

Астрономия

Сурдин В.Г.

Лекция 23

Планеты земной группы

Меркурий

Венера

Земля

Марс

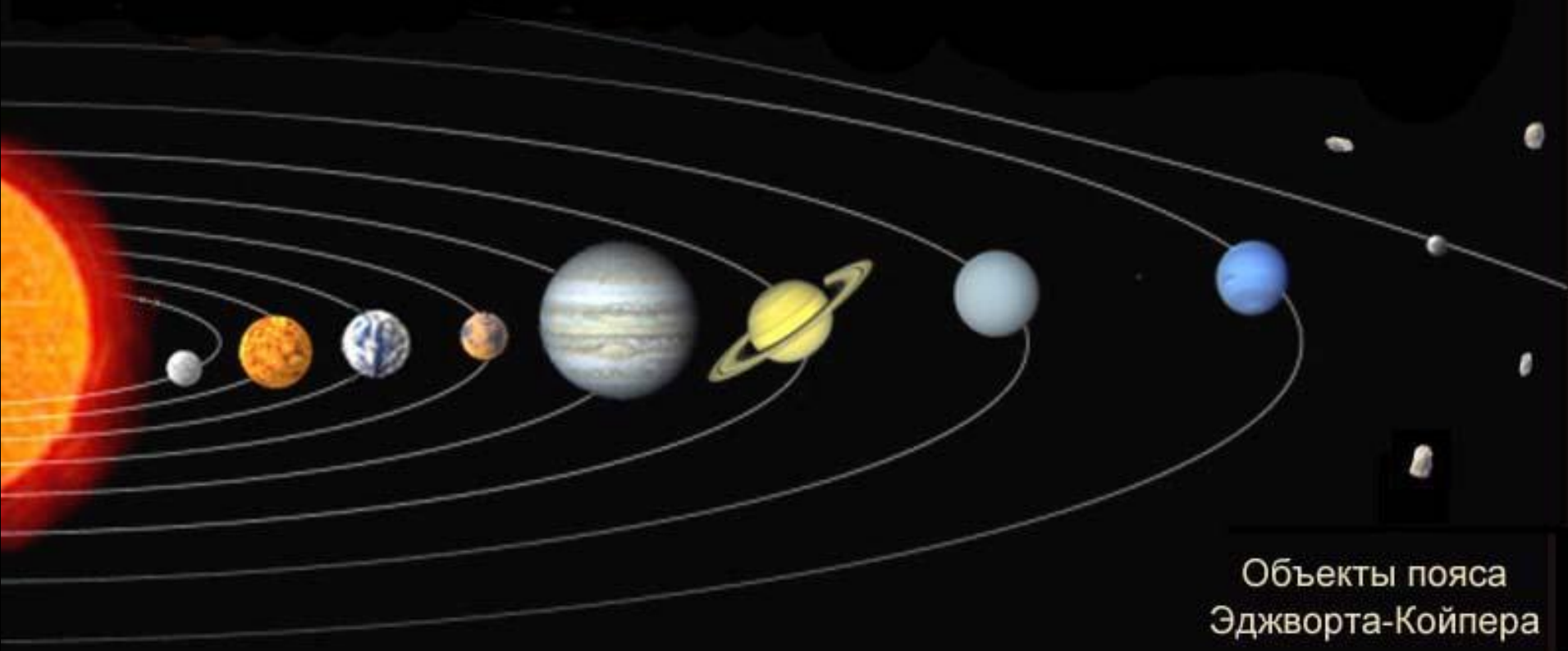
Юпитер

Сатурн

Уран

Нептун

Плутон



Объекты пояса Эдворта-Койпера



Кометы

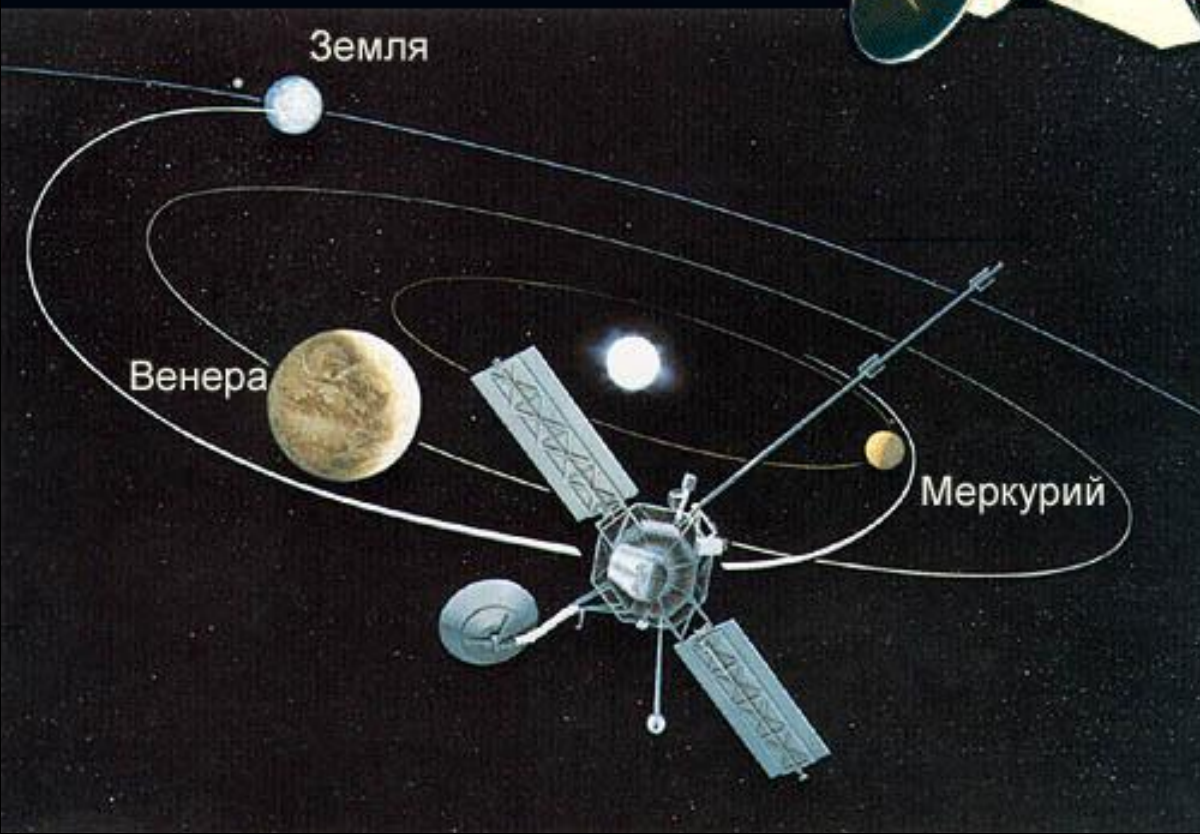
Астероиды



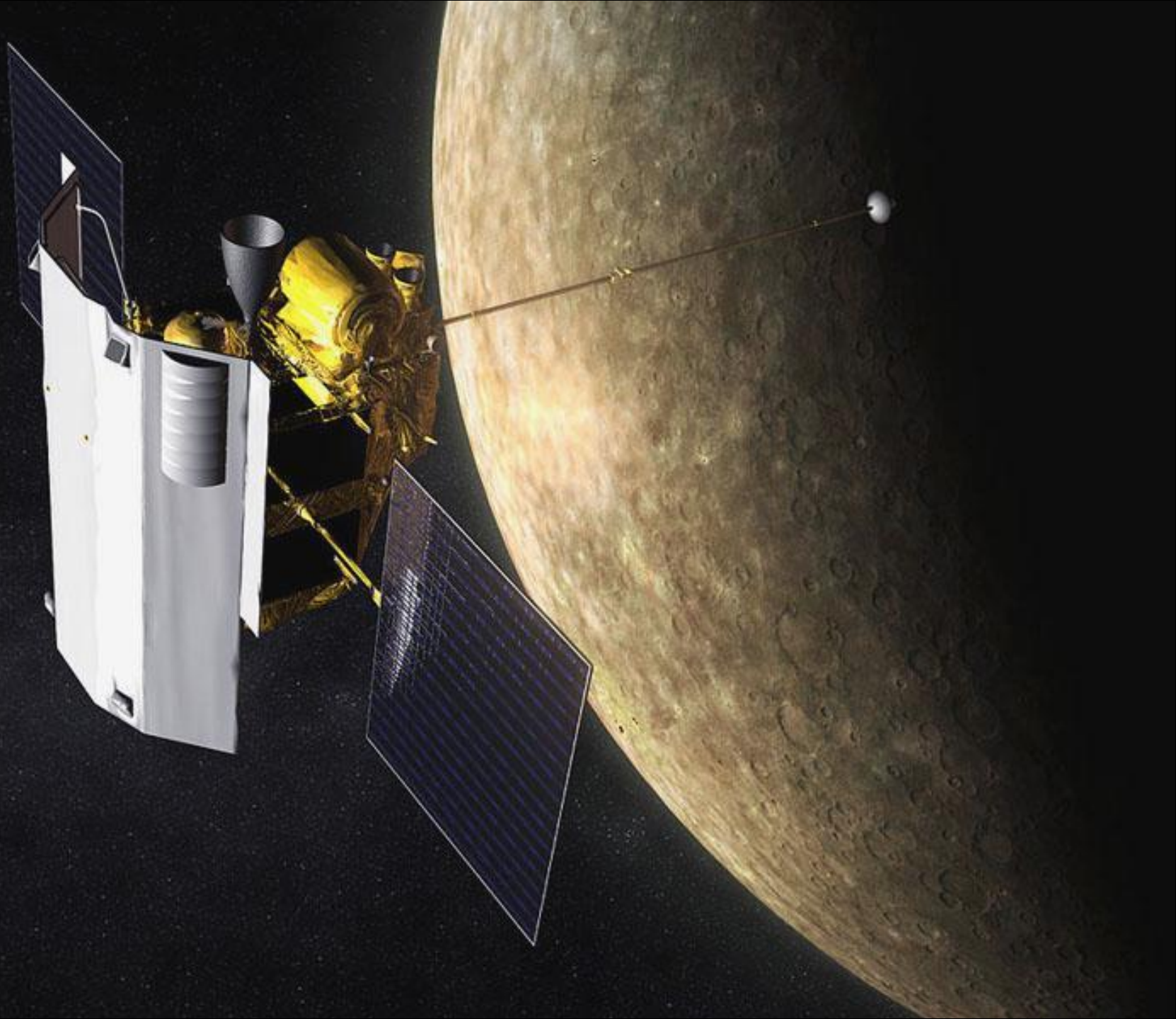
Mariner 10 (NASA)

