ESA's Solar System Program

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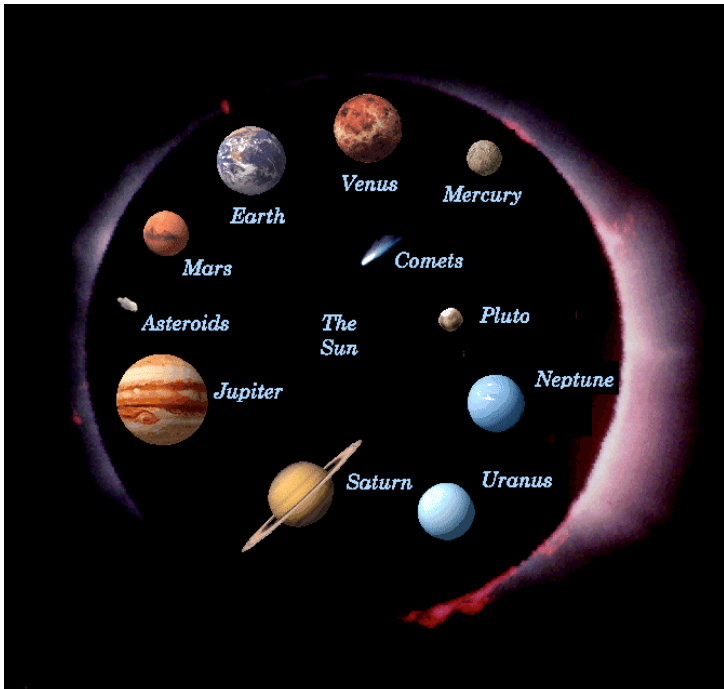
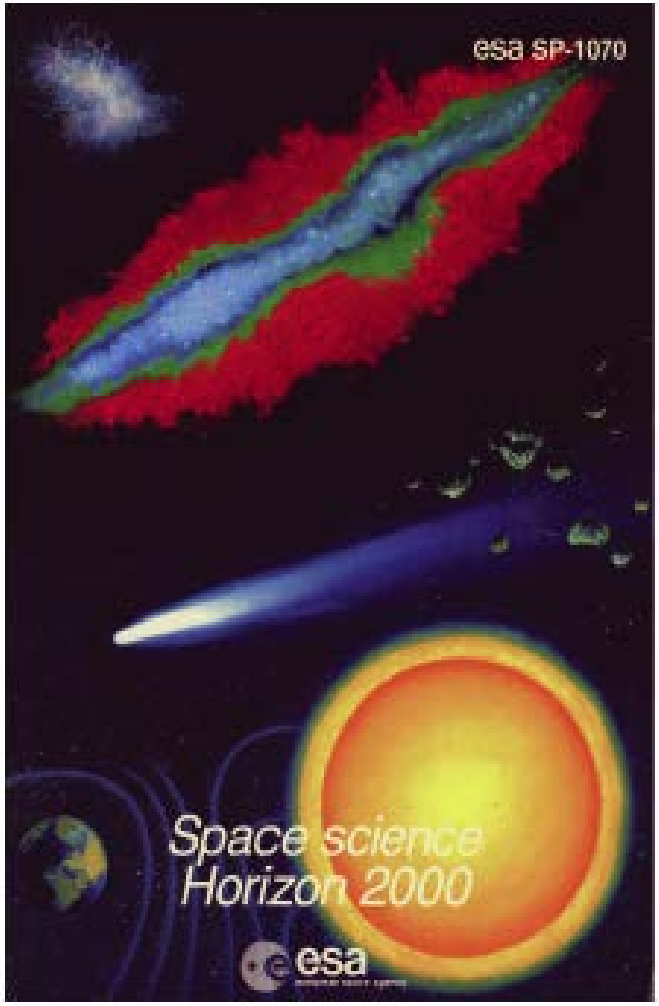
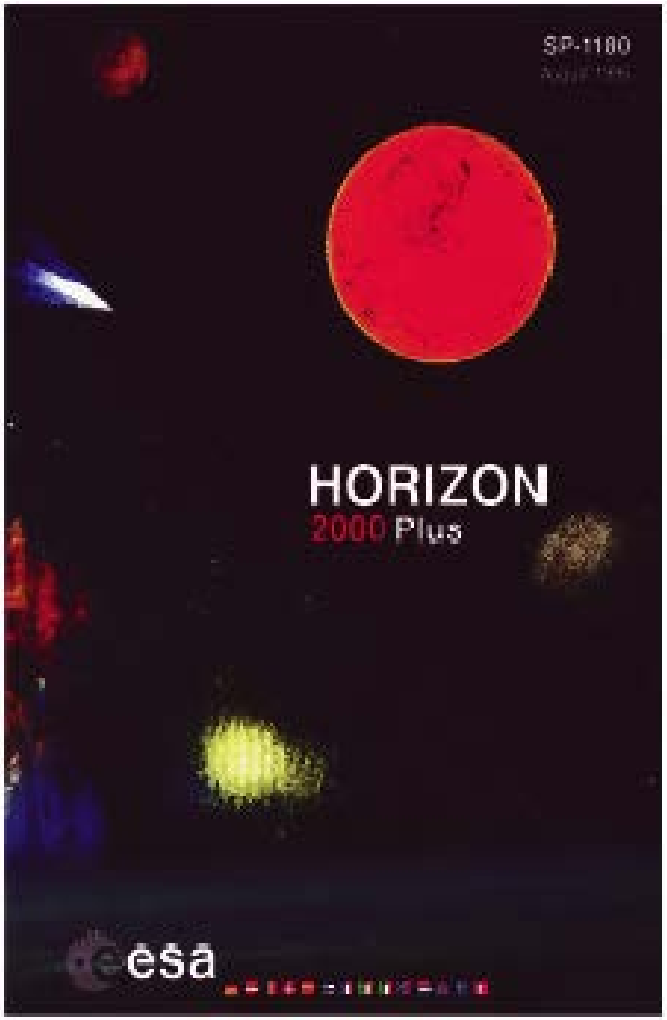


