

Метод высокоточных измерений магнитных градиентов на подспутниковых высотах

Цветков Ю.П.*, Брехов О.М.**, Пчелкин А.В.*,
Филиппов С.В.*, Иванов А.А.*, Бондарь Т.Н.*,
Крапивный А.В.**, Николаев Н.С.**

(*ИЗМИРАН, **МАИ)



**Balloon magnetic gradiometer at the starting position
(Volsk, October 2003)**



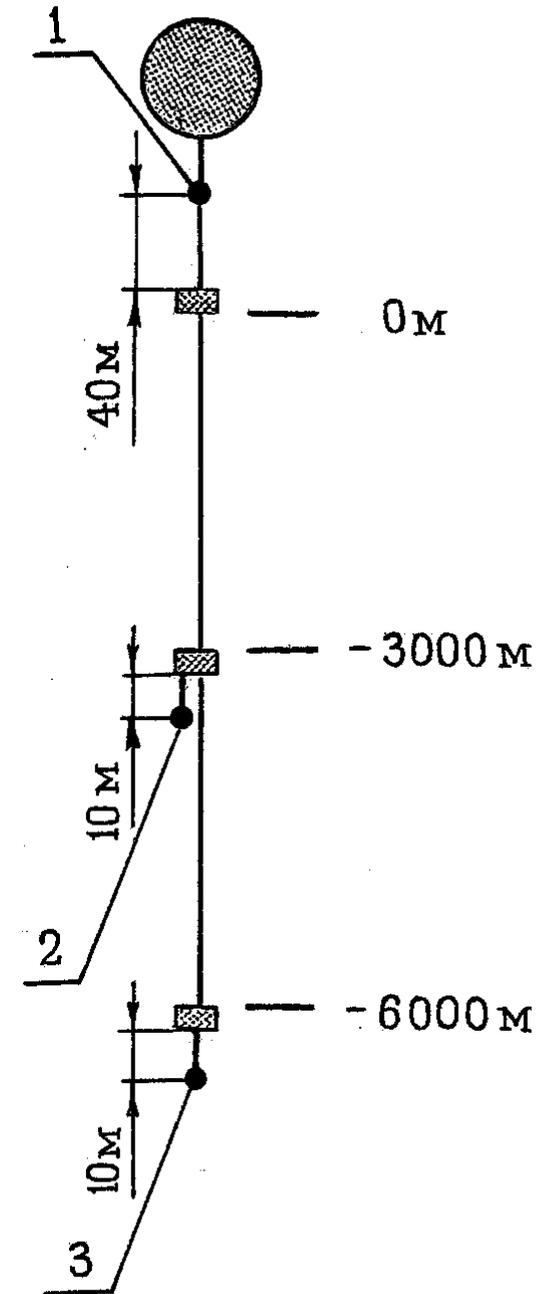
Kamchatka, 1996

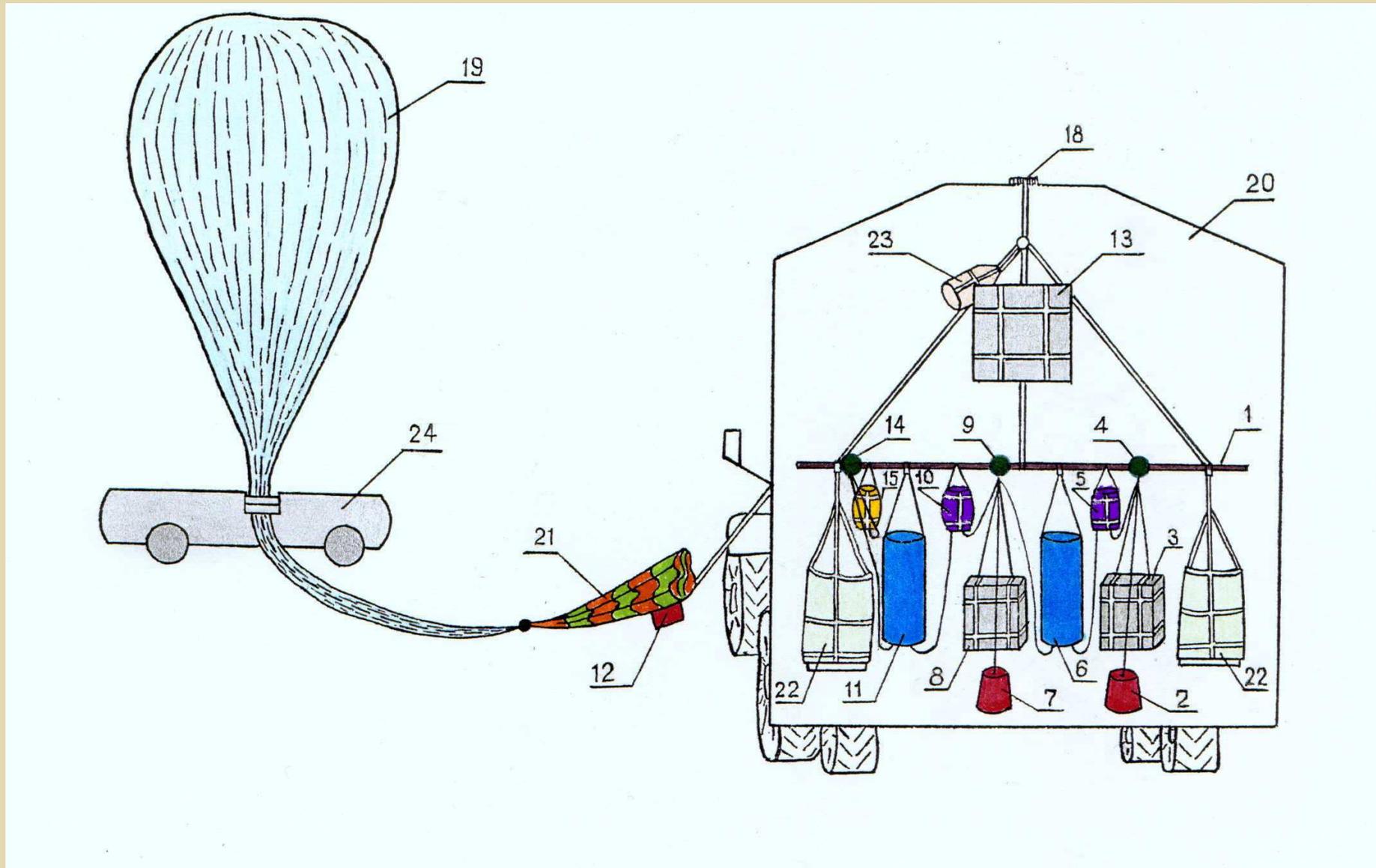
" STRATOSPHERIC BALLOON GRADIOMETER "

three instrumental
containers (20-40 kg each)
uniformly placed along a
vertical 6 km rope

Content of each container:

