Vietnam National Space Center Activities

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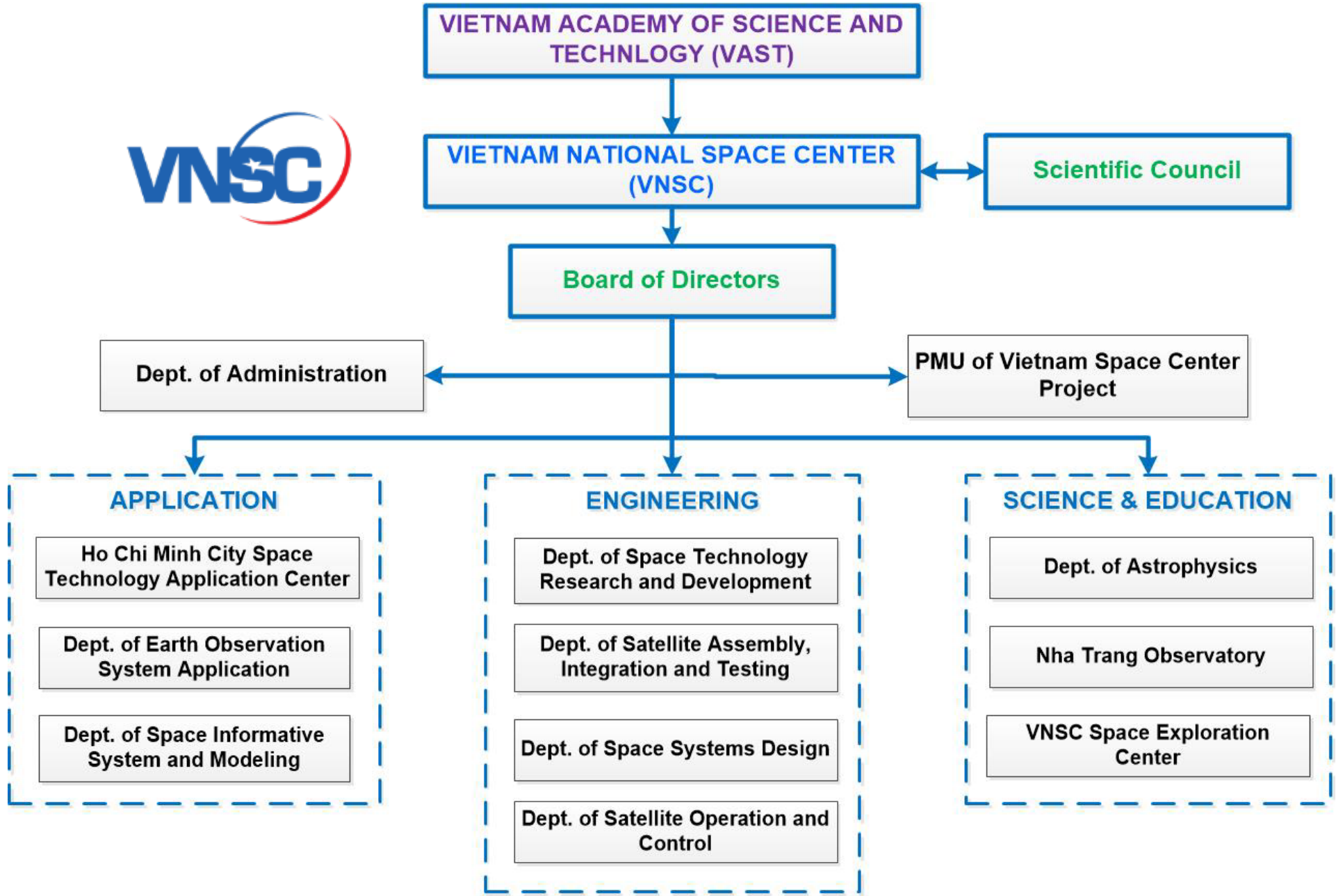
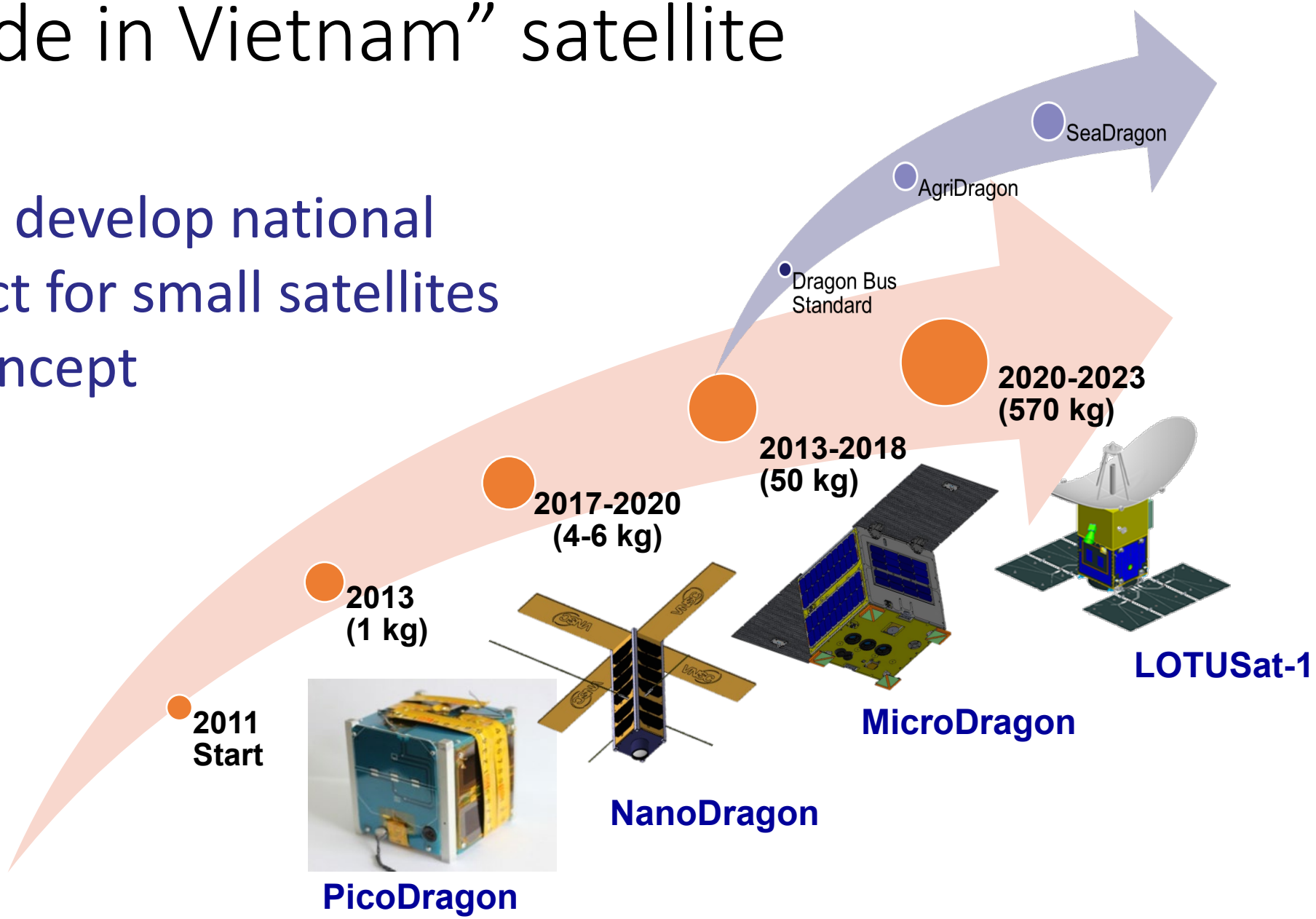

