Space Activities in Bhutan

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Bhutan's Development Timeline and Space Activities

1961
First 5 year Plan

1975
India's first satellite
China's first satellite

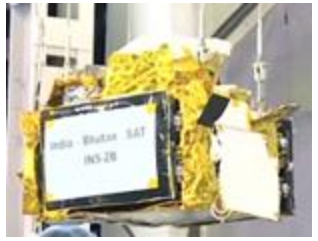
1999
Introduction of TV and Internet

Inauguration of Television in 1999
https://bhutantourisms.wordpress.com/

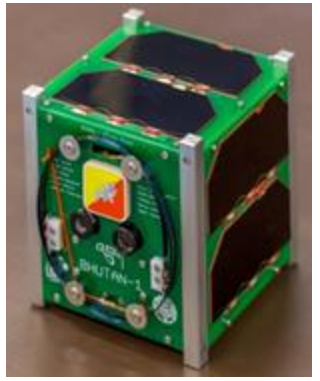
2003
Introduction of Cellular Mobile Services

Oct 2016
Bhutan started first satellite development

2017
Bangladesh's first satellite



Aug, 2018
BHUTAN-1 in Space



Nov, 2022
India-Bhutan Sat launched

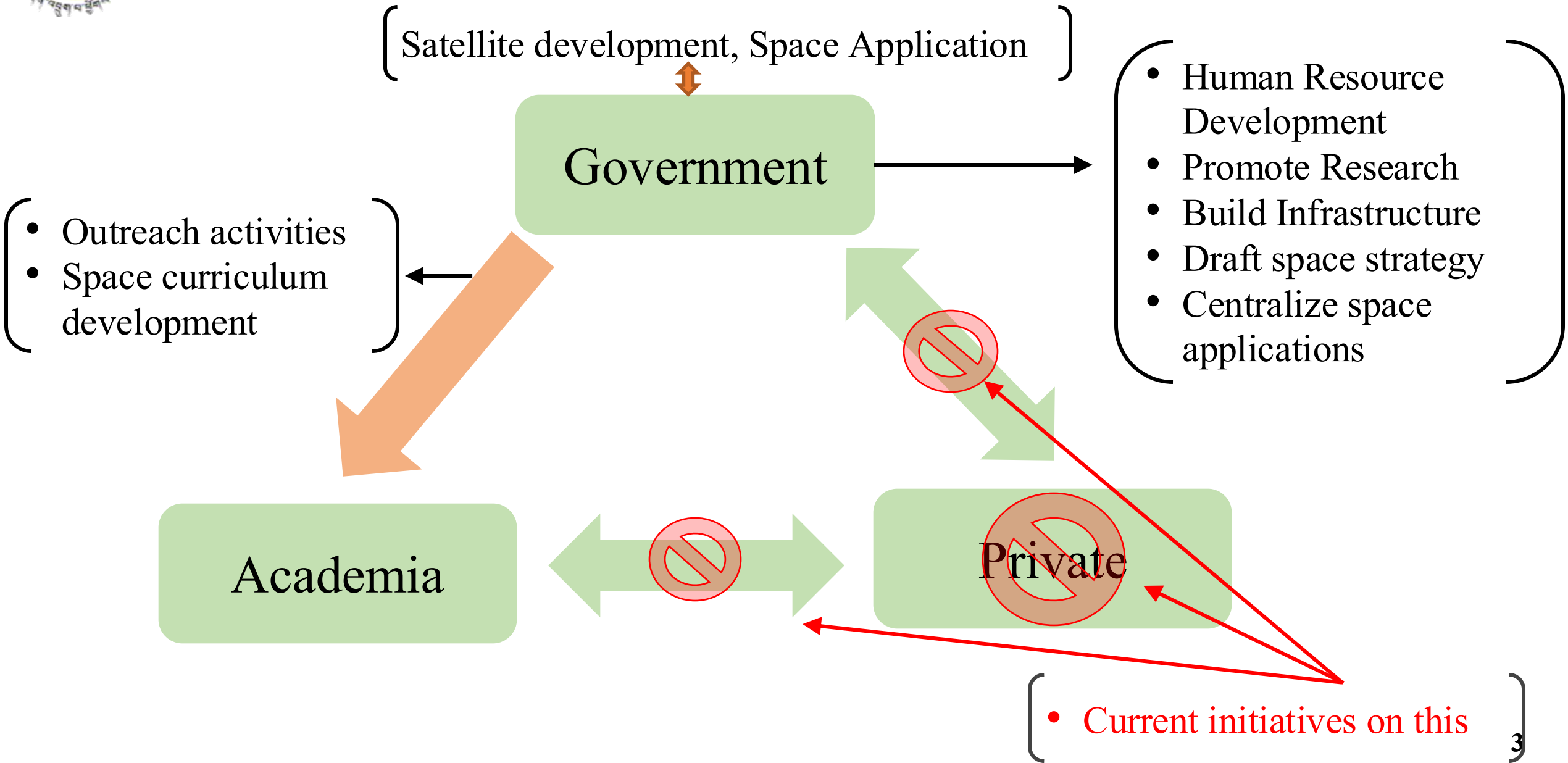
2024-2029
Development of clean room facilities and lab for satellite development

