Mission Venera D (2016) - scientific goals and payload

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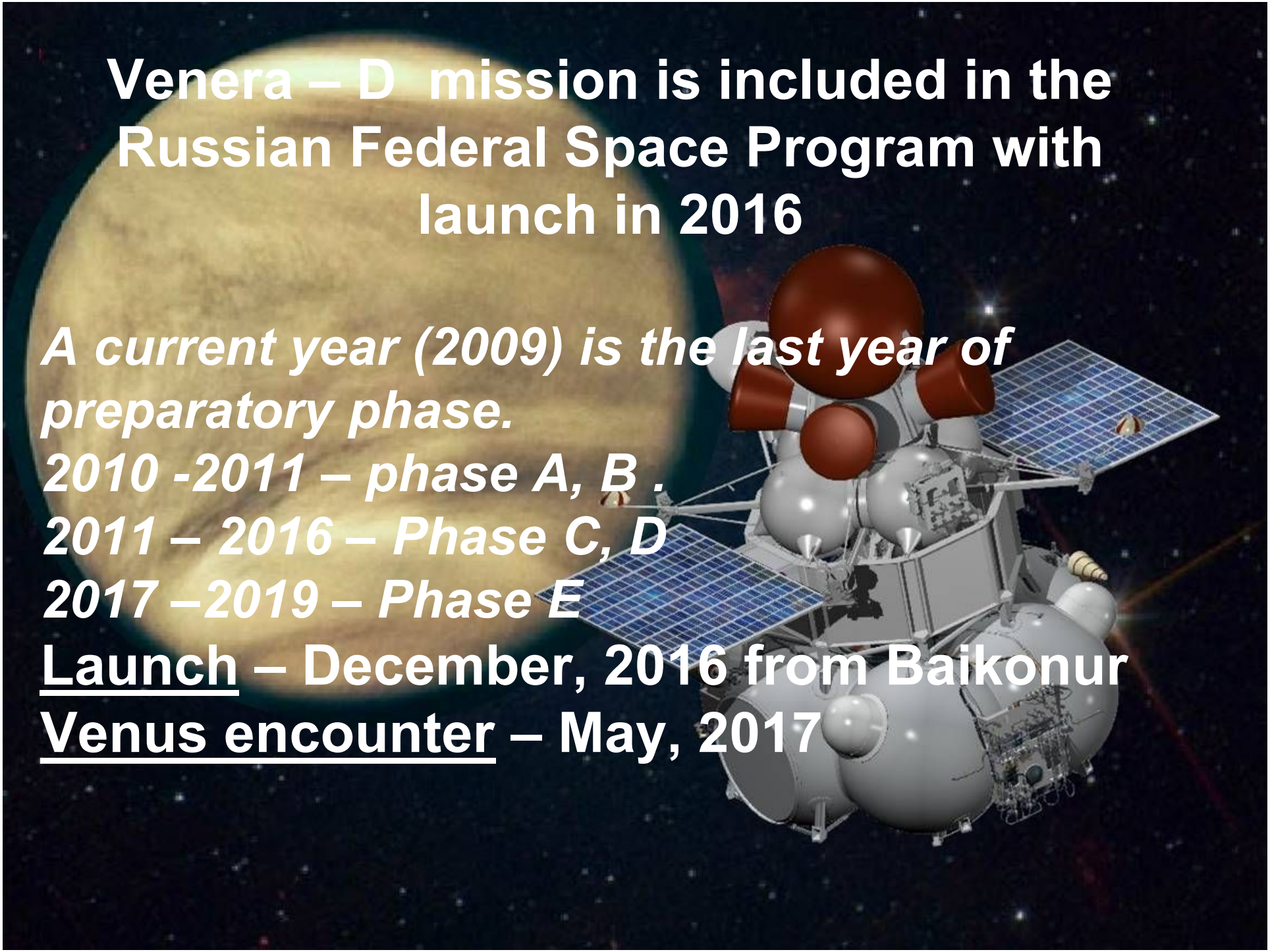
Venera-D workshop, IKI, 30.09-01.10.2009

Venera – D mission is included in the Russian Federal Space Program with launch in 2016



A current year (2009) is the last year of preparatory phase.
2010 -2011 – phase A, B .
2011 – 2016 – Phase C, D
2017 –2019 – Phase E