VIETNAM ACADEMY OF SCIENCE AND TECHNLOGY (VAST)
VIETNAM NATIONAL SPACE CENTER (VNSC)
Scientific Council
Board of Directors
Dept. of Administration
PMU of Vietnam Space Center Project
APPLICATION
Ho Chi Minh City Space Technology Application Center
Dept. of Earth Observation System Application
Dept. of Space Informative System and Modeling
ENGINEERING
Dept. of Space Technology Research and Development
Dept. of Satellite Assembly, Integration and Testing
Dept. of Space Systems Design
Dept. of Satellite Operation and Control
SCIENCE & EDUCATION
Dept. of Astrophysics
Nha Trang Observatory
VNSC Space Exploration Center

“Made in Vietnam” satellite

Aim to develop national product for small satellites bus concept



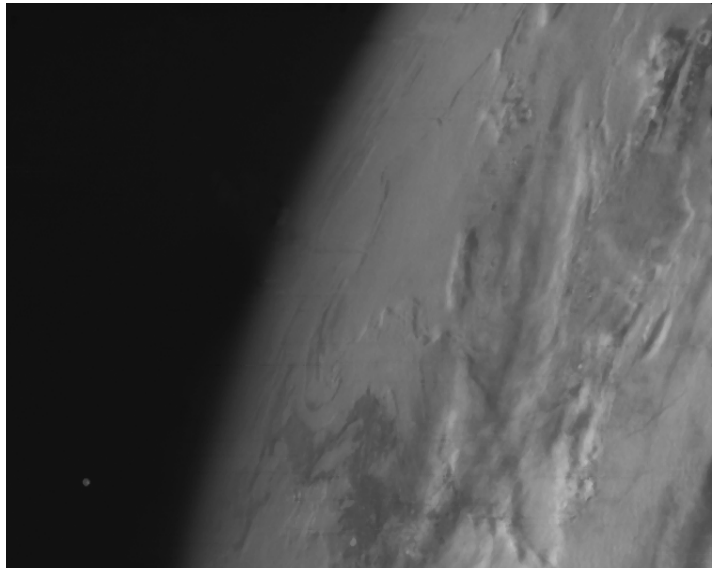
Launching of MicroDragon
"Made by Vietnam" satellite

R&D: 2013-2018

Launch: 18/01/2019

Operation at University of Tokyo

Joint Asian Micro-satellite Consortium agreement from Nov. 18, 2016

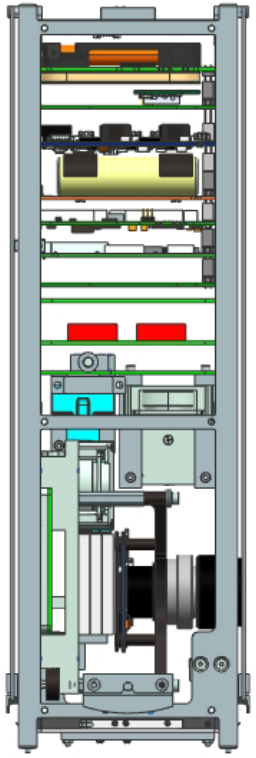


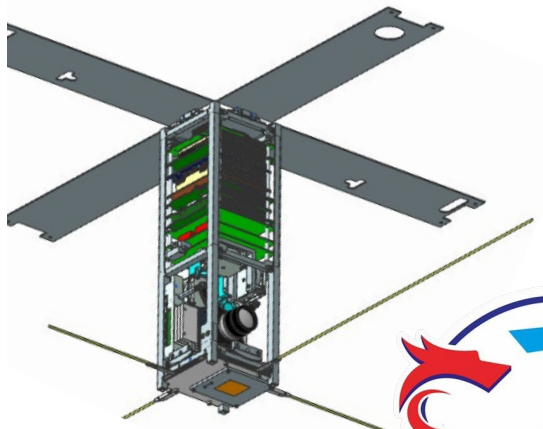
The first image from TPI camera of MicroDragon on Jan. 21, 2019

Development of NanoDragon
"Made in Vietnam"