IPPW-11 Caltech June 16-20, 2014

HORIZON 2000 (1986-2005)
HORIZON 2000+ (2006-2015)

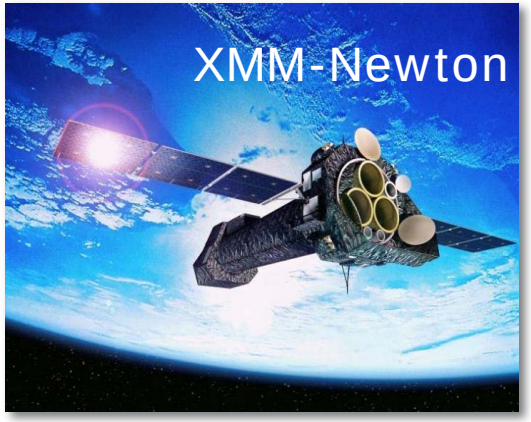




In 1995, a roll-forward of the programme was established, with the name Horizon 2000+, for 10 additional years, i.e. with launches up to 2015.

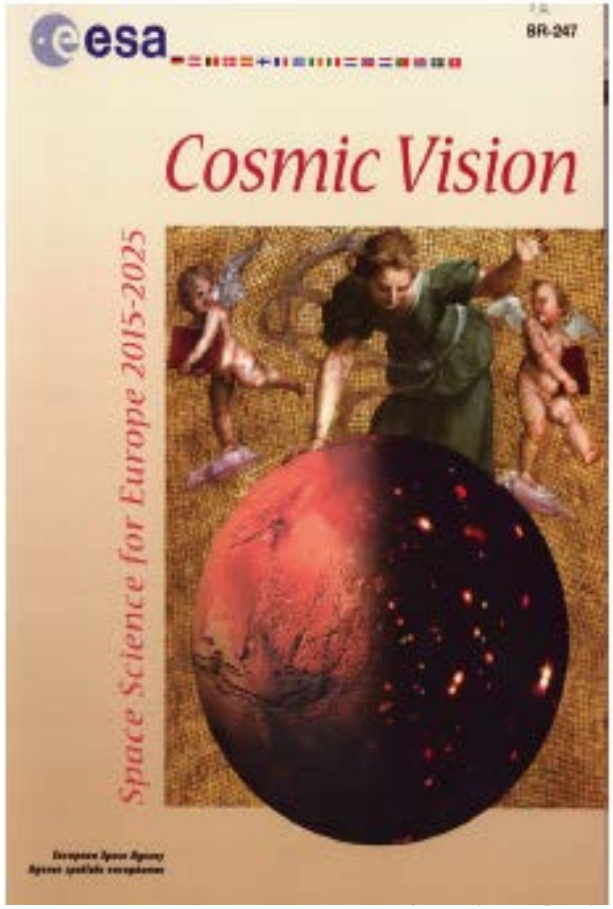
Science Programme building blocks
“Large” (Ariane 5-class) missions