1973 - 1975

Первая экспедиция
к Меркурию

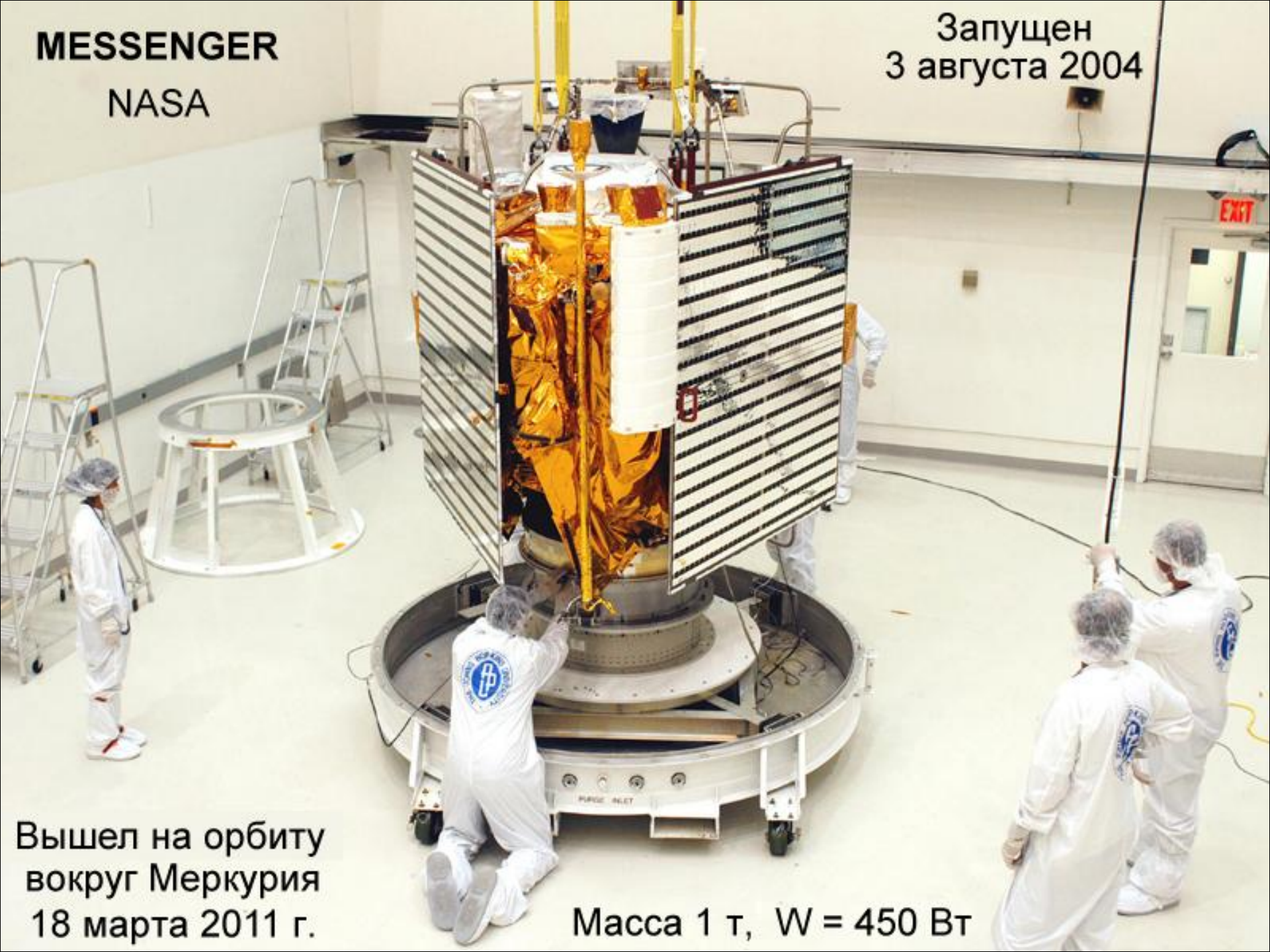


Пролет мимо Венеры
с гравитационным маневром
и затем три пролета
вблизи Меркурия



MESSENGER
NASA

Запущен
3 августа 2004



Вышел на орбиту
вокруг Меркурия
18 марта 2011 г.

