



ISRO – Achievements in 2019



**Presentation to
57th UNCOPUOS
STSC
Vienna, Austria**

February 2020

Tbps
Gbps
Mbps
Kbps



FIVE DECADES OF INDIAN SPACE PROGRAMME

Application Driven, Self-reliant, Focus on National Development

75 Launch vehicle missions



109 Satellites Realized

52 Satellites in Orbit
Catering to National Requirements



Launched
319 Satellites from
33 countries



Missions Accomplished

EMISAT

RISAT-2B

Cartosat-3

RISAT-2BR1

Chandrayaan-2

GSAT-30

March 2019 to January 2020



4 PSLV -C45, C46, C47, C48

47 Foreign satellites

2 New variants of PSLV

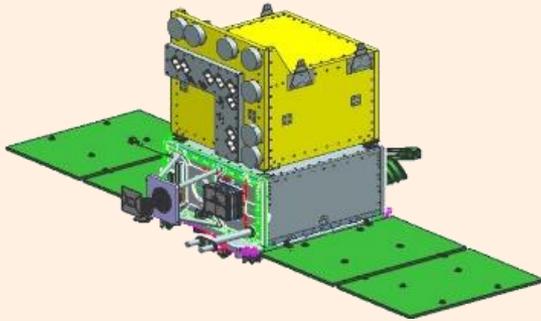
Successful demonstration of orbital platform



GSLV MkIII M1

GSLV MkIII operationalised

PSLV-C45 / EMISAT & PSLV-C46 RISAT-2B Missions



EMISAT -
Satellite for
Electromagnetic
spectrum
measurement



- PSLV-C45
- 47th Flight
- PSLV-QL

01 April 2019



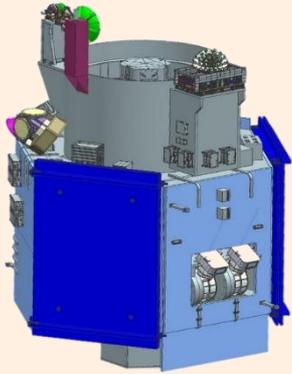
RISAT-2B
Radar imaging
earth
observation
satellite



- PSLV-C46
- 48th Flight
- PSLV-CA

22 May 2019

PSLV-C47 / Cartosat-3 & PSLV-C48 RISAT-2BR1 Missions



Cartosat-3
3rd generation
agile advanced
satellite with
high resolution
imaging
capability



- PSLV-C47
- 49th Flight
- PSLV-XL

27 Nov 2019



RISAT-2BR1
Radar imaging
earth
observation
satellite



- PSLV-C48
- 50th Flight
- PSLV-QL

11 Dec 2019

GSLV Mk III M1 / Chandrayaan-2 Mission

GSLV MK III M1



22nd July 2019

Chandrayaan-2



Orbiter Craft



Lander Craft
with Rover

GSAT 30 Mission



17th January , 2020

Communication satellite configured on ISRO's enhanced I-3K Bus structure

Services in C and Ku bands.

Indian mainland and islands coverage in Ku-band

Extended coverage in C-band covering Gulf countries, a large number of Asian countries and Australia.

