

Астрономия

Сурдин В.Г.

Лекция 23

Планеты земной группы

Меркурий

Венера

Земля

Марс

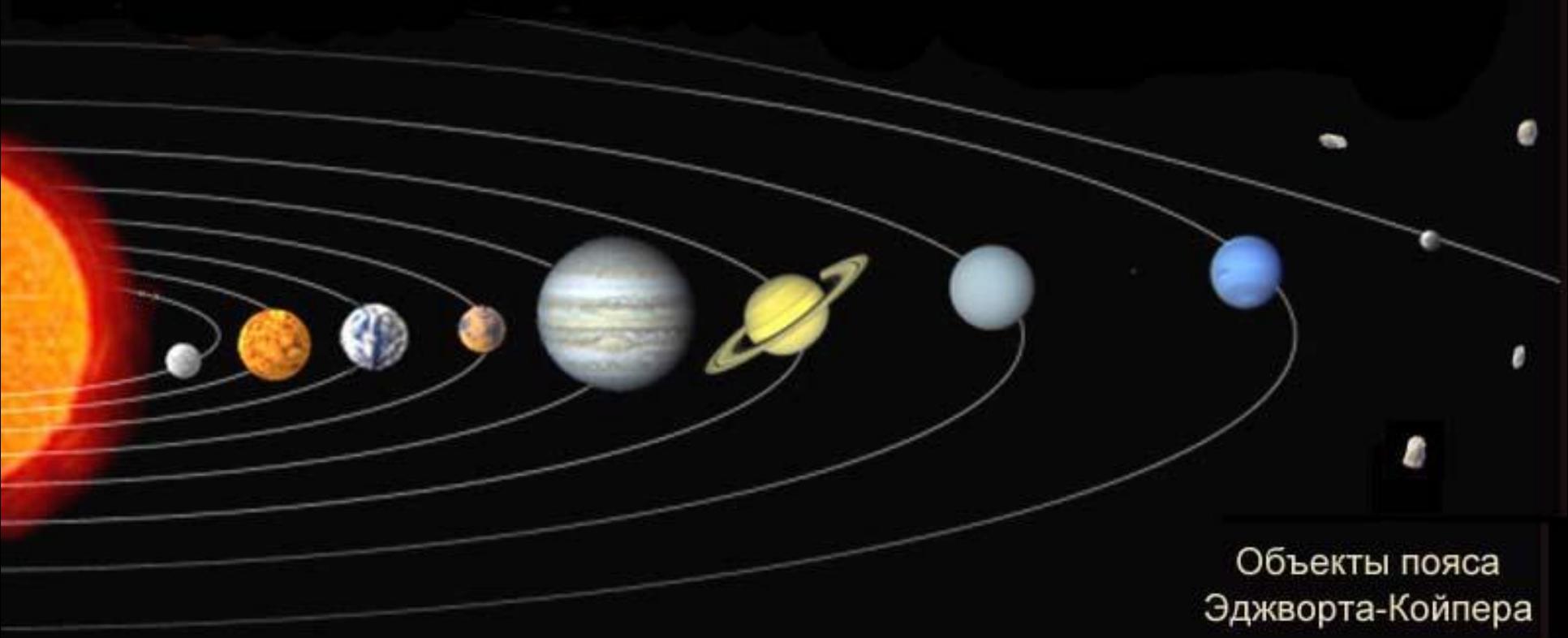
Юпитер

Сатурн

Уран

Нептун

Плутон



Объекты пояса
Эдворта-Койпера



Кометы

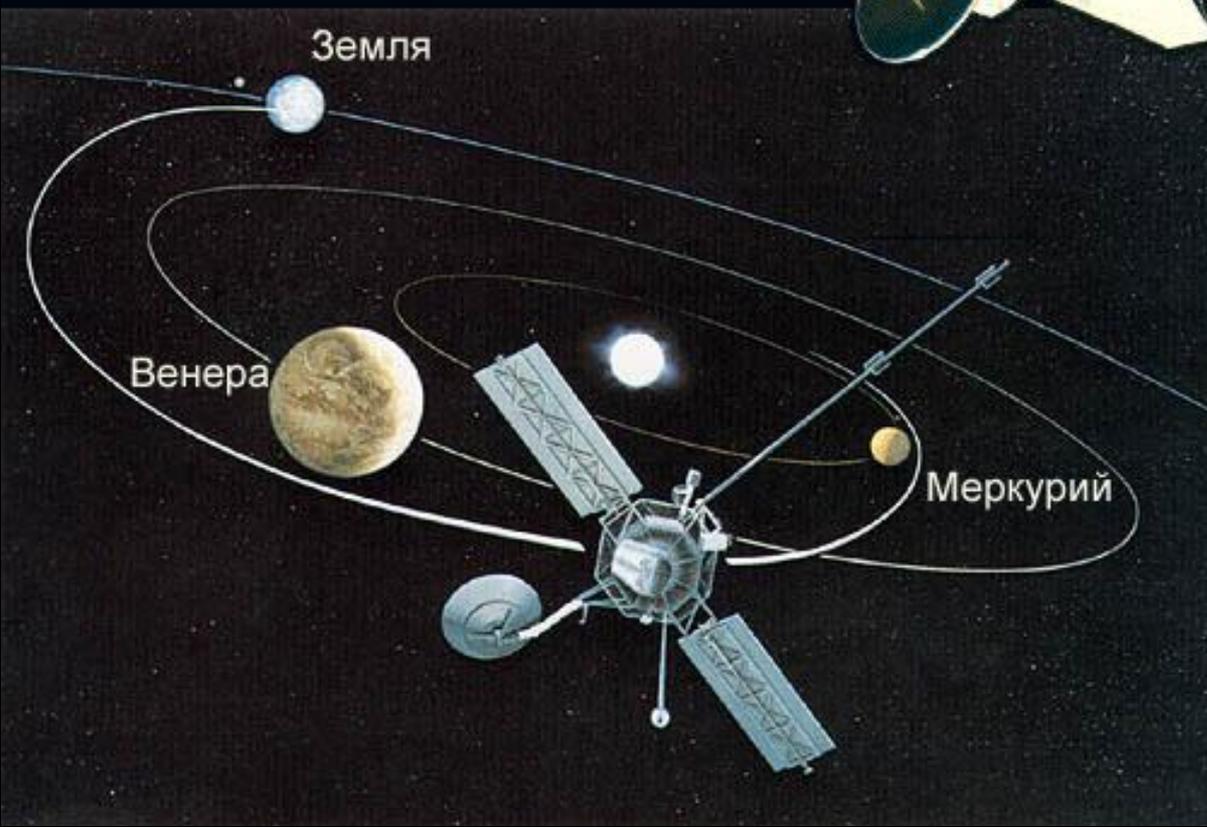
Астероиды



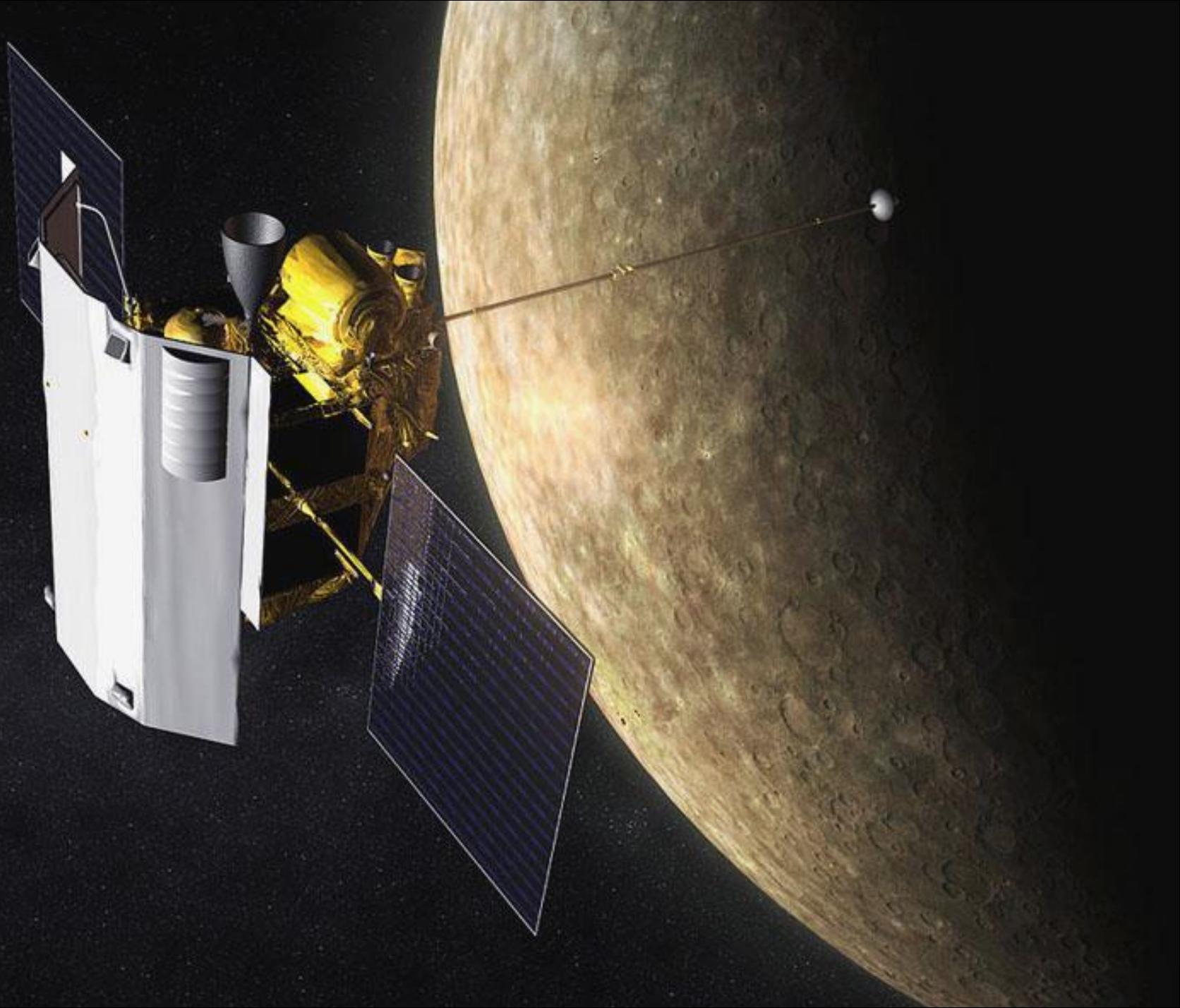
Mariner 10 (NASA)