Масса 1 т, $W = 450$ Вт

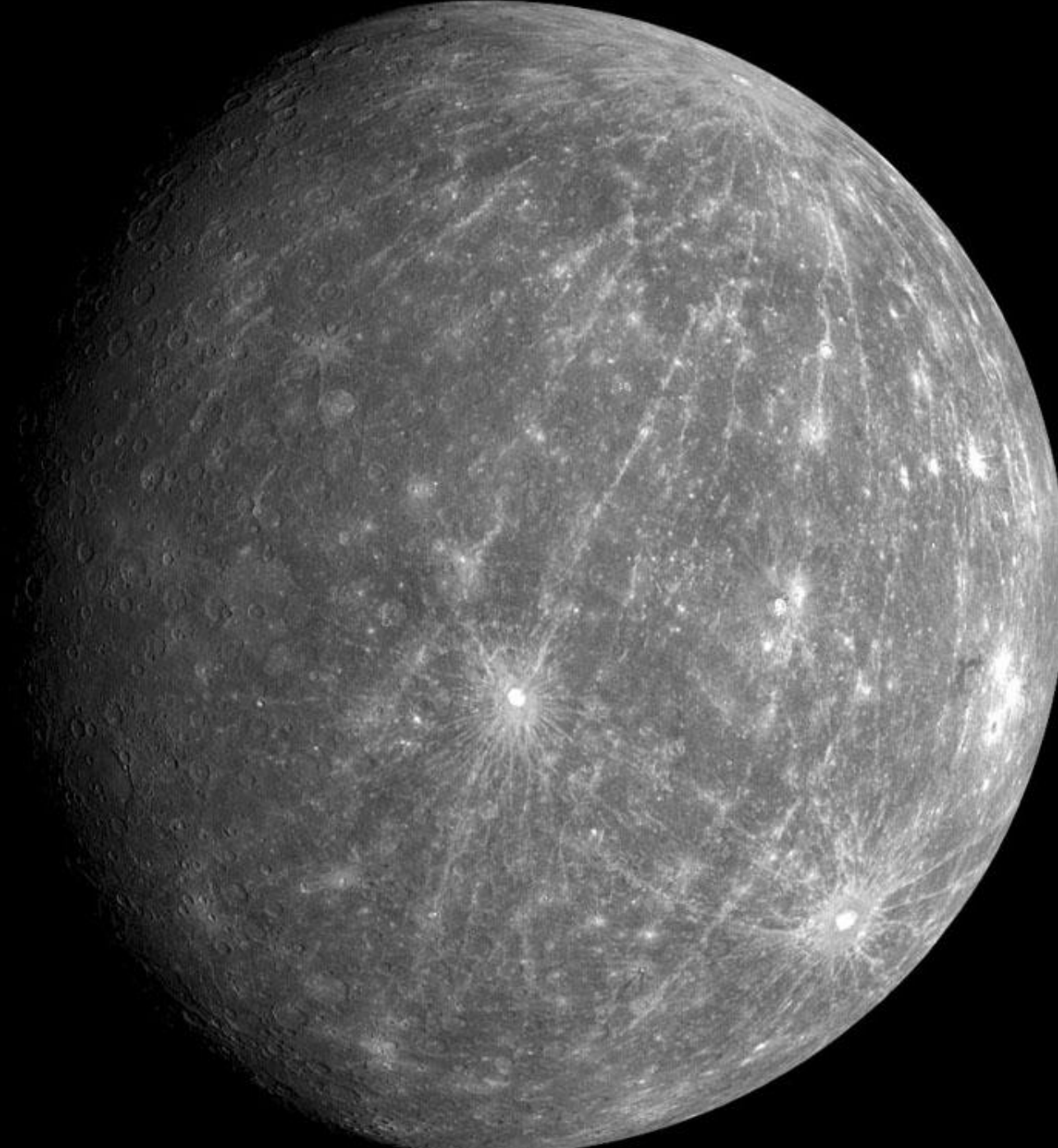
Меркурий

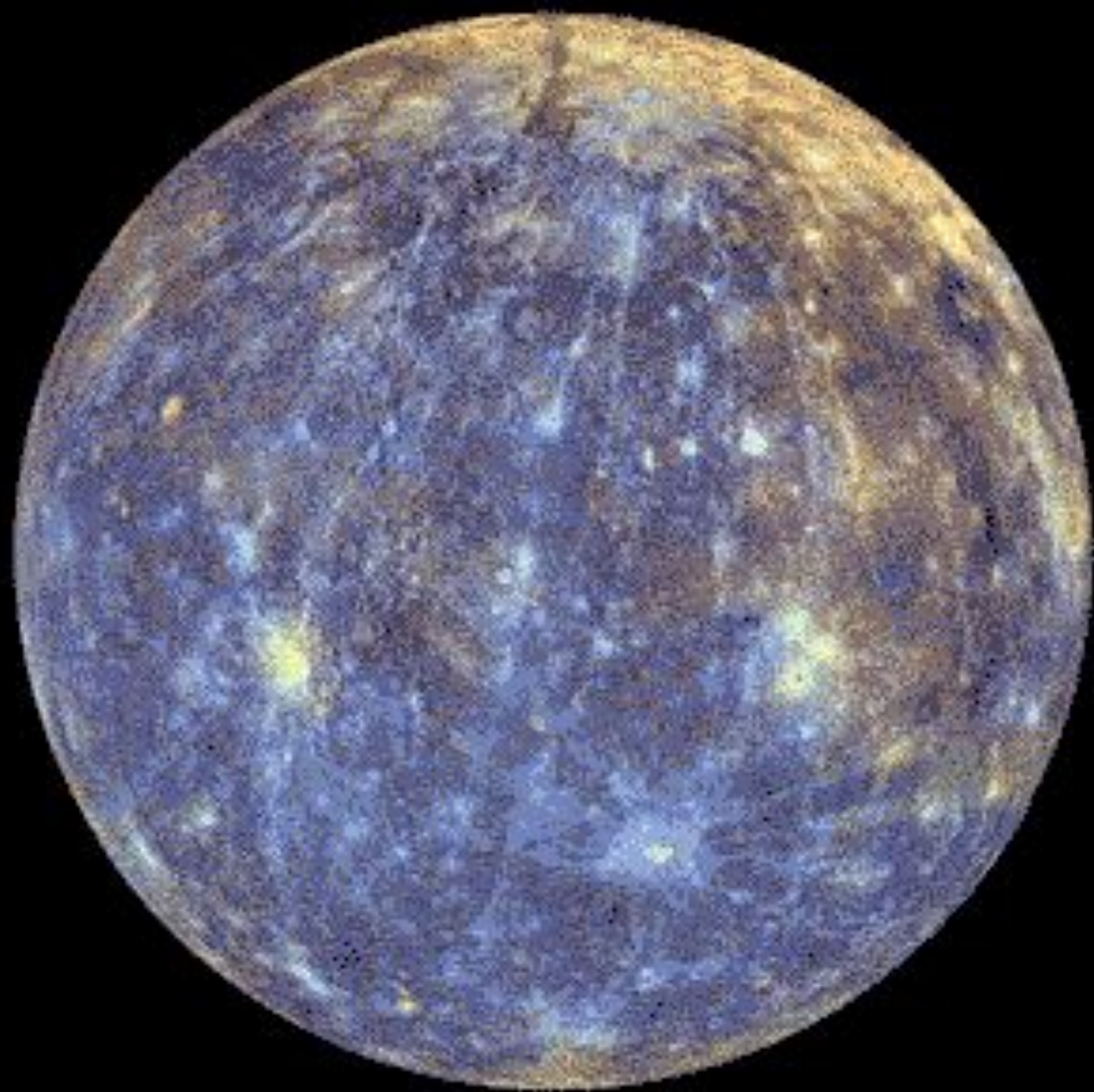
-173 °C

+430 °C

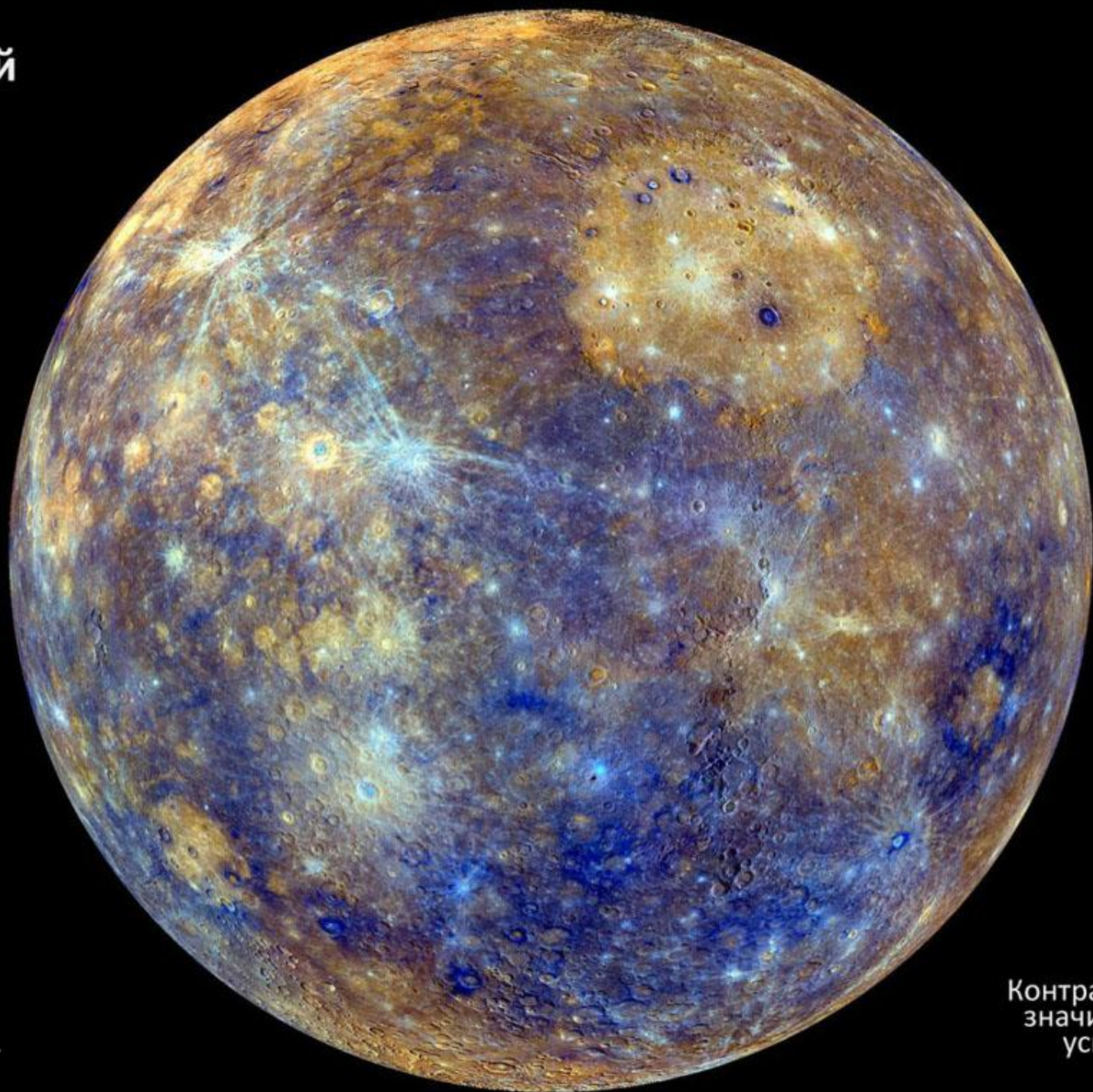
Messenger (NASA)