Launched in Ariane 5 VA-251, Kourou Launch base



Gaganyaan

Exploring New Territories

- Astronaut selection completed for Gaganyaan to undergo extensive training**

Dec 2020



1st Unmanned Flight

July 2021

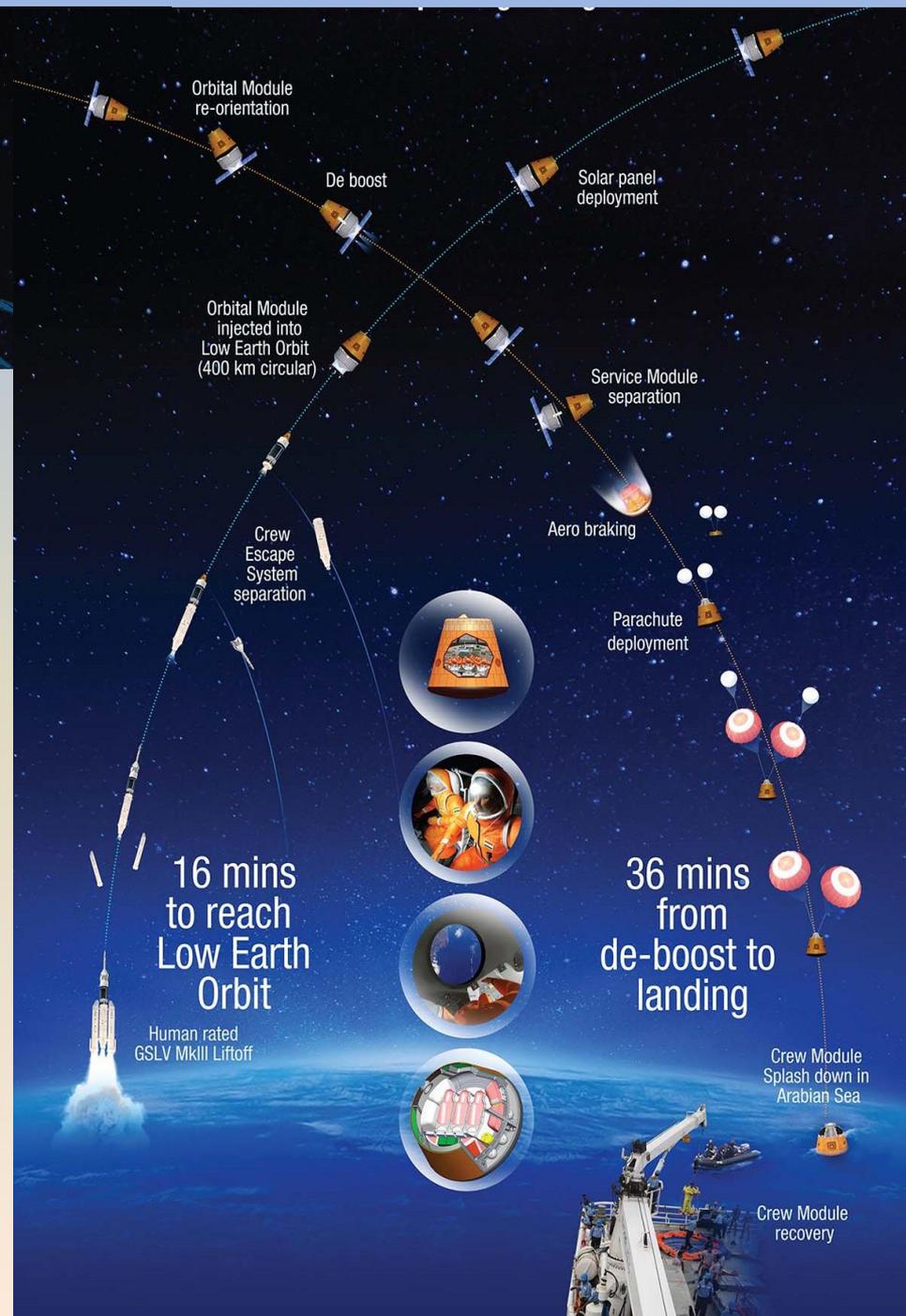


2nd Unmanned Flight

Dec 2021



1st Manned Flight



Opportunities for Collaboration

1 Astronaut Training Centre

2 Docking Mechanism & Ground Testing

3 Human Sciences & Bio Astronautics

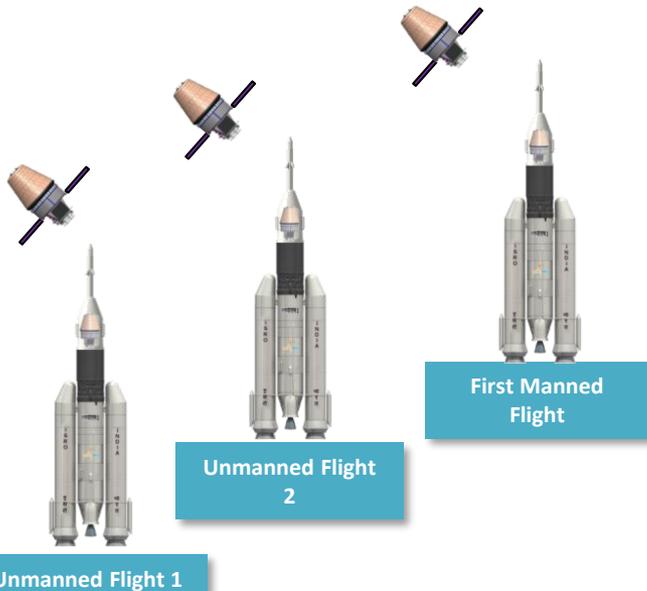
4 Regenerative Life Support System

5 Robotic Missions complimentary with Human

6 EVA & Space Habitat Construction

7 Micro Gravity Experiments

Indian Perspective on Sustained Human Space Flight Programme



Capability for human space flight

Robotic Lunar/Mars mission

- Long duration stay of astronauts in space
- Docking, EVA and space structure assembly