1973 - 1975

Первая экспедиция
к Меркурию

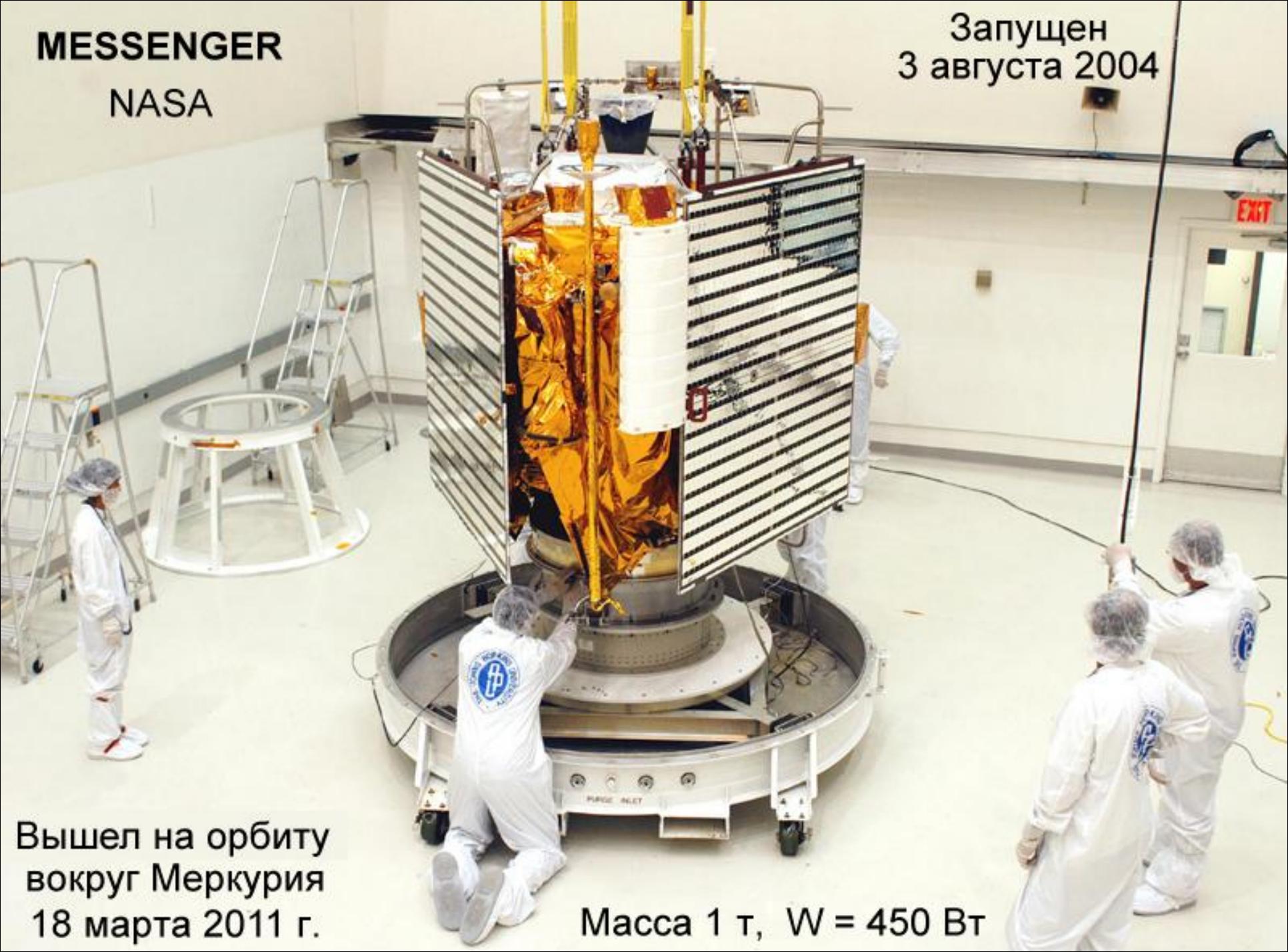


Пролет мимо Венеры
с гравитационным маневром
и затем три пролета
вблизи Меркурия



MESSENGER
NASA

Запущен
3 августа 2004



Вышел на орбиту
вокруг Меркурия
18 марта 2011 г.