Currently working on In-country satellite project

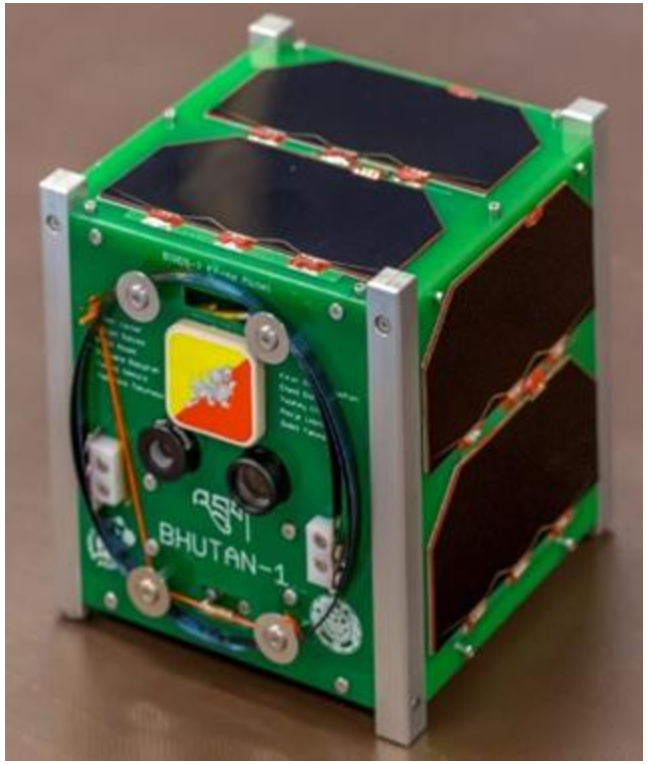
Early 1990s

Bhutan starts using foreign satellites and continues to do so.. (SAS, Himawari, Iridium)

Infant Space Ecosystem in Bhutan

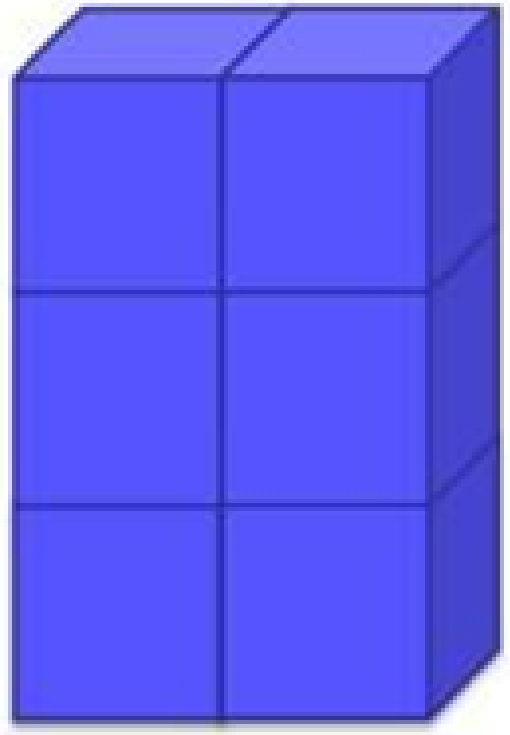


Our Satellite Projects so far:



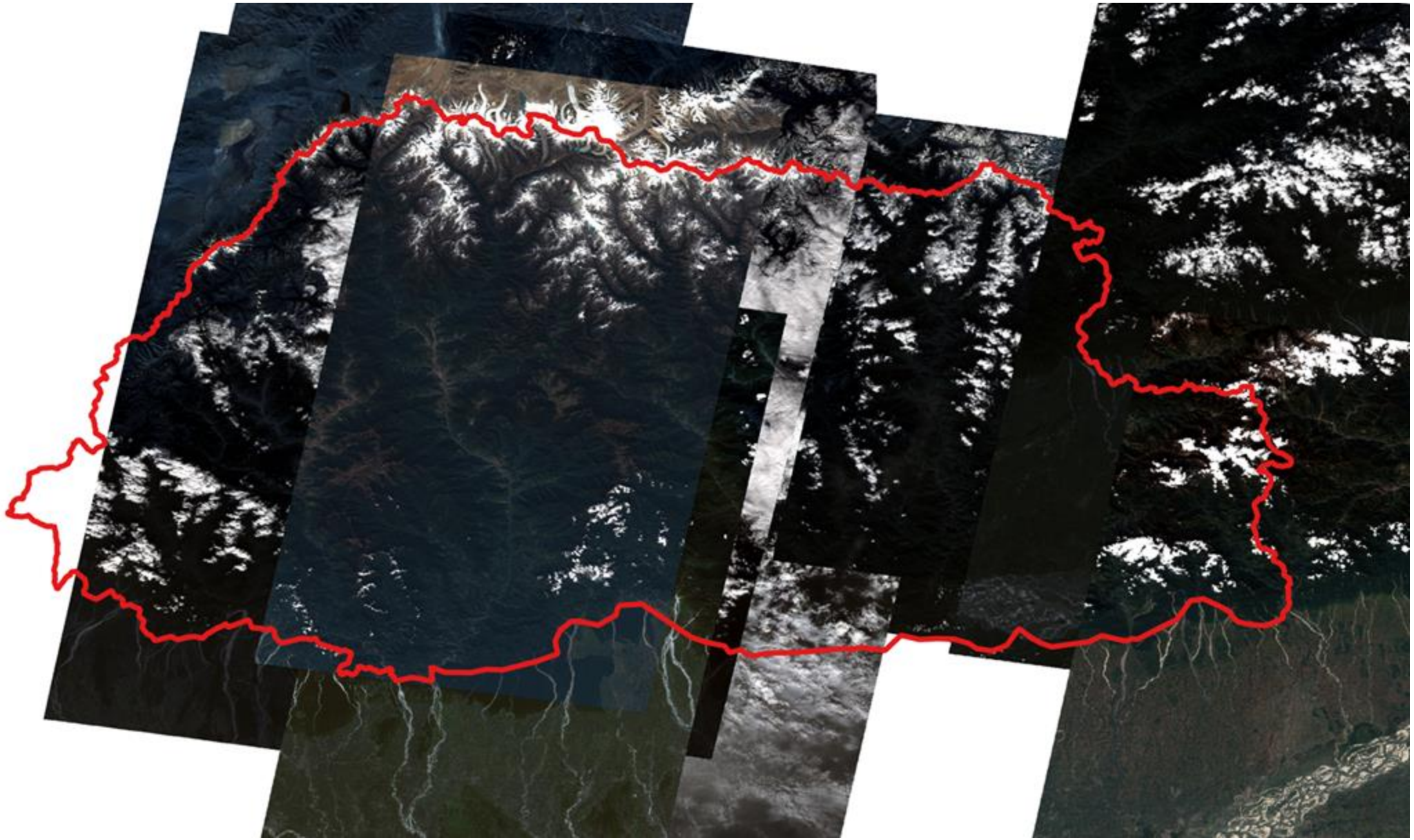
BHUTAN-1 Satellite
Launched - August 2018
EoL - November 2020
Student Project
Kickstart to Bhutan's space program