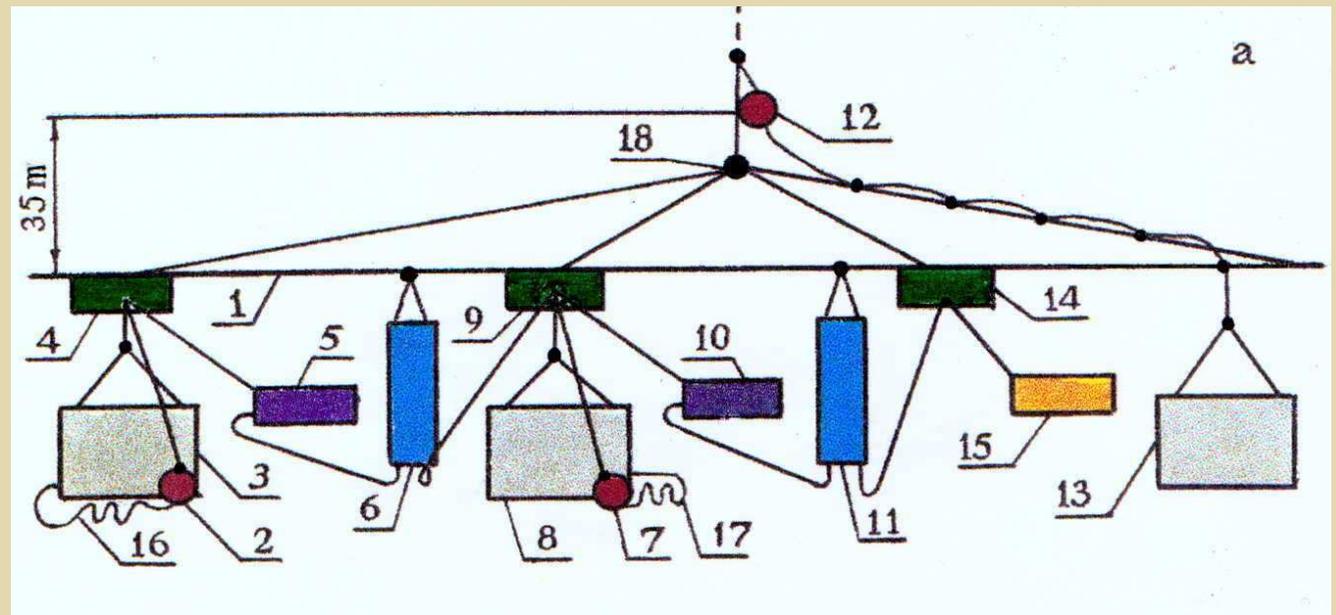
- the measurement instrument
- GPS-receiver
- system of data transfer ("Globalstar" satellite link)





**Balloon magnetic gradiometer at the starting position
(scheme)**

DEPLOYMENT PHASE



At 3 km altitude: pyrotechnical lock 4 works on a command acting from barometrical relay;

- the container 3 begins to fall and pull out from the chamber the parachute 5;

- the carrier rope under action of mass of the container 3 begins to extract from magazine 6.

At the extraction of the whole rope from magazine 6 a container 3 hang on a rope fixed on pyrotechnical lock 9.

At 6 km altitude: pyrotechnical lock 9 works and the process of deployment is renewed already for a carrier rope packed in the magazine 11.

The process of deployment of gradiometer is completed.

The gradiometer gains a working condition.