Масса 1 т, $W = 450$ Вт

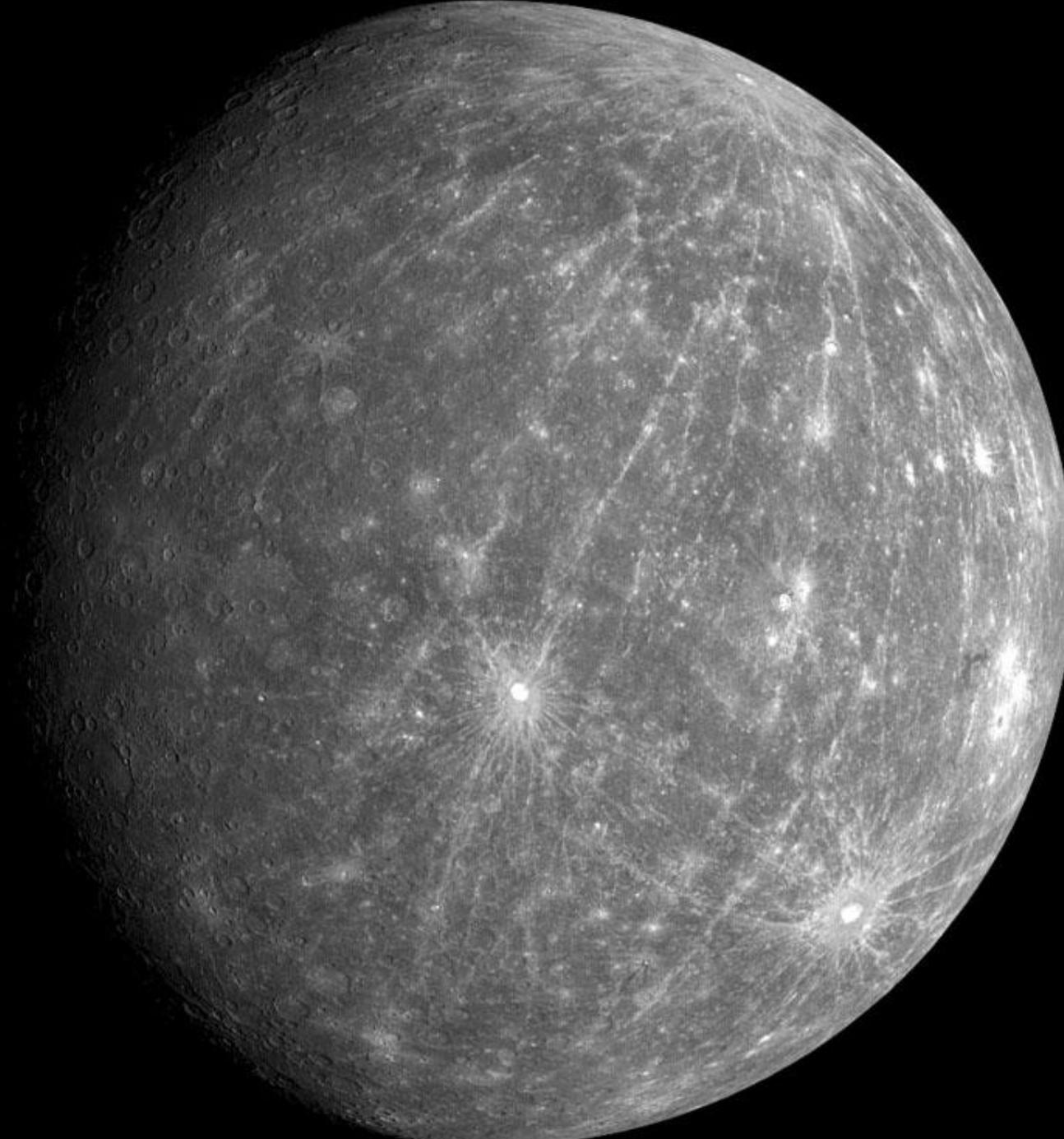
Меркурий

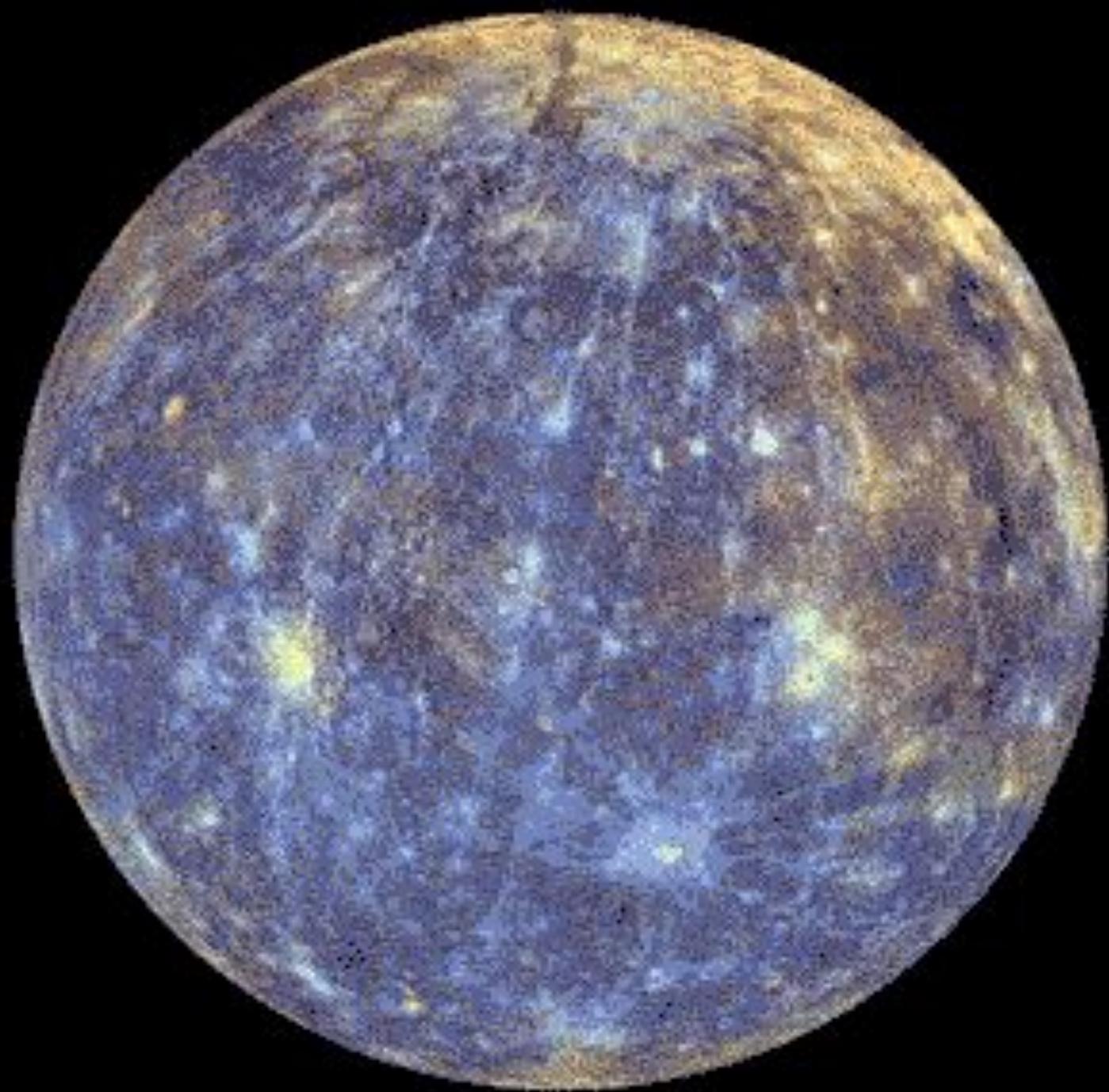
-173 °C

+430 °C

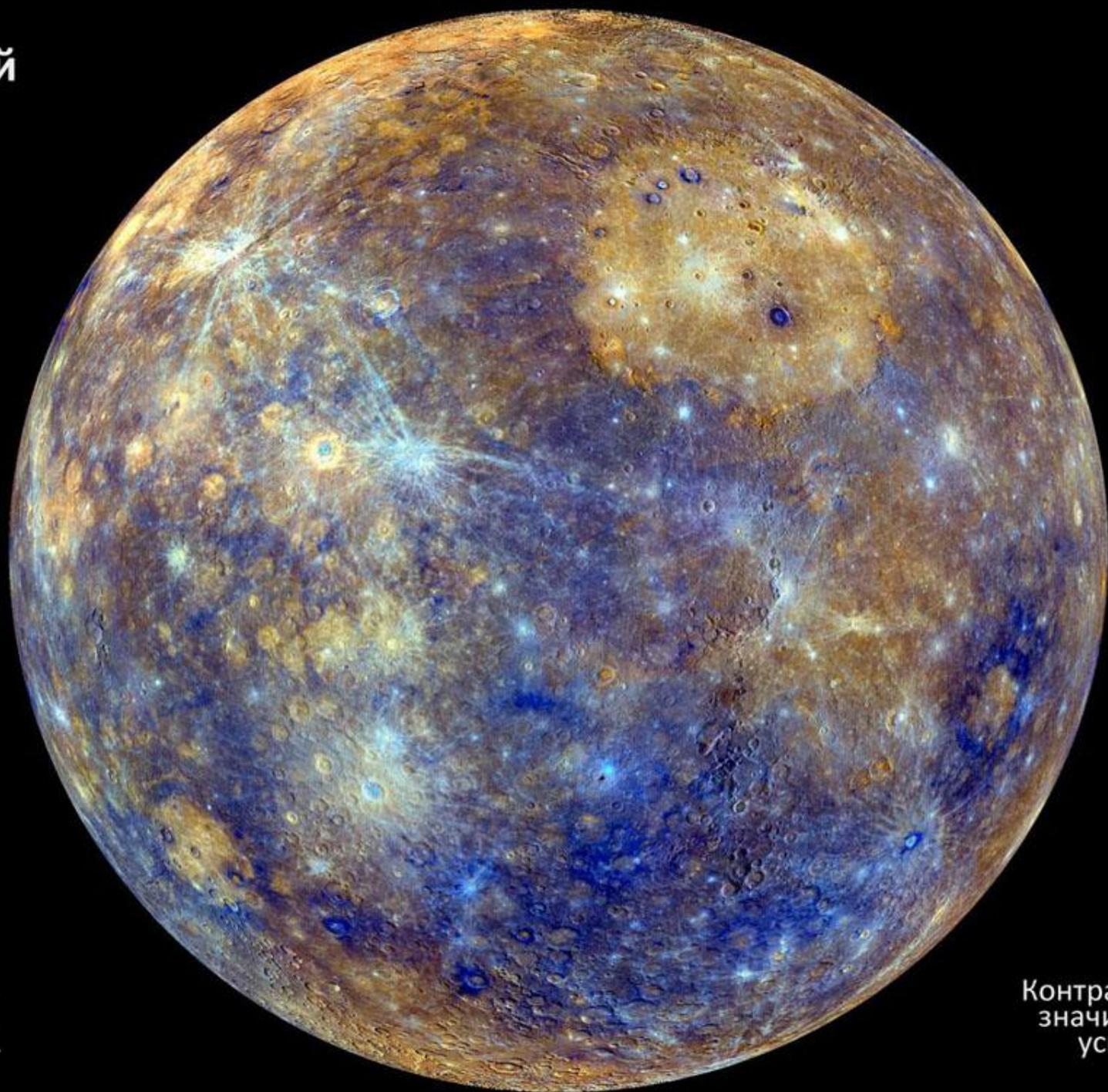
Messenger (NASA)

