

MAURITIUS RESEARCH AND INNOVATION COUNCIL

ISSUE NO. 3



**The First
Mauritian
NanoSatellite
on its way to
Space**

SPECIAL EDITION

Launching of MIR-SAT1 to ISS

**"SHAPING UP THE MAURITIUS OF TOMORROW
THROUGH RESEARCH, TECHNOLOGY AND INNOVATION."**

JUNE 2021

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Message from Honourable Prime Minister

The launch of our first Mauritian nanosatellite is yet another action which is in line with Government's Innovation Strategy.

I am glad that Mauritius is joining the league of space-faring African nations at a particularly opportune time. In the post-Covid era, new technologies will take center-stage and help countries achieve their digital transformation.

I hope that this first step in space for our Small Island State will indeed increase students' motivation and engagement in science, technology, engineering, and mathematics (STEM).

A thrilling adventure starts now for Mauritius.

Pravind Kumar Jugnauth
Prime Minister
Republic of Mauritius

01 June 2021



Message from Honourable Deepak Balgobin, Minister of Information Technology, Communication and Innovation

After two years of hard work, our first nanosatellite is now on its way to space. It is a major landmark in Mauritian history. This stepping stone to space opens new opportunities and initiatives for Mauritius. This leverages on space and satellite innovation technology and provides a new thrust to our socio-economic development.

As was the case in other space faring countries, Mauritius can use this experience on Space and Satellite technology to upheaval STEM (science, technology, engineering and mathematics) education. We can now think of moving into

areas which we never even thought of just a decade ago. Indeed, although it would take a couple of years, we can foresee space/satellite technology as key contributors to the economy of the country.

The launch the first Mauritian satellite shows that we are on the right path with the vision of our Prime minister, Hon. Pravind Kumar Jugnauth towards the digitalisation of our country and building the economy of the future. Even if the size of the satellite is small just like our island, today's launch indicates that the giant leap has been successful and poses Mauritius high in the sky.

Our journey in space begins now.



Message from Chairman

Ocean & Space Connected

We feel extremely lucky to be part of this venture that connects the ocean to the space successfully! Indeed it is breathtaking to see Mauritius receiving data and images from a satellite bearing its flag. The MIR-SAT 1 is an inspiration for every citizen to do amazing things; to reach new heights; and to achieve the unthinkable. The wonderful team behind this project deserves our sincere thanks.

Dr. Kaviraj Sharma SUKON, PFHEA
Chairman, MRIC

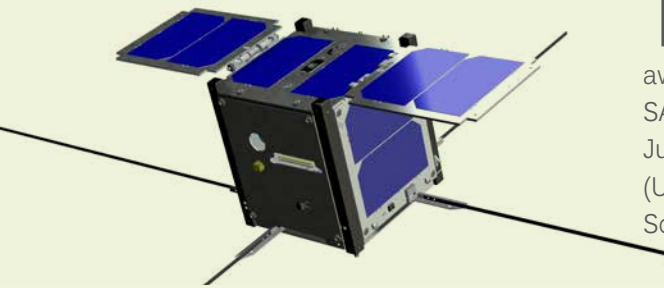


Message from Executive Director

MRIC's quest for promoting research and innovation is today reinforced with the launch of our first nanosatellite in space. The adventure started 3 years ago and today we are witnessing the outcome of this praiseworthy initiative, thanks to the perseverance, motivation and knowhow of a young and dynamic team. It goes without saying that the MRIC management will continuously provide its unflinching support to this pioneer team to chart further space related endeavours that would be instrumental to position Mauritius as the space hub of the region. Let's take up the challenge!