Long duration stay in space

Sample Return Mission to Moon/Mars/Asteroid Colonies in Moon/Mars

- Technology for interplanetary manned missions
- Colonisation of Moon / Mars
- Mining of Near Earth Asteroid / Planets
- Collaborative interplanetary manned missions

Interplanetary manned missions

IAA-ISRO-ASI Symposium on Human Space Flight

Bengaluru, January 22- 24, 2020



Theme: Human Space Flight and Exploration
– Present Challenges and Future Trends

500 delegates, **100** contributed technical papers, **19** invited and plenary lectures

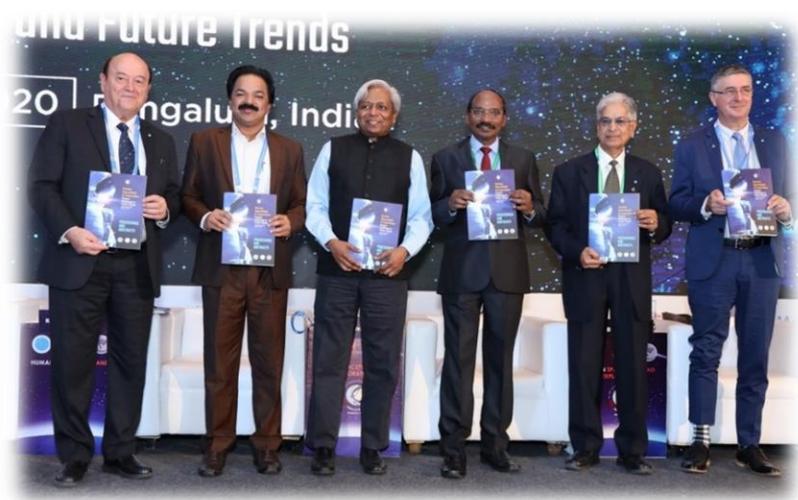
Heads of Space Agencies Panel & Astronaut Panel