Oct 2008





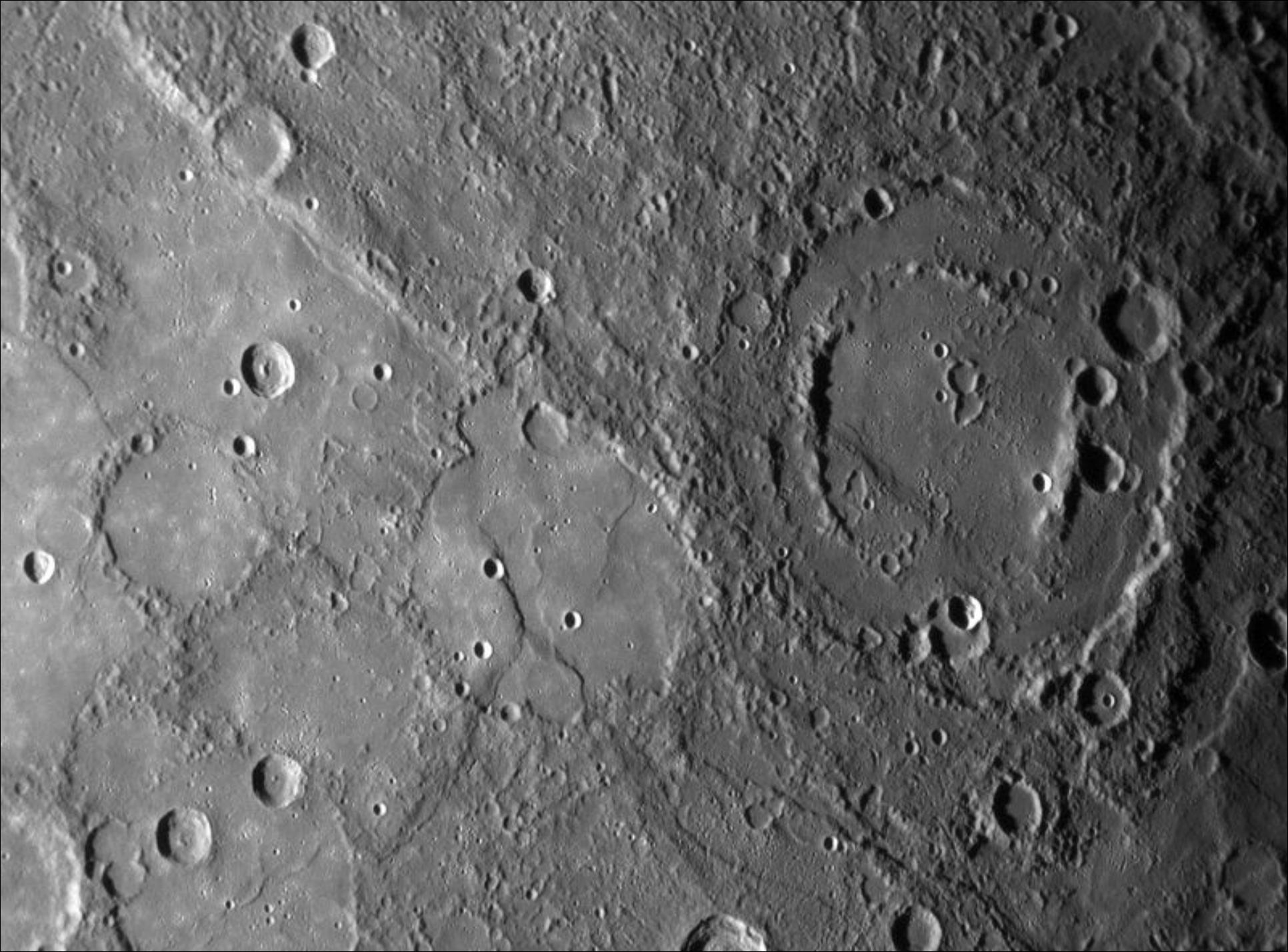
Меркурий



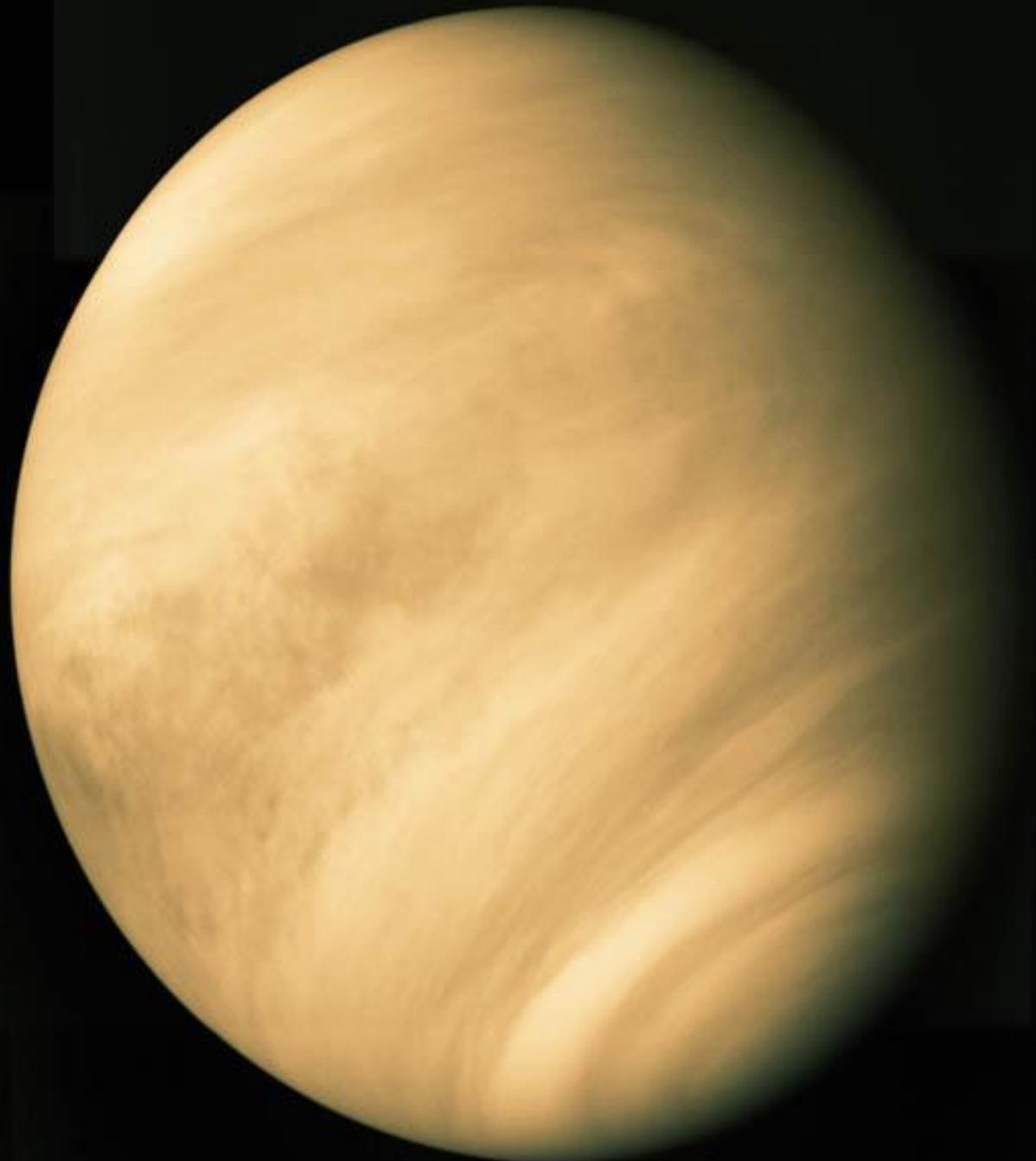
Messenger
NASA, 2011

Контраст цвета
значительно
усилен





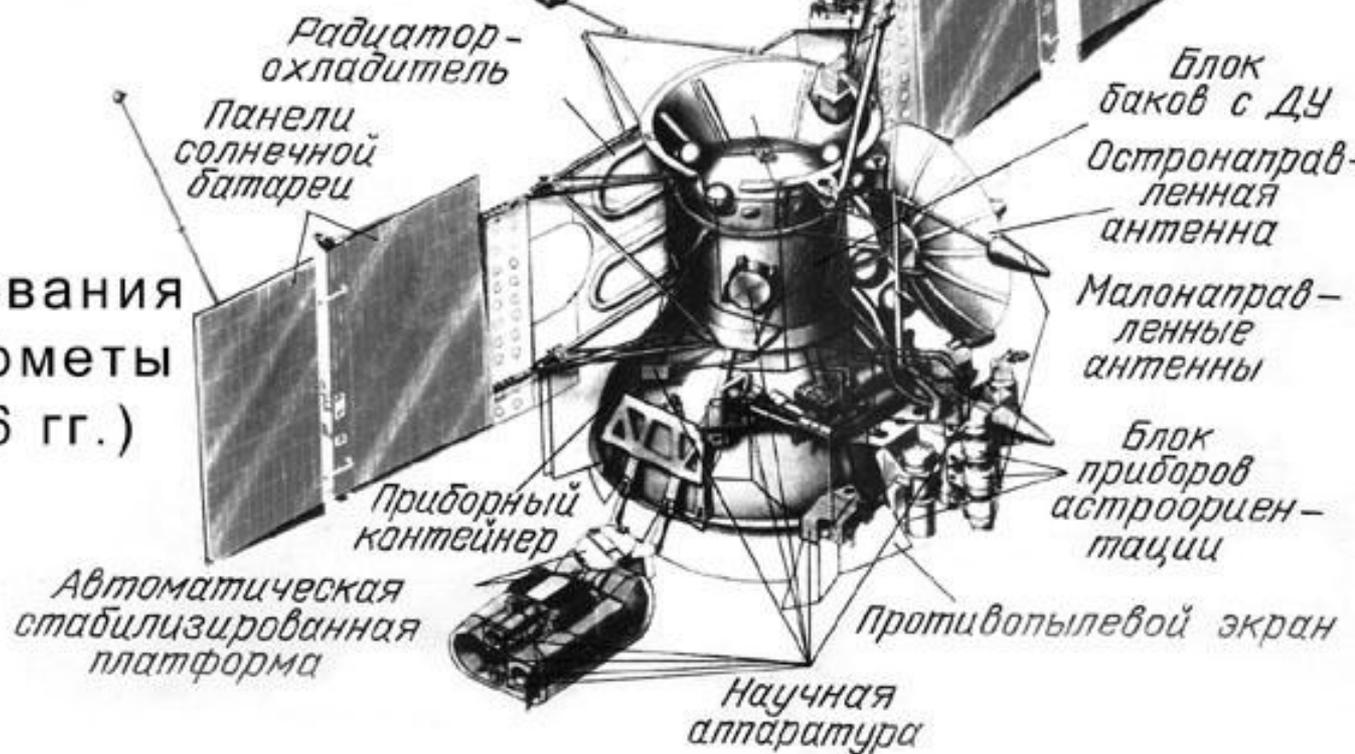
Венера



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



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

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

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

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

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

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)