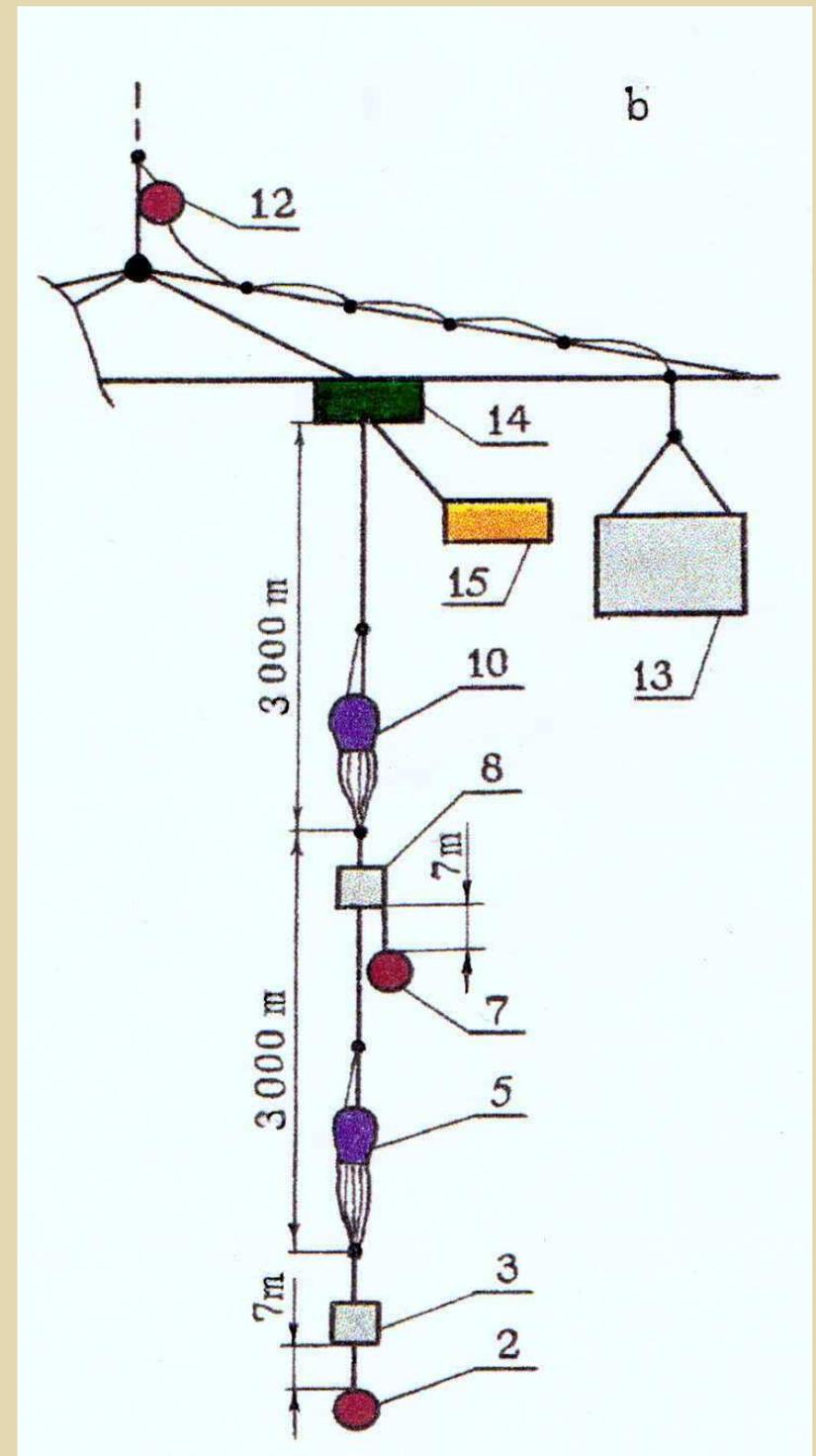
3, 8, 13 - instrumental containers

2, 7, 12 - magnetic field sensors

5, 10 - brake parachutes

14 – pyrolock, ensuring devising of system at landing

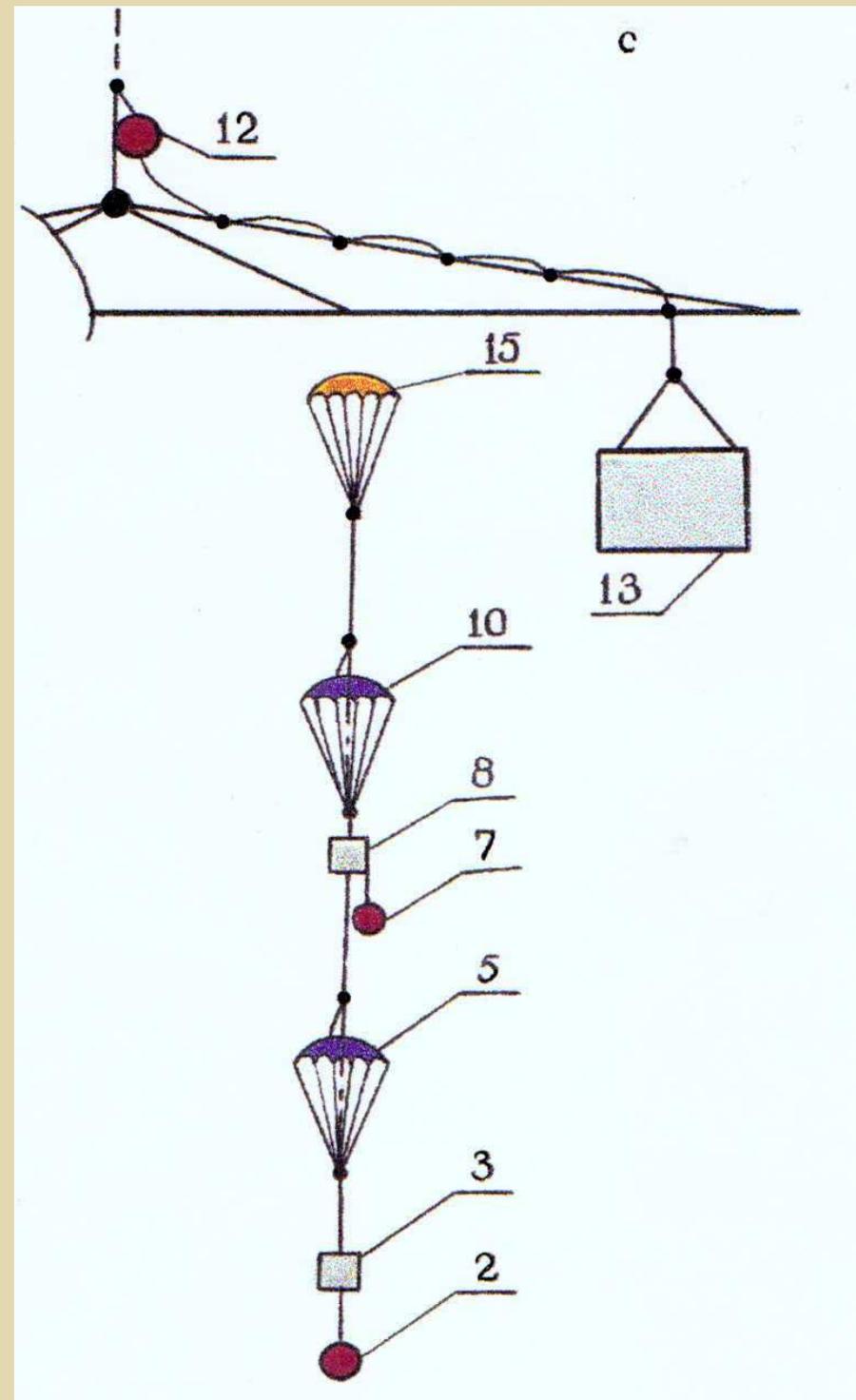
15 - saving parachute



The landing phase of gradiometer flight

The upper container is landing together suspension girder by own saving parachute.

Two lower containers are landing by own open saving and brake parachutes.