1. High innovation content
2. European flagships
3. 3 per 20 years



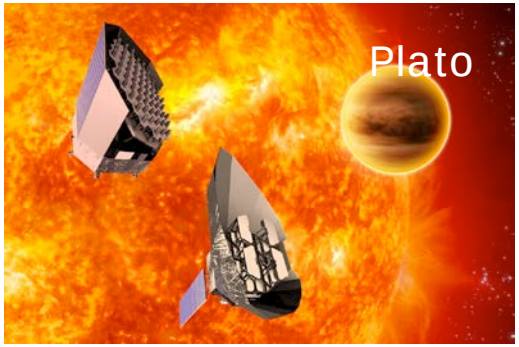
COSMIC VISION

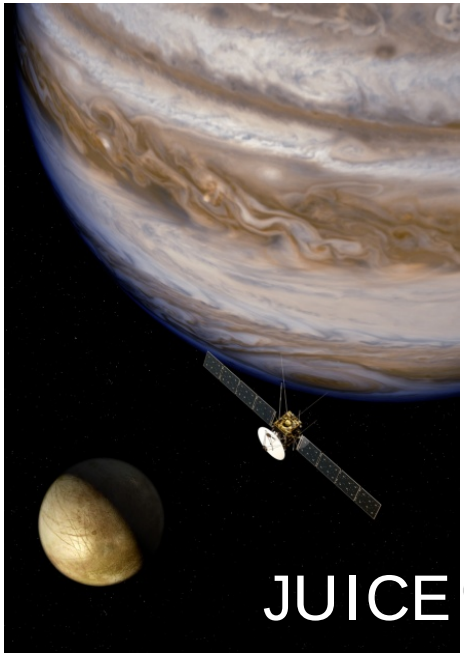
In 2005, a new programme was introduced to replace H2000+, for one more decade (until 2025) with the name Cosmic Vision (2015-2025).

