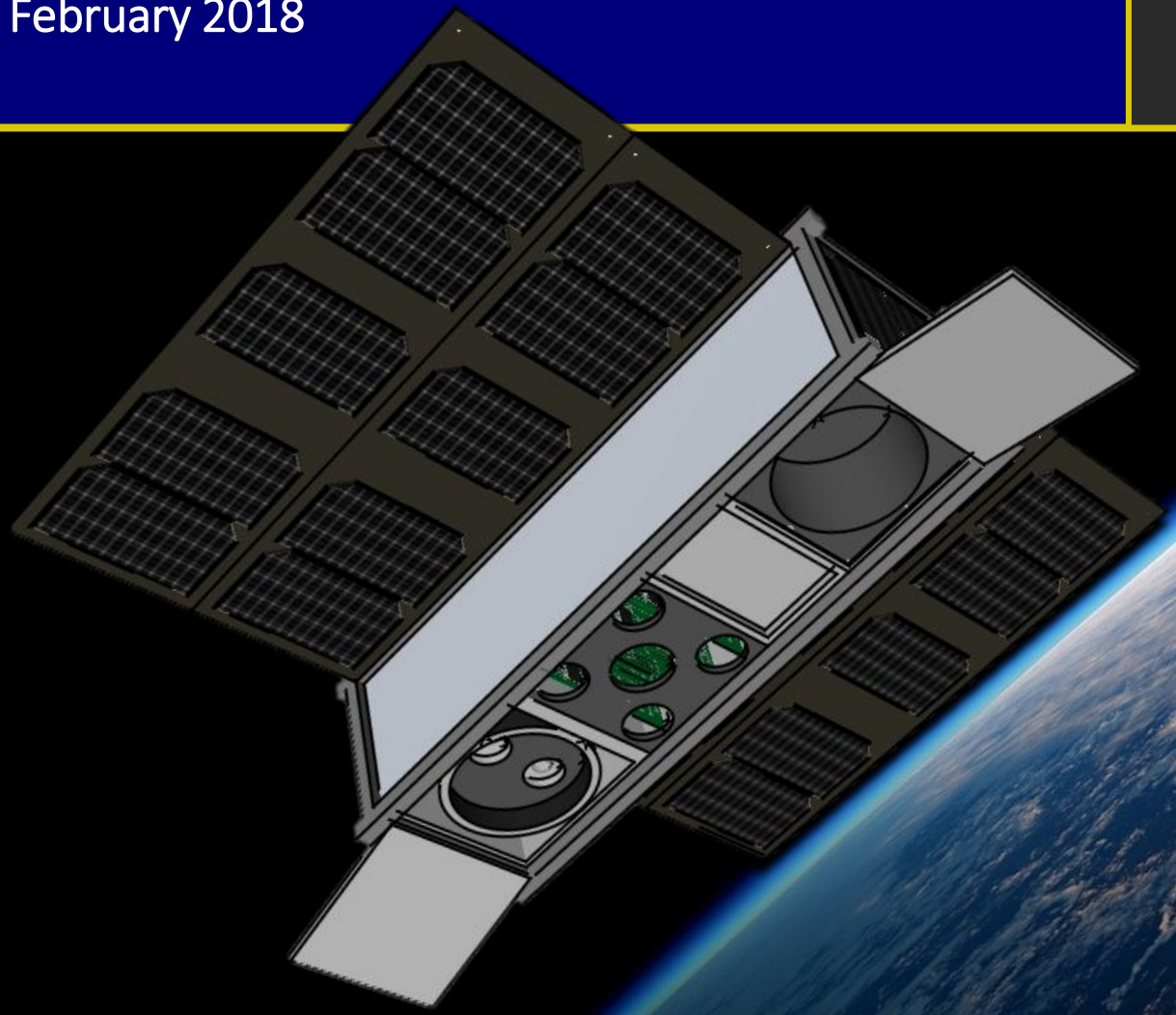
Muhammad-Hassaan Sheikh
BCIT SLP – British Columbia, Canada.
Presented at the 4th United Nations/PSIPW/Pakistan Conference, Islamabad.
February 2018

MURGH-O-MAHI CUBE SATELLITE

For Water Management



تُو شاہیں ہے شکاری ابھی ابتدا ہے تیری نہیں مصلحت سے خالی یہ جہانِ مُرغ و ماہی

This world of inferior prey is meant to sharpen your claws,
You are an ***Eagle*** hunter, but are a novice yet.

In the commemoration of Allama Muhammad Iqbal, outlining his tremendous achievements and writings, this satellite is named ***Murgh-O-Mahi.***

OUTLINE 00

BACKGROUND

01

BACKGROUND

01

ABOUT THE BCIT SATELLITE LAUNCH PROGRAM (BCIT SLP):

- A **student ran organization** for academia established in 2017
- Goal of combining the capabilities of other institutions under one roof
- Currently working with two will expand **even more** next year

BACKGROUND

01

OUR LAUNCH PARTNERS:

- **The University of British Columbia Rocket Team** will provide this project with two launches this year alone
- Both will be at 10,000 feet for testing the satellites
- 30,000 feet and 100,000 feet rockets are currently in development
- Our satellites will be launched in future rockets as well for tests under acceleration environments

BACKGROUND 01

OUR PAYLOAD PARTNERS:

SFU
SIMON FRASER UNIVERSITY

- **The Simon Fraser University Satellite Design Team** will provide consultation for the electronics going into the our satellites
- Currently are partaking in the Canadian Satellite Design Challenge
- Have an abundant amount of experience with payloads in satellites gained over the years

BACKGROUND

01

EDUCATIONAL COOPERATION UNDER ONE ROOF

Assist in the development of the electronics in the satellite

Select objectives, also provide designs and manufacturing for the satellite
(Lead Organization for Murgh-O-Mahi)

Provide launches for structural testing of the satellite in various fields

“Do not waste water even if you were at a running stream.”
- Prophet Muhammad (S)

IMPORTANCE OF WATER MANAGEMENT 02

IMPORTANCE OF WATER MANAGEMENT 02

THE EFFECTS OF MISMANAGING WATER

- Water management plays a key role in the future of mankind

- Once an abundant resource is now scarce to some areas due to over-use, droughts and contamination

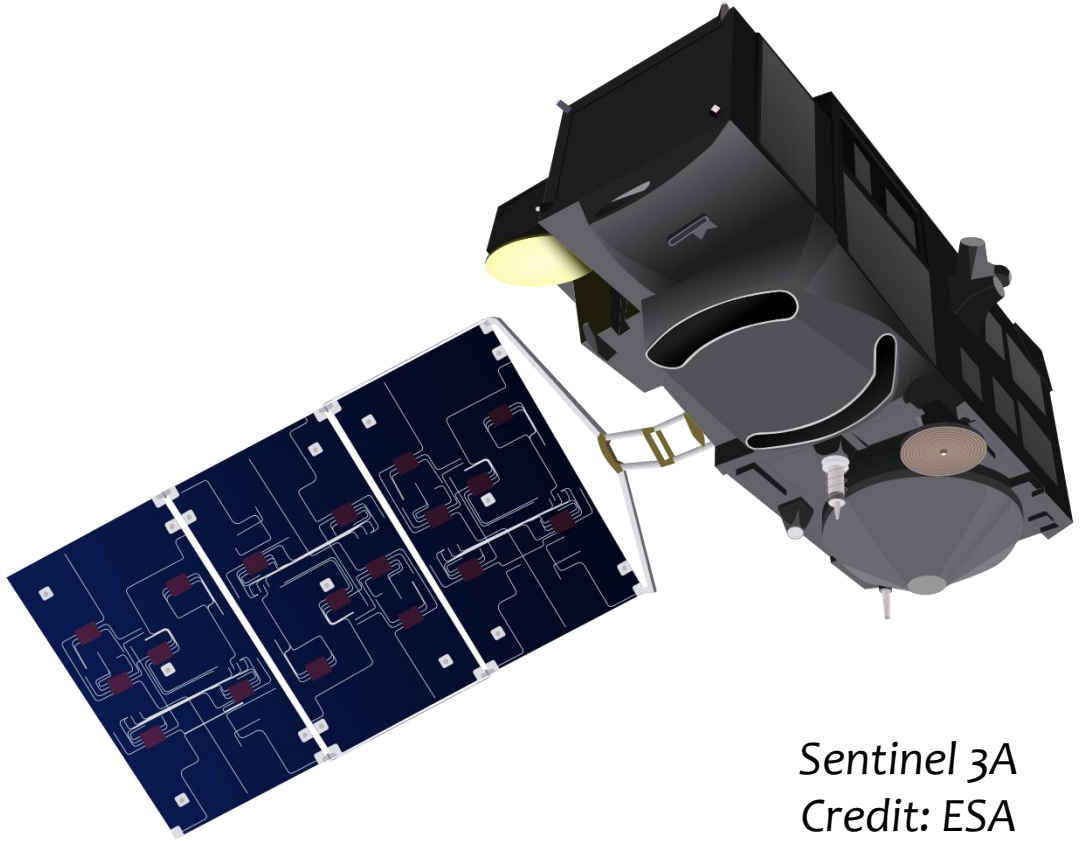
- Detrimental impact on economy and quality of life

How do we protect existing and potential water supply?

SOLUTIONS TO THE ISSUE 03

SOLUTIONS TO THE ISSUE 03

REFERRING TO EXISTING IDEAS



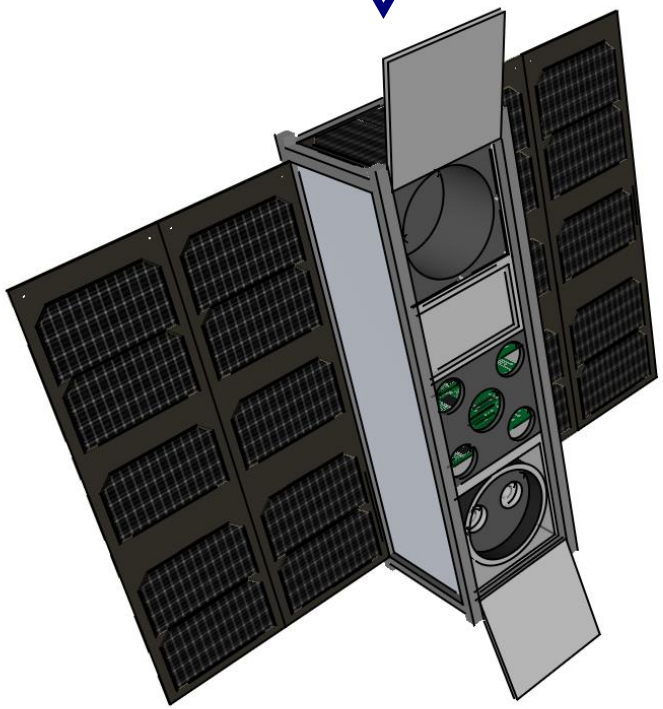
Sentinel 3A
Credit: ESA

- There are many *larger* satellites observing water bodies already
- Using their technology will allow **quicker and cheaper development**
- Can broaden **partnerships** with organizations/teams who are already experienced in using different *existing* technology

