SPACE TECHNOLOGY ACTIVITIES OF VIETNAM IN 2010-2011

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OUTLINE

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2. Satellite technology development
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   - VNREDSat-1;
   - VNREDSat-1B
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   - National Research Program for Space Science & Technology
   - Other projects
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In 2011, typhoon, land slides and flash flood are heaviest in recent 10 years: hundreds habitants died, thousands lived without house, crops defeated, hundreds millions USD are lost for disasters. SPACE TECHNOLOGY REQUESTED FOR MITTIGATION THEM
Satellite Technology Development: Communication satellites

VINASAT-1

• Mass: 2.800 kg. Height: 4 m.
• Designed and built by Lockheed Martin Corporation for VNPT Co., Vietnam
• Launched 19/4/2008 by Ariane 5 from Kourou (French Guiana).
• Located: Geostationary orbit at 132 degrees East.
• Primary satellite control station: Que Duong-Hanoi, Backup station: Binh Duong Prov.
• Lifetime: at least 15 years.
• Number of transponders: 12 for KU-band, 8 for Extended C-band.
Communication satellite /VNPT-Lockheed Martin Co.
VINASAT-2 : under preparation

• VINASAT-1: successfully investigated
• VINASAT-2 Project Kick-off : March 2009
• 11/5/2010: VNPT - Lockheed Martin Co. signed contract on manufacture and launch VINASAT-2
• VINASAT-2 specifications: A2100 Bus, 24 transponders for Ku-band, coverage area: South East Asia and neighbour countries
• Launch: delayed to 2014
VNREDSat-1 Project

- The 1st Vietnam EO satellite
  - Optical payload with spatial resolution 10m/Multispectral and 2.5m/Panchromatic
  - Revisit time: 3 days
  - Sun synchronous orbit, altitude 680 km
  - Mass: ~ 120kg
  - Life time: 5 năm

The Project’s budget open: 11/2010

The CTT team of 15 VN engineers arrived in Toulouse for training: 15/8/2011

Tentative launch: 2014
VNREDSat-1 Project

The Project is underway
VNREDSat-1 Project

The project consists of the following two main packages:

**Primary package:** ASTRIUM EADS
- Design & manufacturing the sat.
- Ground segment installation (X band receiving station at MONRE and S-band control station at VAST)
- Launch service
- Insurance service
- Training and know-how transfer on satellite design, assembly, integration, test, control, receive image, etc of the satellite

**Consultancy package:** VEGA Co.
Consulting on project implementation (quality & progress evaluation)

The VNREDSat-1 System configuration:

- Space Segment
  - AstroSat 100 satellite
    - 2.5m PAN, 10m XS (4 bands)
    - 17.5 km swath
- Launch Segment
- Ground Segment
  - X-Band Ground Station
  - S-Band Ground Station
  - Image Processing Station
    - Ingestion & Archiving Terminal
    - Despacialization, archiving, cataloguing
  - Control Station
    - Satellite Control Terminal
      - Satellite monitoring and control
    - Flight Dynamics Terminal
      - Orbit restitution & maintenance
  - Mission Planning Terminal
    - Mission management
- User Requests
VNREDSat-1 access corridors over 1 day:
Whole world coverage
S-band Station in Hoa Lac Hi-tech park
(under construction)
VNREDSat-1B proposal

- Finance source: Belgium ODA.
- Orbit characteristics: SSO, altitude ~600km
- Platform: Proba, highly flexible
- Compact Hyperspectral Imager Breadboard (CHIB)
- Number of spectral bands: 80-100
- Spectral range: 400 – 830nm
- On-board memory: 64 Gbits
- S-band: Telemetry and Telecommand
- X-band: image downlink, 32 Mbps
- Revisit time: 3 days
- Ground station located in Hanoi with 3-4 satellite contacts/day
- Wide swath width: 250-300 km
The main topics of the program in the period 2008-2011:

- Small satellite technology.
- Applications of RS, GIS, GPS and communication satellite for economic development; natural resource, environment and disaster monitoring;
- Launching technique.
- Fabrication equipments and low cost meteorological ground receiving station.
- Fundamental research relating space science and technology.
- Legal basis for peaceful use of outer space.
Forest cover change assessment for REDD pilot project

Mangrove forest in Ca Mau
Application of GPS high accuracy in monitoring the subsidence of the construction project on the coastal region.
Oil pollution monitoring at South-Middle Vietnam sea (Khanh Hoa prov.)
Applications of Radar Altimeter for estimation of the sea depth

Measurement sea surface height using satellite system Topex/Poseidon

Sea depth mapping based on Altimeter & ship board data
Data received at the Station is used for disaster monitoring including Oil spill; Flooding.
Cooperative project with JAXA using WINDS for Sentinel Asia Network
Regional Server > Client Terminal overview

Services:
Management Functions (data request & transfer, etc)

Basic Network Configuration:

Prepared by JAXA

Prepared by NRSC
Installation of SA-VSAT / WINDS at NRSC
(SA: Sentinel Asia)

• The ground station: automatic operation
• The operation team:
  – Submit EOR (Emergency Observation Request) to ADRC when a disaster occurs
  – Turn on IDU upon JAXA’s request
  – Utilize transferred data for disaster management activities
Satellite Image received from Sentinel Asia

Bình Định Flood rapid map made from ALOS/PALSAR by NRSC (dated 05/11/2009)
REMOTE SENSING APPLICATIONS

Ministry of Agriculture & Rural Development (MARD)

Cooperated with ESRI Vietnam for GIS training and applications for disaster management and reduction

- In 2010 MARD started Project “MOVIMA” / French ODA to network of GPS systems and receiving stations for coastal and marine management and set up for 1500 fishing boats for fishing, weather and rescue information.

