

VNREDSat-1

Vietnam Natural Resources, Environment and
Disaster monitoring Satellite

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General information (1)

- Project Owner:
Vietnam Academy of Science and Technology
- Implementation period: **2011 – 2013**
- Prime contractor: **EADS Astrium**

General information (2)

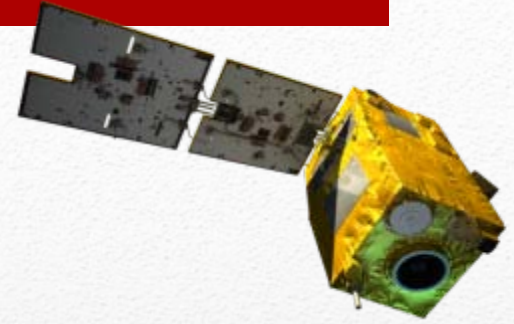
- **Project's Main Items:**

1. Design, manufacture and launch of an Earth Observation Satellite named VNREDSat-1.
2. Building the Satellite Ground Control Station.
3. Upgrading the Existing Receiving Station (own by MONRE) to receive VNREDSat – 1 images.
4. Construction of a satellite image calibration site.
5. Setting up a Communication links between Ground stations.
6. Training and transfer to Vietnam the Small Satellite Technology

Items 1, 3, 6 are implemented by EADS Astrium.

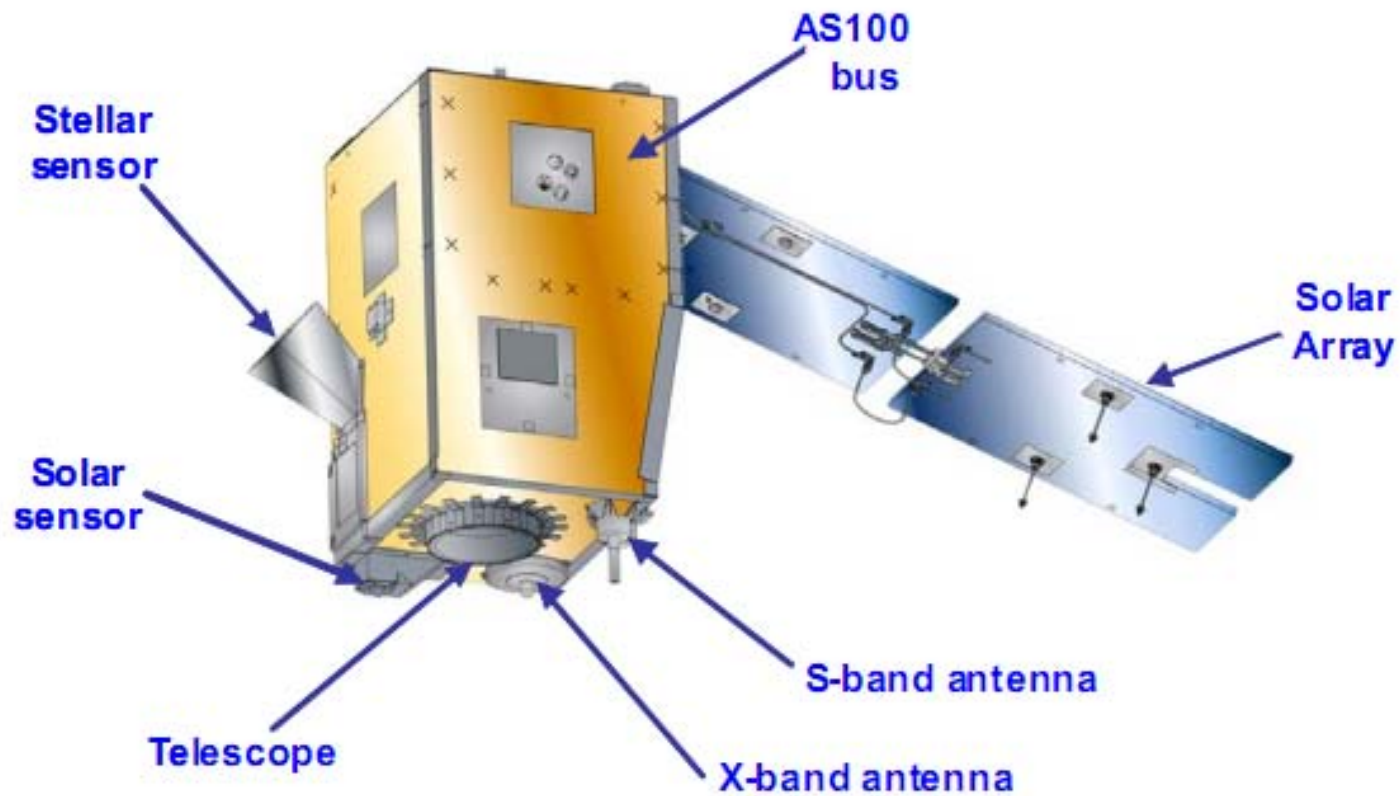
Items 2, 4, 5 are of VAST responsibilities.

