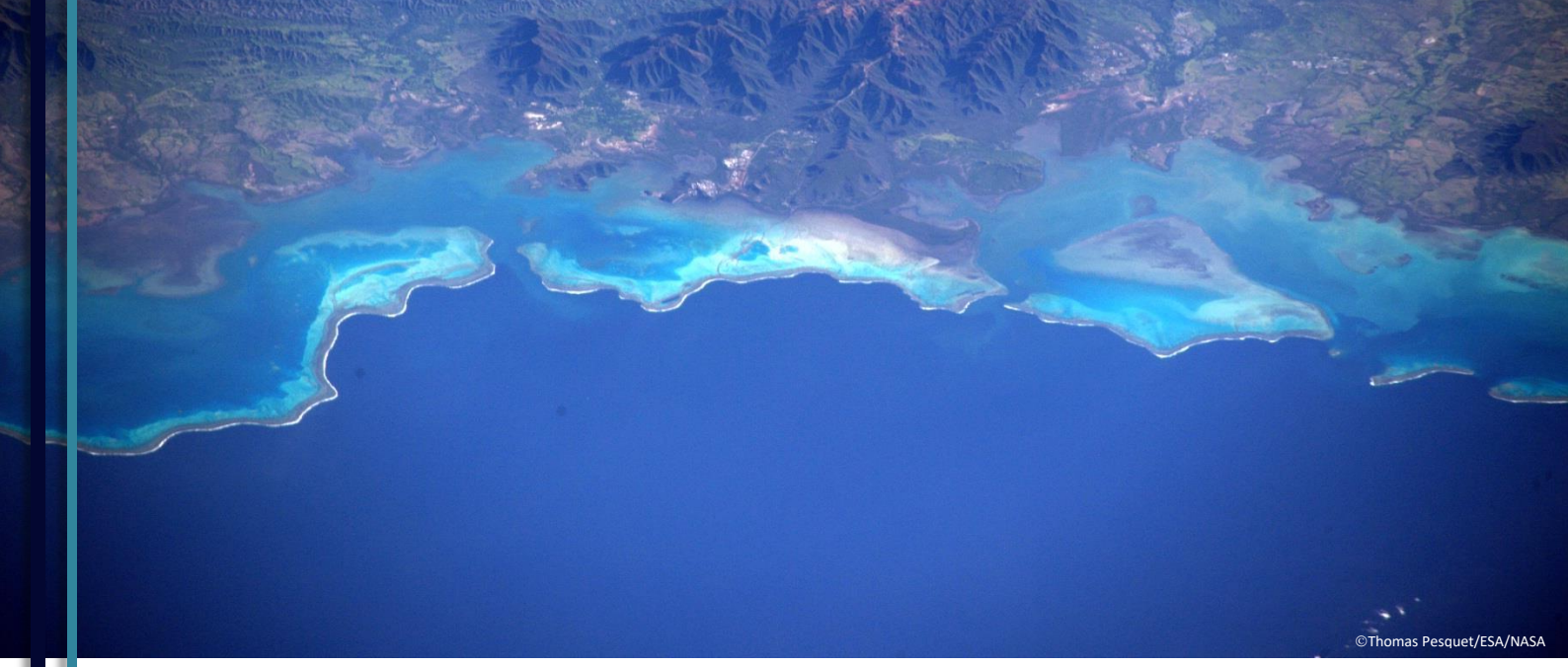


WANT EARTH TO STAY THE « BLUE PLANET » ? PRESERVE WATER!

More than ever, Earth's resources such as water and its inhabitants are threatened by climate change. It is therefore urgent to act and protect the wealth of our planet. On the occasion of the International Mother Earth Day, the French Water Partnership gives an overview of the knowledge from space exploration through the unique images that have helped to see the Earth in a new light.