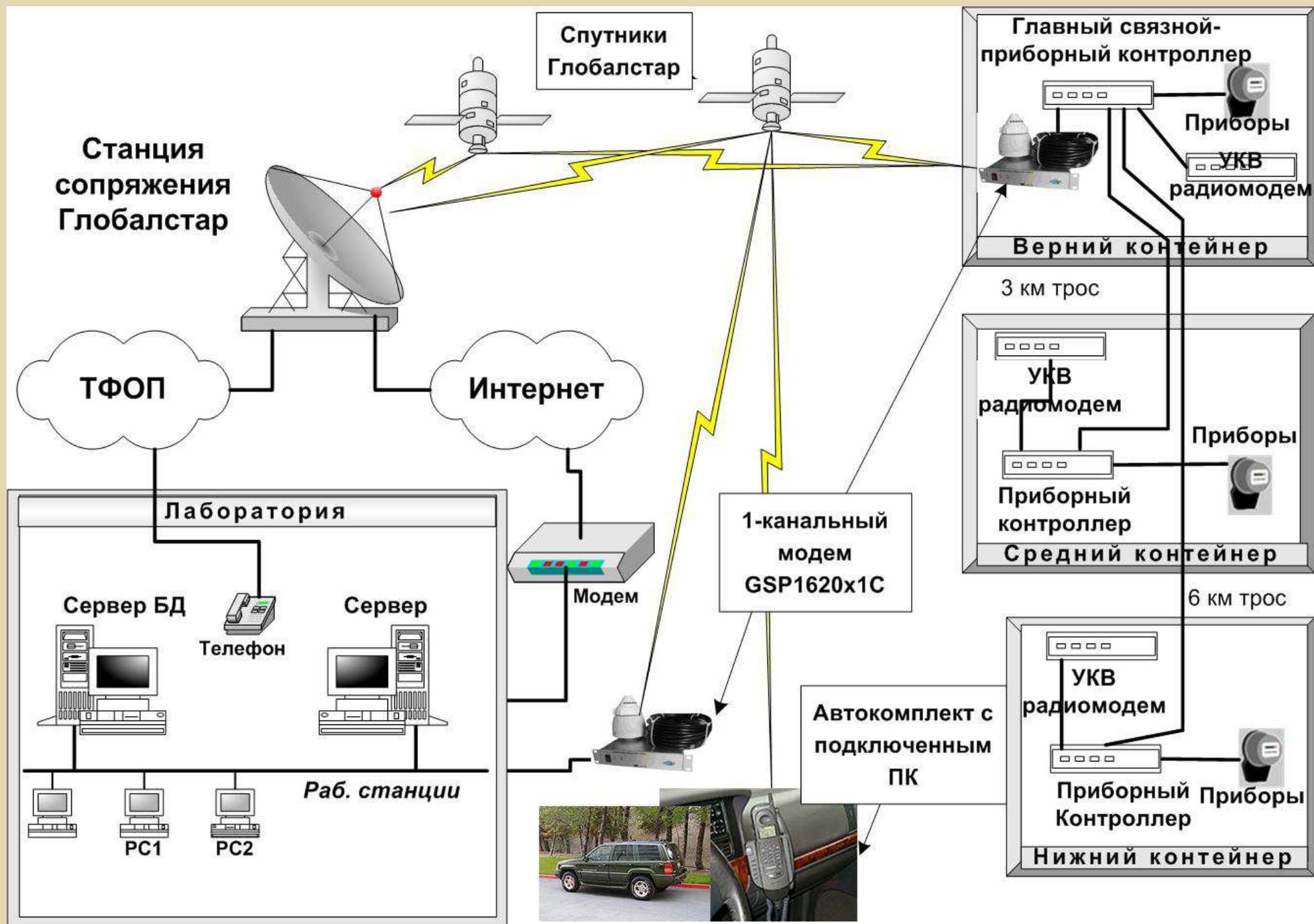




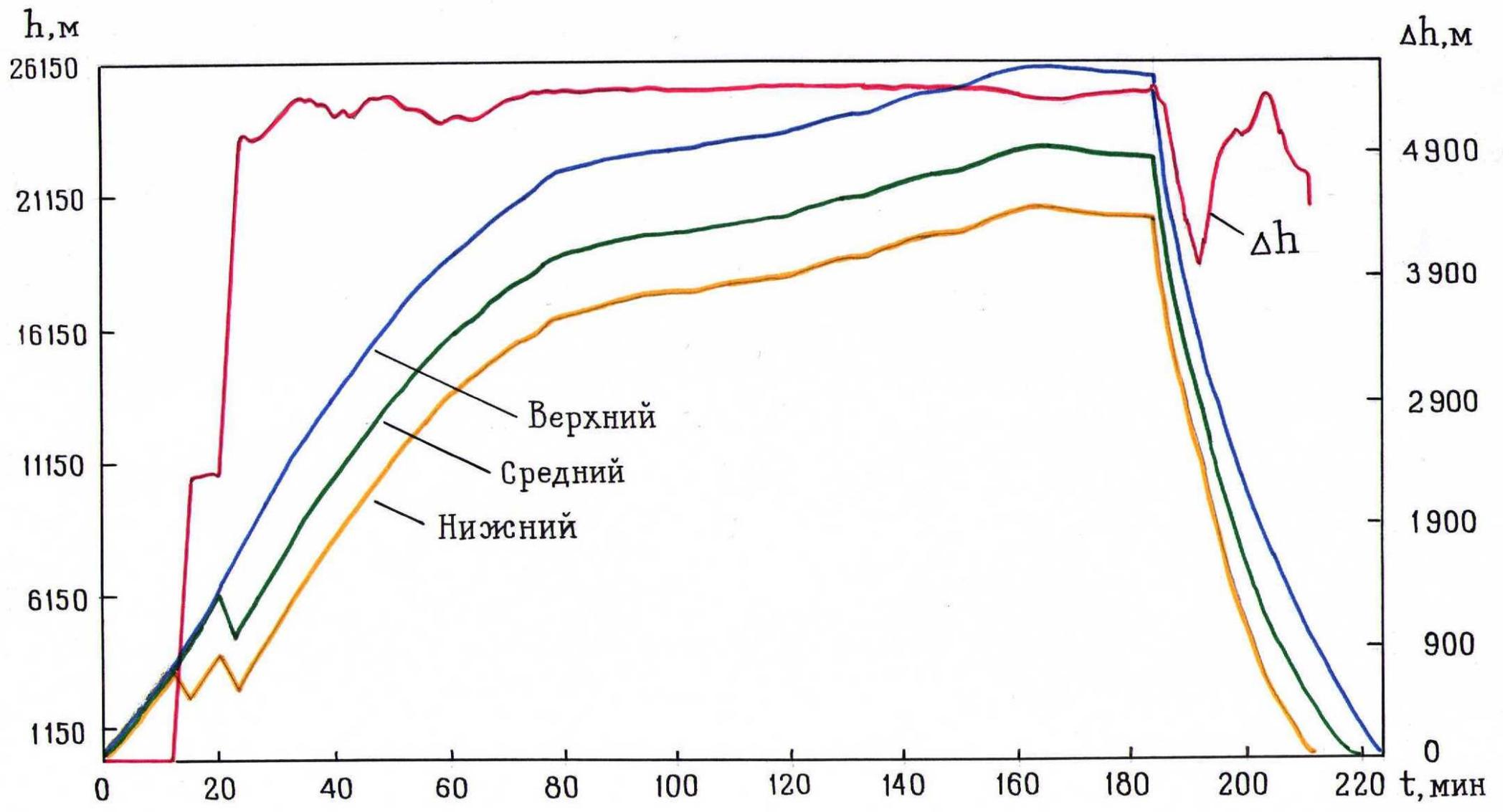
The magazine with rope (3 km)

