

# PTSI – DM 1 – LVA

En vous appuyant uniquement sur les documents du dossier thématique qui vous est proposé, vous rédigerez une synthèse répondant à la question suivante :

***To what extent is space exploration in C21 an opportunity for mankind?***

Votre synthèse comportera entre 450 et 500 mots et sera précédée d'un titre. Le nombre de mots rédigés (titre inclus) devra être indiqué à la fin de votre copie.

## Liste des documents :

- Un article de Rivka Galchen publié dans The New Yorker en 2019.
- Un article de Harvey Morris, publié dans le China Daily en 2021.
- Un article de David Pedreira publié par CNN en 2018.
- Un dessin de Michael Sloan paru dans The Washington Post en 2012.
- Un dessin de Dave Granlund paru sur davegranlund.com en 2020.

## **Document 1 - The Race to Develop the Moon**

*The New Yorker*, Rivka Galchen, April 29, 2019

In January, the China National Space Administration landed a spacecraft on the far side of the moon, the side we can't see from Earth. [...] "The moon is hot again," Jack Burns, the director of the NASA-funded Network for Exploration and Space Science, told me. In the decades since Apollo 11, NASA has invented Earth-mapping satellites, launched the Hubble Space Telescope, collaborated on the International Space Station, and studied Mars. But none of these projects have generated the broad and childlike wonder of the moon.

When the 1969 moon landing was first conceived, it was a strictly political stunt: go to the moon, plant the flag, and come back to Earth. Only twelve people have walked on the moon, all of them between 1969 and 1972. Burns said, "This time we need a more sustainable set of goals and reasons" for going to the moon. He meant a science mission, or a business mission, or both. "Our objectives are different. Our technology is different."

Burns told me that advances in engineering could turn the moon into a way station for launching rockets and satellites farther into the solar system, to Mars and beyond. [...] Lunar construction projects now look feasible. Fifteen years ago, the moon was believed to be a dry rock; now we know that there's water there. Both private industry and national agencies regard the mining of water and precious materials as something that's not too far off. There's space tourism, too, though the quiet consensus among scientists seems to be that the idea is goofy and impractical. [...]

NASA would like to establish a permanent presence on the moon, using reusable rockets and landers. But many scientists see little need for humans on the moon, since robots would do the work more safely and inexpensively.

"Water is the oil of space," George Sowers, a professor of space resources at the Colorado School of Mines, in Golden, told me. [...] Water in space is valuable for drinking, of course, and as a source of oxygen. Sowers told me that it can also be transformed into rocket fuel. "The moon could be a gas station," he said. [...]

Sowers is excited about solar power. He speculates that, if we had a base on the moon, we could use 3-D printers to make giant solar panels [...] which could be launched into orbit; the resulting power could be beamed back to Earth via microwave radiation. "Space solar would be an unlimited, inexhaustible source of green energy," Sowers said. [...] Other specialists have a different view of the resources available in space. Asteroids contain precious metals, such as platinum, palladium, and gold. [...]

The guiding laws of space are defined by the Outer Space Treaty, from 1967, which has been signed by a hundred and eight countries. Individual countries have passed legislation similar to that of the U.S., deeming resources collected in space to be ownable by private entities. It's not difficult to imagine moon development, like all development, proceeding less than peacefully, and less than equitably. So there is a tacit space race already. [...]

## **Document 2 – Space ambitions needed now more than ever**

*China Daily*, by Harvey Morris, January 6, 2021

[...] Last year, state agencies and private companies undertook more than 100 orbital rocket launches. These included no less than three launches to Mars [...]. The three missions are all scheduled to reach their distant destination in February after traveling millions of kilometers into space. [...]

The first of 11 launches to build a Chinese space station by 2023 will [also] happen this year. The 66-metric-ton orbiting space station will be home to three astronauts on six-month rotations and focus on experiments in astronomy, space medicine, life science and biotechnology.

Earthbound skeptics may question why major countries and businesses are expending so much on space exploration at a time when challenges on our planet have been mounting—not just in terms of the pandemic, but also in the face of the economic constraints that have accompanied it.

But that would be to ignore the practical benefits of space exploration that the COVID-19 crisis did much to highlight. As early as April last year, the European Space Agency put out an appeal for fresh ideas on how space resources could be used to boost the fight against the pandemic.