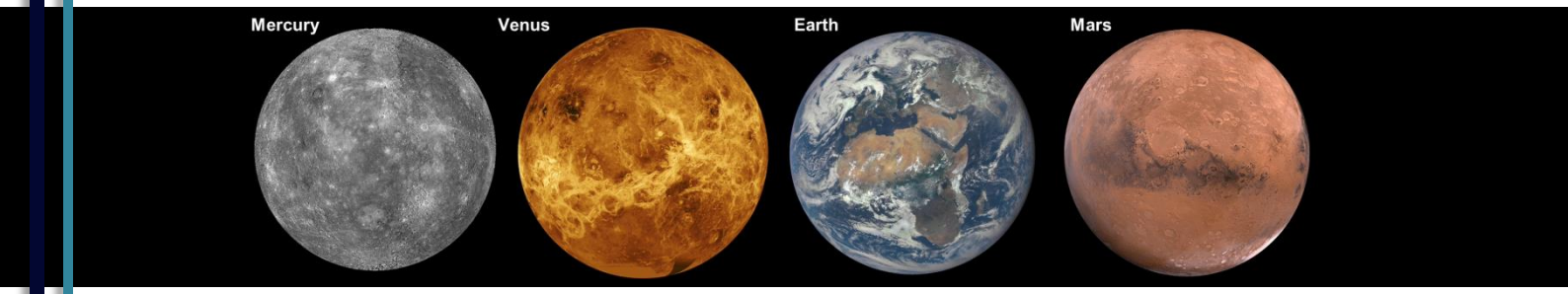
Before space exploration, the terrestrial planets of our solar system were like shiny dots in the sky. Today, they appear differently thanks to space missions. Their color is probably the first thing that impresses and highlights the surprising diversity *(Picture 1).*

The closest planet to the Sun, Mercury, shows a greyish and monotonous surface and looks strangely like the Moon. Like our natural satellite, Mercury is devoid of atmosphere and is thus intensively hit by solar energetic particles due to its proximity to our star. Solar particles have continuously pulverized the surface creating through time a thick layer of dust. The surface is also covered with craters created during the heavy bombardment events of asteroids and small bodies which occurred shortly after the birth of our Solar System and Mercury has not changed since.

Venus appears yellowish and the surface is not visible to the naked eye because of its thick atmospheric layer (95 times thicker than Earth's atmosphere). Its atmosphere is composed of more than 95% of carbon dioxide and the sulfuric acids, are responsible for its color. Thanks to cameras able to see through this thick atmosphere, the images revealed a hostile world where volcanoes and lava flows almost covered the entire surface created after intense volcanic events.

Mars is reddish and is usually named after "the red planet". This atypical color is due to iron oxides dust that covers the first micrometers of the Mars surface. White blobs at the poles are also discernible and correspond to the polar ice caps. Its surface is mainly covered by craters, as is Mercury's. However, there are also some curiosities such as the giant volcano named Olympus Mons (25-kilometers high and 500-kilometers wide). Like Venus, the atmosphere of Mars is composed of more than 95% of carbon dioxide. Therefore, it is very thin (170 times thinner than Earth's atmosphere).

72% of WATER covers The EARTH



Picture 1 – Surprising diversity among the terrestrial planets of our solar system. By looking at its color, the Earth distinguishes itself from the others and appears as a singular planet with its own history. (Credit: NASA, ESA).

By looking at its color, the Earth distinguishes itself from the other bodies and appears as a singular planet with its own history. From space, our planet is mainly blue with brown, green and white spots that highlight the high diversity of resources that compose the planet: oceans, continents, vegetation, clouds, and ice caps.

Oceans are undoubtedly the first thing that impresses when we look at our planet: the Earth appears as an oasis in this vast space composed of dust, gas, and emptiness (Picture 2) and is named after "the blue planet". Water covers about 72% of its surface and is the main ingredient for which its inhabitants are intrinsically linked. Today, Earth is the only planet where liquid water exists permanently.

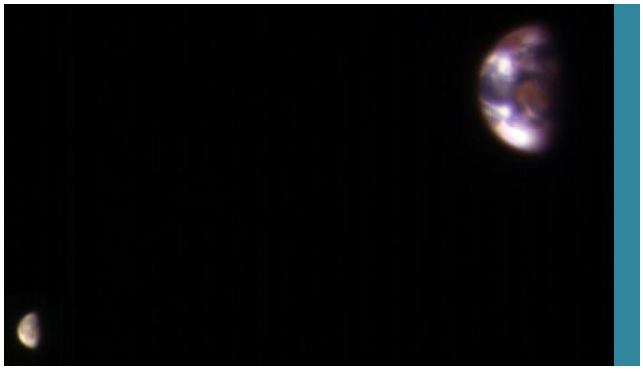
This particularity is due to two key parameters that enable to reach the ideal surface temperature and the atmospheric pressure needed for the stability of water. The first parameter is the distance from the planet to the source of heat – the Sun – that mostly controls the global temperature of a planet. The second parameter is the existence of an atmosphere and particularly its thickness and its composition that both determine the natural greenhouse.