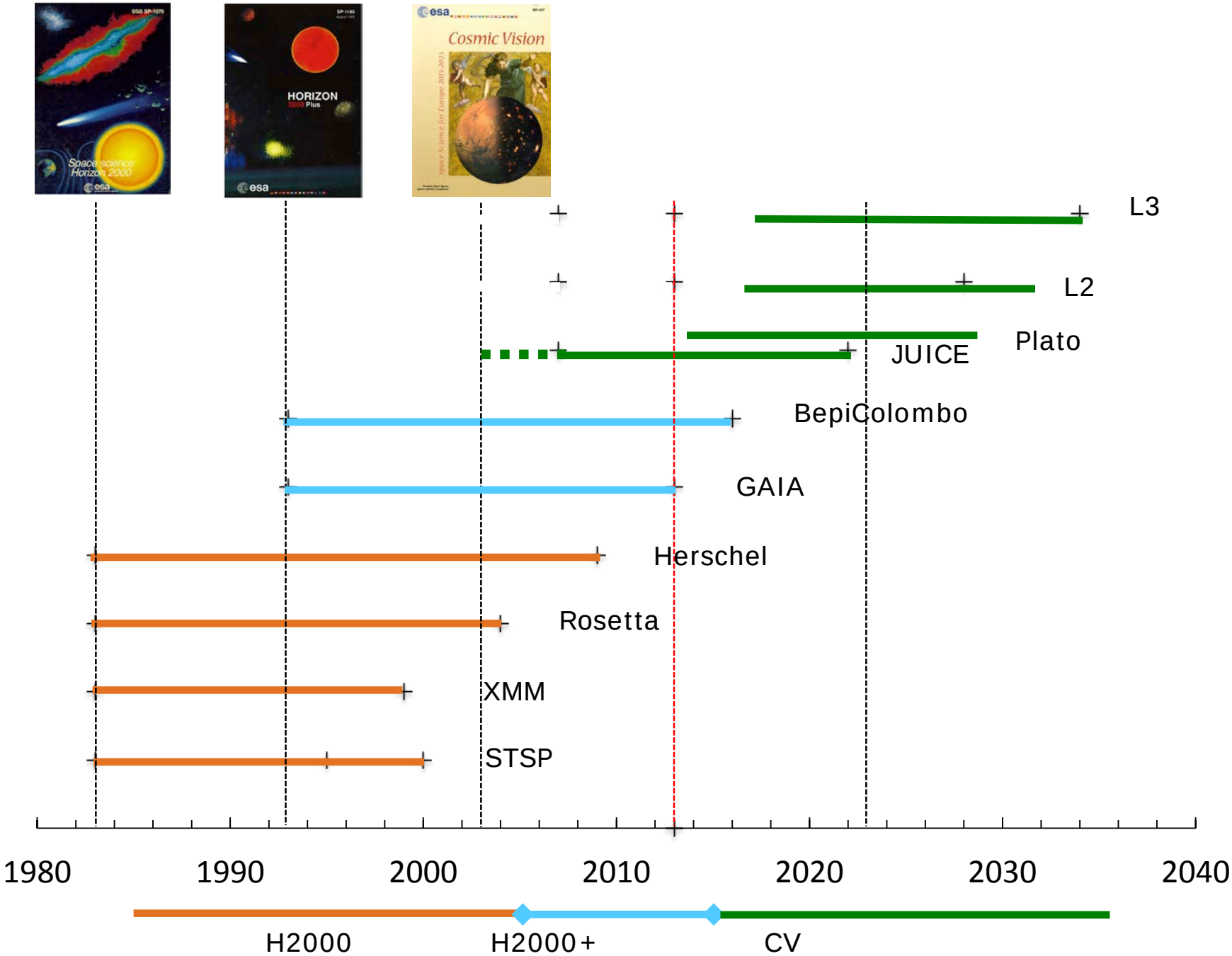


COSMIC VISION (2015-2025)
First slice

- Selection of Solar Orbiter as M1 & Euclid as M2 in 2011
- Selection of Juice as L1 in 2012
- Selection of Plato as M3 in 2014