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

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

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

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

28: Mars 96
November 16, 1996
Destroyed during launch

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

30: Nozomi
July 4, 1998
Missed planet

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

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

33: Mars Odyssey
March 7, 2001
Orbiting Mars

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

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

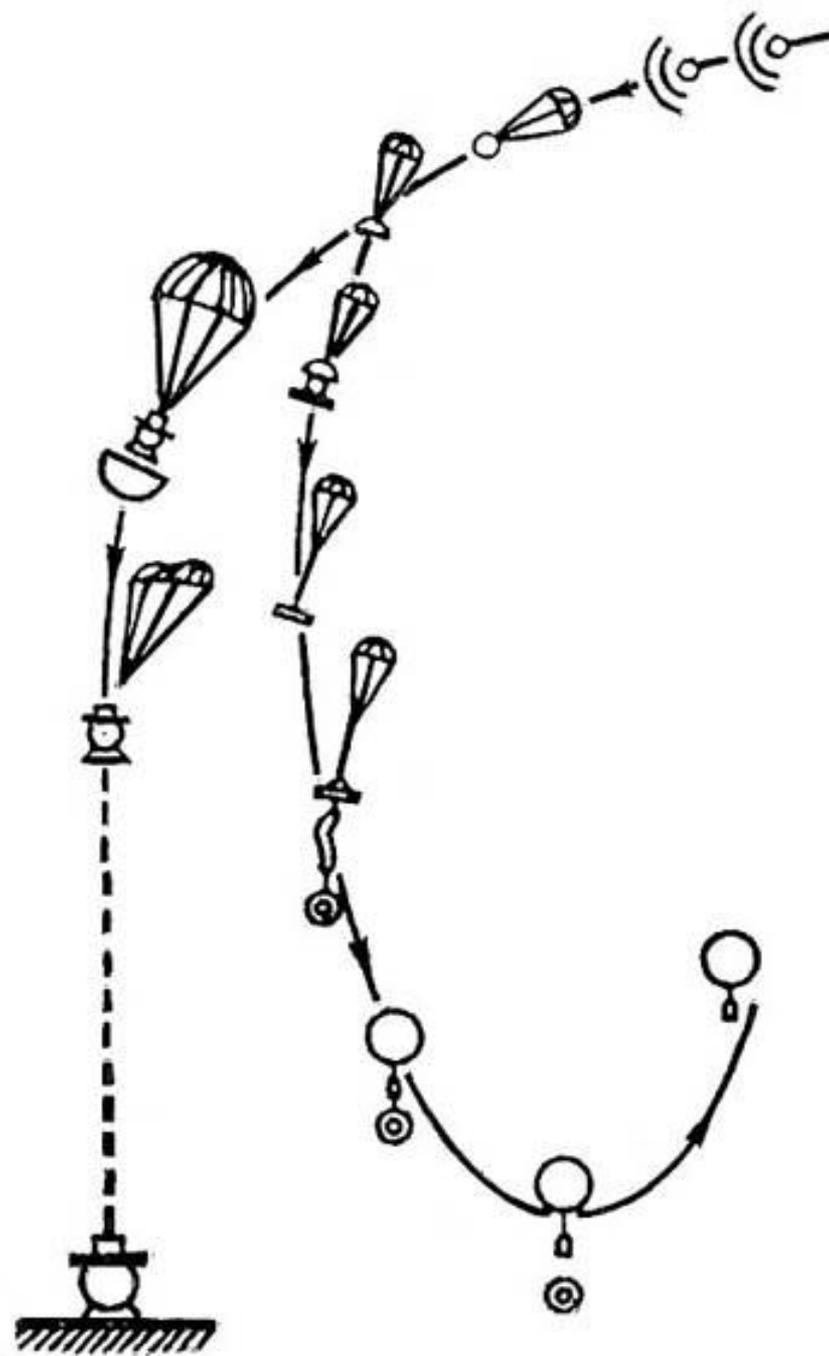
37: Mars Reconnaissance Orbiter
August 12, 2005
Orbiting Mars

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

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

Image credits:
NASA, Roscosmos, ESA, JAXA, Teleshop20.com
Additional media: Shutterstock, Spaced.com, Roscosmos.com

Flags indicated are for launch.
Only dedicated Mars missions are listed.
Created by James B. Collins
www.spacecraft.eu



Посадка
на Венеру
аппаратов
серии
“Венера”

