ÉCOLE POLYTECHNIQUE – ÉCOLES NORMALES SUPÉRIEURES

ÉCOLE SUPÉRIEURE DE PHYSIQUE ET DE CHIMIE INDUSTRIELLES

CONCOURS D'ADMISSION 2014 **FILIÈRES MP ET PC**

ÉPREUVE ÉCRITE DE LANGUE VIVANTE – (XEULCR)

ANGLAIS

Durée totale de l'épreuve écrite de langue vivante (A+B) : **4 heures**

Documents autorisés : ***aucun***

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PREMIÈRE PARTIE (A)
SYNTHÈSE DE DOCUMENTS

Contenu du dossier : trois articles et un document iconographique pour chaque langue. Les documents sont numérotés 1, 2, 3 et 4.

Sans paraphraser les documents proposés dans le dossier, le candidat réalisera une synthèse de celui-ci, en mettant clairement en valeur ses principaux enseignements et enjeux dans le contexte de l'aire géographique de la langue choisie, et en prenant soin de n'ajouter aucun commentaire personnel à sa composition.

La synthèse proposée devra comprendre entre 600 et 675 mots et sera rédigée intégralement dans la langue choisie. Elle sera en outre obligatoirement précédée d'un titre proposé par le candidat.

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SECONDE PARTIE (B)
TEXTE D'OPINION

En réagissant aux arguments exprimés dans cet éditorial (document numéroté 5), le candidat rédigera lui-même dans la langue choisie un texte d'opinion d'une longueur de 500 à 600 mots.

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A - Document 1

What will we call the next generation of astronauts ? Holidaymakers...

The commercialisation of space travel will lead to the next giant step for mankind
Maggie Aderin-Pocock
The Observer, Sunday 20 October 2013

My personal quest for space began at the age of three and it was all because of the magic of *The Clangers*. These small, wonderful, knitted creatures and their animated adventures captured my heart and my imagination, and with the logic of a child I planned my visit to the Clanger home world. People at that time were telling me excitedly about astronauts who had landed on the moon. So it should be quite easy to get one small child to Clangersville.

But some 40 years later and nearly 60 years into the space era, the dream has not materialised ; rather than holidaying on the moon we seem to have barely got off the ground. But the eternal optimist in me tells me that this is all about to change.

My theory is this : in the 56 years since Sputnik 1 left the planet we have had three phases of space. I call them the three Cs. The first phase was confrontation, the second collaboration and the third commercialisation, which is the phase that will get us all out there.

It is easy to forget that confrontation is what got the space era started. The art of war is reliant on technology development. From the Romans to the present day, war is a great incubator for advancement, and the second world war was no exception. I shudder and yet marvel at the accuracy and devastation of the smart bombs we see today, but their early predecessors were V2 rockets, developed by the Germans to strike targets from afar with minimum engagement on their part. Hundreds landed on London.

After the war both the USSR and the Americans tried to obtain the scientific minds behind the bombs. In the cold war, designing rockets that could travel across the planet was the goal and skirting space seemed to be the answer. But once we made that journey people realised that we could get more out of a presence in space and the science of Earth observation was born. From the lofty heights of space, surveillance was a doddle. Why risk a pilot being shot down when you can silently observe the enemy's movement from hundreds of miles up ? The first images were primitive but, as with any war, the technology advanced fast.

This was a time before digital photography, so images were taken on photographic film in the satellite and then dropped towards the Earth where planes would pluck it from the air. This programme continued into the early 70s and only stopped when a Soviet sub was spotted below one of the drop sites.

Space continues to be used for defence today despite the expense, and it is the cost that led to the next phase : collaboration. Around the late 1960s and early 70s, many countries started to form space agencies. They could see the use of having their own satellites, but with each one costing around $100m – and the price of launching it about the same – they could also see the benefit of collaboration on some projects. For scientific missions, budgets are limited. The European Space Agency (ESA) was formed in 1975 as a collaboration between 10 nations ; today

it has 20 member countries contributing about $4bn. [...]

Everything is decided by committee, and although lots gets done, it feels as if the really exciting projects, such as landing the first person on Mars, get delayed and postponed because of a lack of consensus. This is the very opposite of the environment that got the first guys to the moon. So to make the next exciting steps in space I feel that we need a new age. The age of space commercialisation.

I have to confess that my vision of humans in space has been unduly influenced by *Star Trek*, but I would argue that if we are ever to fulfil such a future, we need the commercialisation of space to get us there.

Commercialisation is the magic dust that lets blue-sky thinking become commonplace in a matter of years. We have all seen it happen : the mobile phones of the 80s that cost the earth and needed a small trailer to carry around were replaced by the sleek little numbers we have today (which, might I add, look a lot like *Star Trek* communicators) ; from computers that took up the space of three offices in the 70s to the ultra-light notebook that I am writing this on now.