On Earth, carbon dioxide and water are the main components that contribute to the increase of the surface temperature of nearly 35°C. This natural greenhouse enables to get the ideal conditions in order to have water into its three forms: vapor, liquid, ice. Unlike the Earth, Mars and Venus do not host the same conditions despite the presence of an atmosphere. As their atmosphere is composed mainly by carbon dioxide

Will the landscapes on Mars be the landscapes of tomorrow's Earth?

the greenhouse is either too intense in the case of Venus or too weak in the case of Mars, neither which allow water to exist in its liquid form.

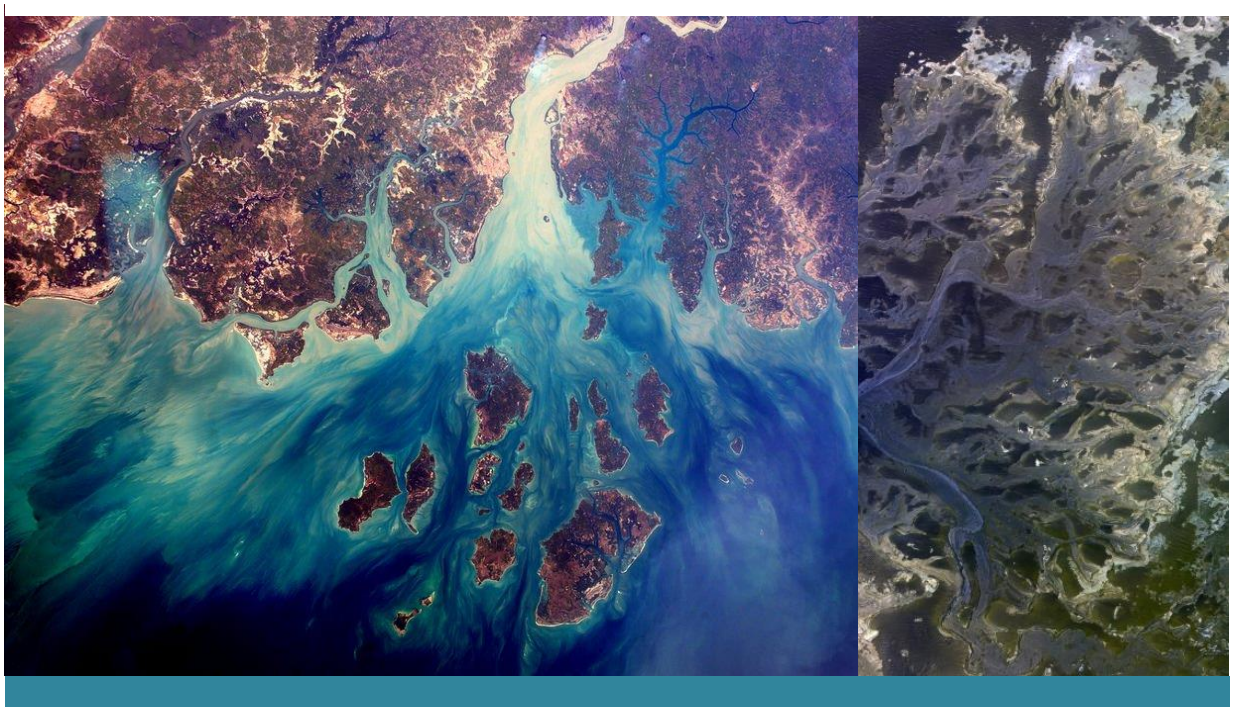
However, the different missions to Mars revealed a totally different past history from what is occurring today. The red planet has in fact known a period of its past history where liquid water abundantly flowed on its surface when the climate was wetter and warmer than today. The only vestiges of this past activity are the presence of dry river beds (Picture 3) and deltaic deposits (Picture 4) and hydrated minerals such as clays. The small size of the red planet is probably the main reason why its internal activity stopped that led to the loss of one after the other its magnetic field, its atmosphere and liquid water on its surface. While on our planet, the water always feeds rivers and oceans, **will the landscapes on Mars be the landscapes of tomorrow's Earth?**