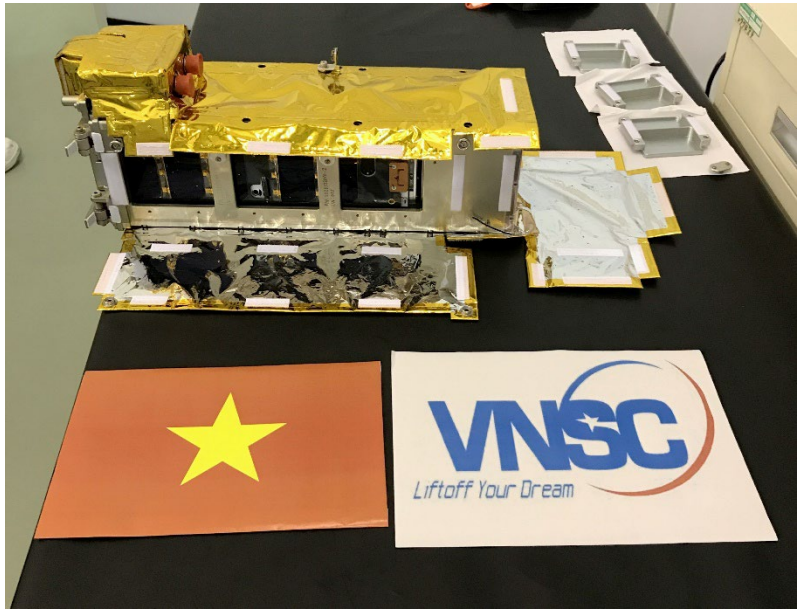
Launch: 1/10/2021

Development & Operation in Vietnam



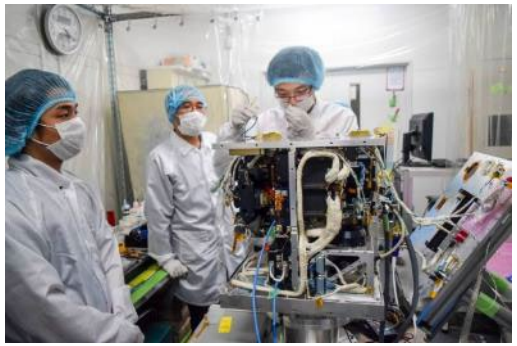


R&D: 2017-2021

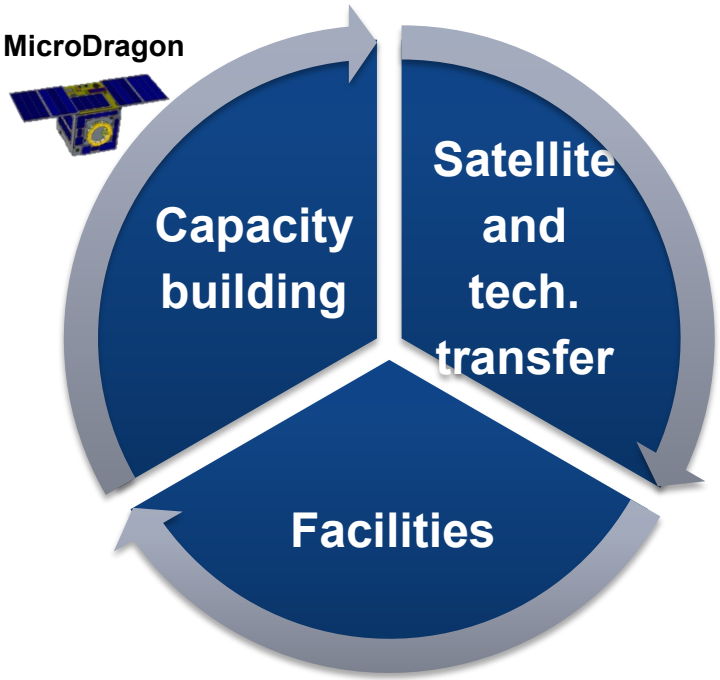


Vietnam EO satellite – LOTUSat-1

PROJECT FOR DISASTER AND CLIMATE CHANGE COUNTERMEASURES USING EARTH OBSERVATION SATELLITE



Capacity Building for Satellite Development (over 100 staffs)

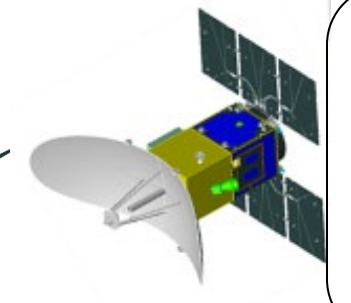


LOTUSat-1 (570 kg) with radar payload

Infrastructure in Ha Noi, Nha Trang and HCM City

AIT facilities for small satellites up to 180kg

LOTUSat 1

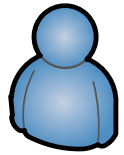


Mass: ~570kg
Life: >5 years
Size: Approx. 1.5m x 1.5m x 3m

<Mission>
X-band SAR sensor
Resolution: ~ 1.0m -16m

SAR Satellite

Ground Station
(7 m S&X band antenna)