Professor Theesan Bahorun, PhD, G.O.S.K
Executive Director MRIC



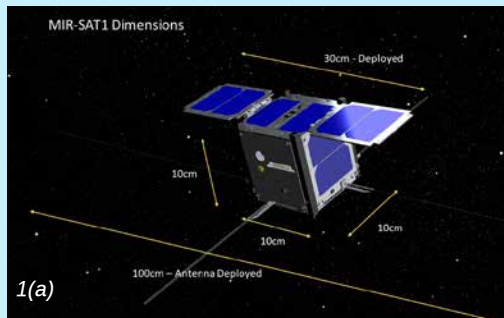


The MRIC won the best design for a Nanosatellite in 2018 under the 3rd round of the UNOOSA/JAXA KiboCube programme. Thanks to this award, Mauritius will send its first nanosatellite (1U CubeSatellite), the MIR-SAT1 (Mauritius Imagery and RadioCommunication Satellite -1), in Space in June 2021. The MRIC benefited from the collaboration of AAC-Clyde Space (UK), expert in nanosatellite technologies and the Mauritius Radio Amateurs Society to design and build the satellite.

Through this project, the MRIC seeks to engage into exploring a new field which is Satellite/space technology which could eventually contribute to the socio-economic benefit of the Republic of Mauritius.

The MIR-SAT1 project will allow us to acquire the basic knowledge, skills and technology in the Space field allowing us to build on further to this knowledge in view of, in due course, setting up a proper space program for Mauritius.

The Mauritius Imagery and Radiotelecommunication Satellite 1 (MIR-SAT1) is a 1 Unit Cube Satellite (or Nanosatellite) which is represented in Figure 1 (a) & (b). It is a 10cmX10cmX10cm (i.e. 10cm³) satellite which has deployable solar panels on its sides. Once in space, the solar panels will deploy together with the antennae. The solar panels are responsible for recharging the on-board battery, while the antennae allows transmission and reception of signals from earth the MIR-SAT and back. The total weight of the



MIR-SAT1 is 1 kg. Figure 1(a) is a schematic representation of MIR-SAT1 and Figure b is the actual photo of MIR-SAT1 before its launch to space.

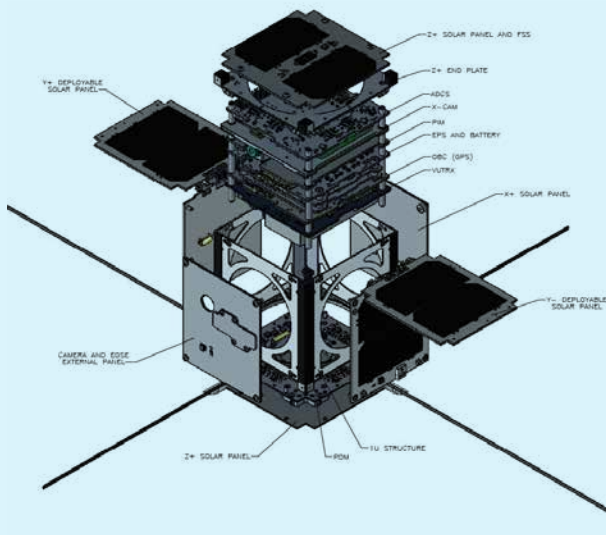


Figure 2: An 'exploded' view of the subsystems in the MIR-SAT1. The main payload is the XCAM-C3D Camera which will be taking pictures of the Mauritius Region

The MIR-SAT1 has an on-board computer to store all the images and other data. It has a rechargeable battery and an ADCS system which allows a certain degree of control of the trajectory of the MIR-SAT1 via commands from the Ground station on Earth.



Figure 3: Launch of the MIR-SAT1 from earth and Deployment from International Space Station (ISS)

- The MIR-SAT1 will be launched to the ISS on the 3rd of June 2021.
- Once it is onboard the ISS, JAXA astronaut will deploy the satellite in space by end of June 2021.
- MIR-SAT1 will follow the path described in Figure 3 and will orbit earth at an altitude of around 410km
- We expect that MIR-SAT1 will pass over the mauritius region about 4 times per day

The main objective of MIR-SAT1 mission is to be able to:

- Download its telemetry from a ground station in Mauritius
- Capture images of Mauritius and its Exclusive Economic Zone
- Demonstrate Island-to-Island Communication through the satellite