Oct 2008





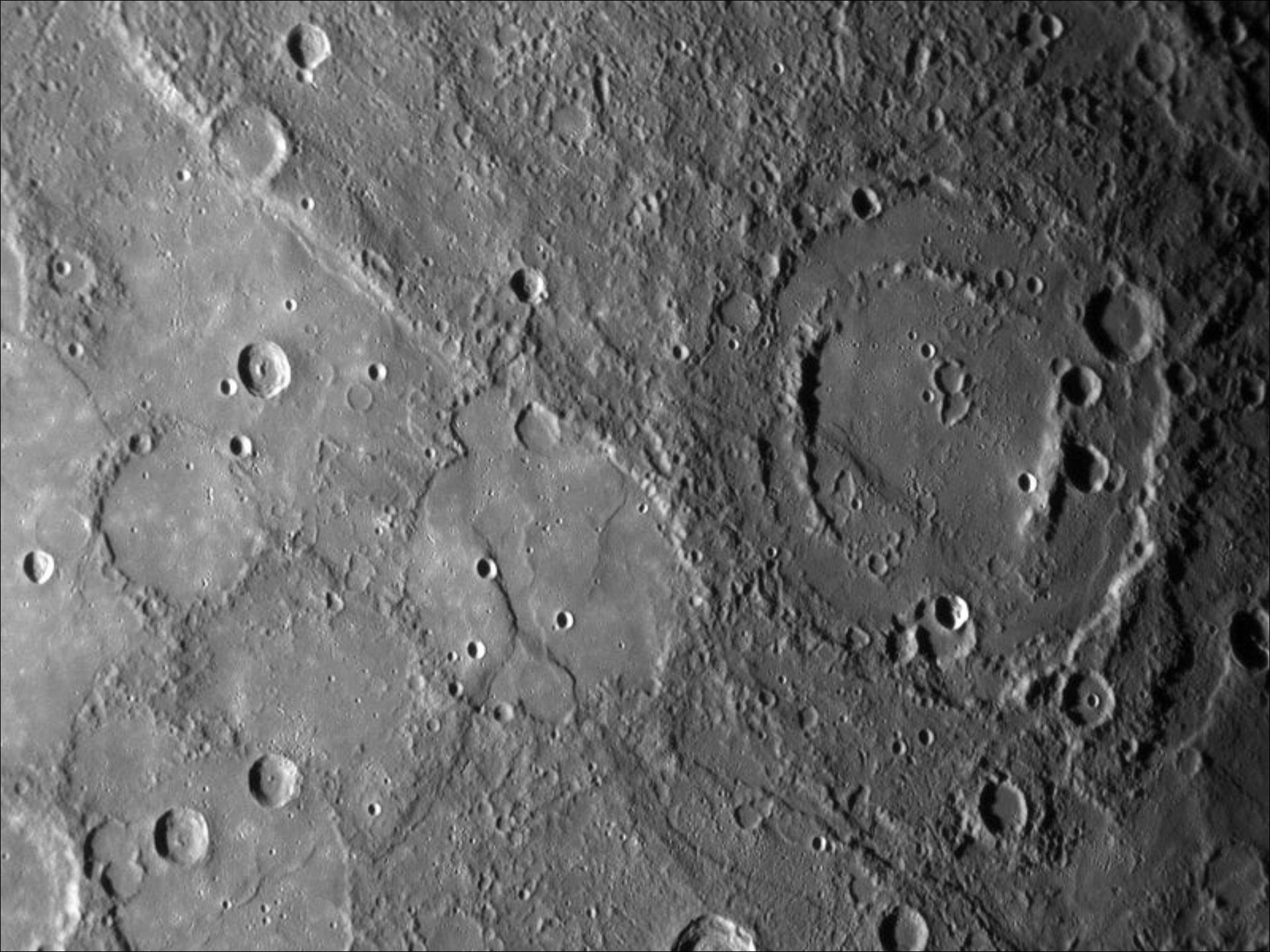
Меркурий



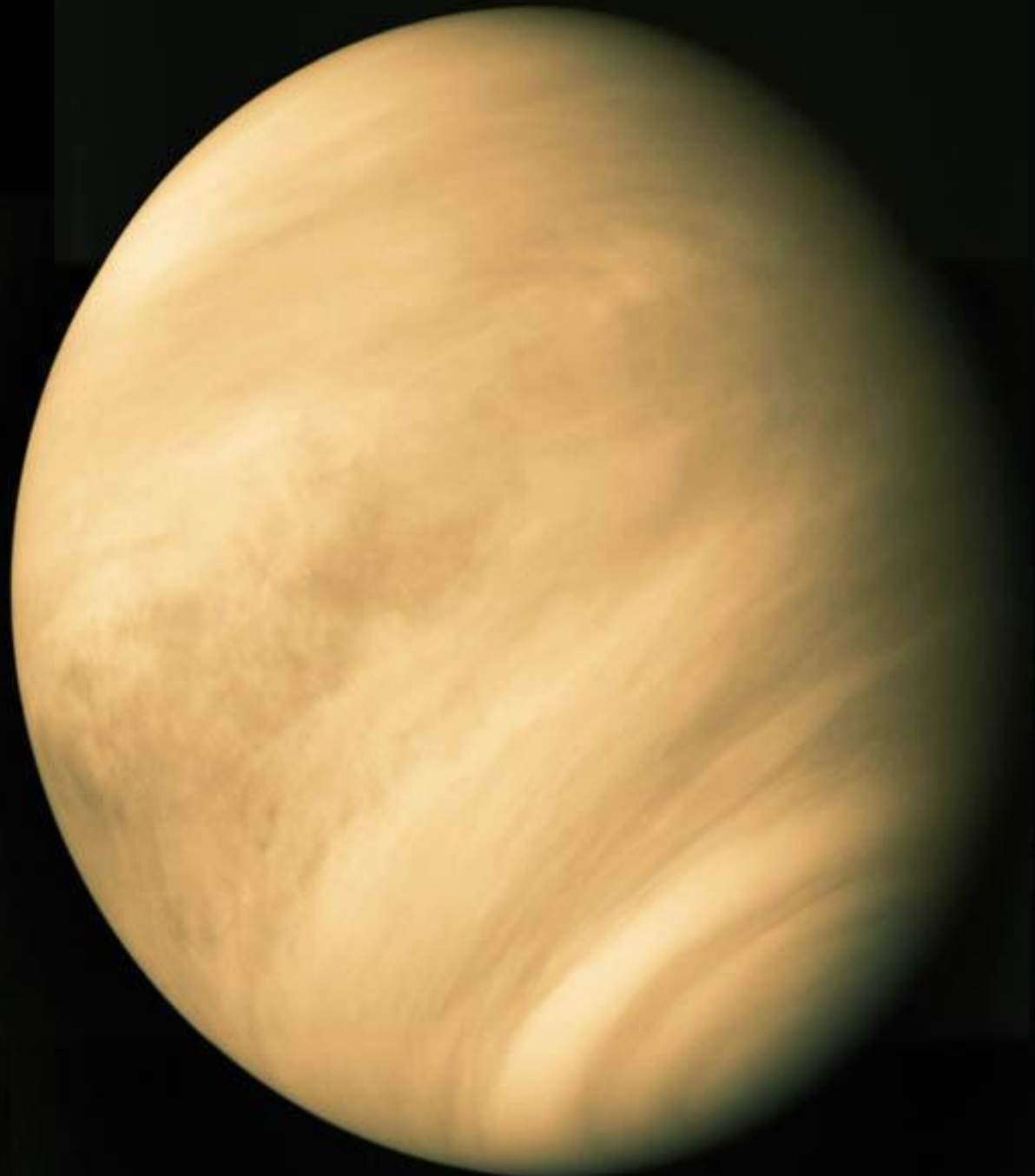
Messenger
NASA, 2011

Контраст цвета
значительно
усилен





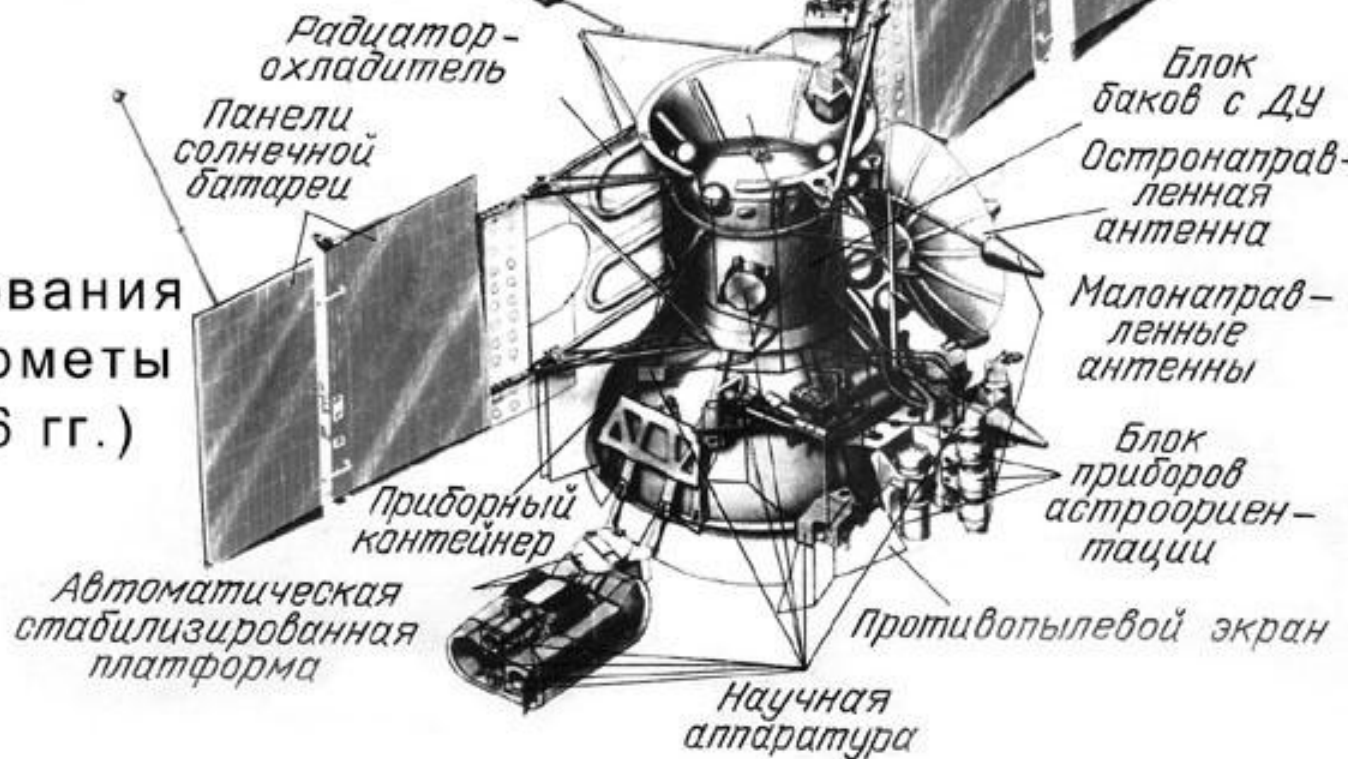
Венера



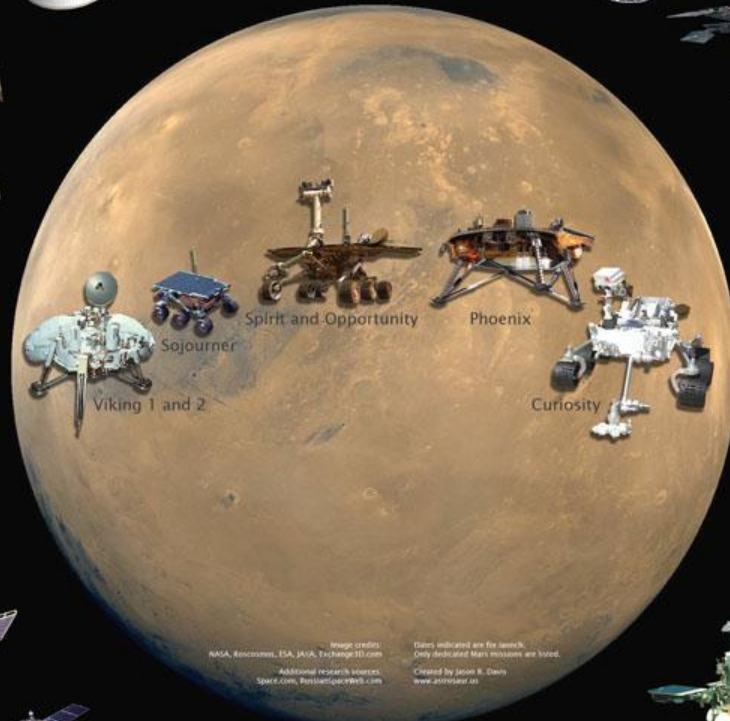
Спускаемый аппарат
для посадки
на Венеру

Вега-1, -2
(СССР и др.)

АМС для исследования
Венеры и ядра кометы
Галлея (1984-86 гг.)



МАРСИАНСКИЕ РОБОТЫ



39: Phobos-Grunt
November 8, 2011
Stranded in Earth orbit

40: Mars Science Laboratory Curiosity
November 26, 2011
Mission to Gale Crater

1, 2: MARS 1M No. 1 / MARS 1M No. 2
October 10 / October 14, 1960
Both destroyed during launch

3, 4, 5, 8: MARS 2MV-4 No. 1 / Mars 1 / Mars 2MV-3 No. 1 / Zond 2
October 24 / November 1 / November 4, 1962 / November 30, 1964
Broke up in Earth orbit / Radio failure en route / Stranded in Earth orbit / Radio failure en route

38: Phoenix
August 4, 2007
Landed, dug for water

6, 7: Mariner 3 / Mariner 4
November 5 / November 28, 1964
Payload fairing failed to open / First flyby and picture return

37: Mars Reconnaissance Orbiter
August 12, 2005
Orbiting Mars

9, 10: Mariner 6 / Mariner 7
February 25 / March 27, 1969
Both flew by, returned pictures

35, 36: Mars Exploration Rovers Spirit and Opportunity
June 10 / July 7, 2003
Both landed on surface

11, 12: Mars 1969 A / Mars 1969 B
March 27 / April 2, 1969
Both destroyed during launch

34: Mars Express / Beagle 2 lander
June 2, 2003
Orbiting Mars, Beagle lost after separation

13, 17: Mariner 8 / Mariner 9
May 8 / May 30, 1971
Destroyed during launch / First probe to orbit Mars

33: Mars Odyssey
March 7, 2001
Orbiting Mars

14, 15, 16: Cosmos 419 / Mars 2 / Mars 3
May 10 / May 19 / May 28, 1971
Failed in Earth orbit / Lander crashed / Lander failed

32: Mars Polar Lander
January 3, 1999
Crashed on surface

18, 19, 20, 21: Mars 4 / Mars 5 / Mars 6 / Mars 7
July 21 / July 25 / August 5 / August 9, 1973
Missed planet / Orbited planet / Lander failed (6 and 7)

31: Mars Climate Orbiter
December 11, 1998
Crashed due to imperial/metric unit mixup

22, 23: Viking 1 / Viking 2
August 20 / September 9, 1975
Both landed on surface, returned data

30: Nozomi
July 4, 1998
Missed planet

24, 25: Phobos 1 / Phobos 2
July 7 / July 12, 1988
Lost communication en route / Lost communication near Phobos

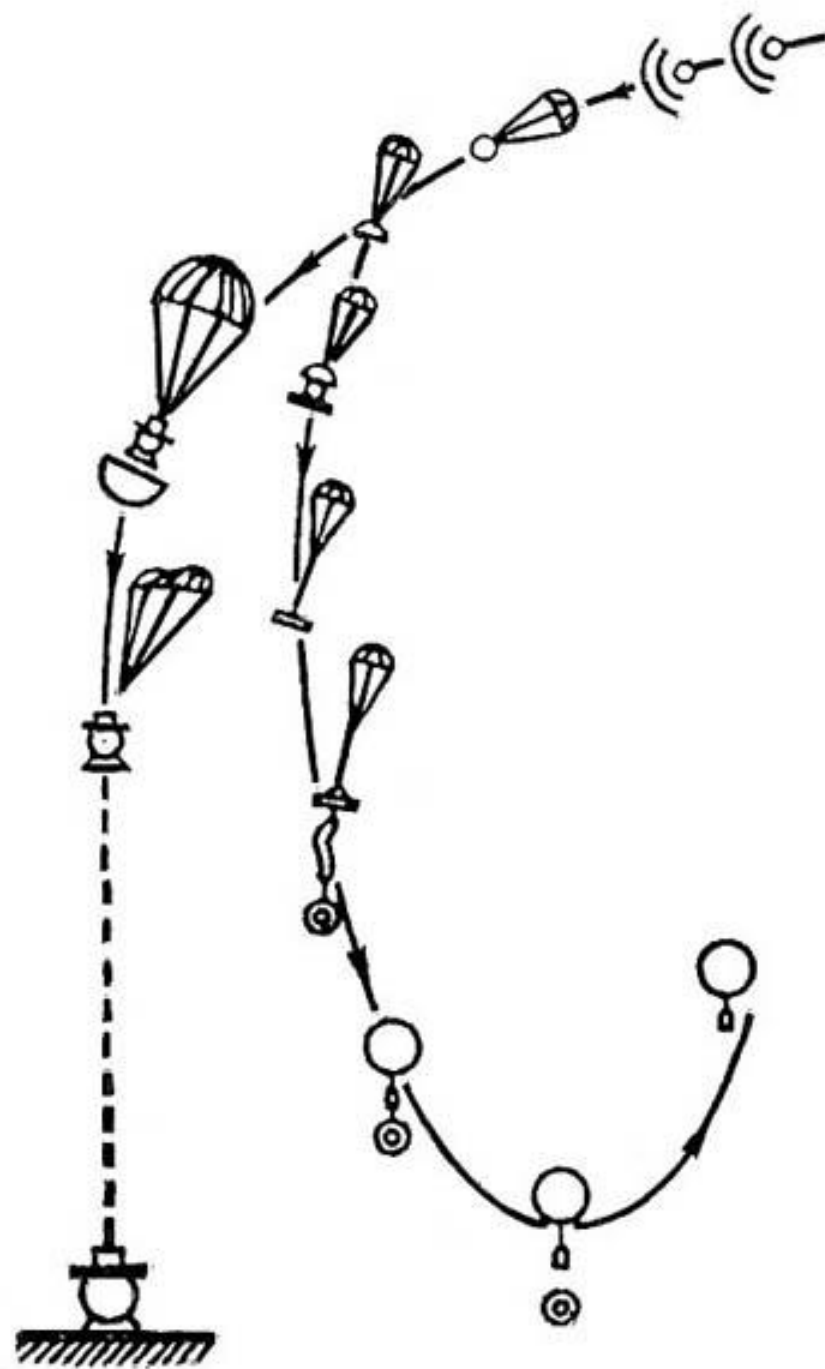
29: Mars Pathfinder
December 4, 1996
Landed on surface, deployed Sojourner rover