VNREDSat-1 satellite

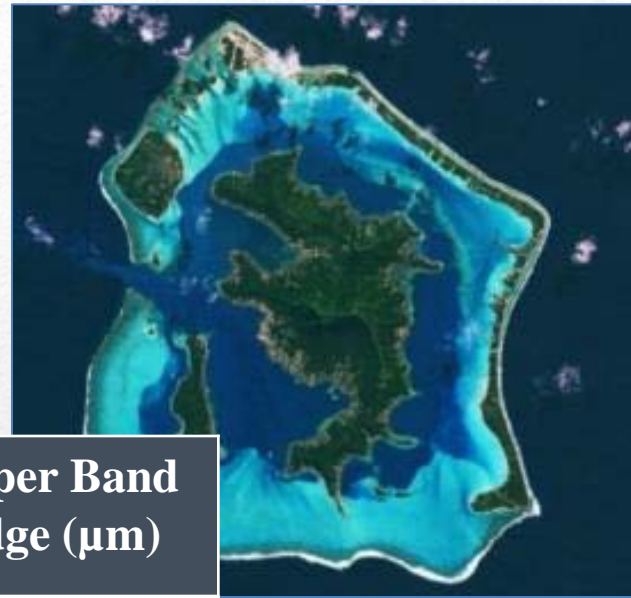


- Mission: Earth observation in PAN and 4 MS spectral bands
- Spatial resolution: **2.5m** (PAN) and **10m** (MS)
- Orbit: **SSO, 680 km** altitude
- Descending local time : **10:30 AM**
- Revisit time: **3 days**
- Platform dimension: **600 mm x 570 mm x 500 mm**
- Total mass: **~130kg**
- Life-time: **5 years (guaranteed)**