Users

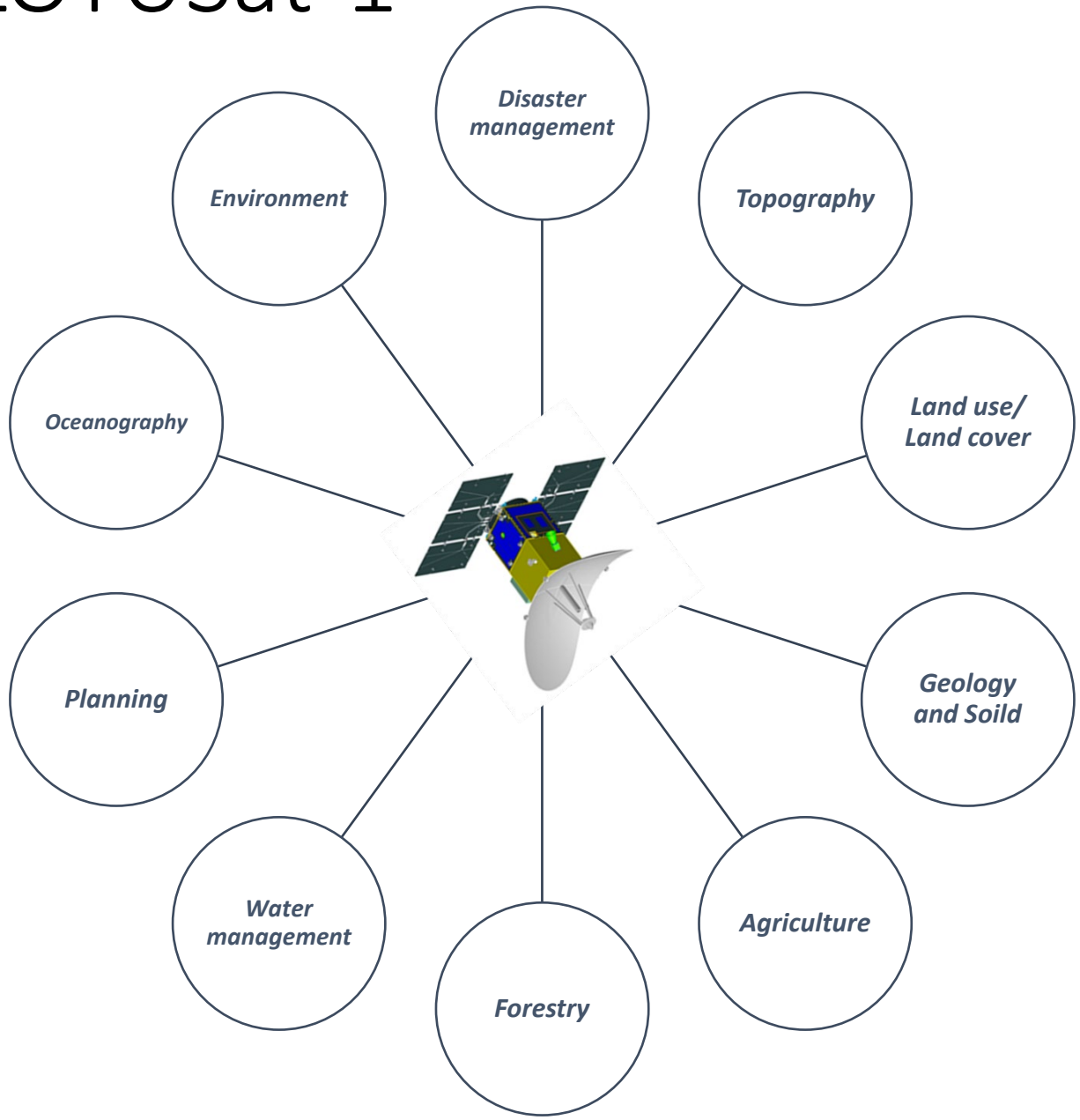
Requirement, Information and Data

Satellite Operation Center

Mission Data Utilization Center

Vietnam EO satellite – LOTUSat-1

SAR Frequency	X - band
Resolution - Spotlight mode	1m x 1m (10km x 10km)
Resolution - Stripmap mode	2m x 2m (12km x 800km)
Resolution - Scan mode	16m x 16m (50km x 800km)
Polarization	HH or VV (switchable)
Look direction	Left or Right
Incidence angle	15°~ 45°
Data downlink	X-band / RHCP 16QAM(832Mbps)/QPSK(416Mbps)