26: Mars Observer
September 25, 1992
Lost communication near Mars

28: Mars 96
November 16, 1996
Destroyed during launch

27: Mars Global Surveyor
November 7, 1996
Orbited and returned data

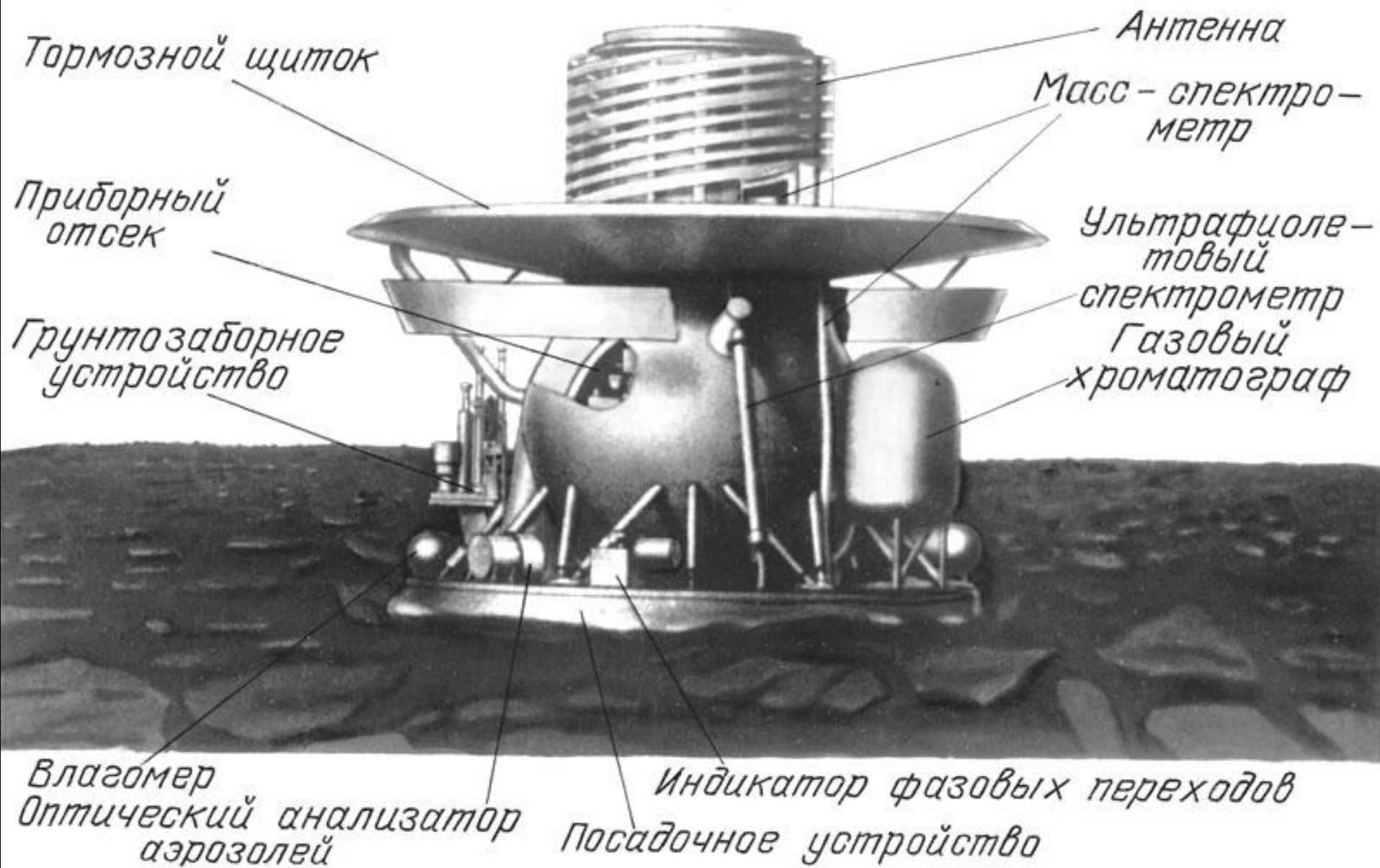
Image credits: NASA, Roscosmos, ESA, JAXA, Telespazio, etc.
Additional credits: Space.com, Penetration, etc.
Created by James B. Collins
www.space.com



Посадка
на Венеру
аппаратов
серии
“Венера”

Аэростат
был только
на аппаратах
“ВеГа”
(1986 г.)

Посадочный аппарат зондов "Венера-9...-14" и "ВеГа-1, -2" (СССР)



Время работы на поверхности около 2 час.

Масса 660 - 760 кг

Венера, март 1982



ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС



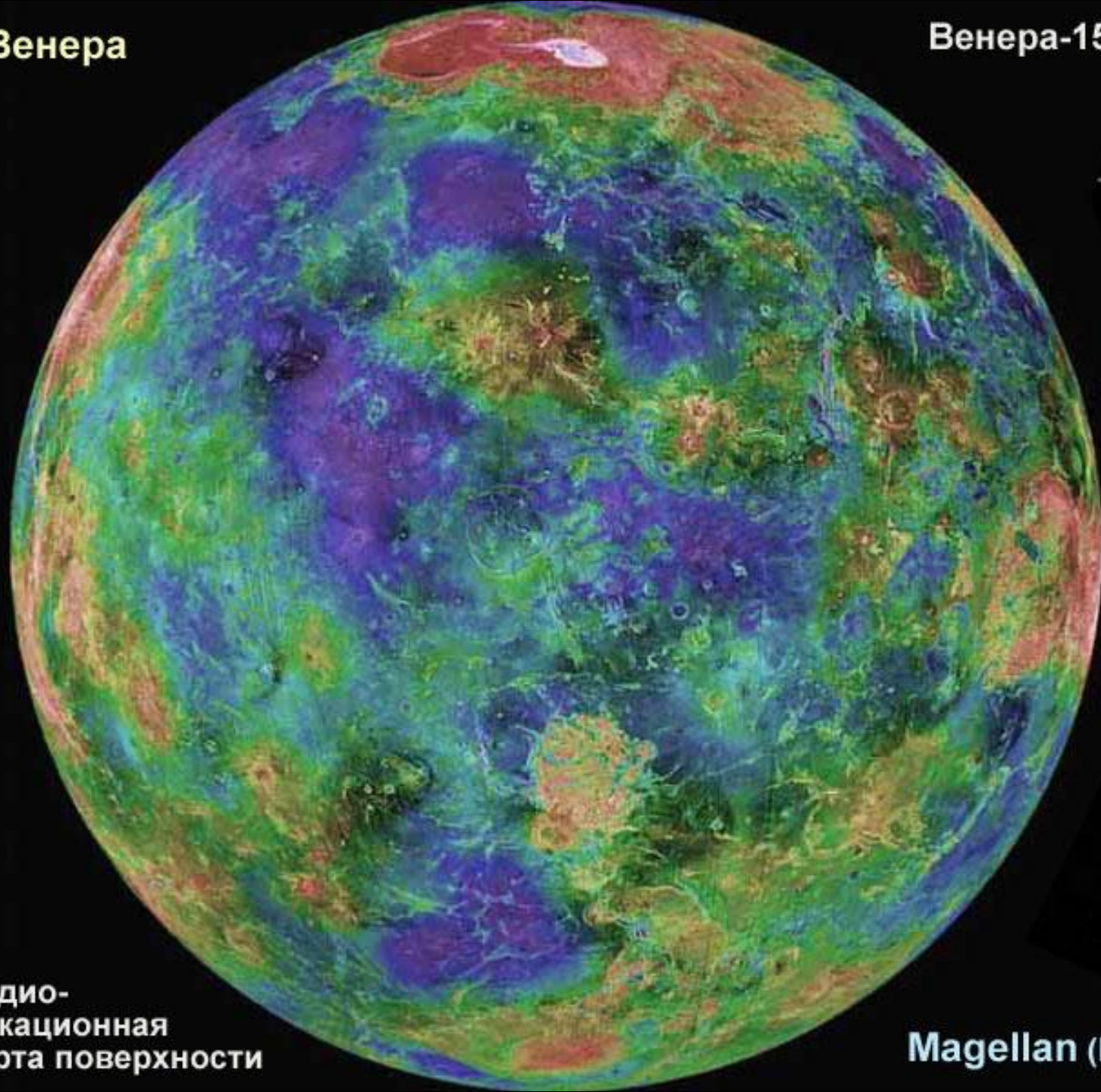
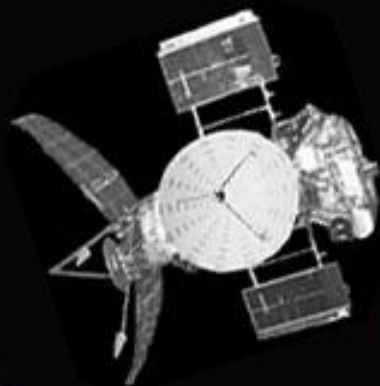
ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС



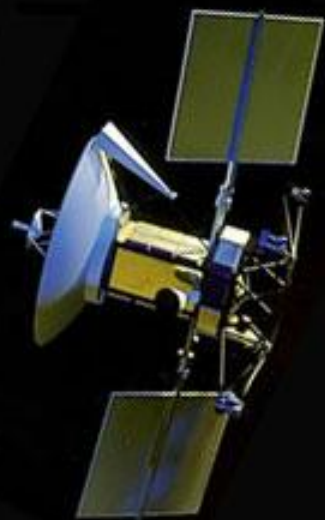
Don P. Mitchell

Венера

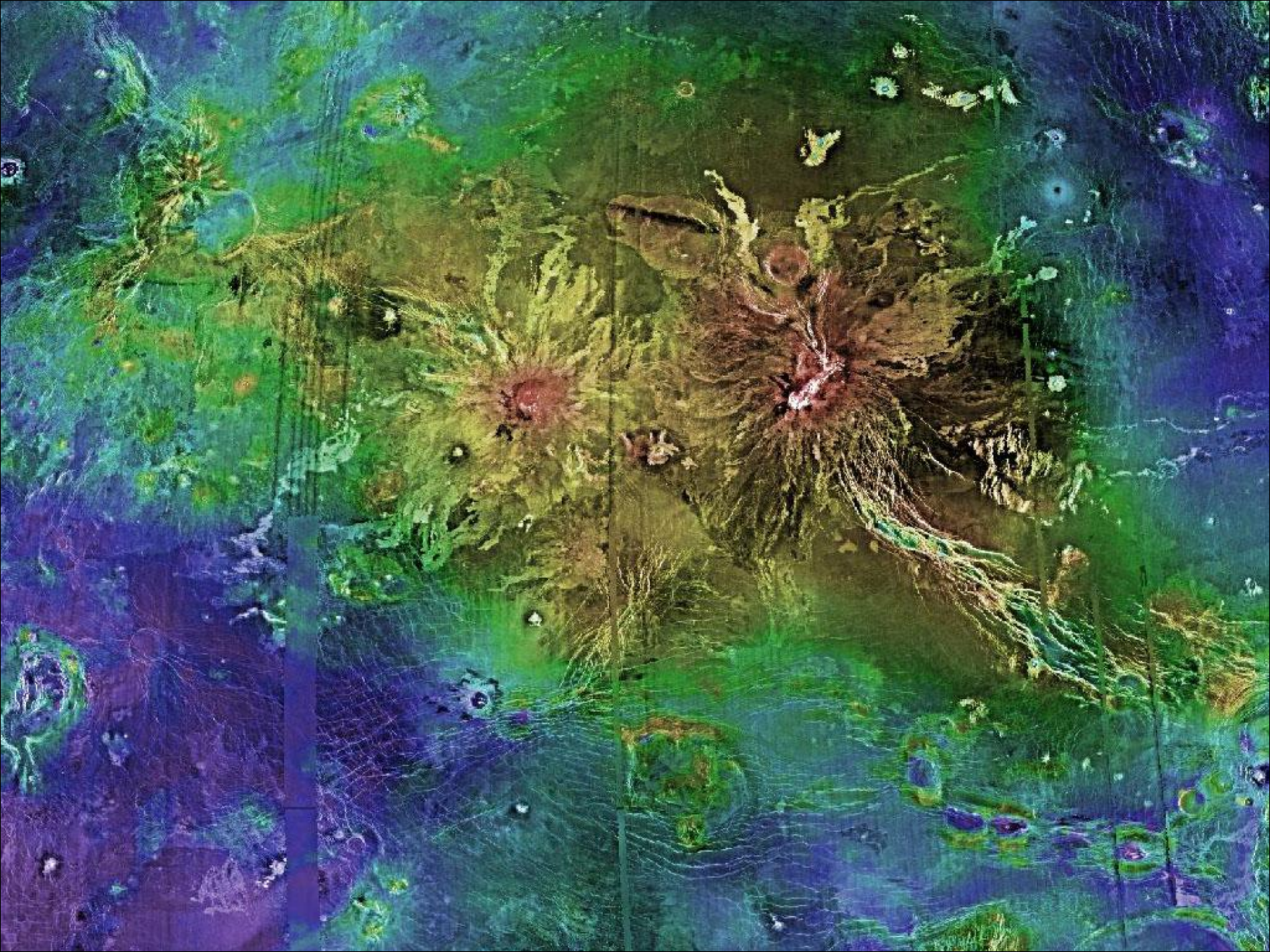
Венера-15 и -16, 1983-1984

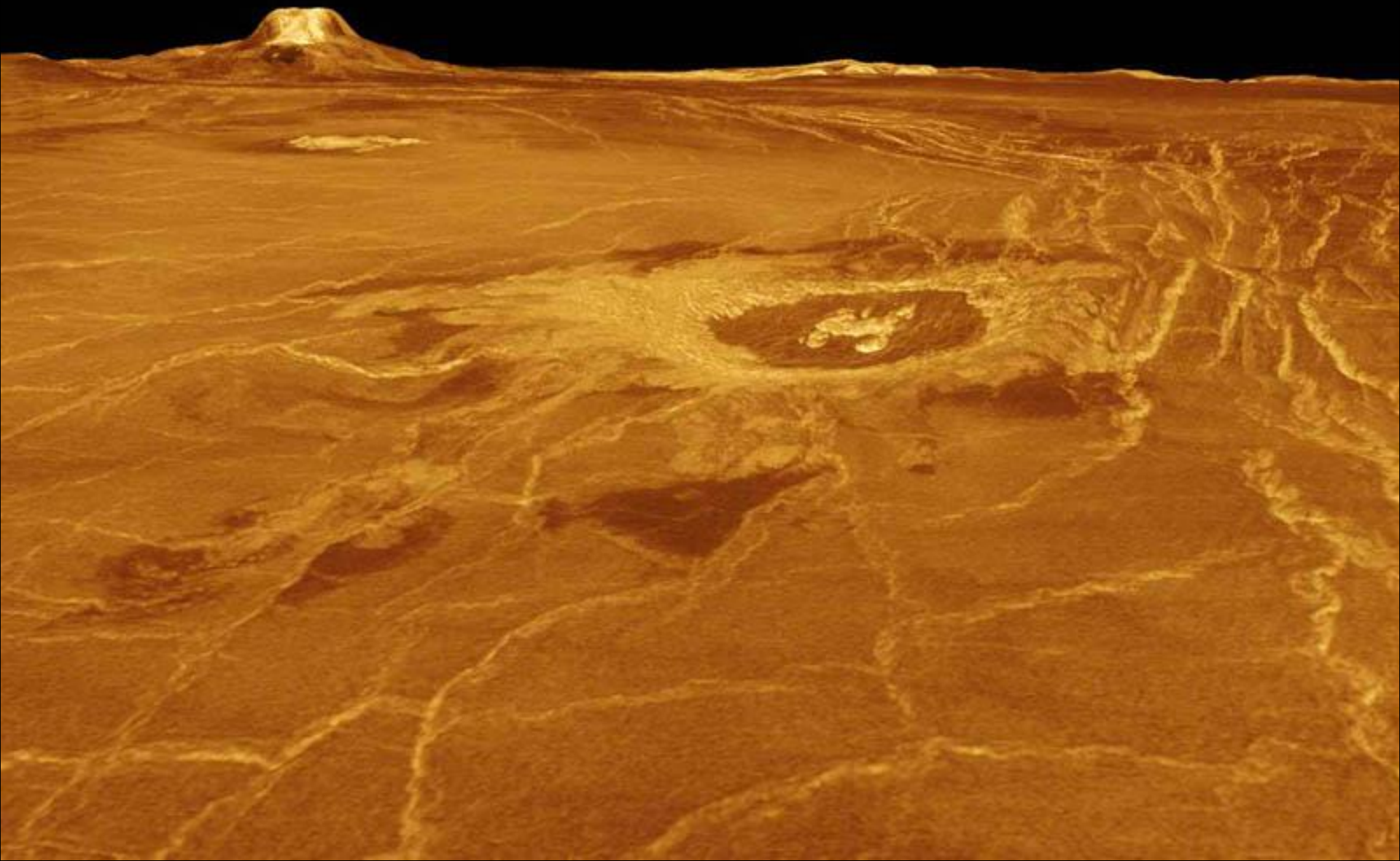


**Радио-
локационная
карта поверхности**



Magellan (NASA) 1989 - 1994