Launch – December, 2016 from Baikonur

Venus encounter – May, 2017

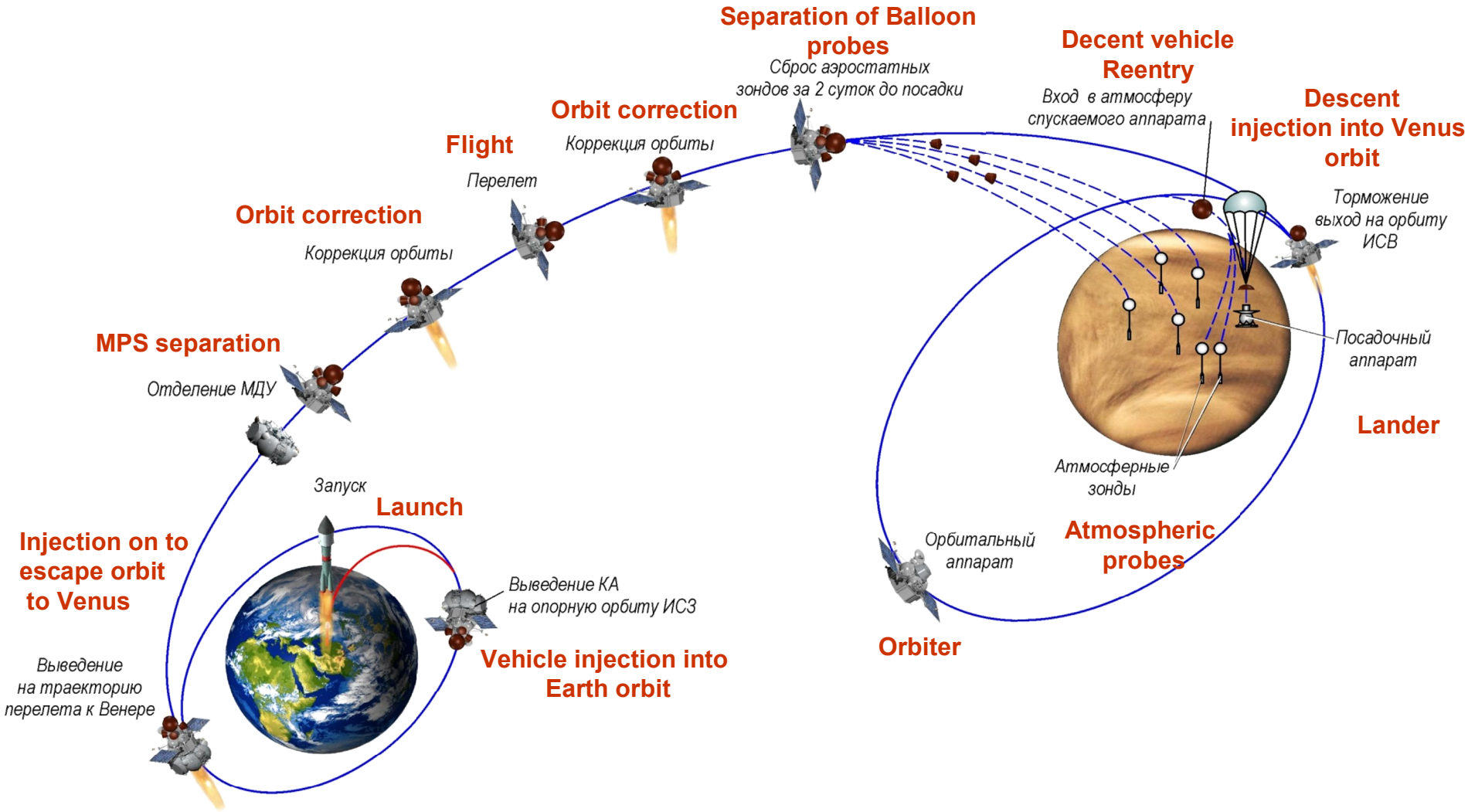
At the moment three versions of launch vehicle with Fregat booster are studied for Venus-D mission (NPOL)

Launcher	Mass on orbit around Venus, kg
Soyuz-2	*1080*
Zenith -2SLB	*1540*
Proton	*2200*

To start the Phase A in 2010 the following problems are to be solved in the current year

- Final formulation of scientific goals of the mission
- Choice of the elements of the mission and development of technical requirement for each element of the mission
-Scientific payload for every element of the mission and strategy of observations
- Ballistics of the flight to Venus
- Choice of the orbit and strategy of separation of the descent module (s)
- A choice of the landing sites and latitudes of the balloon floating
- Improvement of the Reference Model of Venus
- International cooperation