Industry panel

Exclusive student session

Exhibition of technologies and products related to Human Spaceflight



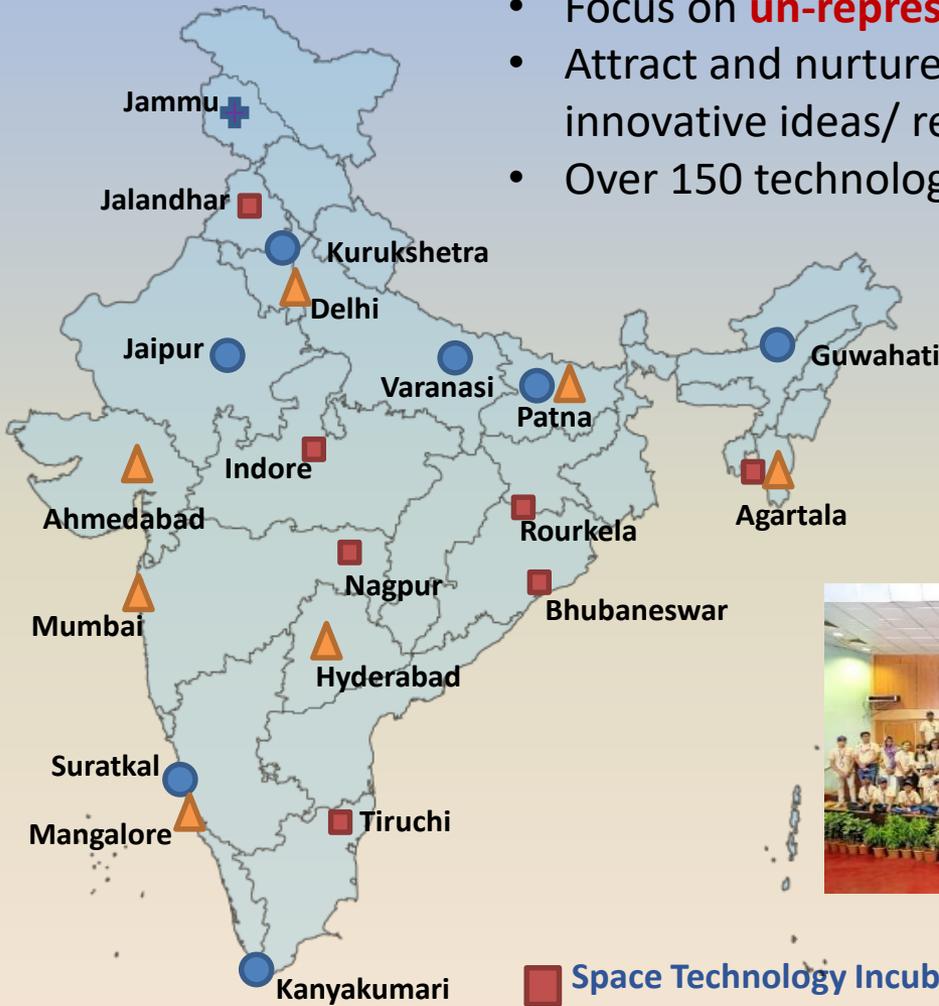


Glimpses of HSP 2020 Symposium Bengaluru, India



Outreach & spin- offs

- Strengthen the **ISRO – Academia –Industry**
- Focus on **un-represented locations**
- Attract and nurture the young academia with innovative ideas/ research aptitude
- Over 150 technology Transfers to users



**YUva Vigyani
KARYAKRAM (YUVIKA)**
First batch of 111
students from 29
States & 7 UTs
participated



- Space Technology Incubation Centres (+4)
- Regional Academic Centres – Space (+5)
- ▲ Space Museums (+7)
- ▲ Space galleries at National Museums (+25)
- ✚ Satish Dhawan Research Centre for Space Sciences

Spin Offs



Lithium Ion Cells



SMART LIMB
(Micro processor
control
prosthetic limb)

Birth Centenary (1919-2019)