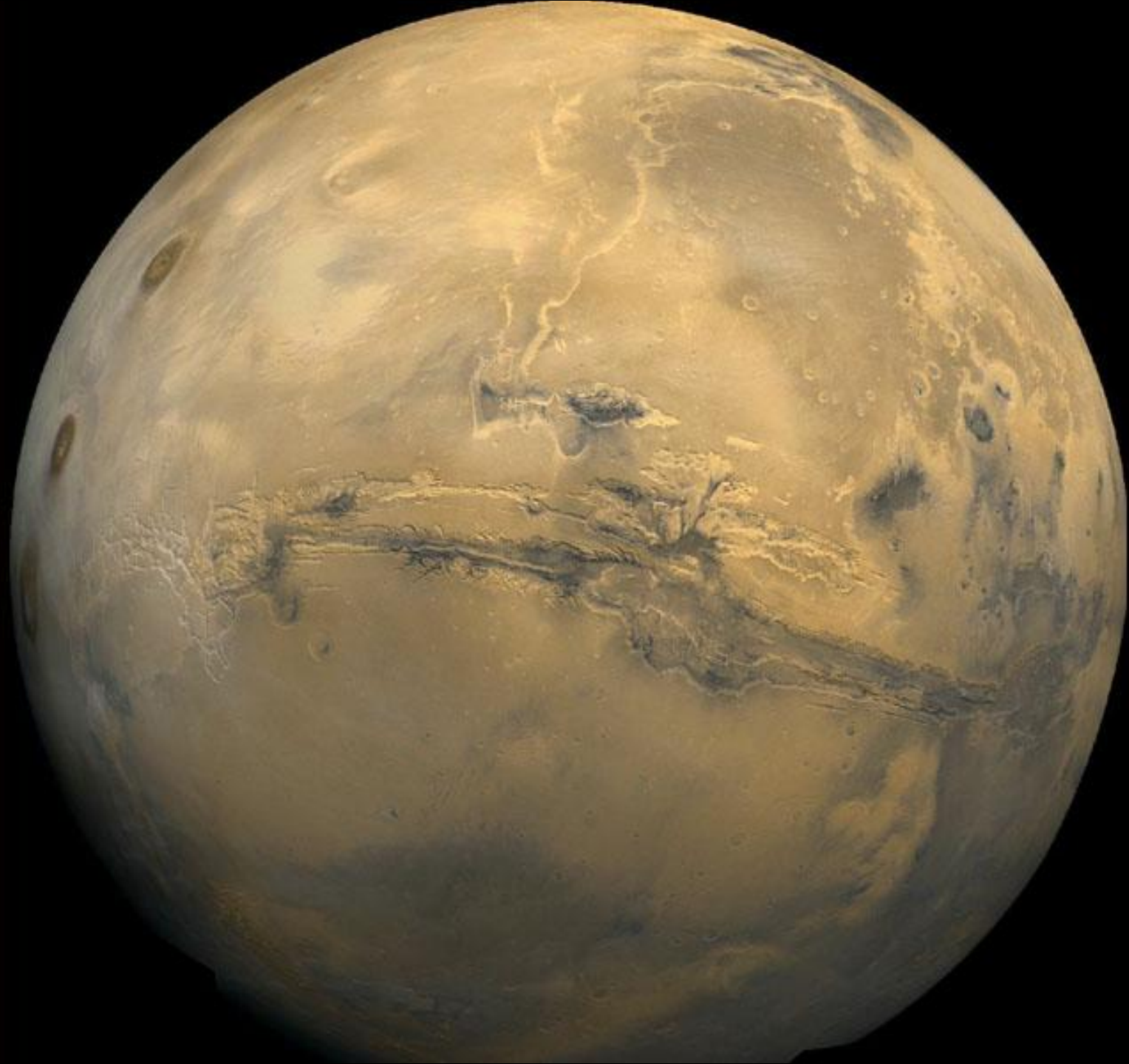


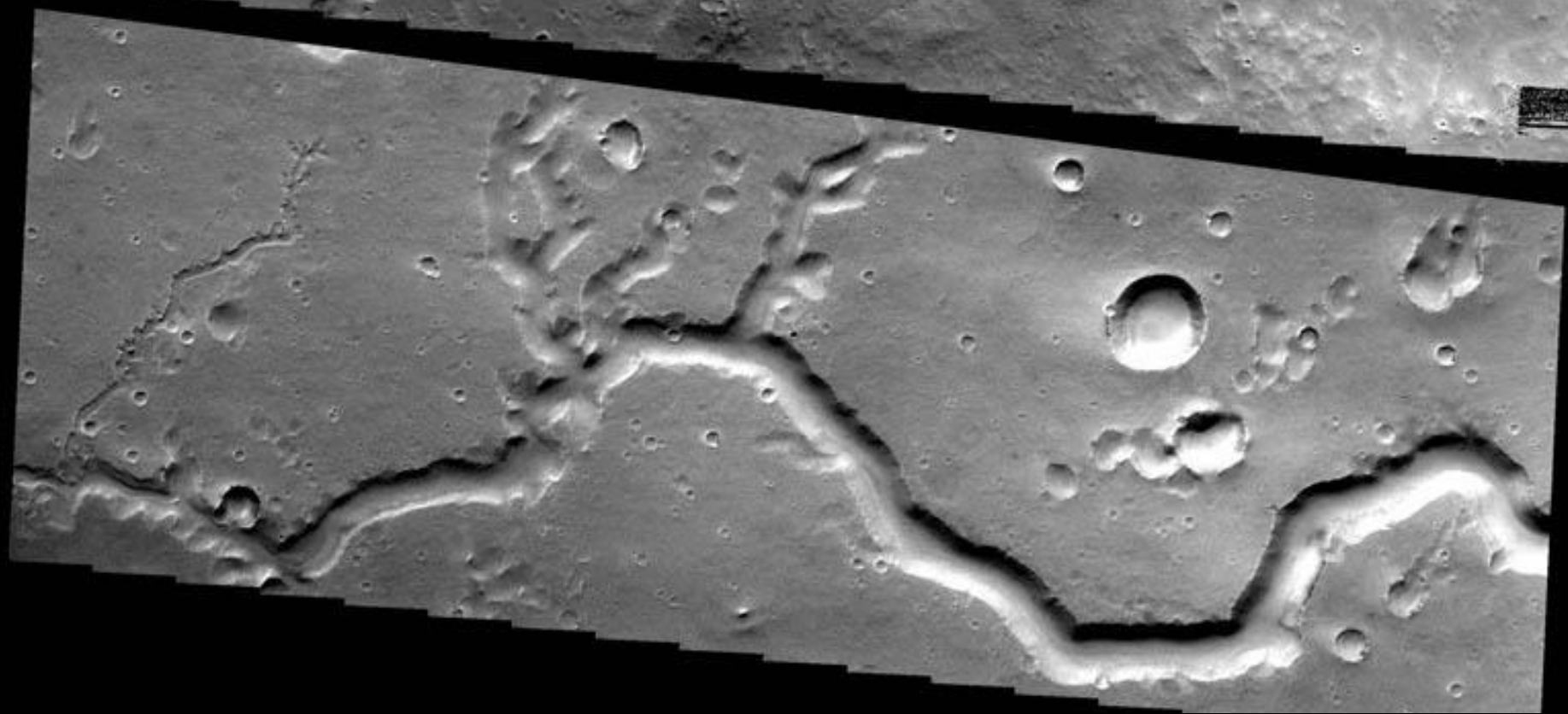
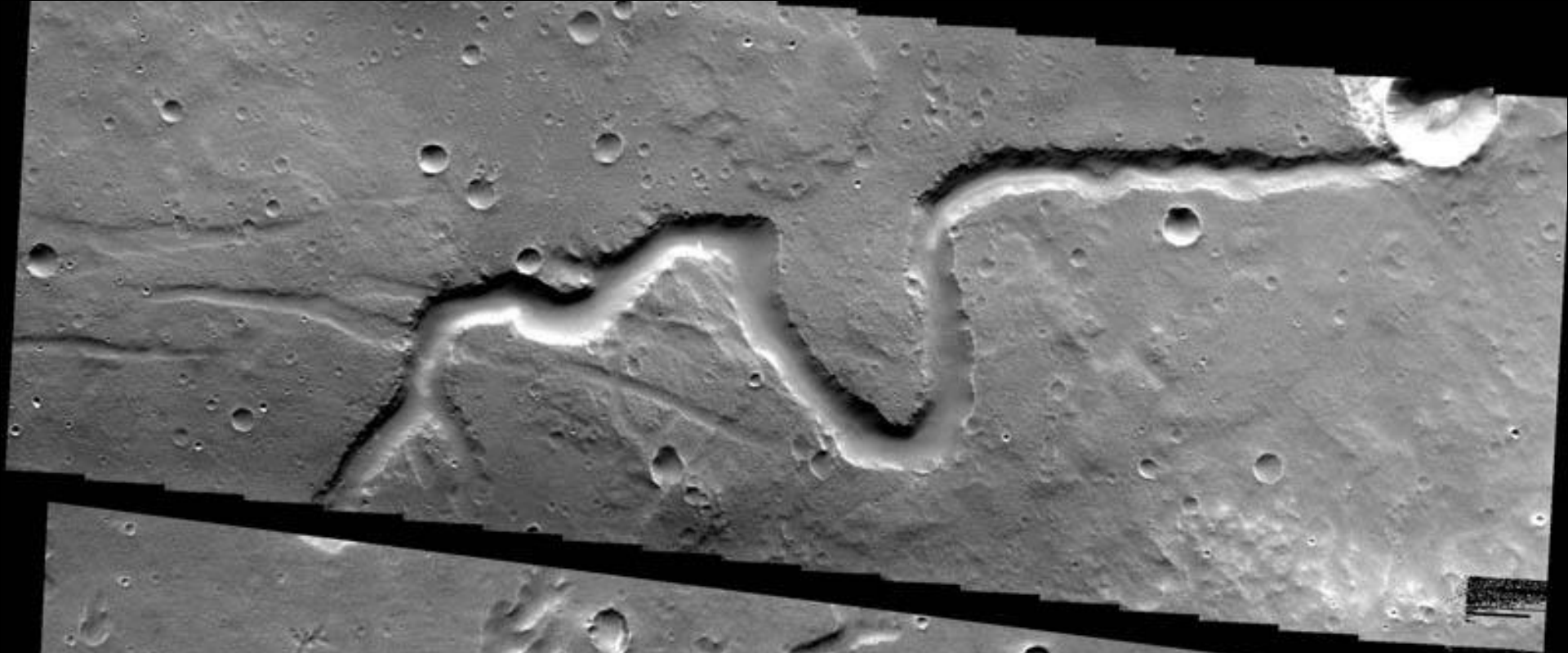


Mapc



Feb 1995 HST





Mars Reconnaissance Orbiter (MRO, NASA)

На орбите около Марса с 2006 г.