SOLUTIONS TO THE ISSUE 03

OUR IDEAS UNDER DEVELOPMENT

MURGH-O-MAHI CUBESAT



GROUND WATER TRACKING DEVICE

- Allow users to track groundwater remotely
- Uses sensors to find water sources and remotely send data to organizations/managing bodies
- In **conceptual** development phase

SOLUTIONS TO THE ISSUE 03

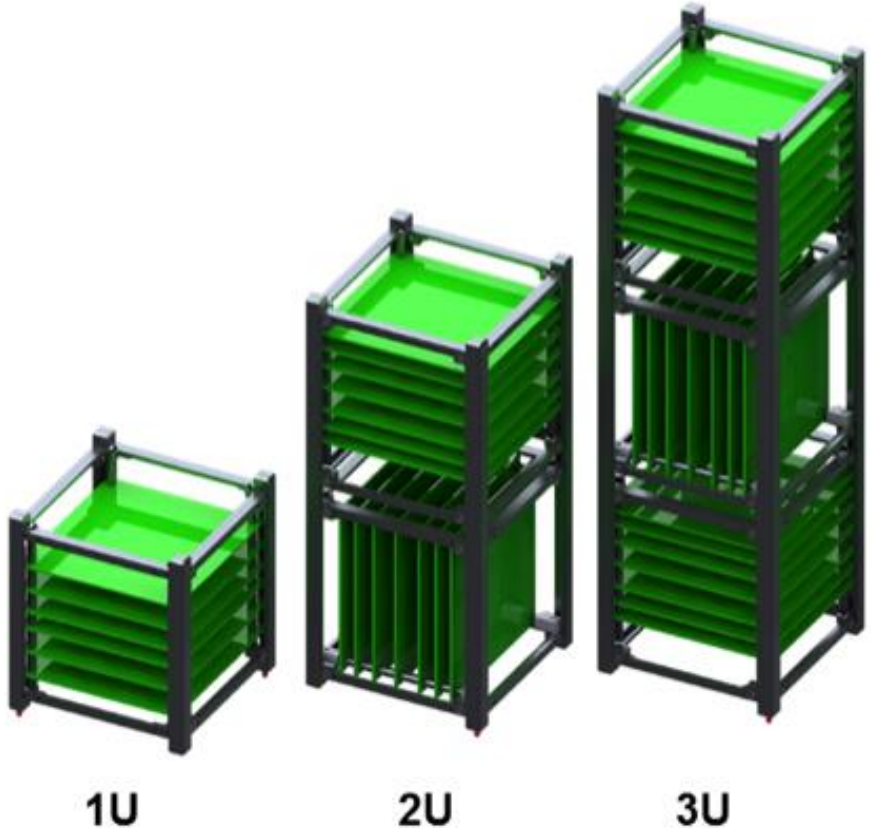
WHAT IS A CUBESAT?

- A CubeSat (Cube Satellite) is a 10x10x10 cm miniature satellite

- The small size allows researchers and organizations with limited capabilities to conduct experiments in space

- Expandable and come in 1U (unit), 2U and 3U standard configurations

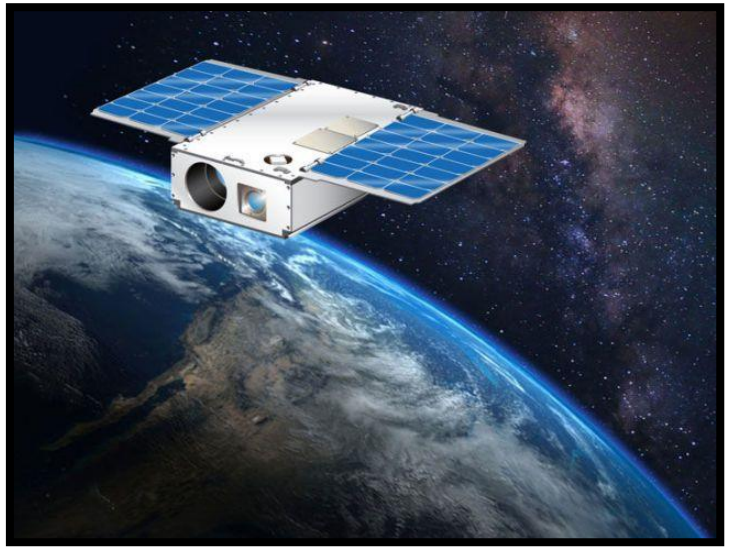
- Internationally agreed upon parameters