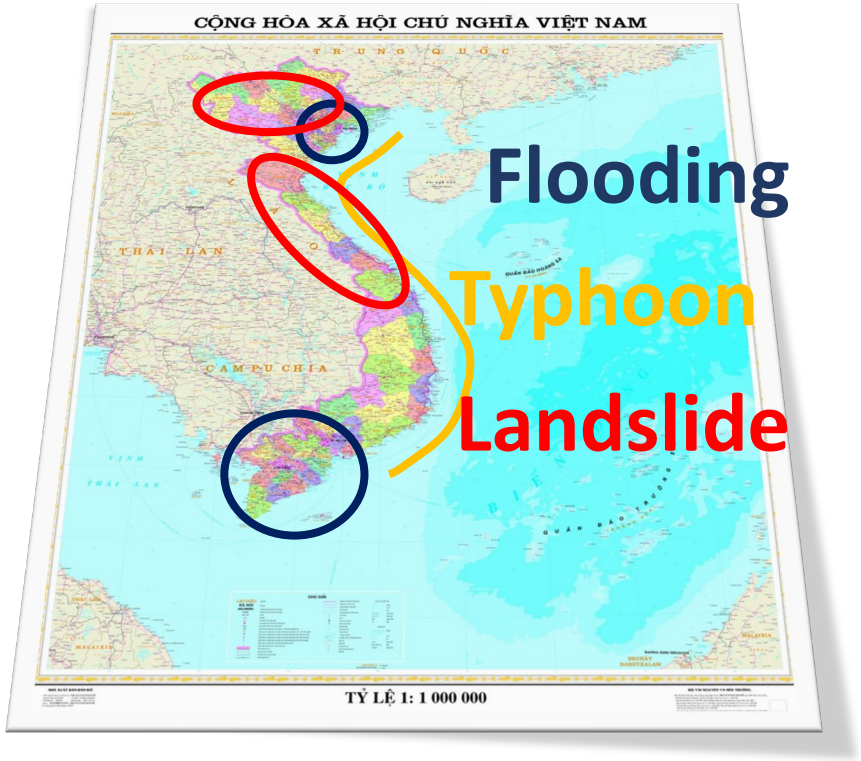


EO applications in Vietnam

Potential application in Vietnam (Priority order)

- Natural Disaster Monitoring
- Agriculture & Natural Resource Monitoring
- Environmental Monitoring
- Urban/Infrastructure Planning
- Maritime Domaine Awareness
- National Security
- Emergency Communications
- Search and Rescue Operations
- Intelligence, Surveillance and Reconnaissance
- Illegal Fishing
- Regional Stability
- Border Protection & Security
- Cartography/Mapping
- Safe Passage
- Continuity of Operations

EO applications in Vietnam



2020

- Tropical storms and typhoons such as Linfa, Nangka, Ofel, Saudel, and Molave (October); Goni, Etau, Vamco (November), struck the northern and central regions of Vietnam, causing some of the most dramatic flooding in recent years.
- 247 death and missing,
- $US 1.5 billion for 2020

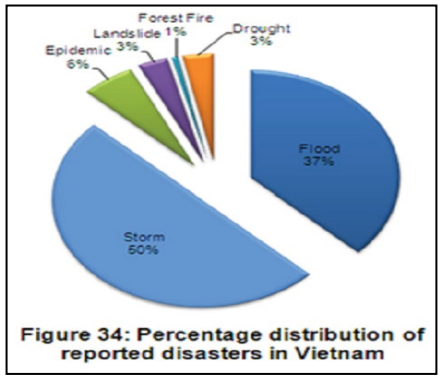


Figure 34: Percentage distribution of reported disasters in Vietnam

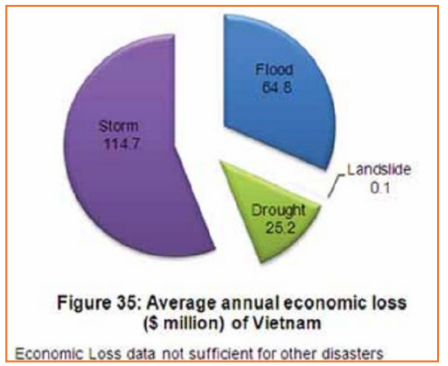


Figure 35: Average annual economic loss ($ million) of Vietnam

Economic Loss data not sufficient for other disasters

Source: World Bank Analysis of CCFSC Damage Data 1989 to 2008

High	Medium	Low
Flood,	Landslide	Earthquake
Storm, Tropical depression	salinity intrusion	
Flash flood		
Drought		