- In 2009-2010, Forest Management Department of MARD cooperated with JAXA using satellite data, software, GIS for forest management (the forest cover change, types of forest, economic value of forest types, etc)
REMOTE SENSING APPLICATIONS USE MTSAT DATA

MARD

3D Geostationary Meteorological Satellite Image (in the case of Typhoon)


Rainfall Estimation by MTSAT data
INTEGRATION OF REMOTE SENSING, GIS, GPS AND SATELLITE COMMUNICATION IN ENHANCING SAFETY FOR OFFSHORE FISHING BOATS
Objectives

- To evaluate the use of new generation SAR data in **rice mapping** and **yield estimation**, towards an **operational system** for rice crop inventory in the Mekong River Delta.
REMOTE SENSING AND GIS IN THE STUDY OF ACTIVE FAULTS AND
ESTIMATION OF MAXIMUM EARTHQUAKE ALONG RED RIVER FAULT ZONE,
VIET NAM

Red River Faults Zone is a large structure and popularly referred to the
boundary between Indochina and South China plates.

SPOT image shown seismic segments (Văn Yên – Trần Yên area)
PASSIVE MW RS APPLICATIONS (STI-VAST)

Design, manufacture & apply the MW radiometers L,C,X bands, integrated with GPS receiver for mapping soil moisture from the aircraft (Aerial remote sensing), measure SSS, SST.
Hoa Lac HHTP is at 40km west Hanoi, connected Hanoi by the longest high way Thang-Long

VNSC model with 9ha area, will be completed in 2017 with blocks of R&D, AIT, test small EO satellite, Training, Ground station, etc.
Vietnam National Satellite Center - VAST

- Project started preparation from 2008 in the Hoa-Lac high tech-park (HHTP)
- The "Vietnam National Satellite Center - VNSC" under VAST, has been established on 16/9/2011 by PM, with main tasks:
  - Implement the Project with Japanese ODA (tentative 600 Mil.USD)
  - Build the infrastructure of the VNSC at Hoa Lac (HHTP) in 9ha includes buildings for integration, assembling & testing, training, key laboratories,... for small satellites development.
  - Develop 2 Radar small satellites (<500kgs) until 2020

Specifications:
- Instrument: X-band SAR
- Ground sampling distance: ~1m
- Total weight: <500kg
- Life-time: 5 years
- Dimensions: 2.6m x 3.5m x 3m
Space Education - APRSAF
Water rocket competition – Hochiminh city 9/2011

Cuộc thi Tên lửa nước – TPHCM-9/2011
Poster Contest 2011
School pupils 8-11 ages/ Subject: Outer Space after 50 years
INTERNATIONAL COOPERATION

• UN/ESA/Vietnam Workshop “Space technology applications for socio-economic benefits” held in Hanoi, 10-14/10/2011
  – 150 participants / 40 foreigners from 23 countries & 5 International Organizations (UNOOSA, ESA, NASA, JAXA, ISPRS)
  – Enhance the cooperation for Space technology development & applications facing to climate change
  – Establish 6 groups
    • Satellite technology
    • Space Technology applications for natural resource management
    • Space Technology applications for monitoring of environment, air pollution & energy
    • Space Technology applications for urbanization & transportation management
    • Space Technology applications for disaster management
    • Space Technology applications for health management
• Agreement between Vietnam – Russian on Space Technology:
  – Appointed to ROSCOSMOS – VNSC (Vietnam Space Committee) to sign the Agreement on behalf of 2 Governments;
  – Cooperation on satellite technology, space technology application, GNSS application (GLONAS), training, space science, etc.
  – Status: on-going to sign the Agreement
• MOU between STI-EADS Innovation Singapore (9/2011) on:
  – Training
  – Projects on Remote sensing for land slides, vegetation biomass
  – Competition of students with theme “RS & GPS for fishermen rescue”
• Project “Vietnam Space Center” with Japanese ODA
• JAXA: UNIFORM project/ APRSAF satellite/ training
• Project with Organization of Cooperative Development GTZ – Germany on forestry management
• Project with Organization of Cooperative Development SNR – Holland on Mangrove forest on coastal region of Vietnam, etc
CONCLUSIONS

– Space Technology in Vietnam has just been developed, but is being supported strongly by Government & International cooperation.

– Vietnam Government pays a great attention and invest to Space S&T, as shown in “Strategy for space technology research and applications until 2020”

– Vietnam will develop some more satellites (communications, EO, etc) through technology transfer, then to master it.

– Vietnam Space Committee has been established for coordinating all Space research & activities in the country & international cooperation.

– International cooperation is very important that’s the best way to develop Space S&T of Vietnam.

– Vietnam thanks all organizations, agencies, institutes for their supports and cooperation in satellite technology, remote sensing, capacity building for human resource, joint projects, etc. and hope to receive more your cooperation.

THANK FOR YOUR ATTENTION