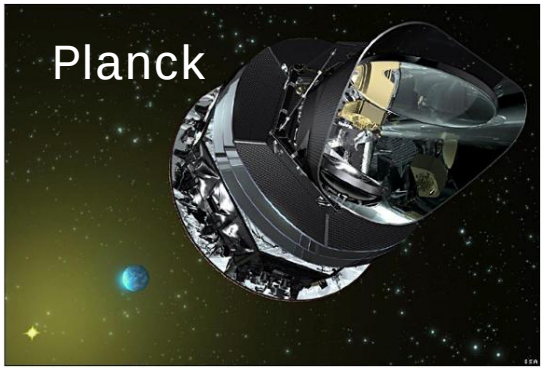


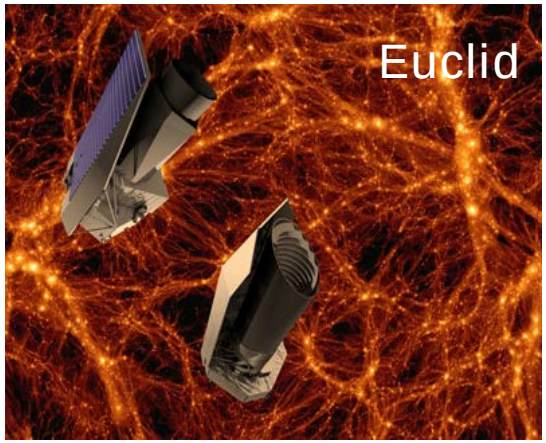


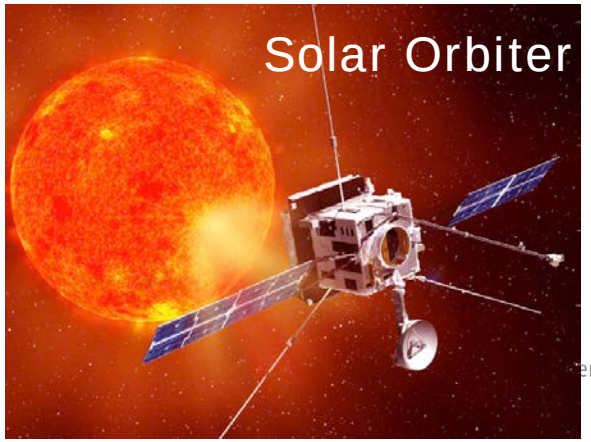

Space science Horizon 2000
HORIZON 2000 Plus
Cosmic Vision
L3
L2
Plato
JUICE
BepiColombo
GAIA
Herschel
Rosetta
XMM
STSP
1980
1990
2000
2010
2020
2030
2040
H2000
H2000+
CV

Science Programme building blocks
“Medium” (Soyuz-class) missions

1. Makes use of current cutting-edge technology
2. Programme workhorse
3. 3-4 per 10 years

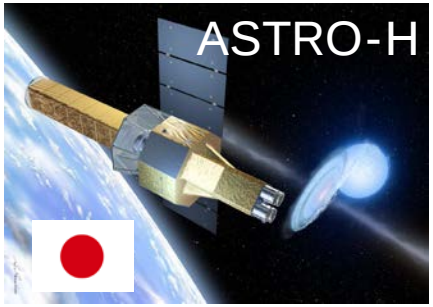


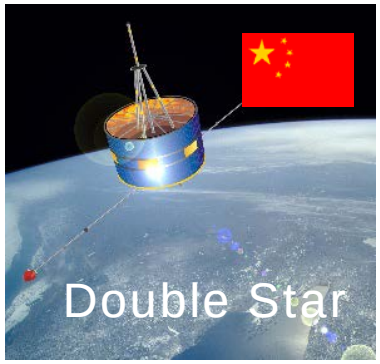




Science Programme building blocks
Missions of Opportunity

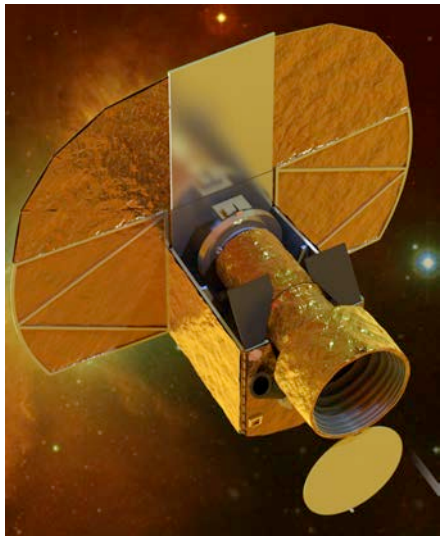
1. Moderate-size participation of the ESA Science Programme in missions led by partners
2. Format can vary
3. Increase flight and science opportunities for European scientists
4. Opportunities for Planetary Exploration need to be identified