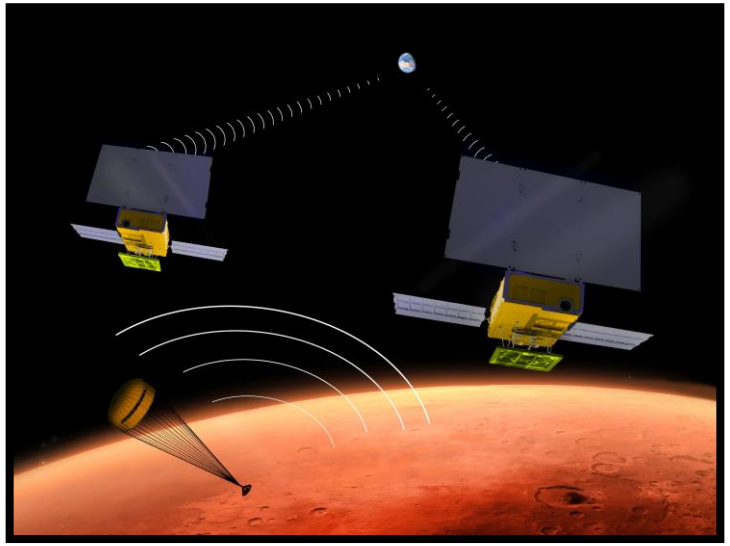
Depiction of different sizes of the CubeSat
Credit: www.radiusspsace.com

SOLUTIONS TO THE ISSUE 03

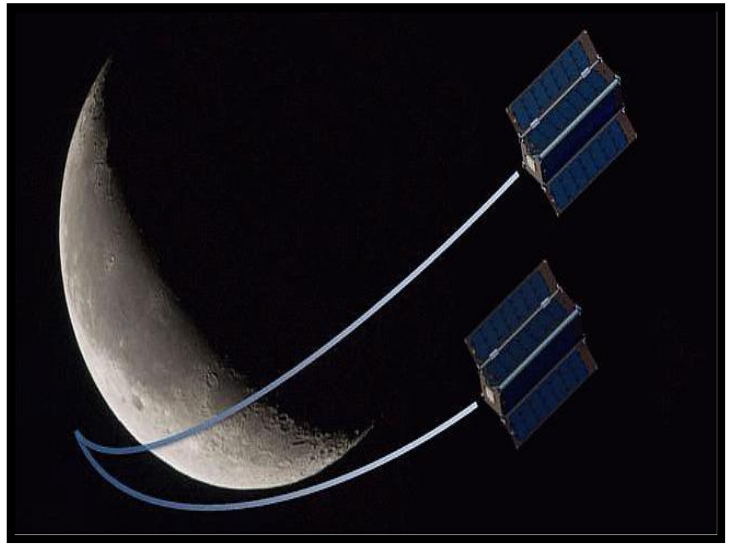
EXAMPLES OF NASA'S CUBESATS



ASTERIA:
technology demonstration of astrophysical measurements using a CubeSat



MarCO:
demonstrate flyby (Mars) capabilities of CubeSats for communication purposes



INSPIRE:
demonstrate capability of a deep space CubeSat

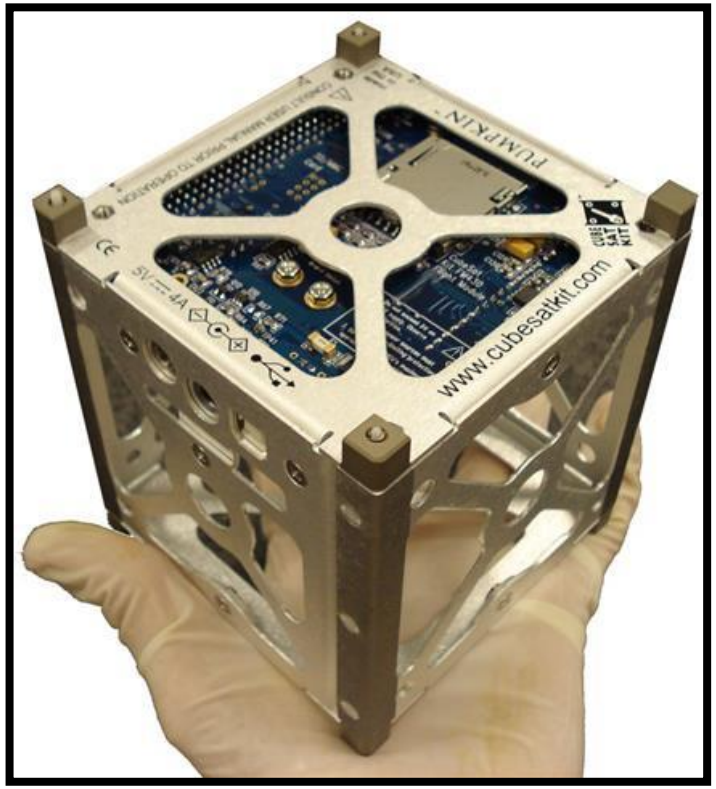
Credit: www.jpl.nasa.gov/cubesat/missions/

SOLUTIONS TO THE ISSUE 03

OBJECTIVE OF MURGH-O-MAHI: AFFORDABILITY

CubeSats, in comparison to traditional satellites are:

- Easier to manufacture
- Much **cheaper** to launch
- Lower operating costs



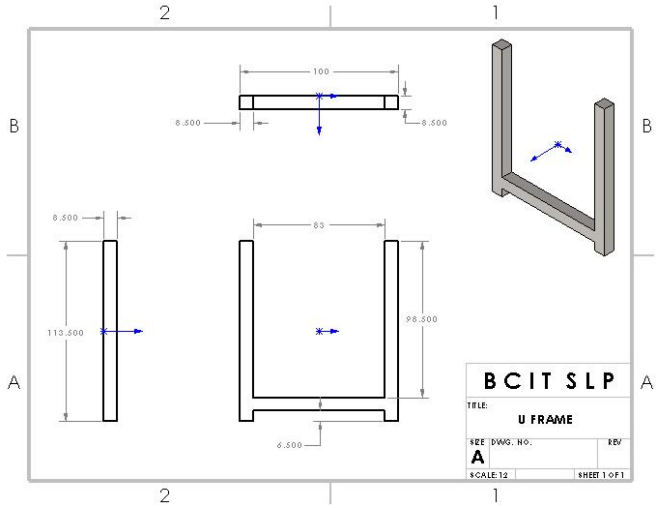
Smaller CubeSat in THE palm of a hand
Credit: ESA

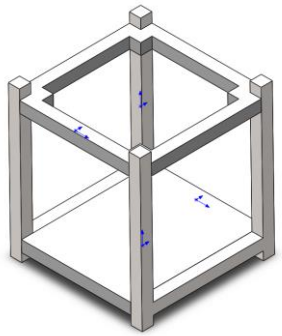
AFFORDABILITY FOR USERS WITH LIMITATIONS FOR WATER MANAGEMENT

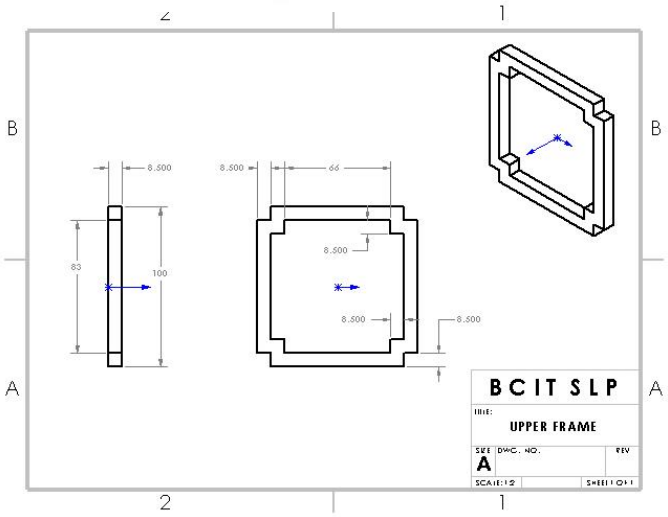
SOLUTIONS TO THE ISSUE 03

SIDE OBJECTIVE OF MURGH-O-MAHI: EASE IN DEVLOPMENT

- Simple structure for lower weights
- Quicker development
- Lower launch cost
- Easier to manufacture
- In house design
- The base design of the Murgh-O-Mahi is not just limited to water resource management capabilities