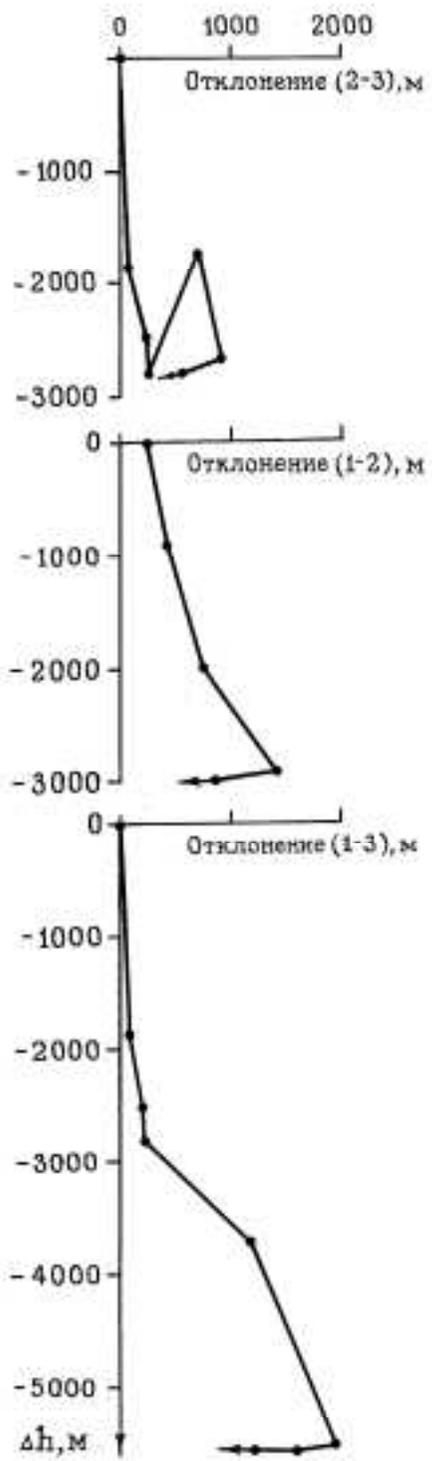
**Balloon suspension
girder (“basket”) at
preflight position**





