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Permanent buildings will be on the moon "within the next few decades" says NASA's Nujoud Merancy



Amy Peacock | 11 December 2024 | 10 comments

As NASA prepares to send astronauts back to the moon in 2027, the US space agency is already thinking about how lunar resources could be exploited for commercial purposes, architecture strategist Nujoud Merancy reveals in this [interview](#).

Merancy is deputy associate administrator for strategy and architecture at the National Aeronautics and Space Administration (NASA).

Working in the Exploration Systems Development Mission Directorate, she describes her work as focusing on "the big picture view of the future" – setting out the early stages of the agency's longer-term programmes.

NASA's immediate focus for lunar missions is scientific research, with its Artemis programme set to land astronauts on the moon in 2027 for the first time since Apollo 17 in 1972.



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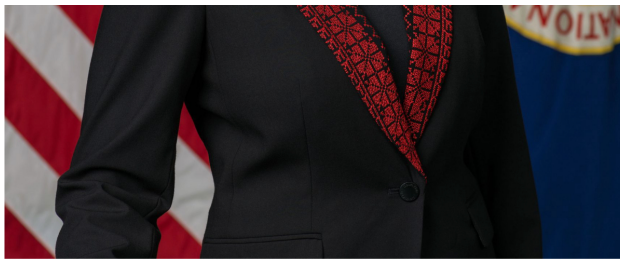
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Nujoud Merancy says permanent infrastructure will be on the moon within a few decades

But as the agency plans for longer-term residency on the moon, Merancy sees the potential for commercial opportunities.

"One of the big questions around the moon is the business case of building out permanent habitation," Merancy told Dezeen.

"Looking longer term, some of the questions turn into: are we there to do mining or some sort of profitable thing, in which case the commercial industry would take the lead more, or is it more of a science-type platform like Antarctica?"

"That's what we're trying to answer – what can we do at the moon?" she continued. "Hopefully within the next few decades, we're looking at more permanent commercial infrastructure, and that's what we call sustained lunar evolution."

"We're starting to see tourism in low-Earth orbit. The possibilities are endless at the moment, and it really depends on how much we can make this an accessible thing through science and technology exploration so that the business community can find those opportunities in the future."

Moon could be similar to Antarctic architecture

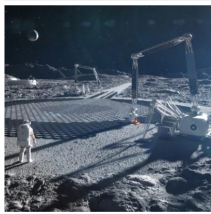
Merancy sees parallels between plans for building structures on the moon and the developments seen in the harsh conditions of [Antarctica](#).

Buildings for scientists on the polar continent started emerging around the early 20th century as simple hut-like structures, but after the 1959 Antarctic Treaty established Antarctica as a continent for research, countries began building their own permanent architect-designed research centres, including the USA's McMurdo Station.

"Antarctica and the McMurdo Station and all the developments that happen there is where I see us in the next couple of decades," said Merancy.

"The nearer-term vision is an international scientific and technological endeavour, and then longer term, I hope to see more people travelling to the moon," she continued.

"It was decades before Antarctica had permanent habitation – that's the type of build-out scheme that we're probably going to use."



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However, the first lunar structures are not likely to look like buildings we are used to seeing on Earth.

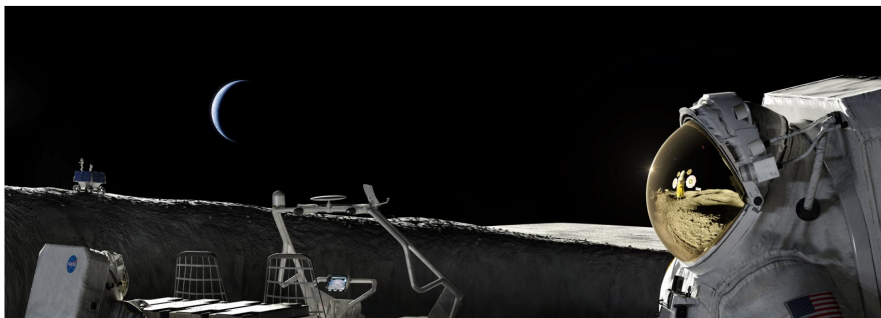
According to Merancy, pressurised rovers that astronauts can live in and use to explore the lunar surface will be developed first.

Then, small habitats will be built with designs that can be extended into larger settlements.

"The word 'buildings' conjures up in people's minds multi-storey type things – we're really looking at how do we get a foothold with small pressurised elements," she said.

"Our immediate goal is to get enough infrastructure to support a crew for 30 days, which is looking accomplishable in the next decade, and from there, start building out."

"Permanent habitation is probably still way off in the future because of the challenge of sustaining the systems and the power levels during the lunar nights, which are many days in length at the south pole and two weeks long at the equator," Merancy continued.



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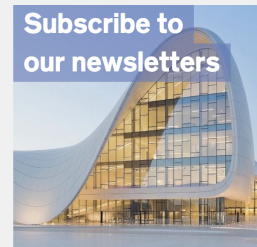


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NASA is preparing to send astronauts back to the moon in 2027

The first habitats to be built on the moon are likely to have a cylindrical shape, similar to space stations and rockets, but inflatable elements could be added as the habitats grow.

