Space biology will be a first for Africa

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It will be a first for Africa: One innovative step by the North-West University (NWU) and one giant leap by the continent. The NWU's Faculty of Natural and Agricultural Sciences is set to launch the research area SpaceBiology@NWU

Dr Tebogo Kupi at IAEA

According to one of the project leaders, Prof Henk Bouwman, this multidisciplinary research area – which is going encompass expertise from other NWU faculties such as engineering too – will look at how biology can assist with living in space.

“Humans will be back on the moon in a few years, but colonisation of the moon and Mars is still some time away. That is why we need research to assist in the process. In situ production of fibre, carbohydrates, fats, protein, nutrients and oxygen will be key for sustained living in space under confined, constrained and extreme conditions. This means organisms must be sustained at productive rates, which implies functional ecosystems based on regolith. Regolith refers to unconsolidated, non-biologically enriched rock and dust.

“The only way to do that is to select and test organisms and communities under simulated (analogue) conditions on Earth, and then to replicate the experiments in space (eventually the moon and Mars). Knowledge of how microorganisms, plants, animals and ecological combinations react in space and on the moon and Mars is required. Africa has many harsh conditions that harbour organisms that may be candidates for space flight and colonisation on the moon and Mars. Our deserts, poor soil areas (often also classified as regolith), mine shafts, isolated islands, aquatic systems and other ecologies have organisms that can sustain and transform regolith into sustainable and arable soils,” says Prof Bouwman.

The rise in spaceflight and space exploration by national (such as Nasa, the National Aeronautics and Space Administration, and Sansa, the South African National Space Agency), international (ESA, the European Space Agency) and commercial entities (such as SpaceX and Blue Origin) has increased the need for space biology research, and groundbreaking research by the NWU has already shown that earthworms are able to grow normally and reproduce relatively normally at up to six times Earth’s gravity. Now it is time to see how they function under microgravity conditions.

“One of the challenges we will be looking at is how to use microbes and earthworms to convert regolith to soil in order to plant plants. There are so many possibilities. We have the best ecotoxicologists in Africa, and we have so many exceptional researchers who are able to measure stress and the effect of stress on biological systems. I think we are perfectly positioned to conduct such research. We have the expertise at the NWU to conduct research to facilitate long space flights and the future colonisation of the moon and Mars. It may take many months to years to reach Mars, and that requires about 1,4 tons of food per person. We will have to be able to grow our own food in microgravity situations,” Prof Bouwman explains.

The African continent is home to some of the harshest conditions on the planet, and the NWU’s expertise regarding ecosystems in these conditions is an invaluable resource.

“There is a vast number of plants, animals and microbes that not only live but thrive under these harsh conditions, and we need to exploit and harness our knowledge about them as we embark on this new adventure for our species. Just think of

the multitude of practical developments that can be brought back to Earth and have practical applications for conditions in Africa."

This includes growing edibles in conditions previously deemed unsuitable for that purpose.

To view the full article, click here: https://news.nwu.ac.za/space-biology-will-be-first-africa.

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