India Bhutan Satellite (INS-2B)
Launched - November 2022
EoL - June 2024
Joint project with ISRO
Enhancement of capacity development



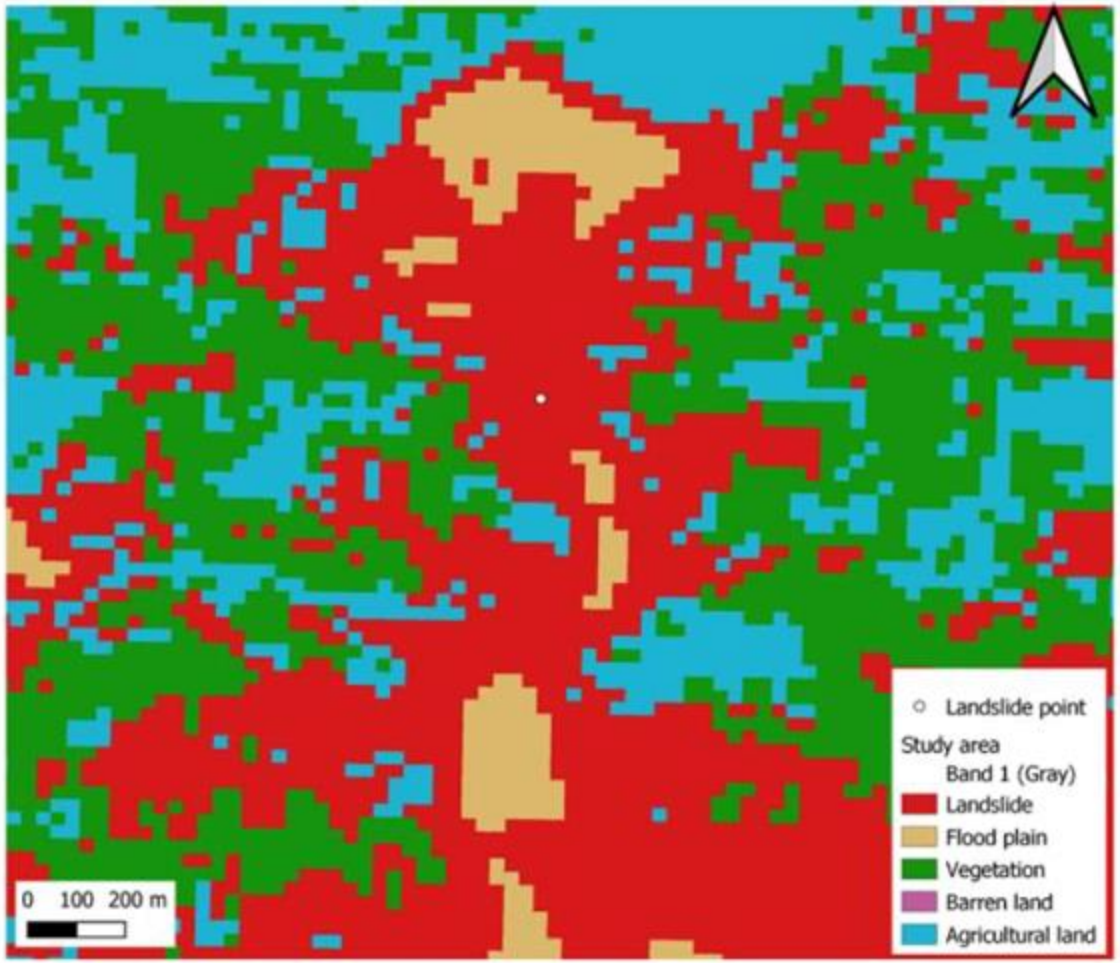
Upcoming 6U satellite (ICSP)
Expected Launch - 2025
High resolution, remote sensing satellite