POSSIBLE VENERA-D MISSION PROFILE (with PROTON)



Scientific goals of the mission

- Investigation of the structure and chemical composition of the atmosphere, including isotopic ratio of light and noble gases;
- Clouds, structure, composition, chemistry;
- Study of the surface composition, mineralogy, geochemistry, insight to internal structure and interaction between the surface and atmosphere, volcanic and seismic activity;
- Study of the dynamics and nature of superrotation, radiative balance and nature of the enormous greenhouse effect;
- Investigation of the upper atmosphere, ionosphere, electrical activity, magnetosphere, escape rate

VENERA-D

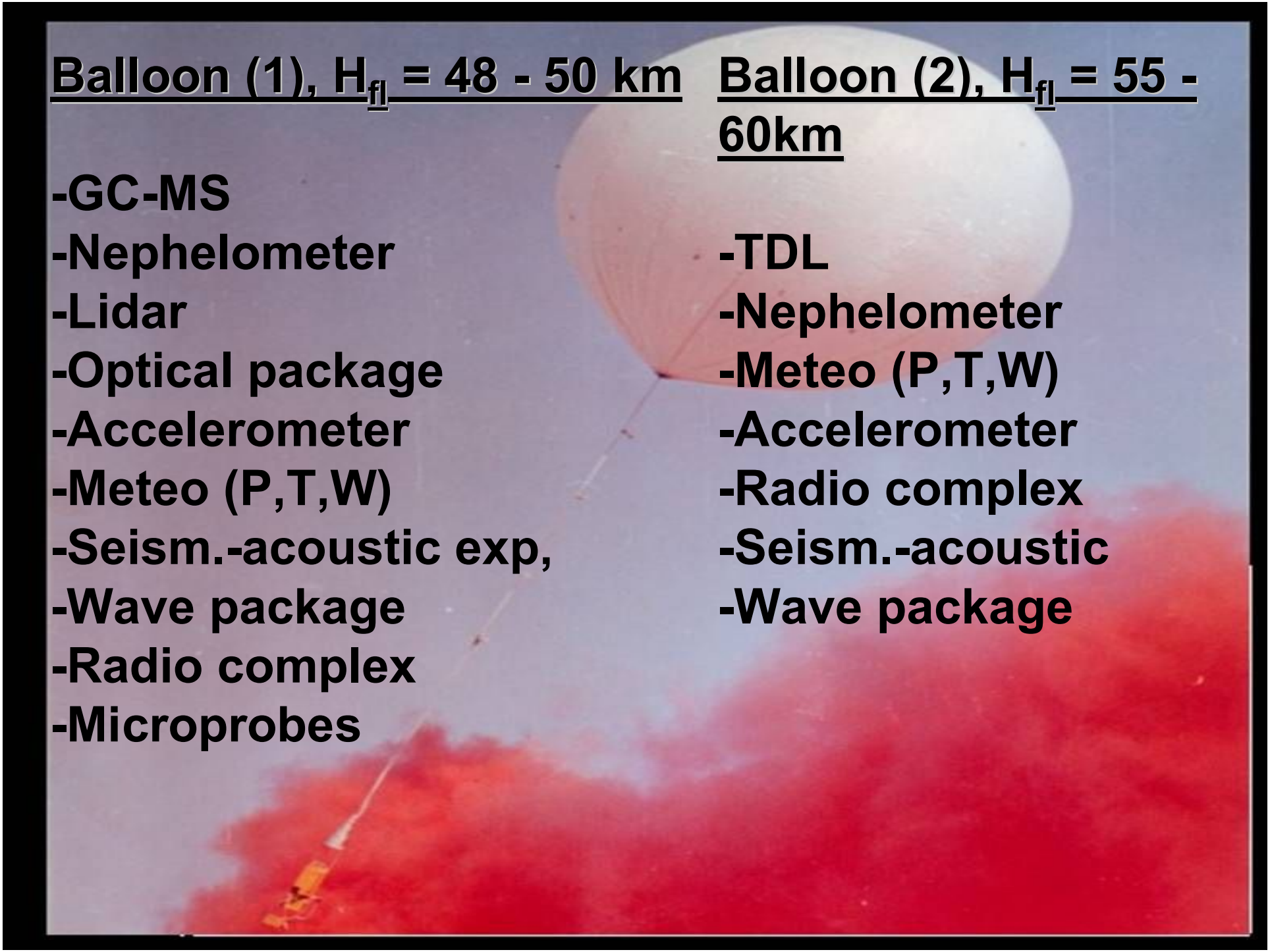
(a currrent preliminary conception)