The ESA was one of a number of international agencies that went on to develop a dashboard that used satellite-based observations to track changes in air and water quality, climate change, economic activity and agriculture, and to measure how regional lockdowns and social distancing measures affected the Earth's air, land and water.

Post-pandemic, it is hoped that space-derived data can be harnessed for a green economic recovery. For instance, cities may use satellite information to dynamically map traffic systems and ease the shift toward zero carbon public transportation systems.

According to the ESA, satellite applications can be used to help plan, monitor, predict and improve renewable energy production, while green construction can make use of space-based data and internet of things sensors to put new buildings in ecologically safe zones and conserve energy. [...]

But missions to Mars and beyond still might strike some as somewhat esoteric—not to say costly—when humanity faces so many challenges back home on Earth. It is worth recalling, then, how many of the modern world's scientific innovations have sprung from the exploration of space. Medical diagnostic tools, wireless technology and camera phones are just some of the practical benefits that have emerged.

To get to Mars, scientists have had to remotely drill for rock samples to look for ancient signs of life, use high-resolution film, develop low-gravity flying machines, and send accurate information back to Earth.

Apart from the additional commercial attractions of space tourism and mining, space exploration will continue to provide answers to scientific questions that have thus far remained unanswered. [...]

### **Document 3 – The race to militarize space is no joke**

CNN, David Pedreira, March 28, 2018

One of the first weapons in space was a triple-barreled handgun designed to kill Russian bears. Cosmonauts brought it with them into orbit in case their descent module landed in a Siberian forest.

Those were simpler times – at least in terms of celestial firepower. The militarization of space is in full gear today. People may have understandably snickered at President Donald Trump’s call for a US “space force,” but the laughter masks the fact that too few are noticing the rush by world powers to develop war-fighting capabilities in orbit. Consider these recent headlines:

- The Pentagon told Congress this month it is studying a combatant command for space warfare to counter recent efforts by China and Russia to militarize Earth orbit.
- China tested a direct ascent anti-satellite and antiballistic missile system in February that analysts say could destroy most US satellites.

These countries, and others including North Korea and India, are testing systems such as lasers that fry or dazzle satellites, space-borne electromagnetic pulse weapons that can knock out power grids, and satellites that maneuver in orbit and target each other.

Of course, this isn’t entirely new. Concerns about weaponizing the cosmos have been around for decades, and international laws have been written to stave them off. The Outer Space Treaty of 1967, which laid much of the foundation for space law, prohibits weapons of mass destruction in orbit, on the moon or on other celestial bodies. But the treaty doesn’t directly ban conventional weapons in space, or weapons fired from Earth into space.

Efforts have been made to strengthen space non-proliferation laws, but none of the major powers seem to be honest brokers in the endeavor. [...]

Calling for an outright ban on weaponry buzzing around low or high-Earth orbit feels like tilting at windmills at this point. There’s too much momentum in the wrong direction. And few are talking about the even bigger issue outside of Earth’s gravitational embrace: the future resource mining of the moon, the asteroid belt and other parts of the solar system.


It’s understandable, because so far there’s been nothing worth fighting for in deep space. It costs thousands of dollars to put one pound of payload into orbit. Mining an asteroid for rare metals just isn’t cost-effective or technically achievable – yet.

But the price to launch material into space is dropping, and companies and governments are gearing up for when the tech is ready. Consider that an asteroid with the scientifically dreary name of 2011 UW158 comes within a few million miles of Earth in its eccentric orbit – and it reportedly contains about \$5.4 trillion worth of platinum.

An economic market that makes the Silk Road look like a five-and-dime will eventually open up in the solar system. And when has humanity ever kept peace in the face of such a mother lode? Jeff Bezos and Elon Musk may have good intentions for space today, but what about the astro-tycoons wrestling over trillion-dollar rocks in the future? [...]

### **Document 4 - Moon draws growing interest as a potential source of rare minerals**

*The Washington Post*, Michael Sloan, February 6, 2012

 Nous ne pouvons pas afficher l'image.

## Document 5 – January 2020



*\* In Star Trek, Romulans are a militaristic alien species and the enemies of the United Federation of Planets (the space force of which is called Starfleet).*