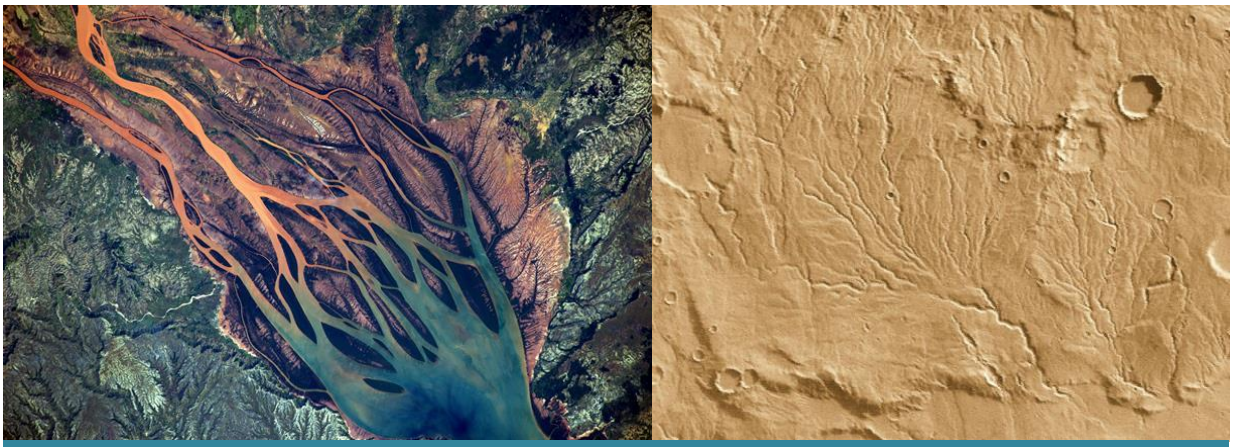
Picture 2 – The Earth seen from Mars from where it is possible to distinguish its singularity: oceans in blue, vegetation in red at the middle of the Earth image corresponding to Australia and the South-East of Asia and the ice caps in white at the bottom-left corresponding to Antarctica. This image was taken by the high-resolution camera named HiRISE onboard NASA's Mars Reconnaissance Orbiter (Credit: NASA/JPL/University of Arizona)

Space exploration has thus changed our vision of the world and enlightened us on the place of our planet within this vast universe. The Earth appears now as a singular and fragile planet with exceptional water resources that mankind has to imperatively protect for its survival. Each country must, therefore, raise its ambitions in terms of emission reductions so that together we can achieve the goal of maintaining global warming at 1.5°C at the end of this century as it has been mentioned on the Paris Agreement. Limiting warming to 1.5 ° C will, therefore, limit the flooding of islands and continents caused by melting ice in the short term and the scarcity of water resources in the long term. Consequently, water has to be at the center of adaptation strategies, so that this exhaustible and sometimes dangerous resource becomes a sustainable and safe resource for the inhabitants. Thanks to the water stakeholders, solutions exist and can serve both to mitigate the greenhouse gas emissions and to adapt to climate change. As for examples, the safeguarding of mangroves, a place of exceptional flora and fauna, as well as the safeguarding of nature in urban areas will benefit the population, biodiversity, the mitigation of global warming, and our adaptation to climate change ■

So let's act together for a common goal: that the Earth stays THE "BLUE PLANET" for a long time!



Picture 3 – Deltas on the Earth versus on Mars. The left image is the Saloum delta located in Senegal, one of the wealthier ecosystems on the Earth known as a biosphere reserve. This image was taken by the French astronaut, Thomas Pesquet from the International Space Station (Credit: Thomas Pesquet/NASA/ESA). The right image (false colors) shows a dry delta within the Eberswalde crater on Mars. The crater contains layered sedimentary deposits about 100-meters thick. This structure demonstrates that Mars hosted a warm and wet climate where liquid water was stable and running off the surface 3 billion years ago. This image was taken by the camera named CaSSIS onboard ESA's ExoMars spacecraft. (Credit: ESA/Roscosmos/CaSSIS).



Picture 4 – Rivers on the Earth versus on Mars. The left image shows the Betsiboka River and the Bombetoka Bay in Madagascar. The reddish color of the water is caused by the red color of the sediments carried in the river. This image was taken by the French astronaut, Thomas from the International Space Station (credit: Thomas Pesquet/NASA/ESA). The right image shows dry river channels on Mars demonstrating the past aqueous activity 3 billion years ago. This image was taken by the NASA's camera onboard Viking orbiter (credit: NASA/Viking).

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The French Water Partnership:

The French Water Partnership (FWP) is the only platform for all French stakeholders, both public and private, operating at international level. With over 170 members, the FWP consists of six panels made up of representatives from 1) the government and its public institutions, 2) NGOs, organizations and foundations, 3) regional authorities and parliamentarians, 4: economic players, 5) research and training organizations, and 6) French and foreign individuals (www.partenariat-francais-eau.fr/en/)