Tribute to

Father of Indian Space Programme
Former Chairman, AEC & Secretary, DAE

Dr. Vikram A Sarabhai



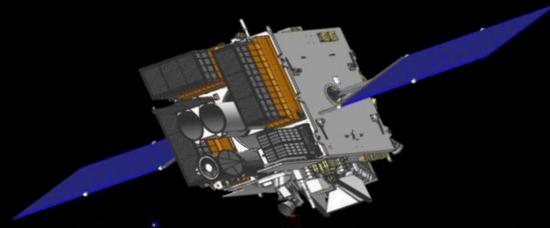
डॉ. कस्तूरामन

डॉ. के. शिवन

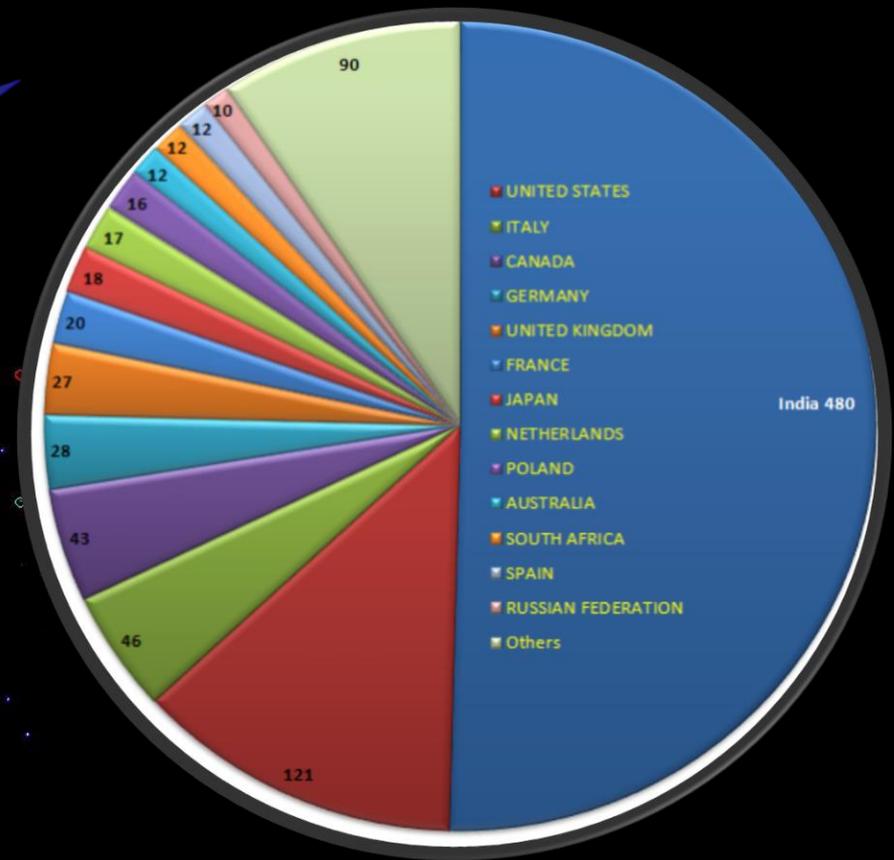
श्री के. एन. व्यास

श्री एन. आर. कौशिक

Astrosat



**New population of
Ultraviolet stars in the
Globular Cluster NGC 2808**



- **7th call for proposals for observations during Oct 2019 to Sept 2020 released.**
- **130+ total publications**
- **1240 users total (46 nations)**
- **Data opened for public access**



NavIC: Indian Navigation Constellation



International mobile standards body
3rd Generation Partnership Project (3GPP) approved India's regional navigation satellite system NavIC

Qualcomm demonstrated NavIC enabled mobile chip
Xiaomi announced NavIC incorporation in Mobile Handset

Fleet & Logistics Management Aviation

Maritime Services & Operations Power Grid Synchronization

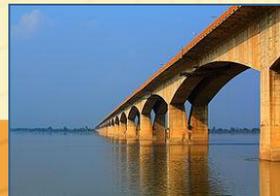
Geo-fencing (EEZ, Heritage sites...) Precise Timing

GIS services Mapping and Geodetic data capture

Aid to hikers and travellers Earth and Atmospheric Studies

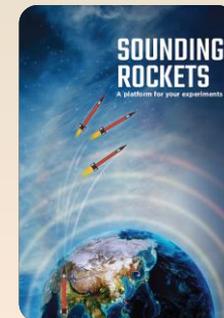
Infrastructure Planning Disaster Management

Forest and Mining Search & Rescue



Global Space Cooperation Avenues

- 235 cooperative instruments with 55 countries and 5 multinational bodies
- 2 joint-satellite missions completed, and 3 ongoing
- International payloads in exploratory missions
- UNISpace Nanosatellite Assembly and Training by ISRO (UNNATI)
- AO on sounding rockets and orbital platform



At UNISPACE+50 (June 2018; Vienna), India announced a capacity building programme on Nanosatellites development named **UNNATI (UNispace Nanosatellite Assembly & Training by ISRO)**



Batch 1: Jan-March 2019



29 Participants from 17 Countries

Algeria, Argentina, Azerbaijan, Bhutan, Brazil, Chile, Egypt, Indonesia, Kazakhstan, Malaysia, Mexico, Mongolia, Morocco, Myanmar, Oman, Panama & Portugal

Batch 2: Oct-Dec 2019



30 Participants from 16 Countries

Bahrain, Bangladesh, Belarus, Bolivia, Brunei, Colombia, Kenya, Mauritius, Nepal, Nigeria, Peru, South Korea, Sri Lanka, Thailand, Tunisia & Vietnam