- Orbiter. Mass: 540 kg, scientific payload 70 - 80kg.
- Balloon at 55-60 km (VEGA type; superpressure, d=3.4 m), duration of functioning more than 8 days, payload up to 5 kg. Mass ~60 kg (without entry system)
- Balloon at 48-50 km (VEGA type; d= 3.4 m), duration of functioning more than 8 days, payload up to 15 kg. Mass ~100 kg (without entry system)
- Microprobes to be delivered from balloon one by one. Mass up to 2 kg, payload up to 0.5 kg, duration of the falling down through the atmosphere ~ 30 min
- Lander. Payload 20-25 kg, duration of functioning on the surface more than 1 hour

Payload , studied at preparatory phase

Lander

-GC- MS
-Gamma spectrometer
-Nephelometer
-Particle counter
-Meteo (P,T,W)
-Optical package
-Wave package
-Accelerometer
-Panoramic camera
-Radio complex
-Seism.-acoustic exp.

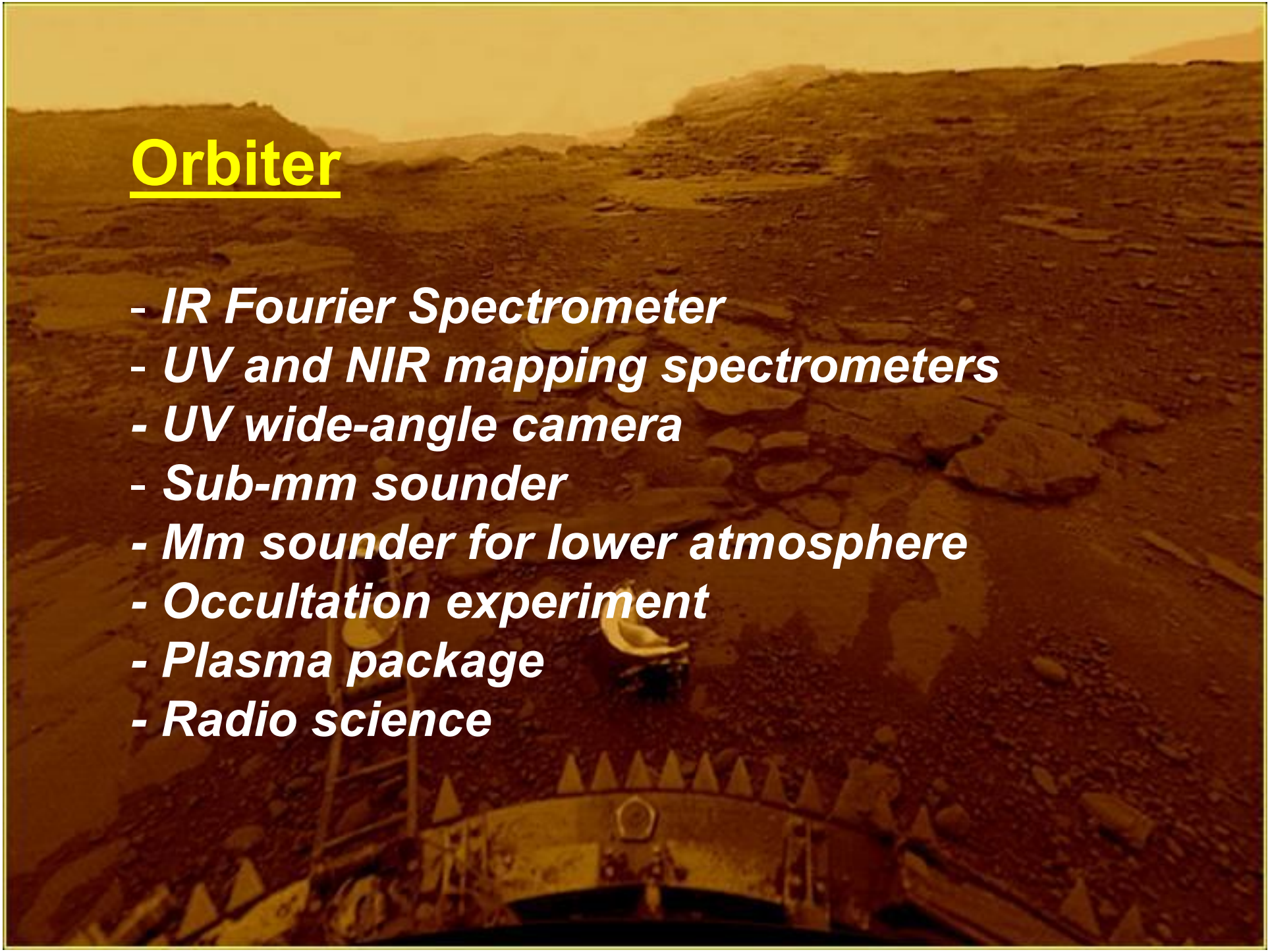


Balloon (1), H_{fl} = 48 - 50 km

-GC-MS
-Nephelometer
-Lidar
-Optical package
-Accelerometer
-Meteo (P,T,W)
-Seism.-acoustic exp,
-Wave package
-Radio complex
-Microprobes

Balloon (2), H_{fl} = 55 - 60km

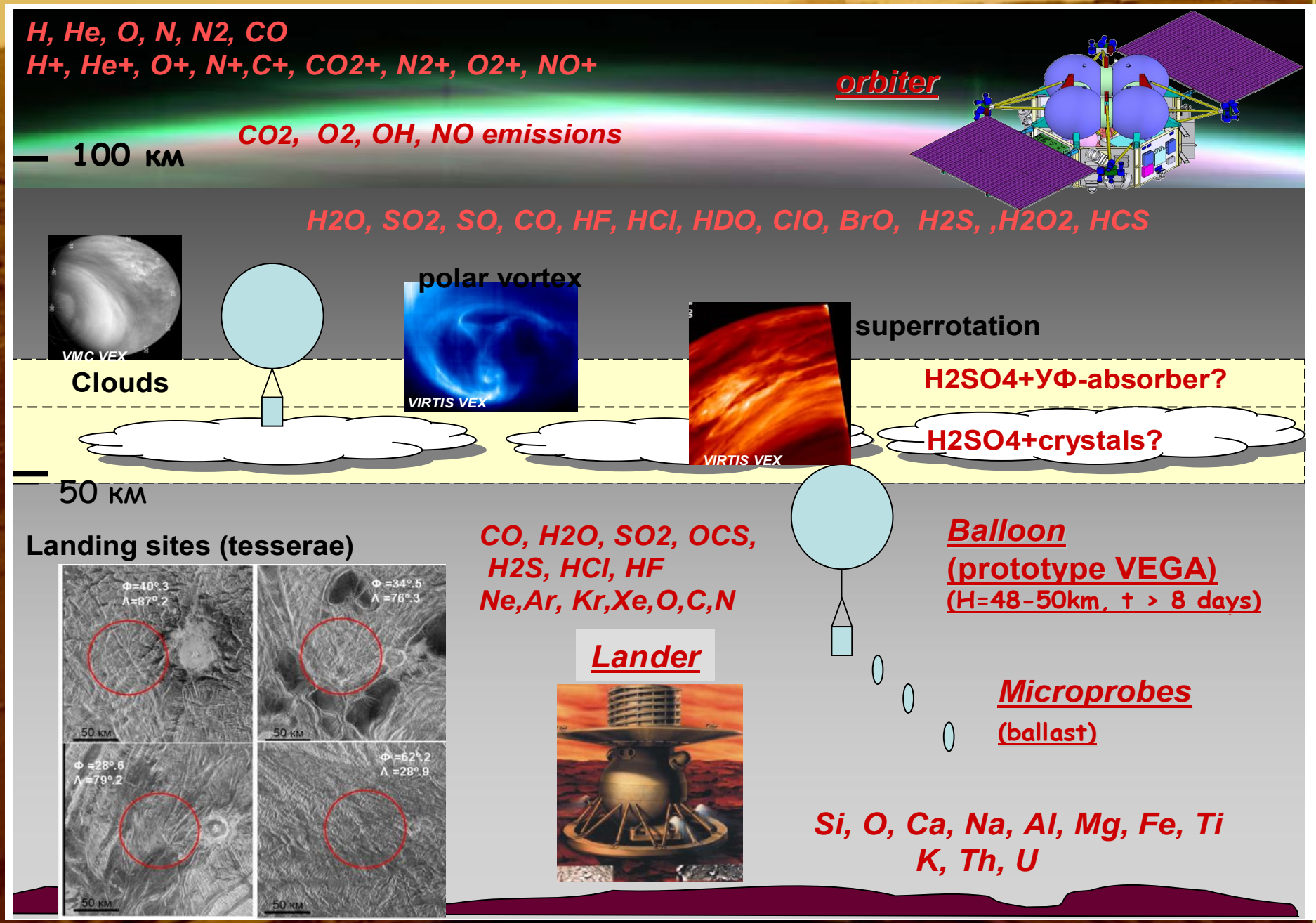
-TDL
-Nephelometer
-Meteo (P,T,W)
-Accelerometer
-Radio complex
-Seism.-acoustic
-Wave package