Commercialisation has the power to transform and, in terms of space, this change is happening now – and it's not just the likes of Virgin Galactic or the plans of Mars One that I am referring to but companies such as SpaceX, which now supplies the International Space Station. Companies such as Reaction Engines, here in the UK, which has come up with a novel design for a new reusable spacecraft that uses oxygen from the Earth's atmosphere to partly fuel its journey into space.

For those who think that my vision is rose-tinted, I say to you, when the Wright brothers made their first flight, no one could have anticipated easyJet. So welcome to the new space era but pack light, excess baggage on space flights is truly exorbitant. (868 words)

Maggie Aderin-Pocock
is a space scientist and research fellow at UCL

A - Document 2

After Neil Armstrong : What future for space exploration ?

By Robin McKie, Published 03 April 2008
To mark the death of Neil Armstrong [2], we have republished this 2008 assessment of Nasa on its 50th birthday

Fifty years ago this month, President Eisenhower announced he was going to end his nation's space race humiliations. He would be establishing a national aeronautical agency that would control America's civil rocket launches and restore the country's ailing scientific reputation. The Soviet Union was then grabbing world headlines with space spectaculars that included putting the first animal, Laika the dog, into orbit. By contrast, America had little else but explosions and ignition failures on launch pads to show for its efforts in post-war rocketry. A National Aeronautics and Space Administration (Nasa) would stop the rot and restore America's faltering space endeavours, Eisenhower told Congress on 2 April 1958.

Thus Nasa, which went on to earn itself a reputation for unfailing technological expertise, was brought into existence primarily to save America from political ignominy. Grand schemes for traversing the heavens and revolutionising space exploration were afterthoughts. And thereby hangs a tale. In coming months, as the agency celebrates its 50th birthday and displays itself as the source of endless technological triumphs, there will be much harking back to glory days : to US flags planted on the Moon and to giant leaps made for mankind.

But behind the bunting and the bombast, it will be hard to avoid the sense of unease hanging over Nasa. Yes, it has achieved great things, but it is also beset by major political and financial worries. This, after all, is one of the world's most lavishly funded scientific organisations, an agency with an annual budget of $16bn (£8bn). American taxpayers who provide that money are entitled to see significant results. The question is : do they get enough of them ? After 50 years, has the agency done enough to justify the money that has been pumped into it ? What has it done for science and, more importantly, what is it likely to do in the future ? Answers to these questions make disturbing reading.

For a start, we should note that Nasa has now less than a dozen flights to make on the space shuttle, the only craft it has for putting human beings into space. In 2010, its shuttle fleet is to be grounded permanently ; the risks of another Challenger or Columbia disaster occurring are considered to be too high to be endured. Thus, in a couple of years, Nasa will be unable to send men and supplies to the International Space Station (ISS), even though its $100bn cost has been met principally by US taxpayers. Instead America will be entirely dependent - until 2014 or 2015 when replacement rockets are ready - on Russia to get men and women into space, a situation that Moscow is likely to use, primarily, to extort geopolitical concessions from the US.

But how on Earth has Nasa ended up rocket-less and technologically impotent ? Most agency supporters blame politicians. Nasa has certainly been shunted in every possible direction by different White House administrations, many of them deeply suspicious of and unfriendly towards space exploration. [...]

Later Kennedy found he had inherited an agency that was devouring more cash than any

other federal programme. However, the president was assassinated before he got a chance to do something about this haemorrhaging of money. The space programme became an homage to the dead president and therefore untouchable, adds DeGroot.

Then came the Apollo Moon landings, which were Nasa's crowning glories, though it should also be noted that many serious risks - the launching of untested equipment, technical short cuts and use of untried software - were taken, but revealed only decades later. Apollo 8 was originally scheduled for only an Earth orbit mission, for example, but at the last minute was sent to circle the Moon in 1968 to restore Nasa's slipping lunar landing schedule. The world marvelled to hear astronauts reading from the Book of Genesis while in lunar orbit. Yet the mission was "the greatest single gamble in space flight then and since", according to the astronaut Deke Slayton. "We didn't even have the software to fly Apollo in Earth orbit, much less the Moon." (673 words)

Robin McKie
is science editor of the Observer

A - Document 3

NASA Adrift in Interplanetary Space

By S. Fred Singer
May 24, 2013

Since the first Apollo landing in 1969, NASA has been looking, unsuccessfully, for an overarching goal to match this spectacular achievement : landing men on the Moon. The International Space Station (ISS) has not turned out to be what it was advertised. It has made no breakthrough scientific contributions ; it has not explored the solar system further ; and it has not excited a great amount of public interest since it was set up. In retrospect, many would refer to it as a white elephant. Its annual maintenance costs are a drain on the NASA budget. Even worse, its supply has to be contracted out – to Russia. The trouble is : ISS had no well-defined goal.