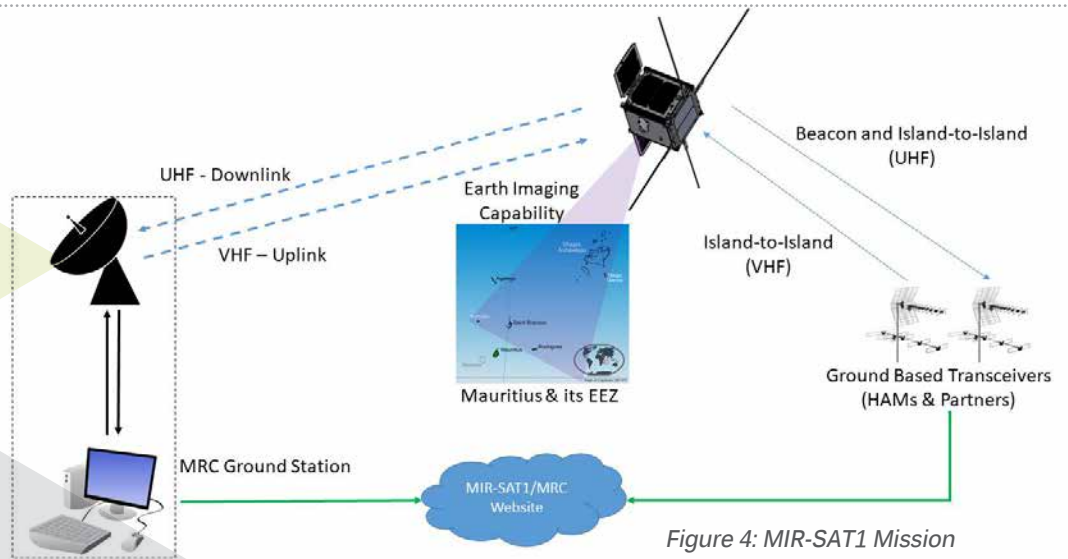
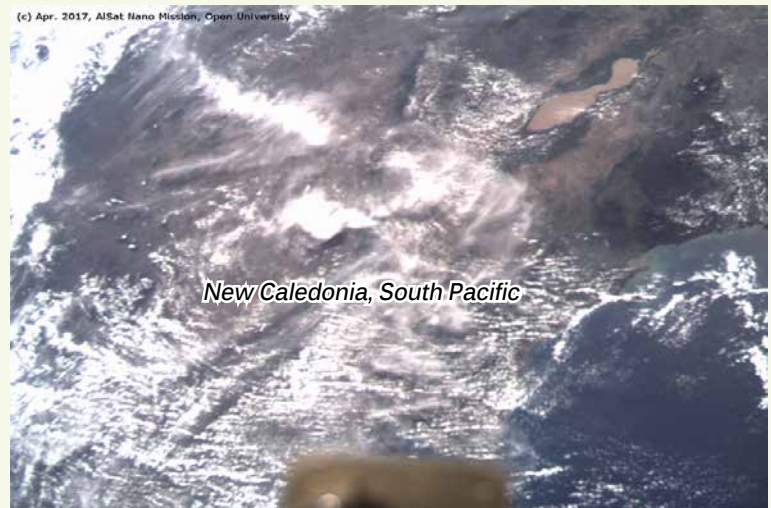


Figure 4: MIR-SAT1 Mission

The MIR-SAT1 is equipped with a space graded XCAM-C3D camera which has a 1.3 Megapixel resolution. In response to the commands, we will send to it via our ground station and flatsat, it will be able to take pictures of the region of Mauritius once it will approach our island.



Alaska



New Caledonia, South Pacific

Figure 5: An example of the type of images expected from MIR-SAT1. These images were taken from a distance of 650Km from earth.

Special Thanks:

This project was fully funded by the Government of Mauritius. The MIR-SAT1 project has benefitted constant support and guidance from the High Level Steering Committee Chaired by Hon. D. Balgobin, Minister of Information Technology, Communication and Innovation. We are thankful to the valuable contributions of Prof T. Baborun, Executive Director of the MRIC and Dr K.S. Sukon, Chairperson of the MRIC who believed in and encouraged the MIR-SAT1 team all through the process. Thanks also to our Collaborator from the Mauritius Amateur

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**"Space is our next Frontier...We just need to Dare...
Our Journey Begins"**

Space Mauritius Team