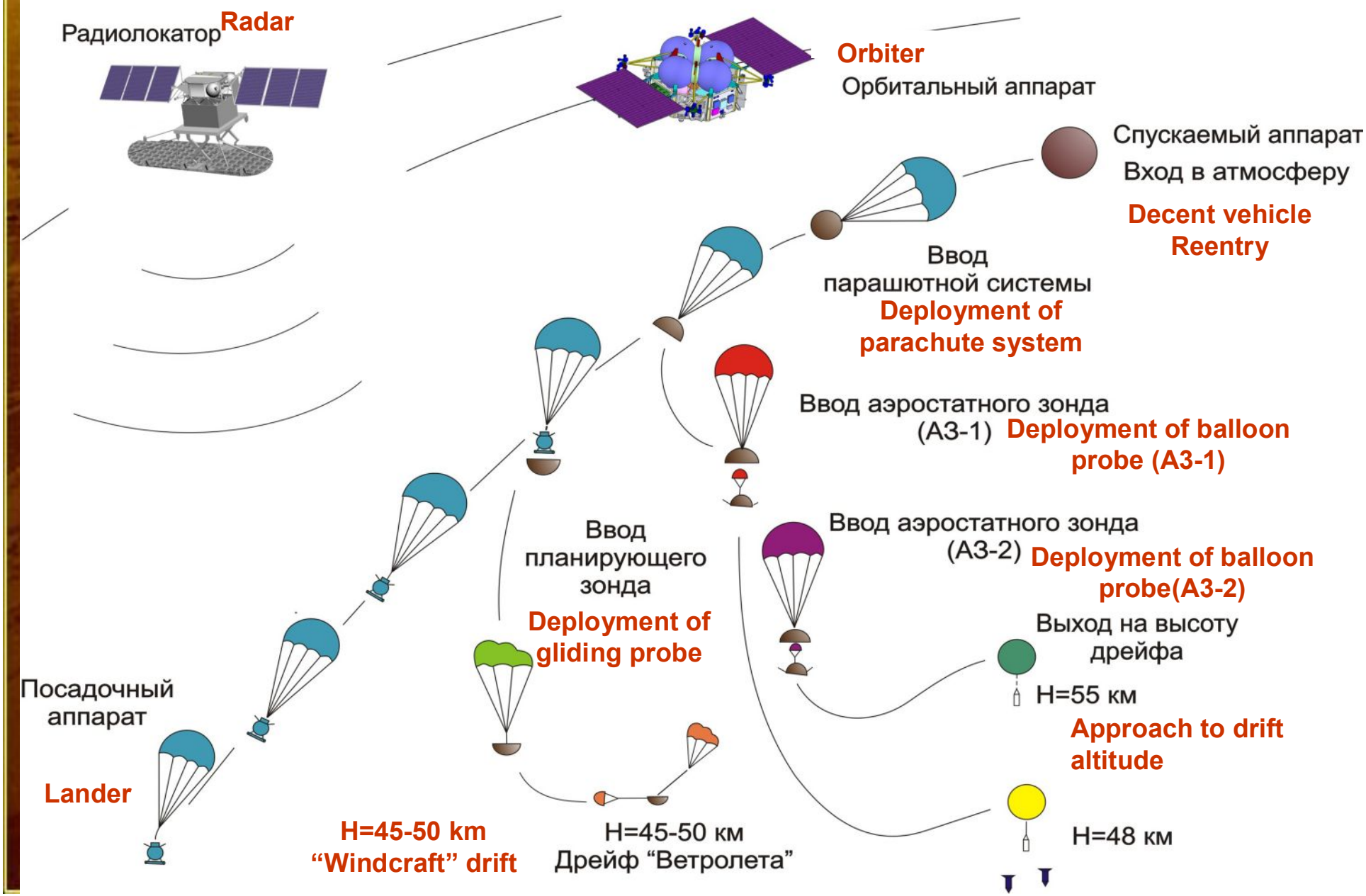
Orbiter

- *IR Fourier Spectrometer*
- *UV and NIR mapping spectrometers*
- *UV wide-angle camera*
- *Sub-mm sounder*
- *Mm sounder for lower atmosphere*
- *Occultation experiment*
- *Plasma package*
- *Radio science*

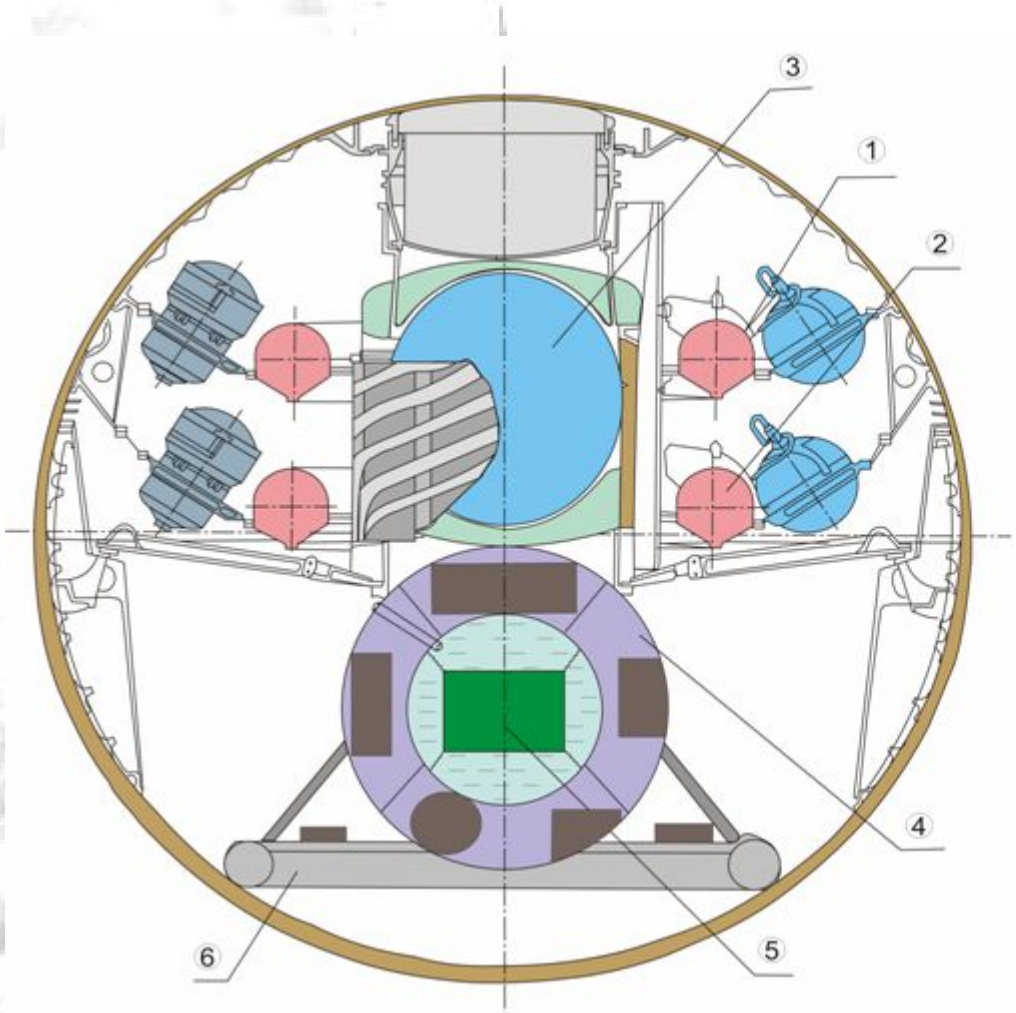
Preliminary conception of the Venera-D mission



Venera-D experiment plan (Proton launcher)



Descent module



1 – Balloon 1
2 - Balloon 2
3 – Drift zond
4 - Landing module
5 – Scientific payload
6 – Landing device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EVERYBODY FOR
COOPERATION