Aerostat connection diagram – lab server – field team car





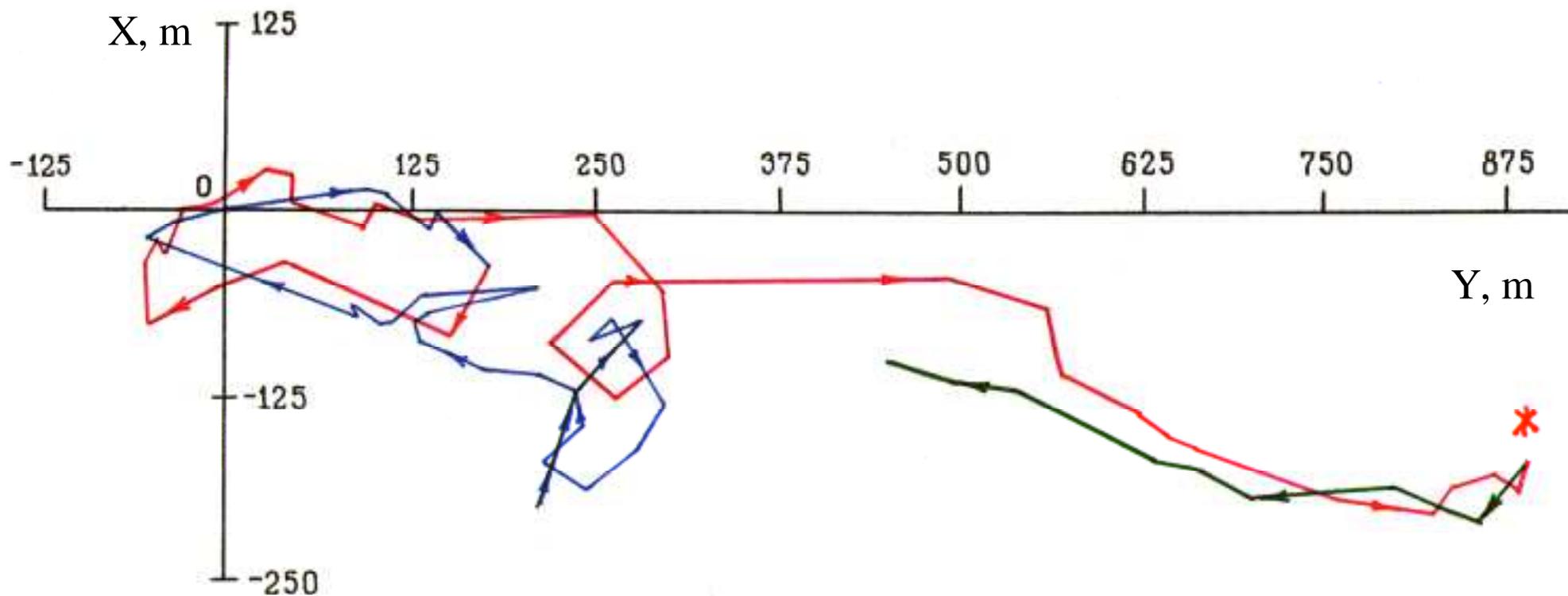


Fig. 6. A projection of a position of middle magnetometer in regard to upper magnetometer on the horizontal plane in the cold season of year ($\Delta h=3,1$ km)

- minutes 75-120
- minutes 120-170
- minutes 170-183