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

Венера, март 1982



ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС

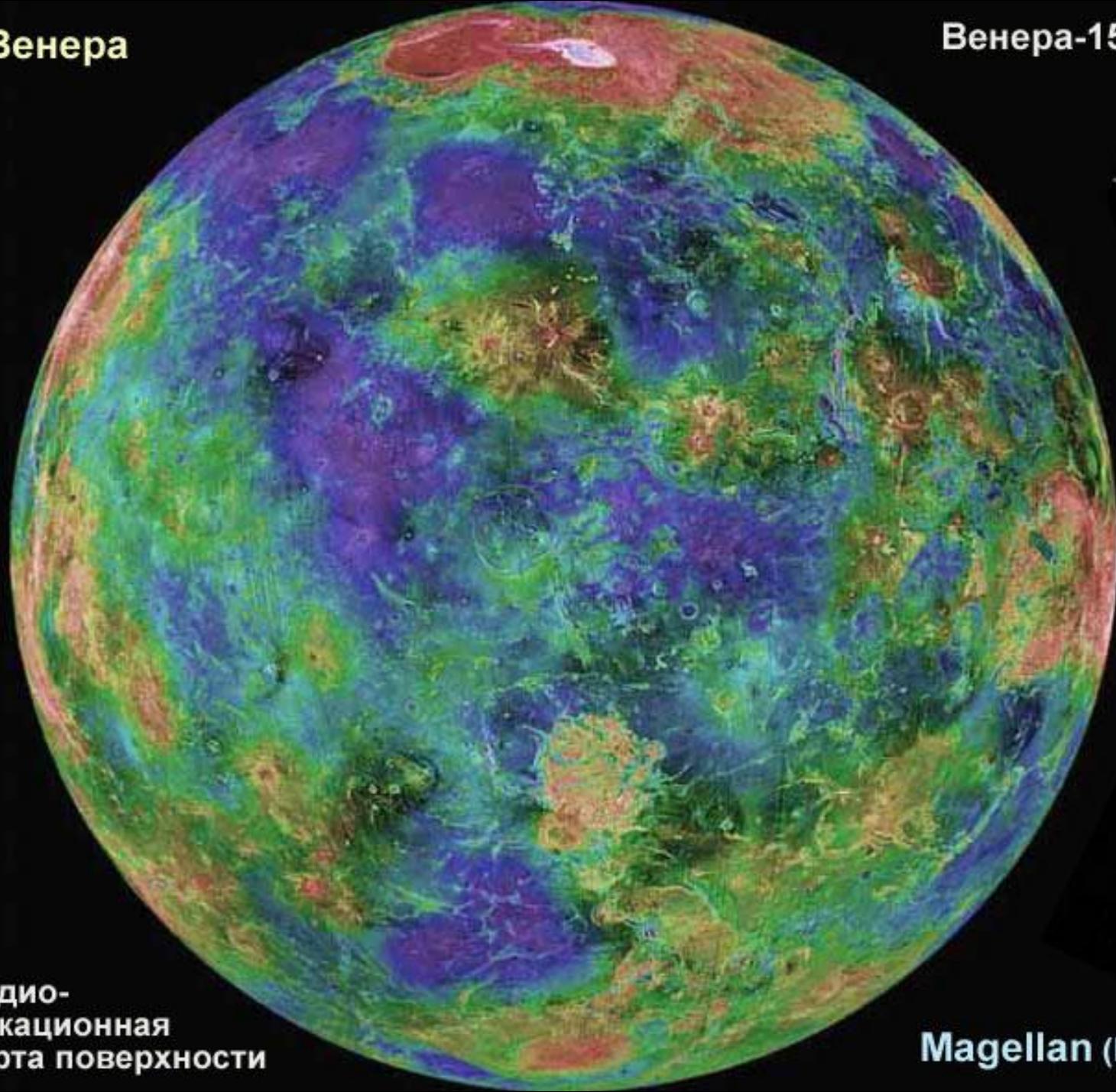


ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС



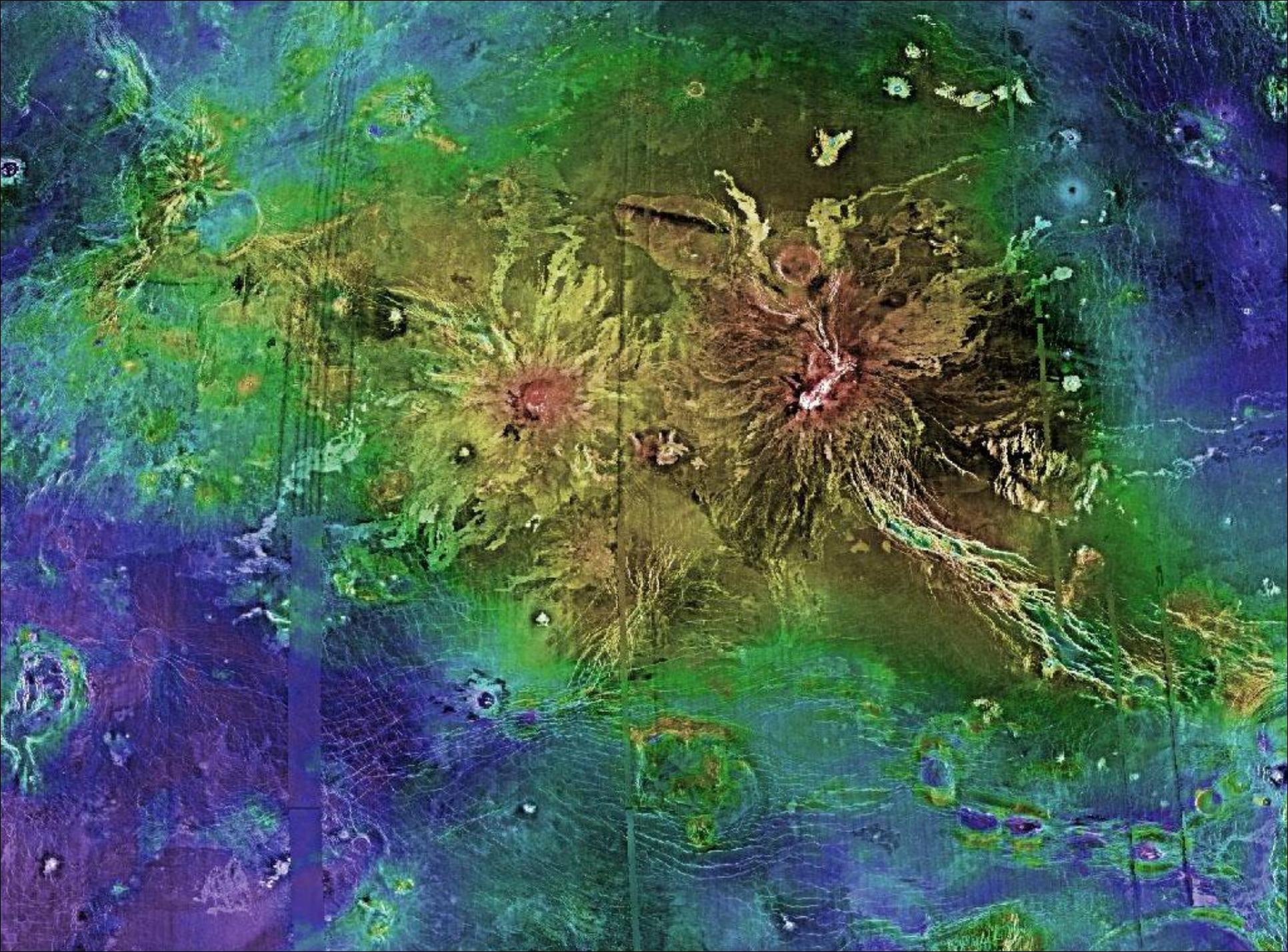
Венера

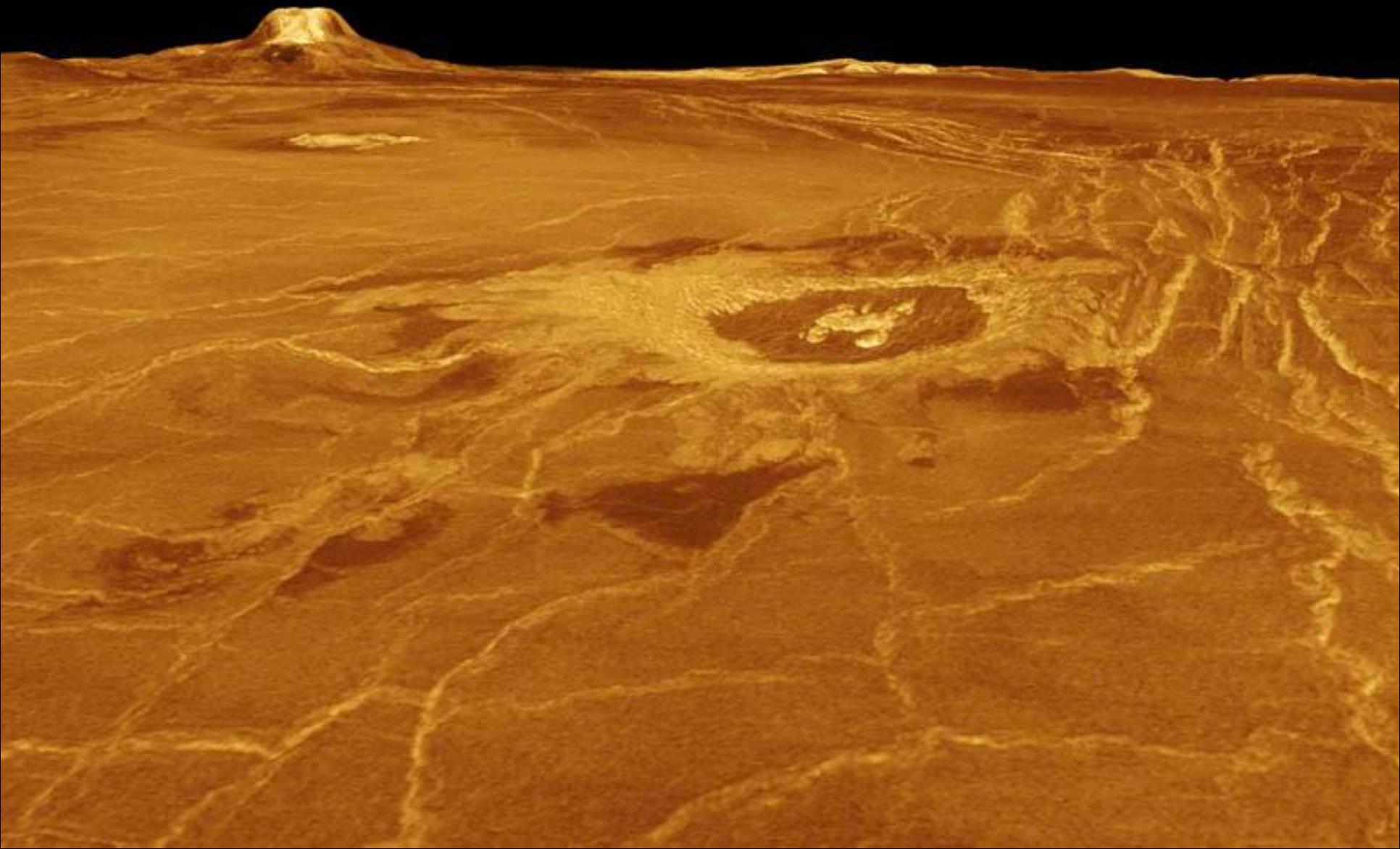
