
Mr. De Rossi
Mission scientist –
Dr. Rob Mackenzie
(University Cambridge, UK)

Test pilots - O. Shepekov
A. Beschastnov
Number of flights - 21 flights

Total duration - 84.5 hours
• 70 scientists from 11 countries (Russia, Italy, Germany, United Kingdom, Switzerland, Finland, Spain, Argentina, Brazil, Chili, USA) were involved at APE-GAIA aircraft mission.

• Scientific measurements were carried out also during transit flight of M-55 from Moscow to Ushuaia and back.
Flights of M-55 during Antarctic “ozone hole”
Ushuaia, Argentina, September –October 1999
- Aircraft in-situ measurements of ozone concentration and water vapor at altitude about 17 km outside and inside of polar vortex during Antarctic "ozone hole".
Test campaign in Zhukovskii, Russia
October 22-26, 2001

- Ground and flight tests of SIOUX and HALOX scientific instruments.
- Coordinated by Dr. h. Schlager and Dr. F. Stroch
  ( DLR, FZJ, Germany )
- Test pilot - Roman Taskaev
- Number of flights - 7 flights
- Total duration of flights - 24.5 hours
Envisat test & validation campaign, Forli, Italy
July 2002

- Flight tests of new SIOUX and HALOX scientific instruments. Validation of ENVISAT data.
- Coordinated by Dr. h. Schlager and Dr. F. Stroch (DLR, FZJ, Germany)
- Test pilot - O.Shepetkov, R. Taskaev
- Number of flights - 7 flights
- Total duration of flights - 24.5 hours
Flight tests of MIPAS scientific instrument.

Coordinated by Dr. Cornelius Blom
(FZK, Germany)

Test pilot - R. Taskaev

Number of flights - 9 flights

Total duration of flights - 43.5 hours
EUPLEX
European polar stratospheric cloud and lee wave experiment, Kiruna, Sweden
January 2003- February 2003

- 400 scientists from 11 countries: Russia, Italy, Germany, USA, United Kingdom, Switzerland, Finland, Canada, Sweden, Iceland, Japan were involved at aircraft EUPLEX mission.
- 27 scientific instruments aboard of M-55 Geophysica aircraft.
- 2000 kg - total scientific payload aboard of M-55 “Geophysica” aircraft.

The M-55 Geophysica, a uniquely flexible twin engined high altitude platform. Because of the basic ruggedness and reliability of a twin engined aircraft a great flexibility of operation is available. This allows flight planning to safely direct the aircraft through areas of active lee waves that similar research aircraft, e.g. the NASA ER-2, have been unable to penetrate due to safety considerations. Given the unique flight paths that was flown the data obtained from several instruments were uniquely useful for the interpretation of multiphase processing in PSC.
- Mission took place in Kiruna, Sweden
- Principal Investigator
  - Dr. Fred Stroch (FZJ, Germany)
- Mission scientist –
  - Dr. Rob Mackenzi
    - (University Cambridge, UK)
- Test pilots - O. Shepetkov
  - O. Kononenko
- Number of flights - 11 flights
- Total duration - 49 hours
ENVISAT Arctic validation campaign, Kiruna, Sweden
February - March 2003

Mission took place in Kiruna, Sweden
ENVISAT validation data
Principal Investigator: Dr. K. Blom (FZK, Germany)
Test pilots - O. Shepetkov
O. Kononenko
Number of flights - 6 flights
Total duration - 25.5 hours
TROCCINOX
Tropical Convection, Cirrus and Nitrogen Oxides Experiment, Oberfaffenhofen, Germany, Aracatuba, Brazil
January - February 2005
Mission took place in Aracatuba, Brazil
Principal Investigator - Prof. Dr. U. Schumann (DLR, Germany)
Mission scientist - Dr. H. Schlager (DLR, Germany)
Test pilots - O. Shepetkov, O. Kononenko
Number of flights - 21 flights
Hard work in Aracatubo, Brazil
Test campaign TC-5, Oberfaffenhofen, Germany
July 2005

Flight tests of CRISTA and MARSHALLS scientific instruments.

Coordinated by Dr. F. Stroch (FZJ, Germany)

Test pilot - O. Shepetkov

Number of flights - 5 flights

Total duration of flights - 16.5 hours
SCOUT – O3 Stratosphere-Climate Links With Emphasis on the UTLS, Darwin, Australia
October - November 2005
Mission took place in Darwin, Australia
Principal Investigator - Dr. Cornelius Shiller ( FZJ, Germany )

Test pilots-  O. Shepetkov
             O. Kononenko

Number of flights- 25 flights

Total duration - 100,5 hours
Mission took place in Ouagadougou, Burkina Faso, Africa
Principal Investigator - Dr. Francesco Cairo (ISAC-CNR, Italy)
Test pilot- O. Shepetkov

Number of flights- 12 flights
Total duration - 46 hours
SUMMARY

- 191 flight of M-55 “Geophysica” aircraft (1993-2006)
  - 76 transit flights,
  - 115 scientific flights
- 703 flight hours 19 minute - Total duration of flights
- 8 scientific international projects
- All missions were carried out successfully!!
July 19, 2004
President Vladimir Putin and pilot Oleg Shepetkov – awarded as Hero of the Russian Federation
M -55 “Geophysica” aircraft over the world
Future perspectives for high altitude platforms

*Stratospheric research
*Remote sounding and mapping of the Earth surface
*Development of new long range stratospheric aircraft based on M-55 “Geophysica” plane as prototype
*Launching of micro-satellites with weight about 100 kg
*Multi-use spacecraft complex for suborbital flights
*Airborne telecommunication systems