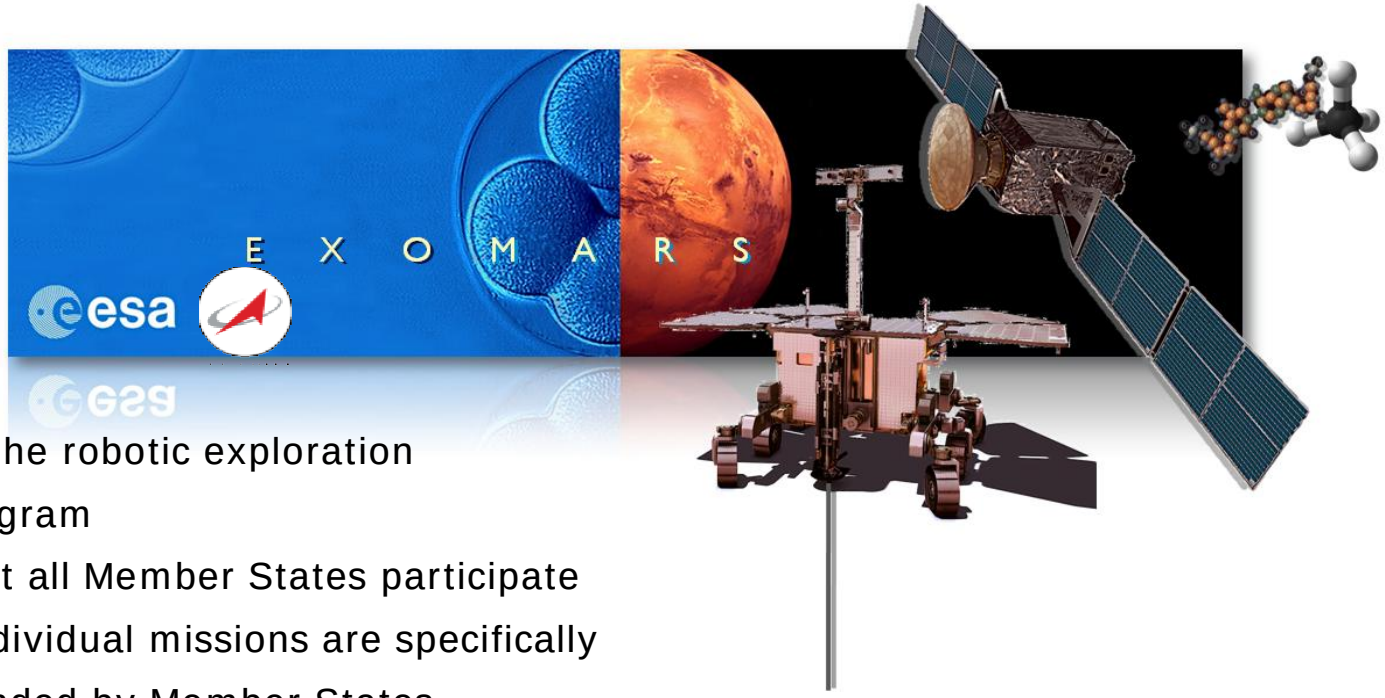
Science Programme building blocks
Small missions

a. New Programme element, still “experimental”
b. Fast and with ESA cost = 0.1 yearly budget
c. Increase flight opportunities for European scientists
d. 1st example: CHEOPS



e. Cube Sat-Nano Sat-or What 4 S.S.?

The (optional) European Robotic Exploration Program



1. Focused on the robotic exploration
2. Optional program
    a. Not all Member States participate
    b. Individual missions are specifically funded by Member States
    a. Based on international cooperation with Russia
3. Two missions currently approved ("ExoMars")
    a. Trace gas orbiter (TGO) and Entry, Descent, and Landing Demonstrator Module (EDM) (2016)
    b. Exo-biology rover with Pasteur P/L (2018)
4. Long-term goal is Mars Sample Return

ExoMars ‘16 Science & Technology

Scientific Objectives:

-Deliver a detailed characterisation of the Martian atmosphere's composition (trace gases).

-Imaging of surface features

-Mapping of subsurface hydrogen

Technology

-Support the deployment and part of the data transmission of the Entry, Descent and Landing Demonstrator Module

-Serve as a data relay to support communications for ESA’s ExoMars Rover during the ExoMars 2018 mission.

Schiaparelli: the ExoMars Entry, Descent and Landing Demonstrator Module for 2016

Technology

-Schiaparelli will hit the atmosphere of Mars at 21 000 km per hour. T At landing, the velocity will be less than 15 km per hour.

-Schiaparelli will arrive at Mars during the global dust storm season, which means that it may encounter a highly dust-loaded atmosphere.

-Schiaparelli is designed to land on a terrain with rocks as high as 40 cm and slopes as steep as 12.5° .

Science (for a max of 8 sols)

-sensors for Wind, Humidity, Pressure, Temperature Optical Depth, Atm charging; EDM science to refine models of atmospheric structure

ExoMars '18 Science & Technology

Science

-Search for signs of past and present life on Mars;

-Investigate how the water and geochemical environment varies;

-Investigate Martian atmospheric trace gases and their sources.