EASE IN DESIGN – MANUFACTURING – DEPLOYMENT

SOLUTIONS TO THE ISSUE 03

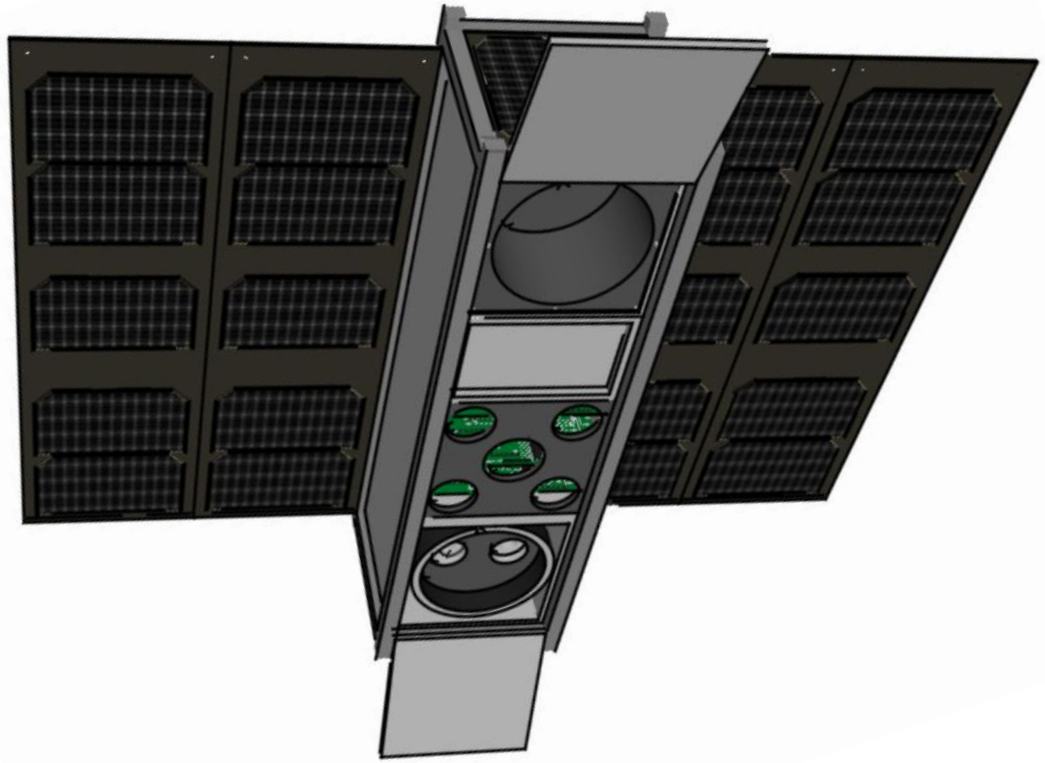
SIDE OBJECTIVE OF MURGH-O-MAHI: SUSTAINABILITY IN SPACE

- The conceptual use of Ultra Violet degradable plastics for space is currently being tested by BCIT SLP for acceleration environments
- Eventually incorporate plastics to allow testing in space – not necessarily eliminating use of metal but decreasing it
- May become a stepping stone for countering the issue of space junk

SUSTAINABILITY NOT ONLY FOR **EARTH,** BUT IN **OUTER SPACE** AS WELL

SOLUTIONS TO THE ISSUE 03

MAIN OBJECTIVE *OF MURGH-O-MAHI: SUSTAINABILITY FOR EARTH*



- Allow timely response to water related disasters through imaging capabilities
- Imaging capabilities for ***water security***
- Assist in monitoring water bodies
- Create an organized interface for developing and lower end users

PROVIDE SUSTAINABILITY FOR WATER HERE ON EARTH

TECHNOLOGY IN OUR DESIGNS 04

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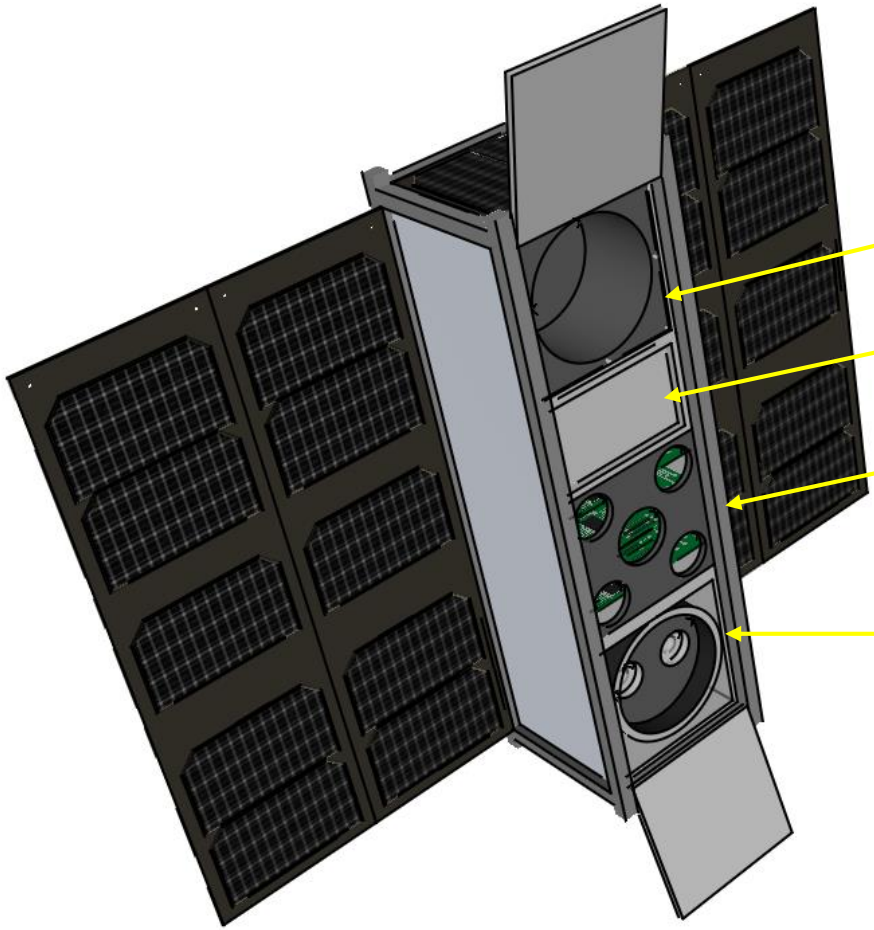
BASIC *OVERVIEW OF OUR DESIGN*

IN DESIGN & TEST PHASE



Radiometer

Power

Electronics/Controls

Imaging Sensors & Radars

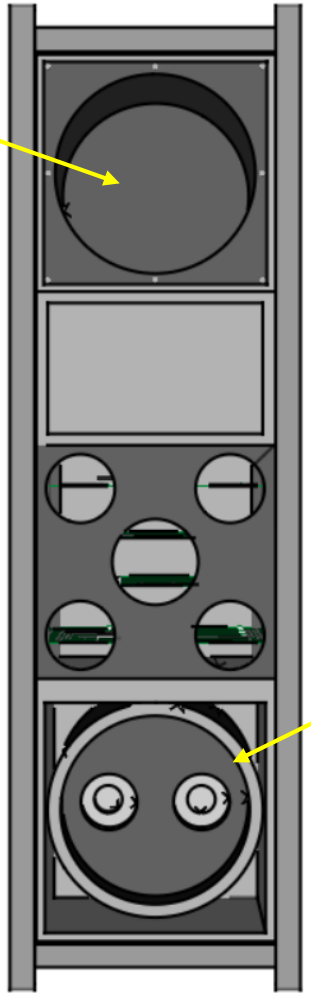
TECHNOLOGY IN OUR DESIGNS

04

MICROWAVE RADIOMETER

Remote sensing of atmospheric temperature/humidity

- Same technology used in larger satellites for similar studies (climate change and rainfall)
- Microwave Radiometer configuration for CubeSat has been developed & implemented by NASA previously