Source CCFSC

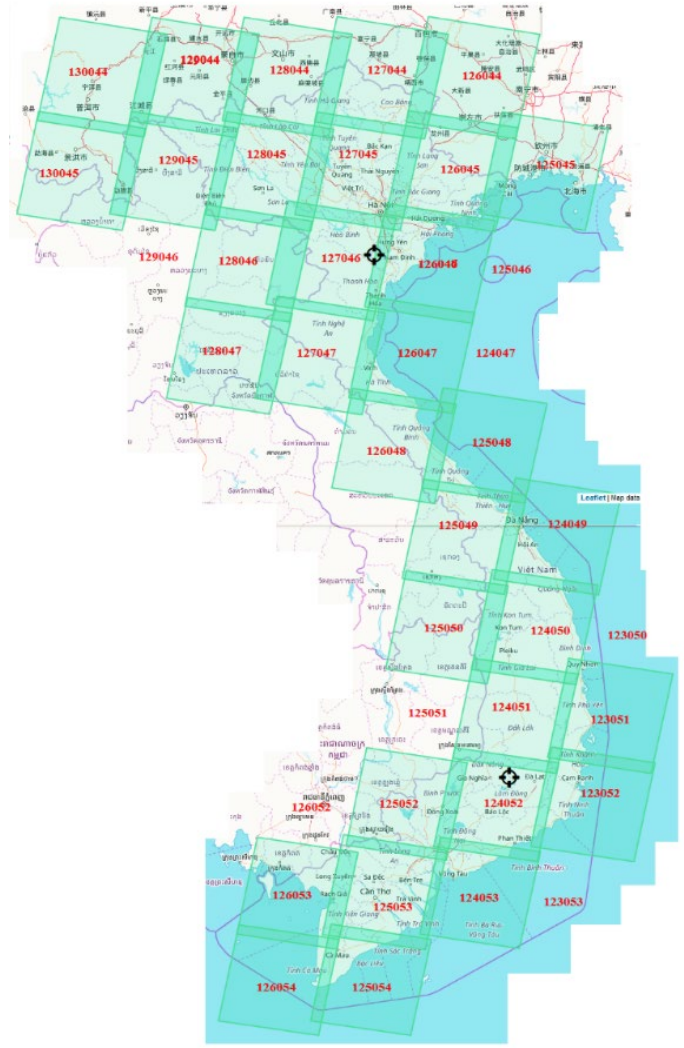
EO application at VNSC - Vietnam Data Cube

Data

- Optical data
  - Landsat-4,-5,-7,-8: from 1986
  - Sentinel-2: from 2018
- SAR data
  - Sentinel-1: from 2014
  - ALOS/Mosaic: from 1996
  - ALOS-2: from 2016
- Source of Data: USGS (Landsat); ESA (Sentinel); JAXA (ALOS and JERS)
- Collection progress is continuning
- ARD available
- Free and Open (data from JAXA is free of charge for governmental user)

Applications

- Forest monitoring: in collaboration with FIPI, CNES, CSIRO
- Rice monitoring: in collaboration with University of Maryland; CESBIO/CNES



EO application at VNSC - VietSCO

S-1/2 ARD

ALOS ARD

LotuSat ARD

Other ARD.. Landsat +

VDC (Vietnam DataCube)

Infrastructure

Research

Modeling

Algorithm

Activities

Carbon Stock assessment

Water use

Methane emission

Expected outcomes

Develop more complete scenarios of the impacts of CC

Indicators with socio-economic data

Long-term benefits

EO application at VNSC - VietSCO

Vietnam Space Climate Observatory (VietSCO)