Technology

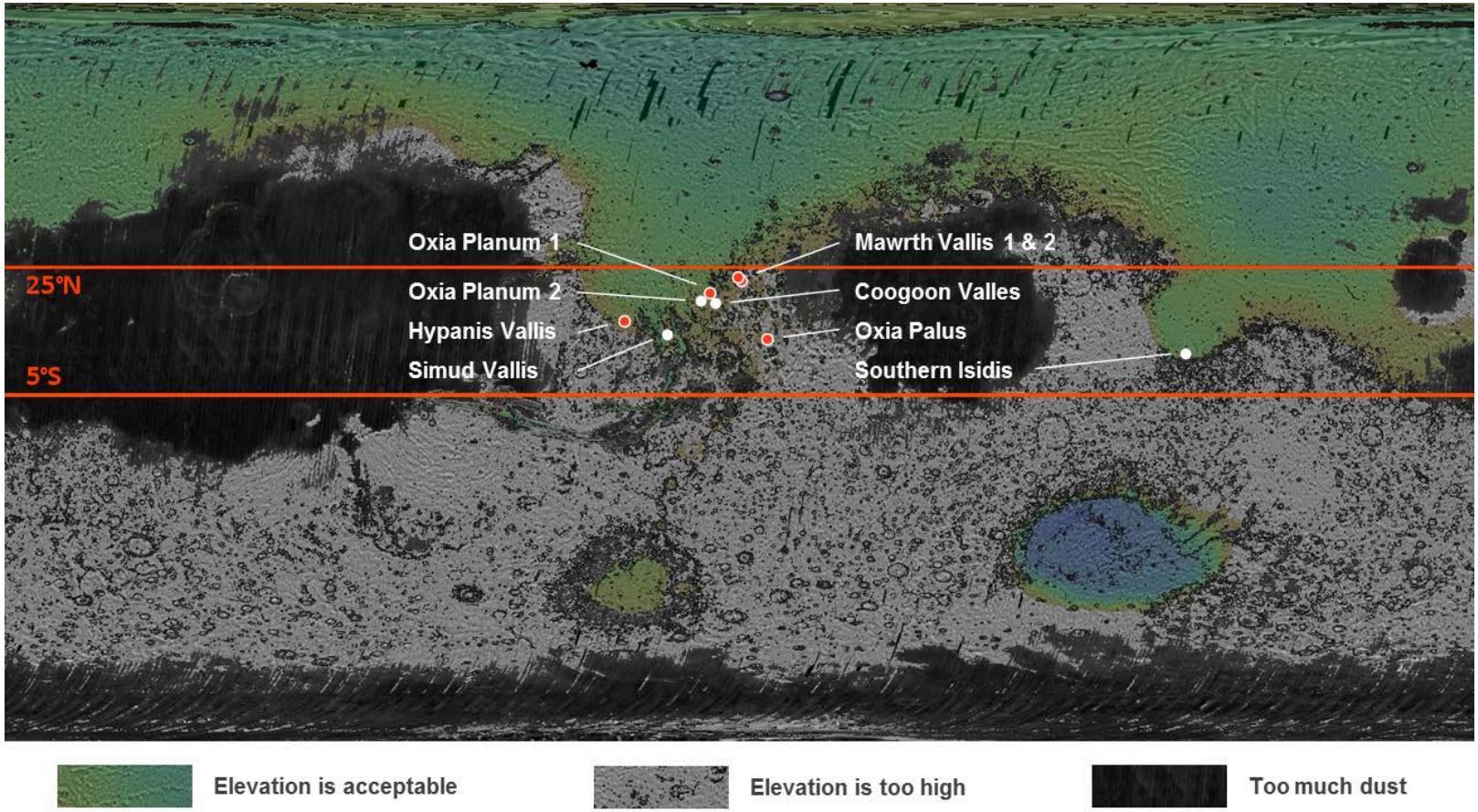
-Entry, descent and landing (EDL) of a payload on the surface of Mars;

-Surface mobility with a rover;

-Access to the subsurface to acquire samples (2m robotic drill)

-Sample acquisition, preparation, distribution and analysis.

Proposed Landing Sites for ExoMars '18



Conclusions

- Much was done in the last 25 years with an average budget of about 200M€/yr;
- ESA has achieved its main goals: creating competitive industries and a world-class user community;
- Management of space business in Europe is evolving rapidly and a new balance between the EU and ESA will come into existence in the short/medium term.

New challenges, new missions, new visions are at the horizon: Europe will be there!