"Cylinders are the best structures to build for pressurised elements, so you're looking at the cylindrical modules we're familiar with, but building in airlocks and sustainable crew living systems – toilets, beds, hammocks, things like that," said Merancy.

"Over time, as we deploy systems, we'll hopefully be able to build out larger systems that could include inflatable habitats, as they give you a lot of volume for the same mass."

Merancy explained that while in-situ 3D printing offers some potential for building on the moon, it is unlikely to be used for pressurised modules. Instead, it could be used for making landing pads and protective walls.

"Radiation is a problem out there, so you could use it to build up protective berms around your habitats with the lunar regolith," she said.

"You could build up shielding so that when the rockets land, you can land them closer to your habitats because you've got a break to keep the plume impingement of kicking rocks up on your habitat."

"If you look back at Apollo, everything was truly Spartan"

A lot of what gets built on the moon will stay there, according to Merancy. Because of this, she is considering the sustainability of permanent structures and their impact on the lunar landscape.

"As we understand the benefits of in-situ resource utilisation, whether it's the regolith or water ice, do we need to set up special zones to protect certain areas and basically have national parks on the moon?" she said.

"There are so many policy questions around what we're doing for that reason, and what it means to be sustainable is a big question that can cover a variety of aspects, including the ability to keep visiting and the preservation of certain parts of the moon."

Merancy hopes that what does get built on the moon exceeds lunar designs from past missions, going beyond what is merely functional to also have an element of beauty.



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BIG creates 3D-printed data storage device to be sent to the Moon

"If you look back at Apollo, everything was truly Spartan – the functionality of it trumped any design aspect," said Merancy.

"We're threading the needle of how we make things functional, but because we want them to be sustainable and longer lasting, we need more comforts for the crew for their psychological benefit," she continued.

"We are very limited and performance-challenged with what's taken to the moon – every kilogram that gets added to the vehicle takes away from oxygen or water that could have been delivered, so performance challenge is a big driver in the design," Merancy added.

"I would love to get to the point that adding features for the beauty of it can be a much bigger consideration."

Dezeen recently spoke with experts in space architecture, who are using their Earth-based experience to design habitats in preparation for NASA's return to the moon.

The images are courtesy of NASA.

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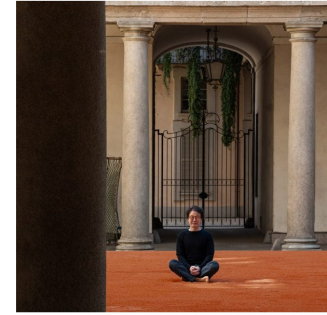
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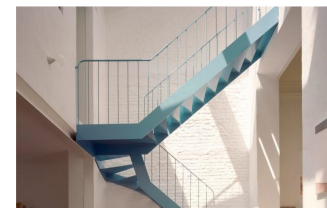
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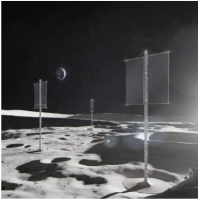
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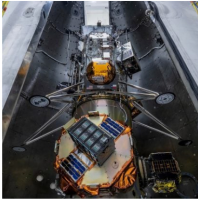
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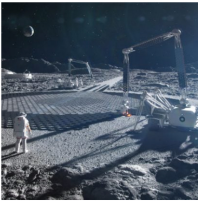
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Paul Giacomantonio

9 months ago edited

So NASA is going to get above low earth orbit? Ok that's nice. And then get through the radiation belts at over 4,000° f? Ok, that sounds good. How much will it cost? I think the idea might be for humans to figure out how to live in peace first on Earth before bringing their cancerous personalities to other moons and planets. God speed NASA...

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tom roberts

9 months ago edited

Leave the moon alone!

Like 0 Reply 0 Share >



Ed

8 months ago

Why? There are no indigenous peoples that will be exploited, no ecological concerns, etc. This is frontier-thinking. Colonization of the moon is going to happen—I'd prefer it be the work of people with universal values. "Leave the moon alone"? There will always be critics of ambition and industry as regards the advancement of humanity, but time quickly proves them foolish.

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steve hassler

9 months ago edited

May not be the first though. Did they check the far side?

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apseo radiales

9 months ago edited

What?
Little grey men with big bulging eyes, and no ears waltzing around on the dark side?

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APG

9 months ago edited

Surely a small modular nuclear power station would be a solution for a permanent base (notwithstanding @Ken Steffes point about us destroying everything!😂).



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IDRACULA 

9 months ago

Moon Police? Mortals in alien environments psychologically tend to break down under stress. Who will be the first person to be murdered on the Moon? Will Moon be coed to complicate matters even more? Scientists know man is the weakest part of all this space talk.

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apsco radiales  → IDRACULA

9 months ago

"Who will be the first person to be murdered on the Moon?"
The architect who designed the place?
Why can't I open the windows?

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Ken Steffes 

9 months ago edited

Why? First humans destroy earth. Then they move on and begin destroying the entire solar system.

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RK 

9 months ago edited

Probably need to be a bit sooner than that if Space Karen is ever going to achieve his target of having 1m people living on Mars by 2050.

<https://www.businessinsider.com/elon-musk-plans-1-million-people-to-mars-by-2050-2020-1>

(it's not like he's got form in vapourware, right?)

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