VNREDSat-1 satellite overview

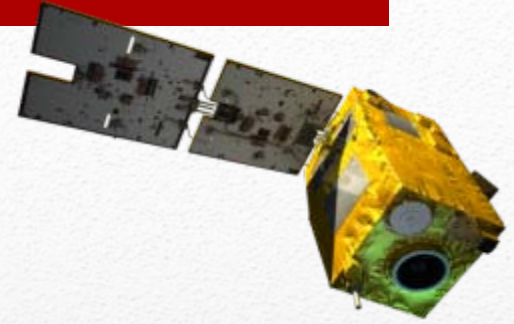


Spectral bands



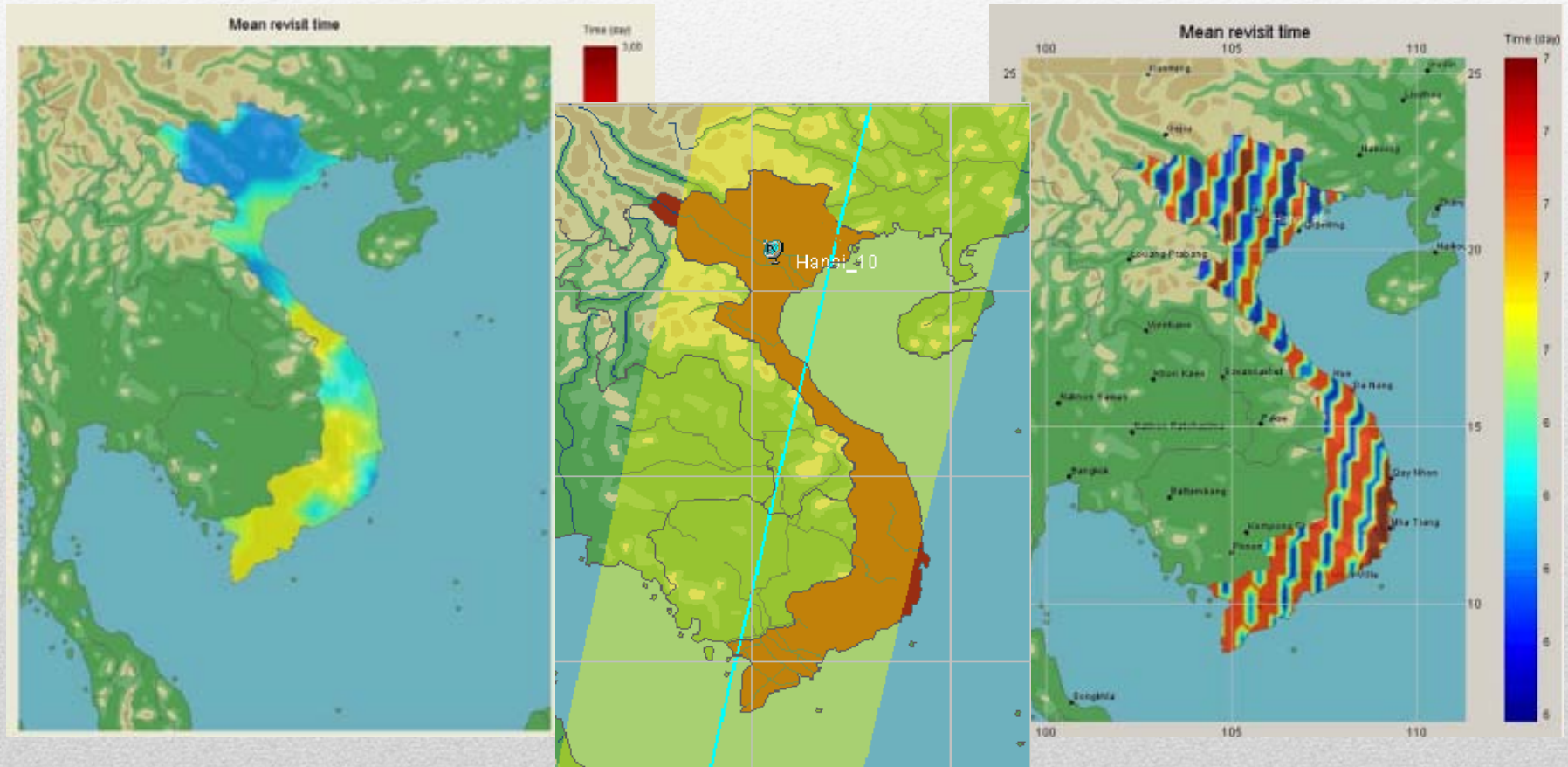
Band	Name	Lower Band Edge (μm)	Upper Band Edge (μm)
Panchromatic	PAN	0.45 ± 0.02	0.75 ± 0.02
Blue	B1	0.45 ± 0.02	0.52 ± 0.02
Green	B2	0.53 ± 0.02	0.59 ± 0.02
Red	B3	0.625 ± 0.02	0.695 ± 0.02
Near Infrared	B4	0.76 ± 0.02	0.89 ± 0.02