INDIA-BHUTAN SAT, On-Orbit Data



INDIA-BHUTAN SAT, On-Orbit Data Utilization

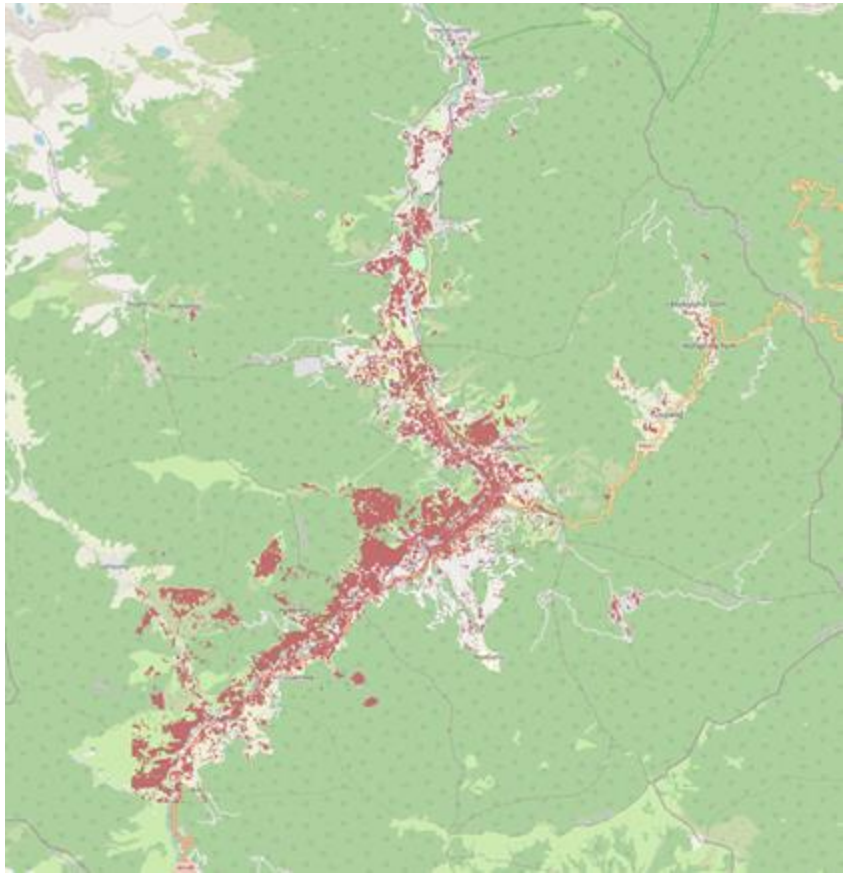
- Landslides mapping in Bhutan by Department of Geology and Mines