SPECTRAL IMAGING SENORS

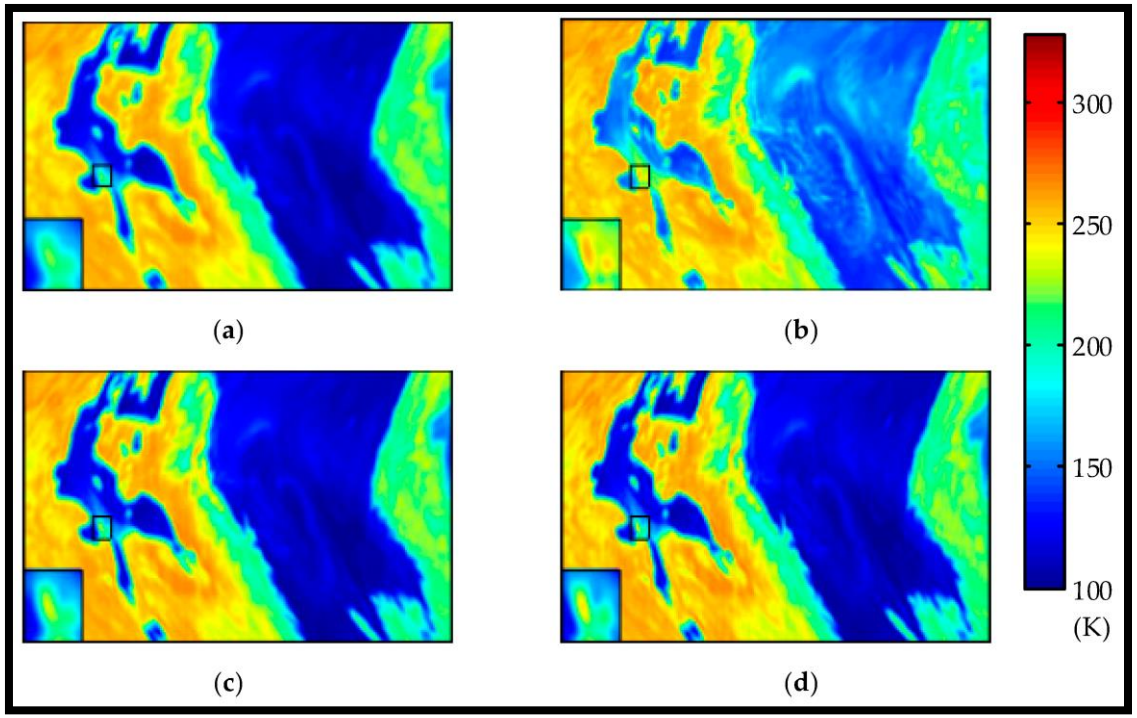
- Track clouds
- Widespread amongst CubeSats
- Response related efforts
- Observe waterbody levels

Also incorporating Synthetic-aperture radar (SAR)

IMPLEMENTATION OF OUR IDEAS 05

SAMPLE DATA FROM PROPOSED SENSORS (OTHER SYSTEMS)

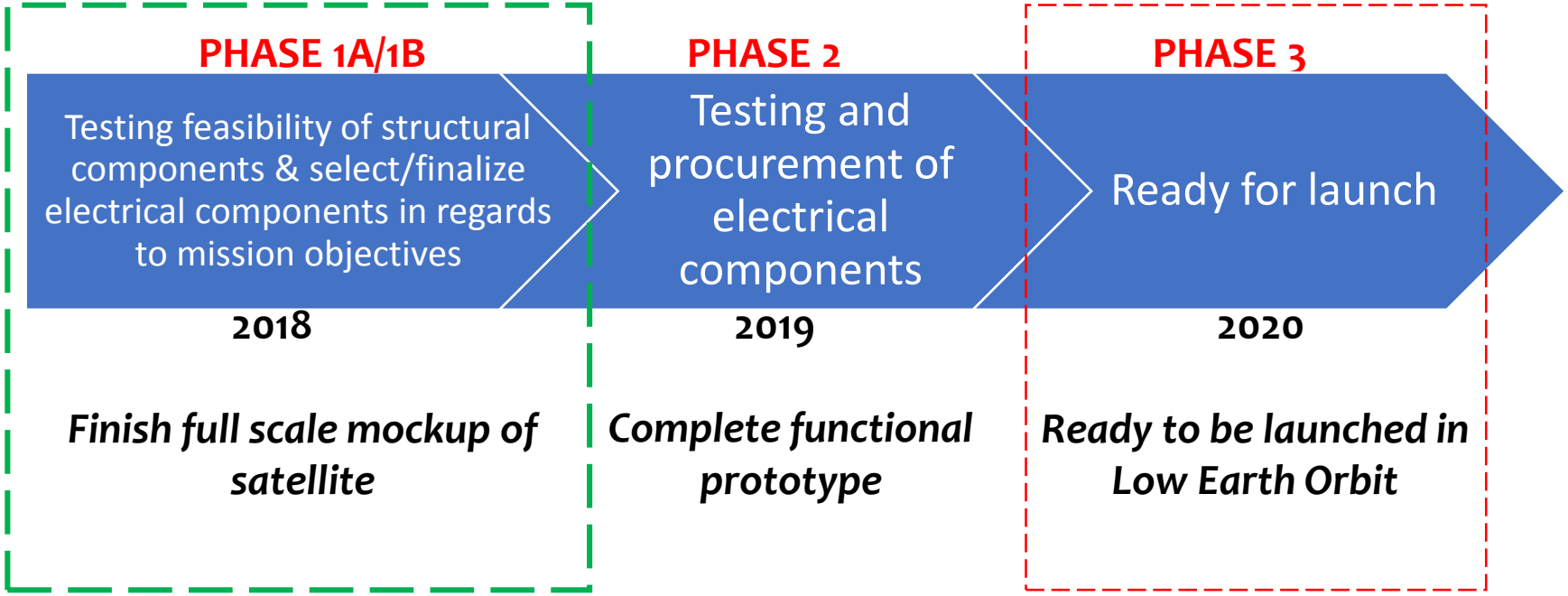
Credit: Planet Labs
https://www.planet.com/markets/impact/