Венера-15 и -16, 1983-1984



**Радио-
локационная
карта поверхности**

Magellan (NASA) 1989 - 1994

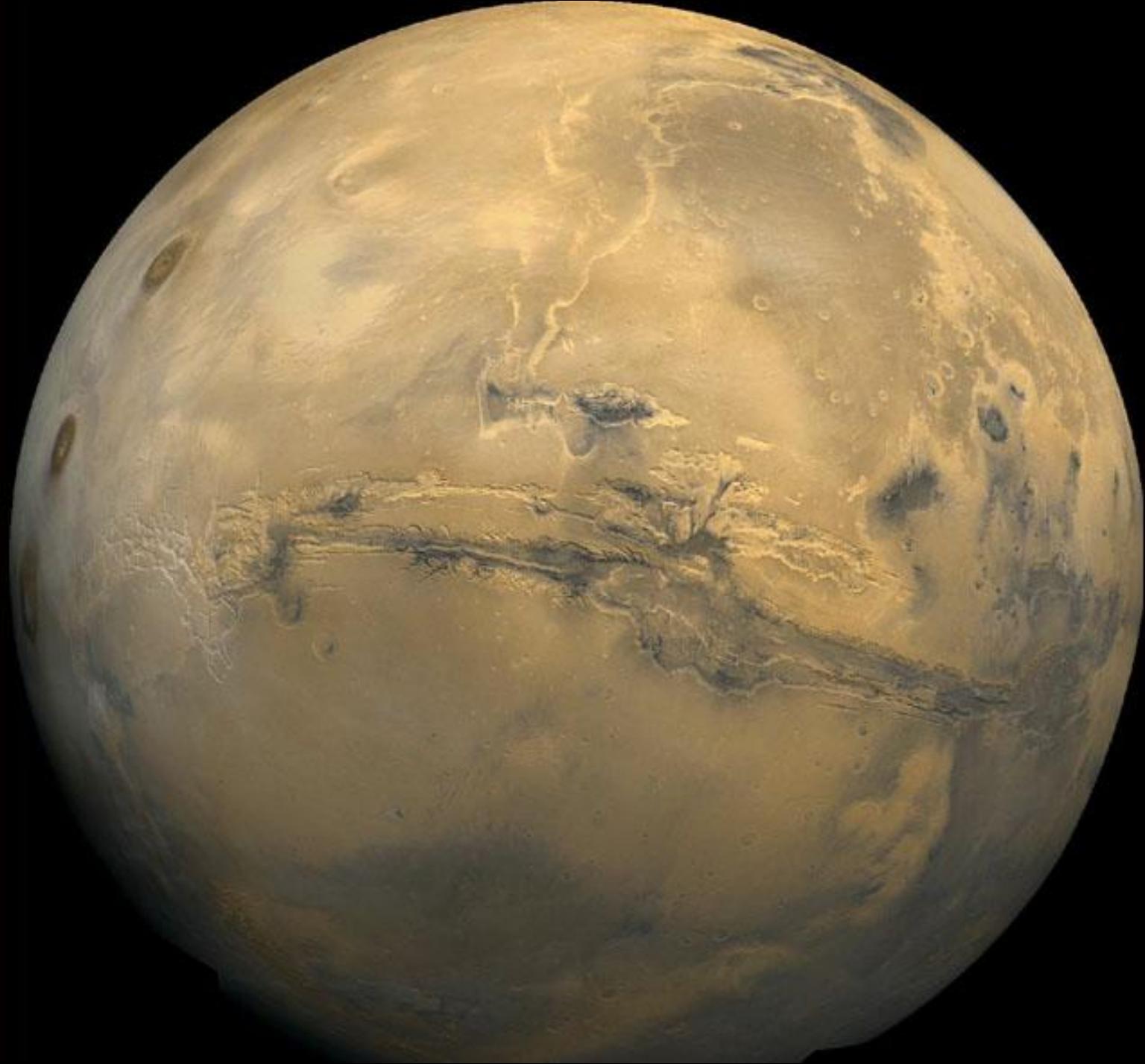


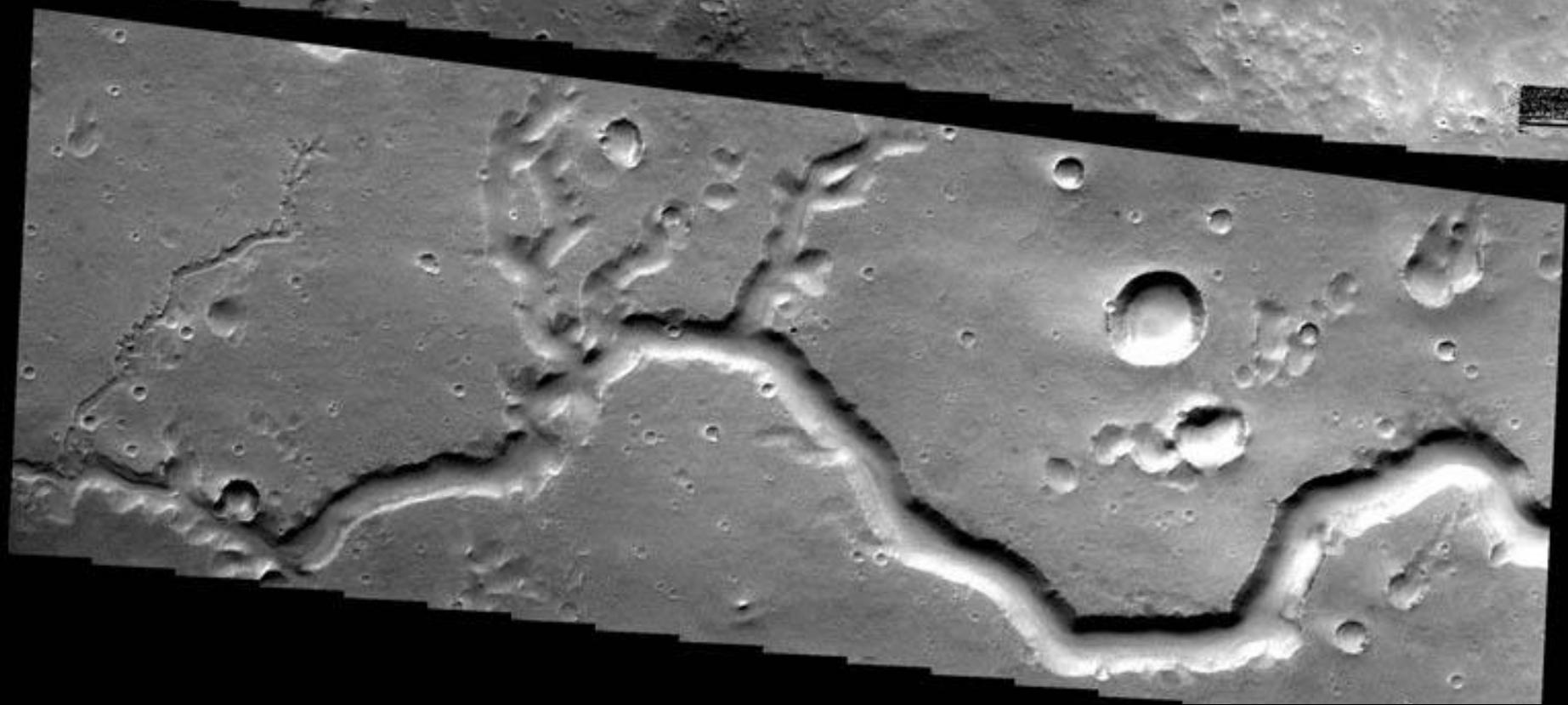
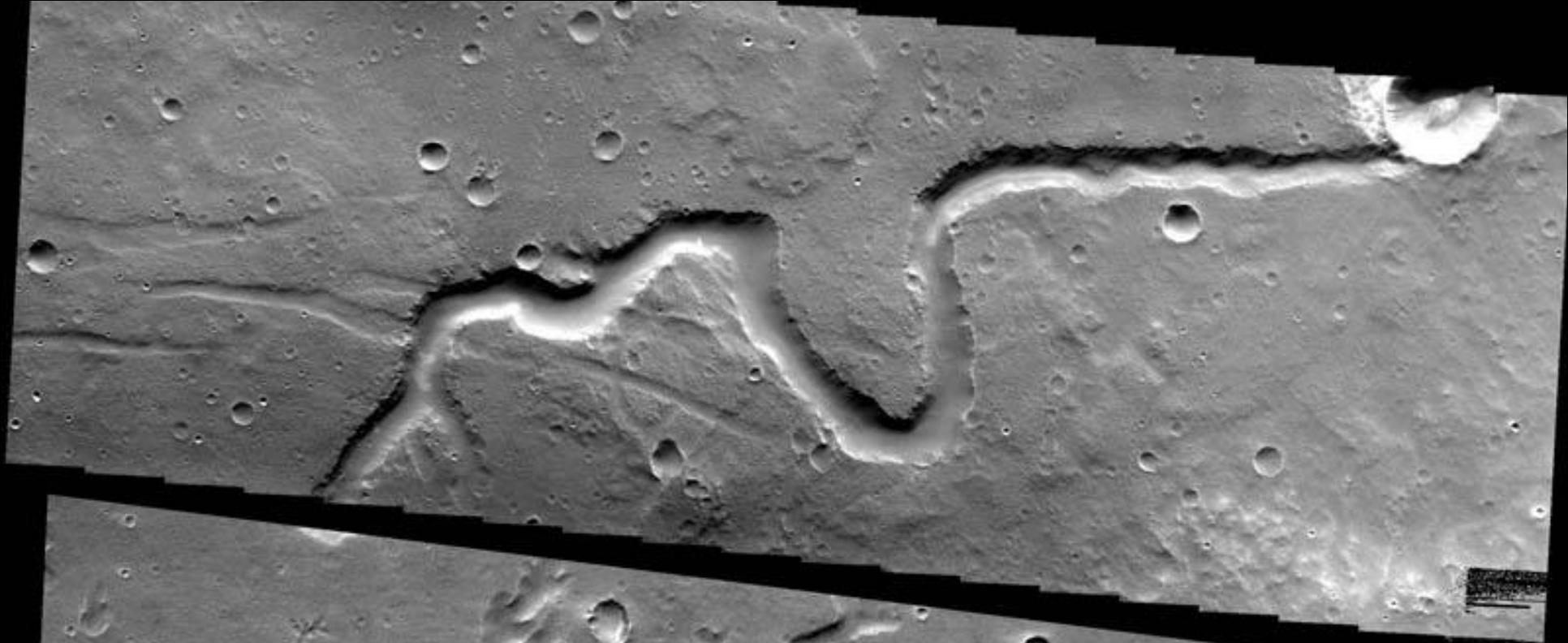


Mapc



Feb 1995 HST





Mars Reconnaissance Orbiter (MRO, NASA)

На орбите около Марса с 2006 г.