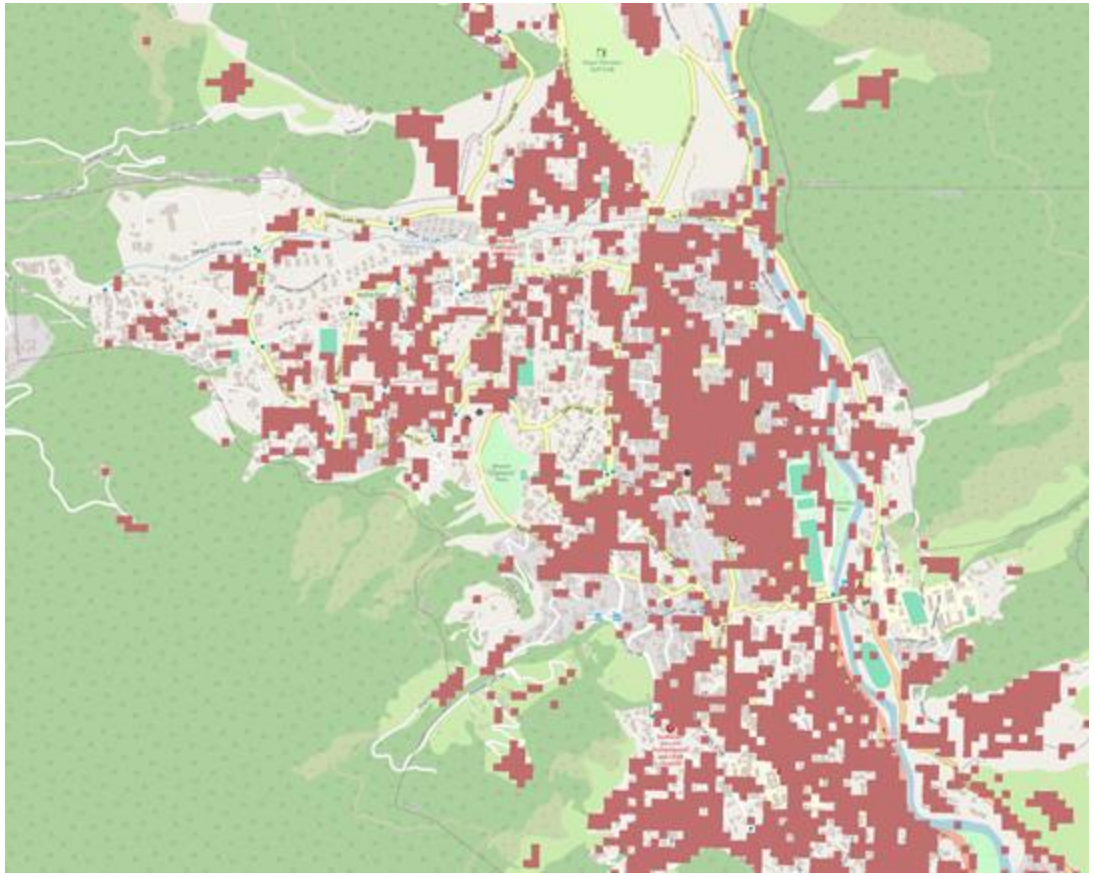


- Applications limited due to low spatial resolution

INDIA-BHUTAN SAT, On-Orbit Data Utilization

- Department of Human Settlements for studying urban settlements in Thimphu





- Ground truth could not be validated due to low spatial resolution of the images.

ICSP Primary Mission Objective

Differences between details at different spatial resolution

15m
@Landsat

5m
@Blackbridge RapidEye

0.5m
@Airbus Pleaides

Crop and Vegetation Monitoring | Disaster Risk Analysis | Water Bodies Monitoring | Urban Expansion Analysis

Why a Remote Sensing Satellite for Bhutan?

- Leverage in house space systems development capability
- Data sovereignty
- On demand imaging (where and when to capture imagery)
- Stimulate public-private partnerships
- Long Term Cost Benefit and Sustainability