Yes, there have been plenty of proposals. During the first Bush administration, NASA thought it had a clear go-ahead and proposed a manned Mars mission, in addition to putting a manned base on the Moon (to do what ?). But once the price tag was revealed, around 400 billion dollars (which was then real money), the NASA plan was DOA (dead on arrival).

Since then there have been proposals to establish a permanent colony on the Moon – again without any clear justification. Many have compared it to the ISS and labeled it another white elephant. In fact, it would add little to our knowledge of the Moon, and probably would not even create much public excitement : "Been there, done that" – to much of the public, just a repeat of the Apollo mission.

Such a Moon colony has been labeled as an important 'step towards the human exploration of Mars' ; but this claim was never justified in any detail. Many would describe it as a detour, or as a blind alley. Even worse, it would consume so much of the NASA budget as to make any other space project infeasible.

More recently, we've heard proposals such as landing on the far side of the Moon, to set up radio telescopes in a noise-free environment. There might be some justification for this, but it is an expensive undertaking without commensurate returns.

Similarly, we've heard of human missions to asteroids, as worthwhile goals. But there are likely to be as many kinds of asteroids as there are meteorites. And these can be studied more easily in samples taken from the dusty shelves of museums around the world.

It is interesting to contemplate the military aspects of space but hard to think of any beyond Earth orbit. Yet I well remember that during the early days of the space race with Russia, there were Pentagon proposals to "occupy" the Moon. Why ? Because it is military doctrine to occupy the high ground. And why high ground ? Well, whenever we see the Moon, it's "up there," the generals replied. I spent much time explaining that the Moon is not an ideal place from which to launch nuclear missiles.

Among the more imaginative proposals has been the occupation of libration points, places where opposing gravitational forces of celestial bodies balance to zero. These have been suggested

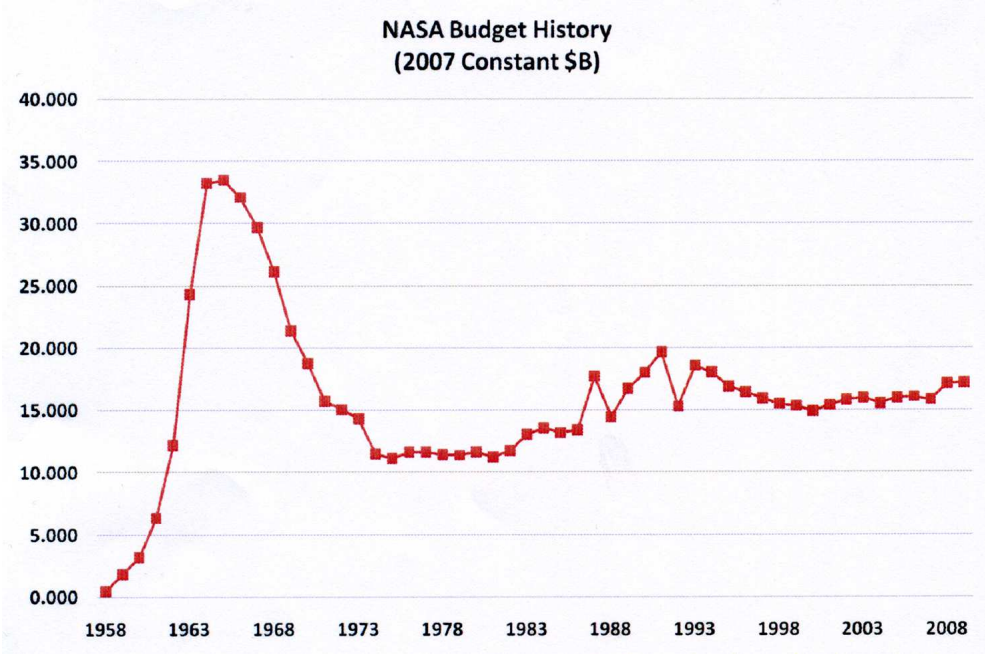
as places for storing anything – from propellants to pieces of asteroids. There may even be international competition for libration points. But since there are several, it should be a simple matter to divide them up between the major space-faring nations. Another great project for the United Nations and for the State Department!

The latest proposal is to capture a small asteroid and bring it to a libration point, where it would remain more or less stationary – so it can be studied at leisure. Again, it is being sold as a step towards Mars – probably an idea thought up by some armchair astronaut in the White House. [...]