UNNATI - Enabling platform to make Nano satellites

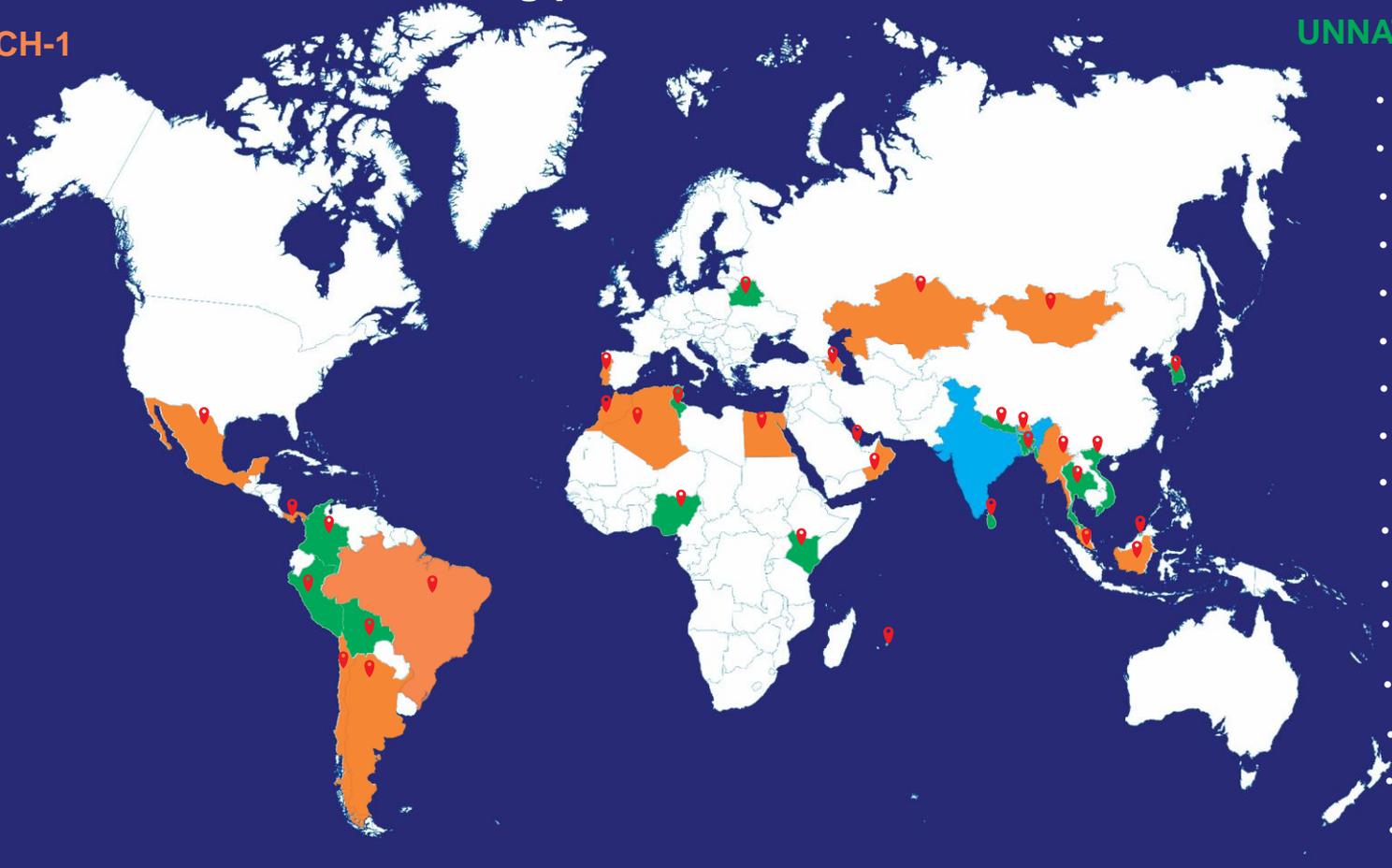
UNNATI BATCH-1

- Algeria
- Argentina
- Azerbaijan
- Bhutan
- Brazil
- Chile
- Egypt
- Indonesia
- Kazakhstan
- Malaysia
- Mexico
- Mongolia
- Morocco
- Myanmar
- Oman
- Panama
- Portugal

UNNATI BATCH-2

- Bahrain
- Bangladesh
- Belarus
- Bolivia
- Brunei
- Colombia
- Kenya
- Mauritius
- Nepal
- Nigeria
- Peru
- Republic of Korea
- Srilanka
- Thailand
- Tunisia
- Vietnam

59 Participants from 33 Countries across the Globe



UNNATI PROGRAMME OPPORTUNITIES 2020



Welcoming Participants across the
Globe for UNNATI-Batch 3

- ❑ The details of the training programme including application form are available at www.isro.gov.in/unnati.
- ❑ For clarifications, contact unnati@ursc.gov.in

Batch 3

Commencement of Registration	: May 15, 2020
Last date to apply	: June 30, 2020
Finalization of Candidates	: July 31, 2020
Commencement of Course	: October 15, 2020
Completion of Course	: December 15, 2020

UNNATI

UNNATI BATCH 3 COURSE CONTENTS

- ❑ **Theoretical coursework**
 - Module 1: Basics of satellite technology and its applications (Duration: 2 weeks)
 - Module 2: Nano satellite missions (Duration: 2 weeks)

- ❑ **Practical Exposure on Nano satellites AIT**
 - Module 3: Hands-on training on Nano satellite assembly, integration and testing (Duration: 4 weeks)

**COME, LEARN & BUILD NANO SATELLITE
WITH INDIA - ISRO**

THANK YOU

100+