ELECTROMAGNETIC SPECTRUM

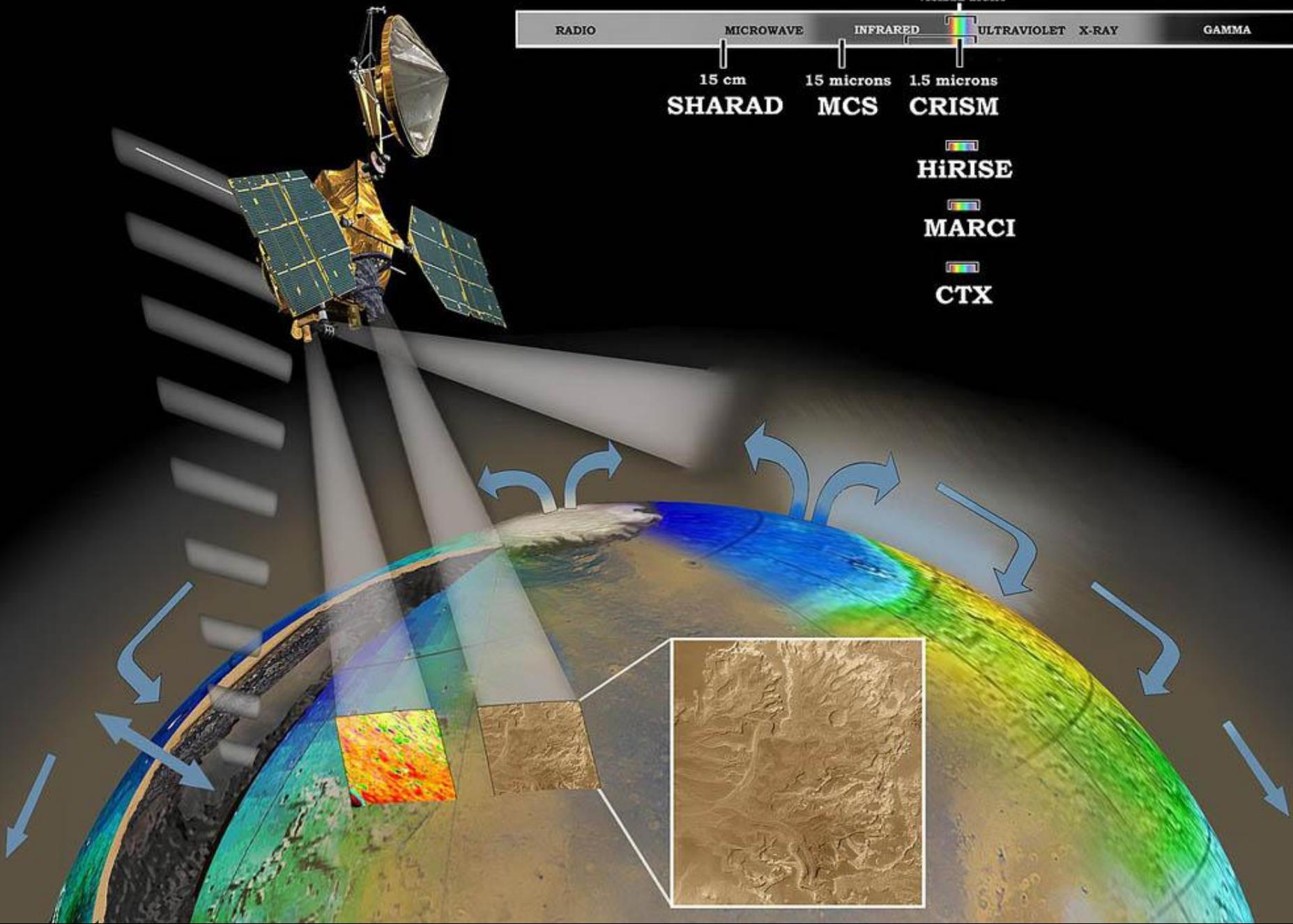


15 cm 15 microns 1.5 microns
SHARAD **MCS** **CRISM**

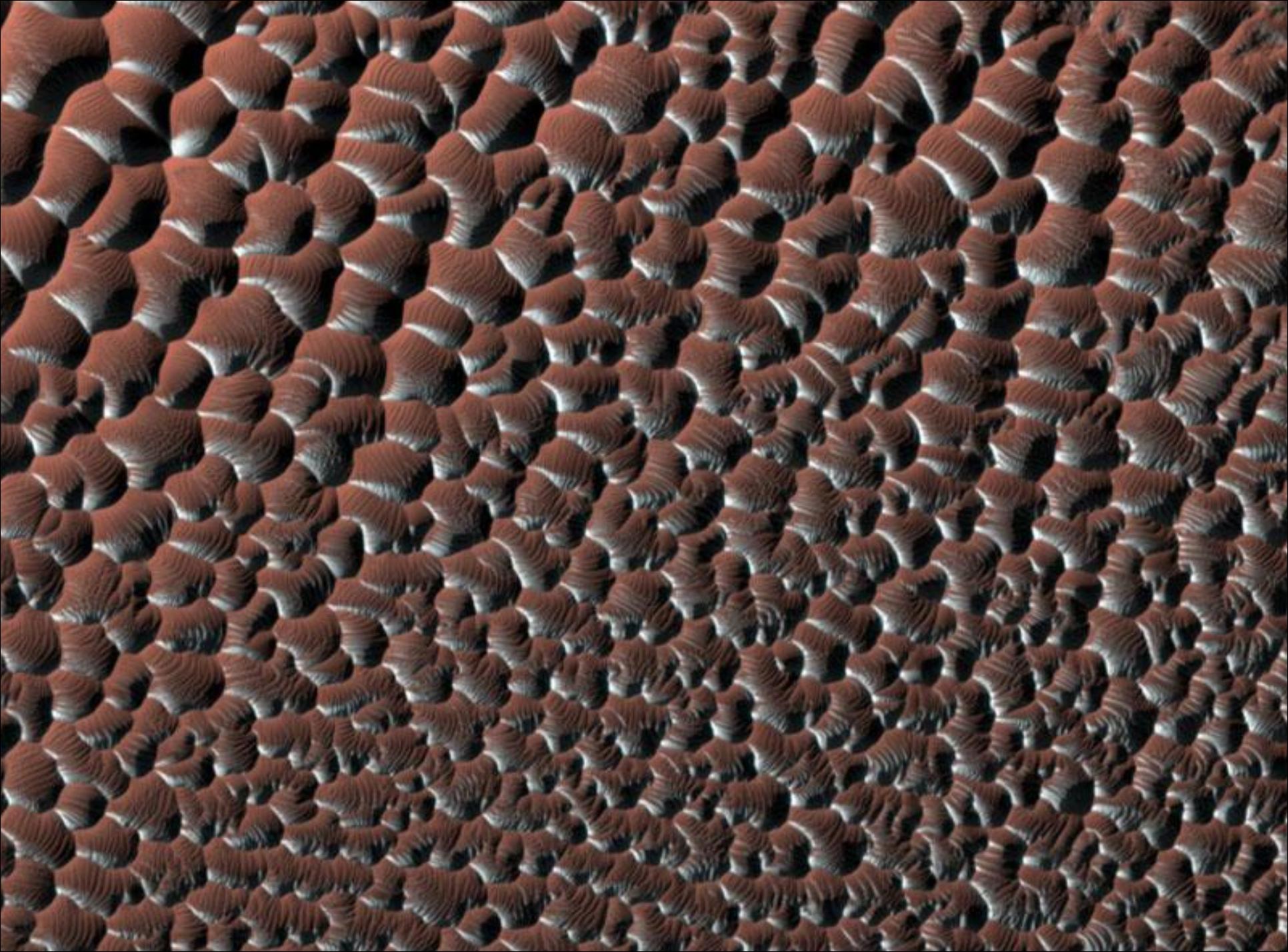

HiRISE


MARCI


CTX



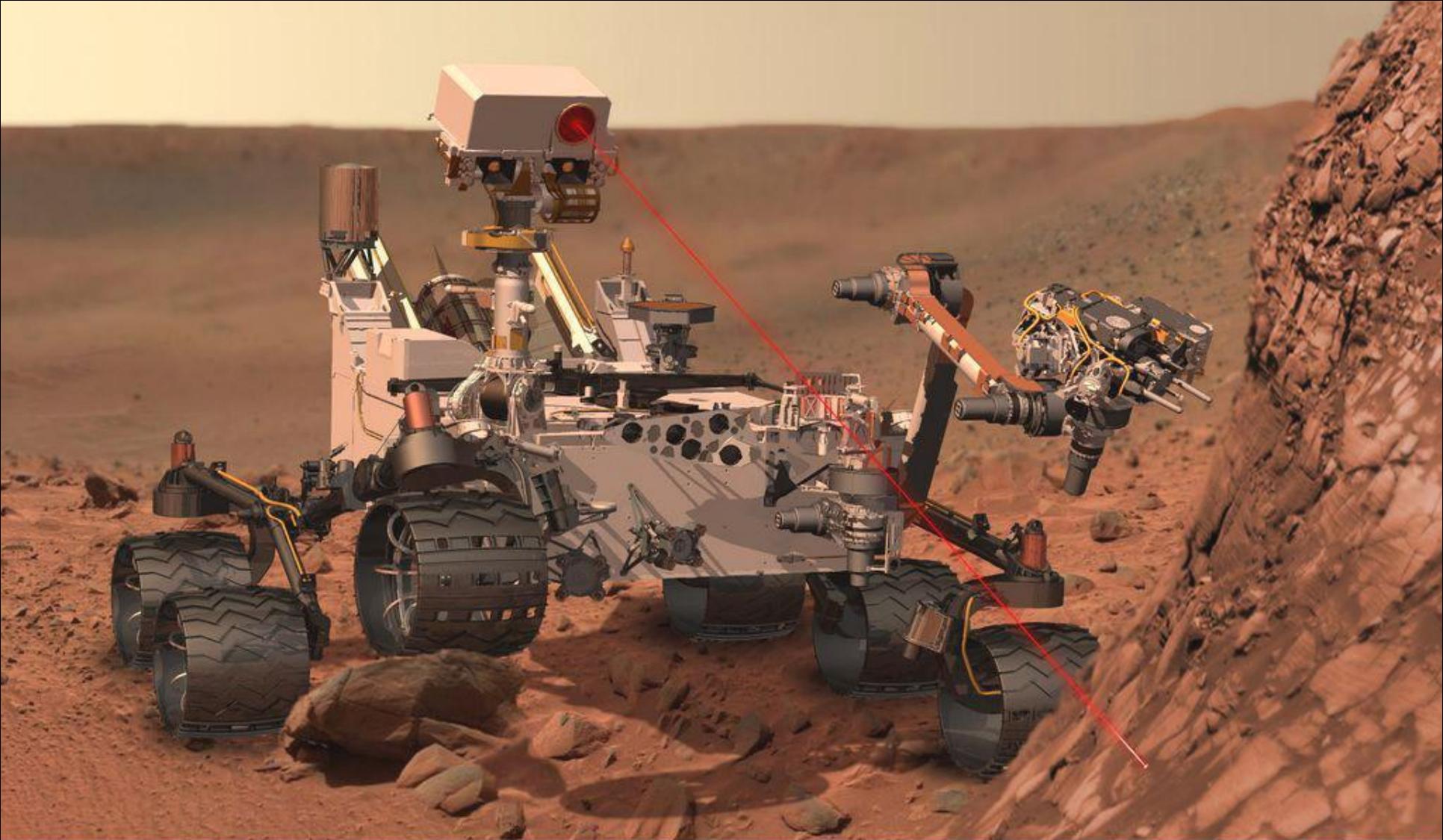












Mars Science Laboratory rover, Curiosity (NASA)

Работает на Марсе с 6 августа 2012 г.

Проект научной базы на Марсе

1987 г.

2007 г.