Credit: A Deconvolution Technology of Microwave Radiometer Data Using Convolutional Neural Networks
http://www.mdpi.com/2072-4292/10/2/275

IMPLEMENTATION OF OUR IDEAS 05

SCHEDULING



FUTURE PROSPECTS FOR DEVELOPMENT

Canadian Satellite Design Challenge
Conception d'un satellite: un défi canadien
CSDC

مركز الأمير سلطان لأبحاث البيئة والمياه والصحراء
Prince Sultan Research Center for Environment, Water & Desert

جائزة الأمير سلطان بن عبدالعزيز العالمية للمياه
PRINCE SULTAN BIN ABDULAZIZ INTERNATIONAL PRIZE FOR WATER

IMPLEMENTATION OF OUR IDEAS 05

THE OUTCOME

All in all, this project is planned and designed to:

- allow users with limited or developing capabilities to take advantage of existing technology currently in larger satellites used for water management through affordable means by implementing them in Cube Satellites.

- develop partnerships under the BCIT SLP banner, and then cooperate with other organizations/institutions (not limited to Canada) who are currently working and are experienced in the related field for this project.

- Contribute to the community by sharing information and data with an opensource objective and demonstrate the potential of developing platforms, such as the CubeSat.

IMPLEMENTATION OF OUR IDEAS 05

THE OUTCOME

- This effort is in the development stage with a very dynamic design.
- As technology changes in the world, so does the technology in our satellite.
- By sharing our ideas from BCIT SLP and our partners, we can grasp the attention of more experienced individuals or institutions in the audience who may assist us further in the challenges we may encounter in our project

REFERENCES

06

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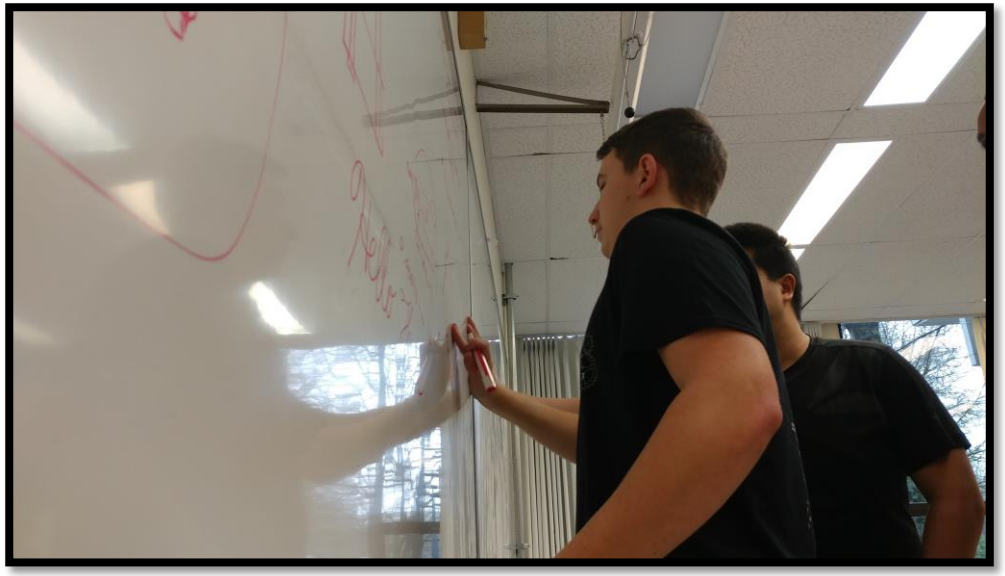

Thank You

For updates or questions on this project, follow us up on:

www.facebook.com/bcitSLP

+1 (604) 376-1094

Chief Engineer: hassaansheikh.m@gmail.com