Fred Singer
is professor emeritus at the University of Virginia and
director of the Science & Environmental Policy Project.
His speciality is atmospheric and space physics.

A - Document 4

Nasa Budget History



B - Document 5

Éditorial

A One-Way Ticket to Mars

By LAWRENCE M. KRAUSS
Tempe, Ariz. New York Times September 1, 2009
Op-Ed Contributor

NOW that the hype surrounding the 40th anniversary of the Moon landings has come and gone, we are faced with the grim reality that if we want to send humans back to the Moon the investment is likely to run in excess of $150 billion. The cost to get to Mars could easily be two to four times that, if it is possible at all.

This is the issue being wrestled with by a NASA panel, convened this year and led by Norman Augustine, a former chief executive of Lockheed Martin, that will in the coming weeks present President Obama with options for the near-term future of human spaceflight. It is quickly becoming clear that going to the Moon or Mars in the next decade or two will be impossible without a much bigger budget than has so far been allocated. Is it worth it ?

The most challenging impediment to human travel to Mars does not seem to involve the complicated launching, propulsion, guidance or landing technologies but something far more mundane : the radiation emanating from the Sun's cosmic rays. The shielding necessary to ensure the astronauts do not get a lethal dose of solar radiation on a round trip to Mars may very well make the spacecraft so heavy that the amount of fuel needed becomes prohibitive.

There is, however, a way to surmount this problem while reducing the cost and technical requirements, but it demands that we ask this vexing question : Why are we so interested in bringing the Mars astronauts home again ?

While the idea of sending astronauts aloft never to return is jarring upon first hearing, the rationale for one-way trips into space has both historical and practical roots. Colonists and pilgrims seldom set off for the New World with the expectation of a return trip, usually because the places they were leaving were pretty intolerable anyway. Give us a century or two and we may turn the whole planet into a place from which many people might be happy to depart.

Moreover, one of the reasons that is sometimes given for sending humans into space is that we need to move beyond Earth if we are to improve our species' chances of survival should something terrible happen back home. This requires people to leave, and stay away.

There are more immediate and pragmatic reasons to consider one-way human space exploration missions.

First, money. Much of the cost of a voyage to Mars will be spent on coming home again. If the fuel for the return is carried on the ship, this greatly increases the mass of the ship, which in turn requires even more fuel.

The president of the Mars Society, Robert Zubrin, has offered one possible solution : two

ships, sent separately. The first would be sent unmanned and, once there, combine onboard hydrogen with carbon dioxide from the Martian atmosphere to generate the fuel for the return trip ; the second would take the astronauts there, and then be left behind. But once arrival is decoupled from return, one should ask whether the return trip is really necessary.

Surely if the point of sending astronauts is to be able to carry out scientific experiments that robots cannot do (something I am highly skeptical of and one of the reasons I don't believe we should use science to attempt to justify human space exploration), then the longer they spend on the planet the more experiments they can do.

Moreover, if the radiation problems cannot be adequately resolved then the longevity of astronauts signing up for a Mars round trip would be severely compromised in any case. As cruel as it may sound, the astronauts would probably best use their remaining time living and working on Mars rather than dying at home.

If it sounds unrealistic to suggest that astronauts would be willing to leave home never to return alive, then consider the results of several informal surveys I and several colleagues have conducted recently. One of my peers in Arizona recently accompanied a group of scientists and engineers from the Jet Propulsion Laboratory on a geological field trip. During the day, he asked how many would be willing to go on a one-way mission into space. Every member of the group raised his hand. The lure of space travel remains intoxicating for a generation brought up on "Star Trek" and "Star Wars."

We might want to restrict the voyage to older astronauts, whose longevity is limited in any case. Here again, I have found a significant fraction of scientists older than 65 who would be willing to live out their remaining years on the red planet or elsewhere. With older scientists, there would be additional health complications, to be sure, but the necessary medical personnel and equipment would still probably be cheaper than designing a return mission.

Delivering food and supplies to these new pioneers — along with the tools to grow and build whatever they need, for however long they live on the red planet — is likewise more reasonable and may be less expensive than designing a ticket home. Certainly, as in the Zubrin proposal, unmanned spacecraft could provide the crucial supply lines.

The largest stumbling block to a consideration of one-way missions is probably political. NASA and Congress are unlikely to do something that could be perceived as signing the death warrants of astronauts.

Nevertheless, human space travel is so expensive and so dangerous that we are going to need novel, even extreme solutions if we really want to expand the range of human civilization beyond our own planet. To boldly go where no one has gone before does not require coming home again.

Lawrence M. Krauss
the director of the Origins Initiative at Arizona State University
is the author of "The Physics of 'Star Trek."' (980 words)