Ground Station Capabilities in Campus

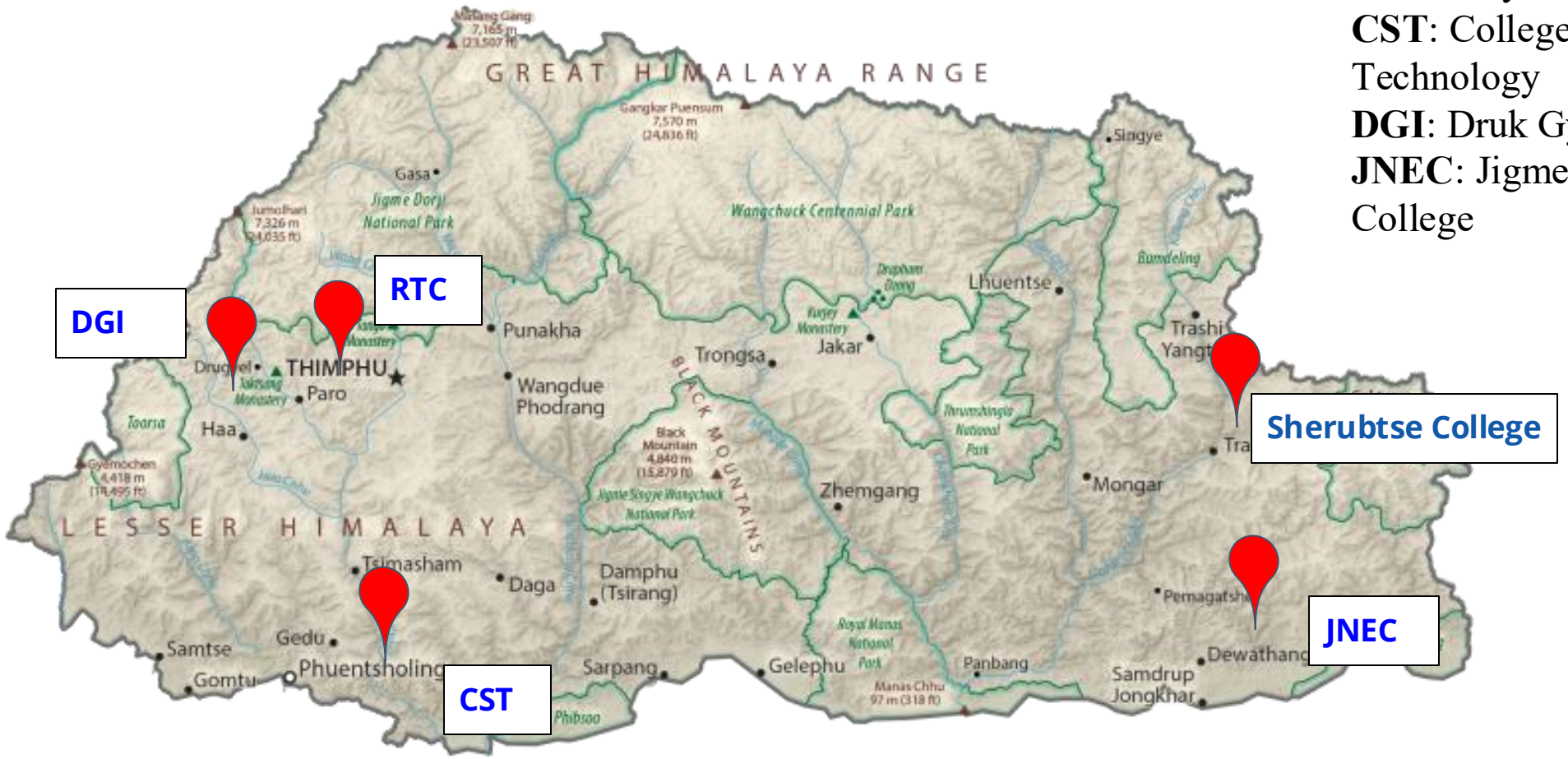
- Amateur radio satellite ground station
- Operates in UHF and VHF frequencies

- S-band ground station for INS-2B
- 2.7m antenna

Plans for setting up commercial VHF/UHF and S-band ground stations

Ground Stations across Bhutan

RTC: Royal Thimphu College
CST: College of Science and Technology
DGI: Druk Gyalpo's institute
JNEC: Jigme Namgyal Engineering College



Amateur VHF/UHF ground stations across 5 colleges in Bhutan

Future Efforts

Satellite testing facilities set-up

Development of capacities/capabilities in space systems

Promotion of Public-Private partnerships for boosting space economy

STEM Outreach activities

Cooperation and Collaboration with external agencies