ELECTROMAGNETIC SPECTRUM

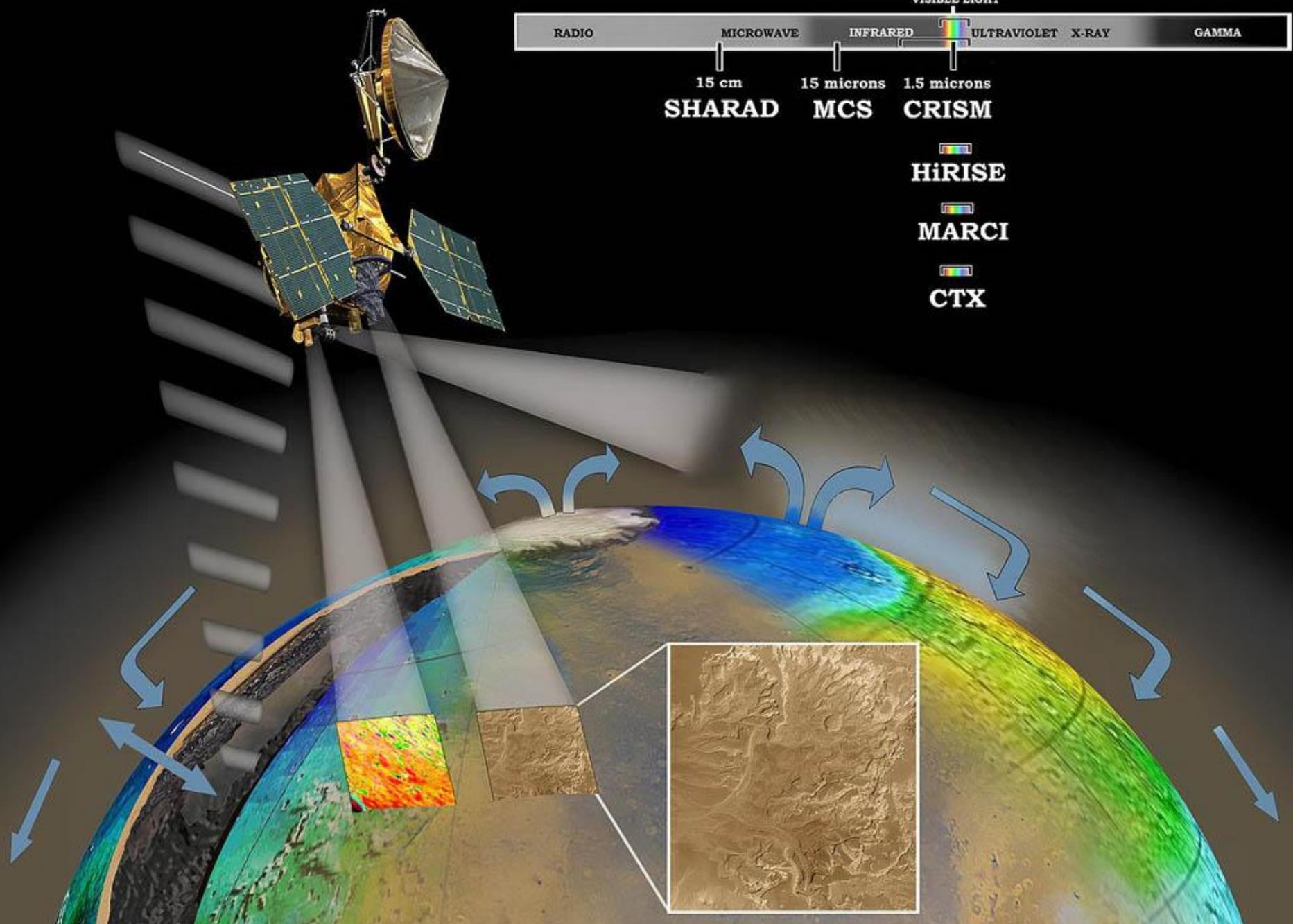


15 cm 15 microns 1.5 microns
SHARAD **MCS** **CRISM**

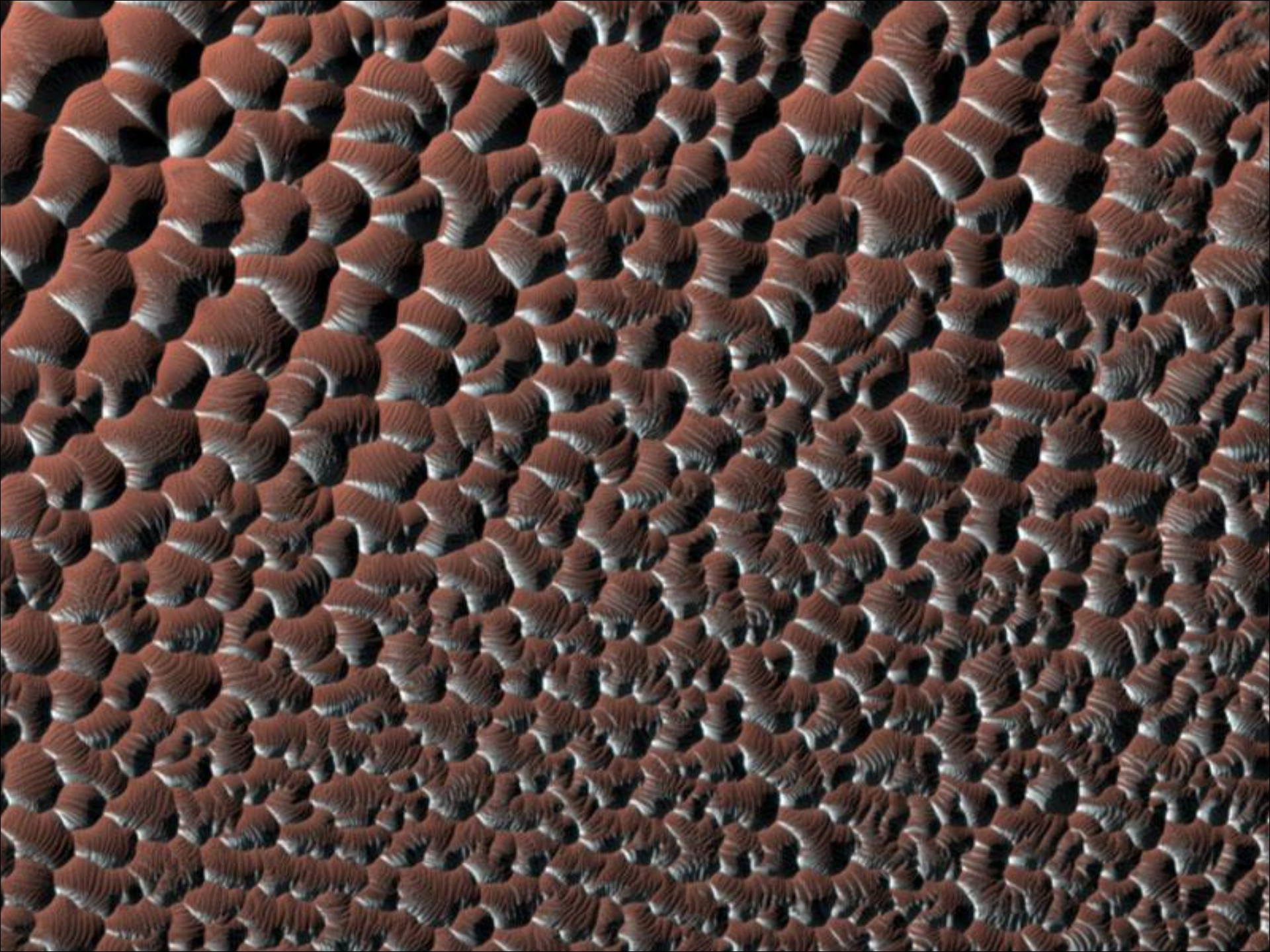

HiRISE


MARCI

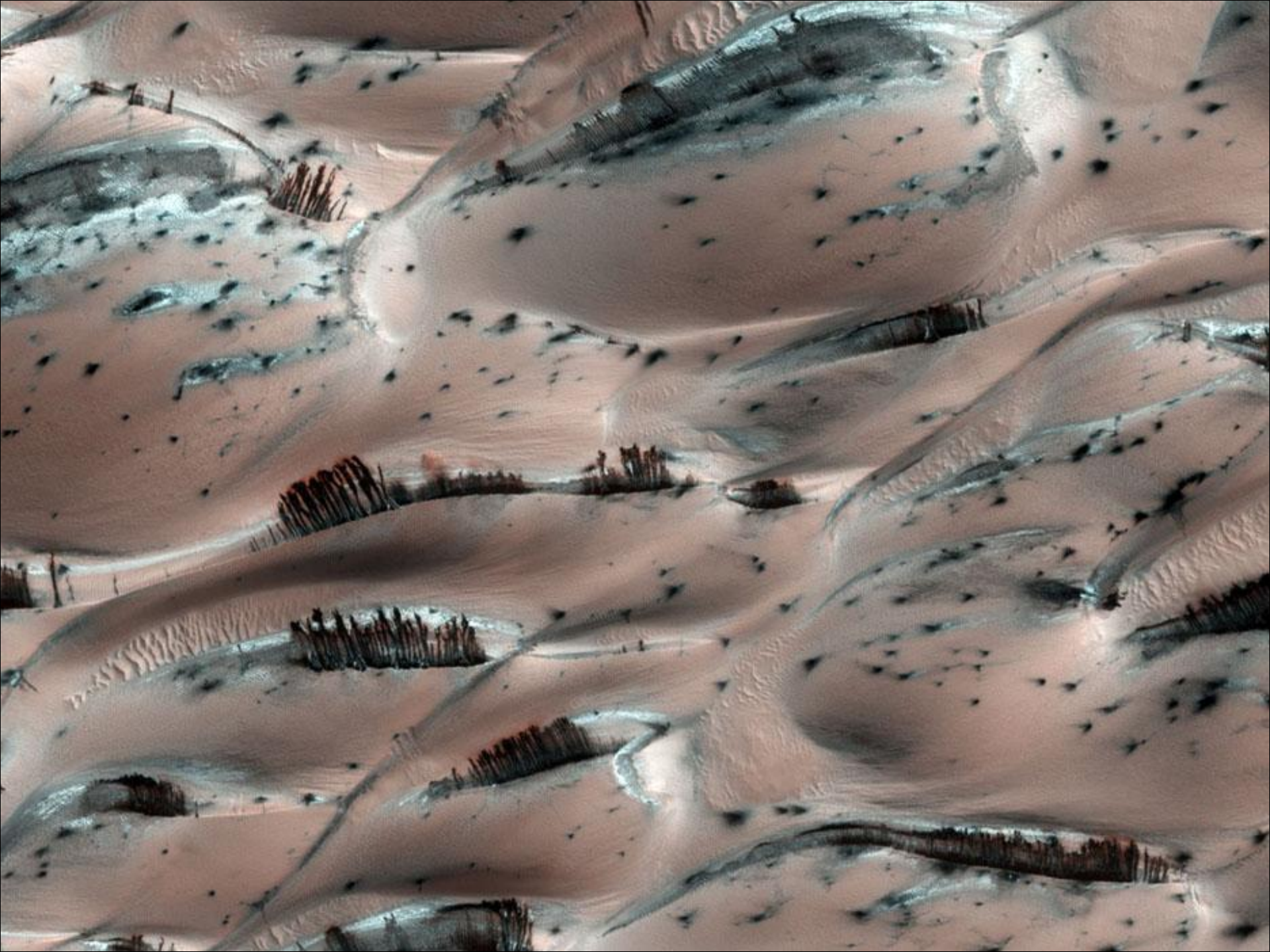

CTX



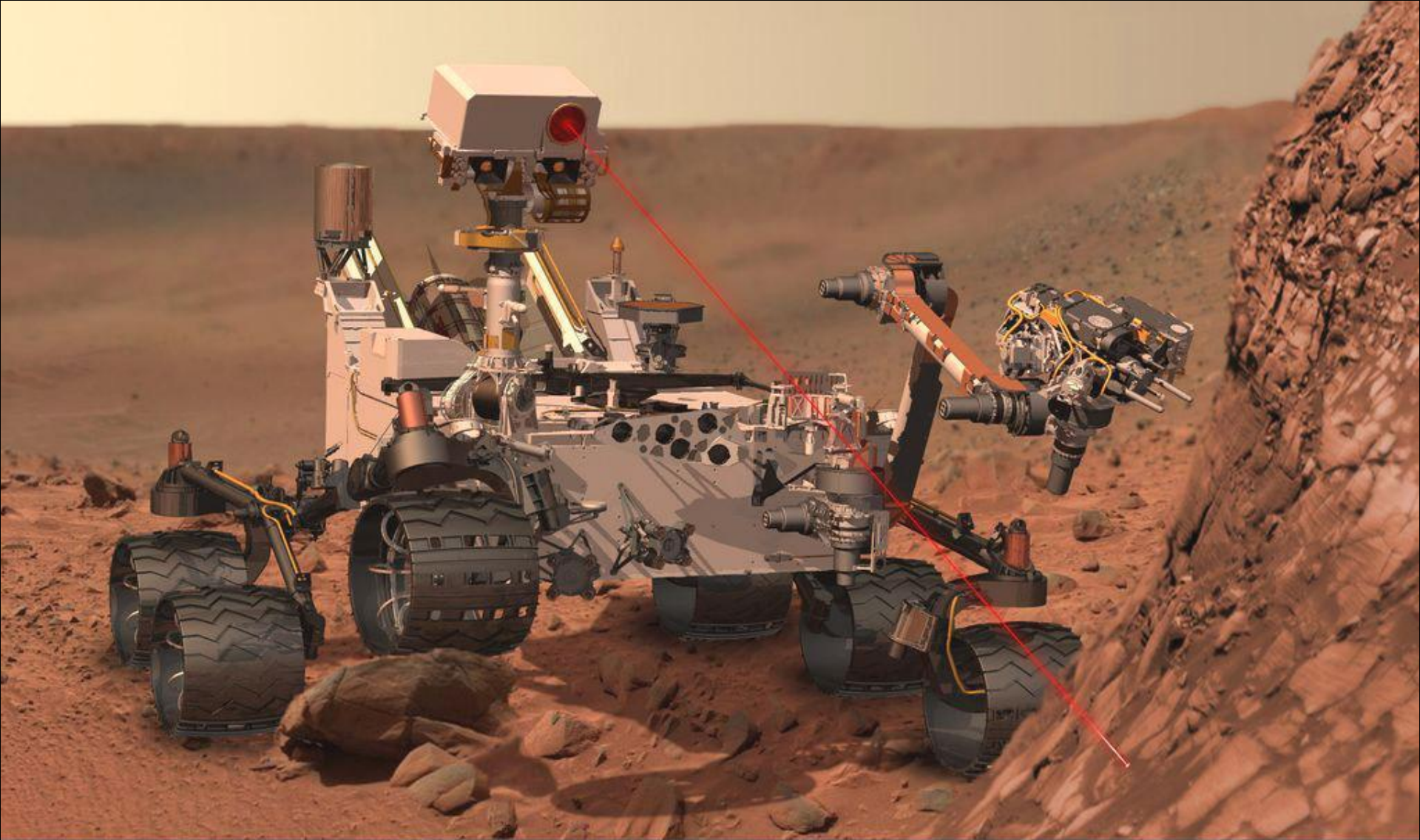












Mars Science Laboratory rover, Curiosity (NASA)

Работает на Марсе с 6 августа 2012 г.

Проект научной базы на Марсе

1987 г.

2007 г.