Existing

Tools for rice monitoring
Tools for estimation of losses due to typhoon

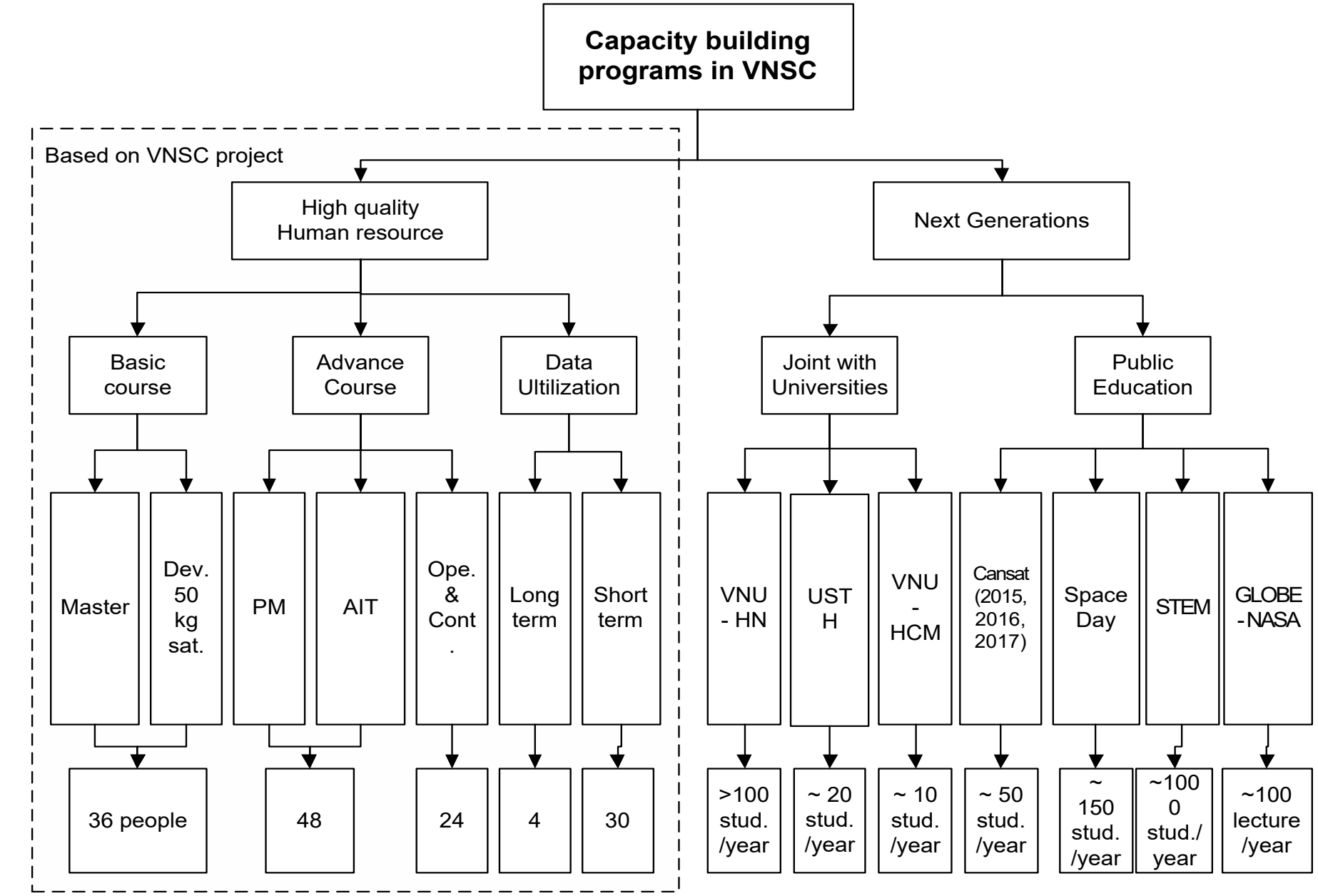
VietSCO components

Monitoring rice production areas affected by climate change in the Mekong Delta (VIMESCO Rice); Monitoring impact of typhoons on agricultural areas in Vietnam in support of more resilient agricultural planning (Viet-ARRO).

VietSCO Products

VM-Rice	SR Map: Seasonal Rice maps
V-ARRO	FE Map: Flood Extent map –flood extent and % district affected based on S-1
V-ARRO	RR Map: Rice Recovery maps at S-1 acquisition date
V-ARRO	FD Map: Flood Duration map – extent of flood over time based on S-1
V-ARRO	RAF Map: Rice crop Affected by Flood map – areas planted with rice affected
VM-Rice	RGS Map: Regional Growth Stage map
VM-Rice	CC Map: Crop Calendar map
VM-Rice	CCC Map: Crop Calendar Change map
VM-Rice	ACR Map: Annual Change Rice map – areas changed to or from rice year over year
VM-Rice	DR Map: Drought/Rice map – areas affected by drought + rice areas (annual, year over year)
VM-Rice	SI Map: Salinity Intrusion map – impact of salinity intrusion (+ projections) on rice crops area
VM-Rice	CCI Map: Climate Change Impact map – cumulative impact of climate factors

VNSC Capacity building programs



International cooperation

VAST/VNSC is an official member of:

- Group on Earth Observations (GEO): 96th member since 2014
- Committee on Earth Observation Satellites (CEOS): since 2012
- International Astronautical Federation (IAF): from 2012
- International Academy of Astronautics (IAA): from 2012
- Asia-Pacific Regional Space Agency Forum (APRSAF)
- Sentinel Asia

Public Outreach
Space Exploration Center

STEM Day

Space Day

Optical Telescopes

CanSat Competition

Planetariums

GLOBE Program

Education course

Public Outreach
Space Sci. and Tech. Museum

Conclusion

1. Vietnam “Strategy of space science and technology development and application to 2030” was approved on February 4, 2021;

2. Main mission of VNSC: to improve national earth observation capacity; to develop satellites in Vietnam.

3. International cooperation and technology transfer from developing countries for the fast development

4. Improving humand capacities and creating space industry ecosystem for sustainable development

Thank you