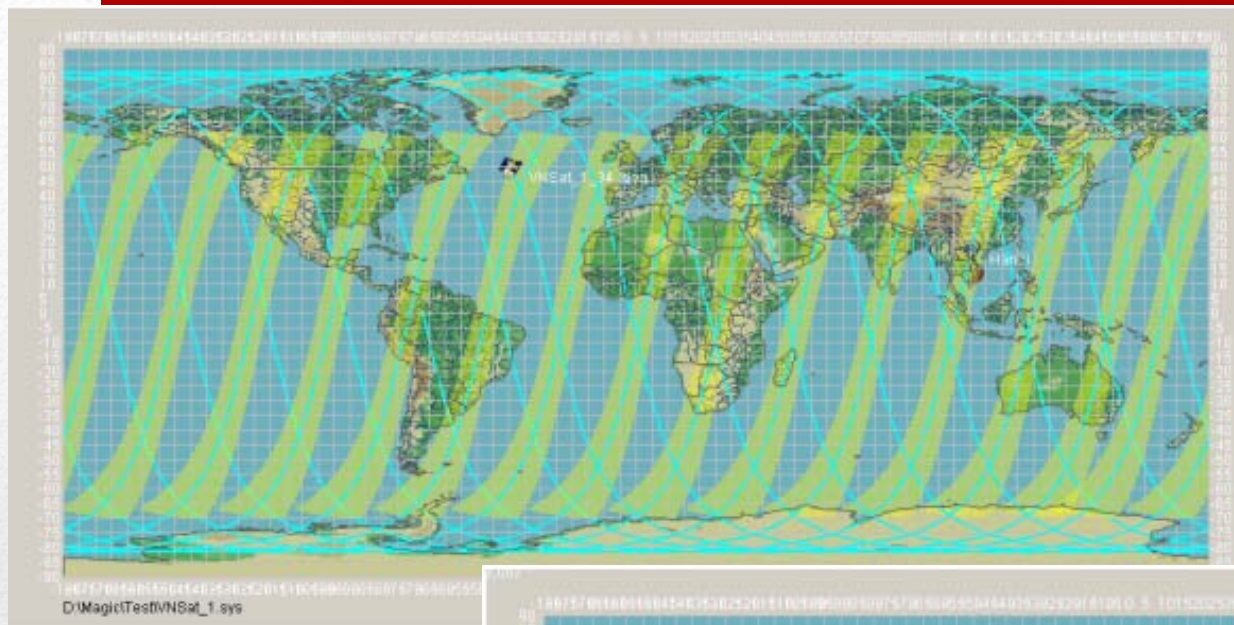
Imaging capability



- Spatial resolution: **2.5m** (PAN) and **10m** (MS)
- Imaging modes: single shot, scanning, stereo
- Swath: **17.5 km**
- Strip length: **823 km** (PAN + MS)
- Number of acquired images per day: **100 scenes**
- Max. acquisition inclined angle: +/- 35 degrees

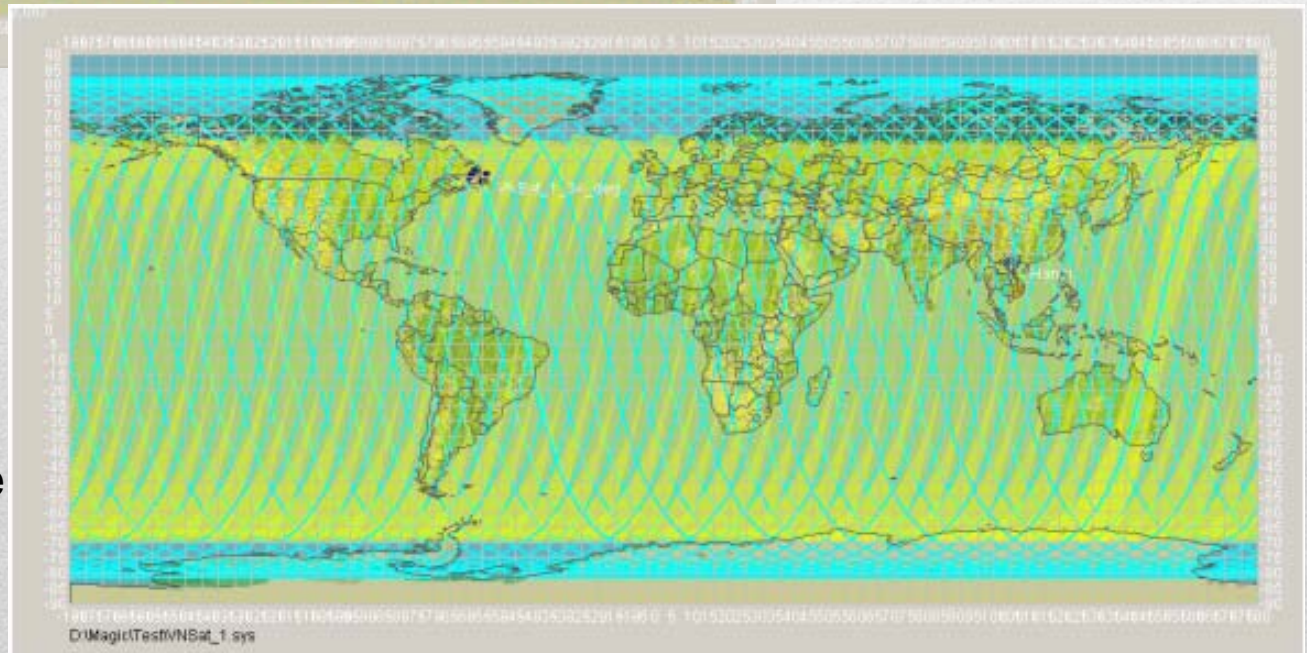
VNREDSat-1 access corridor and mean revisit time map



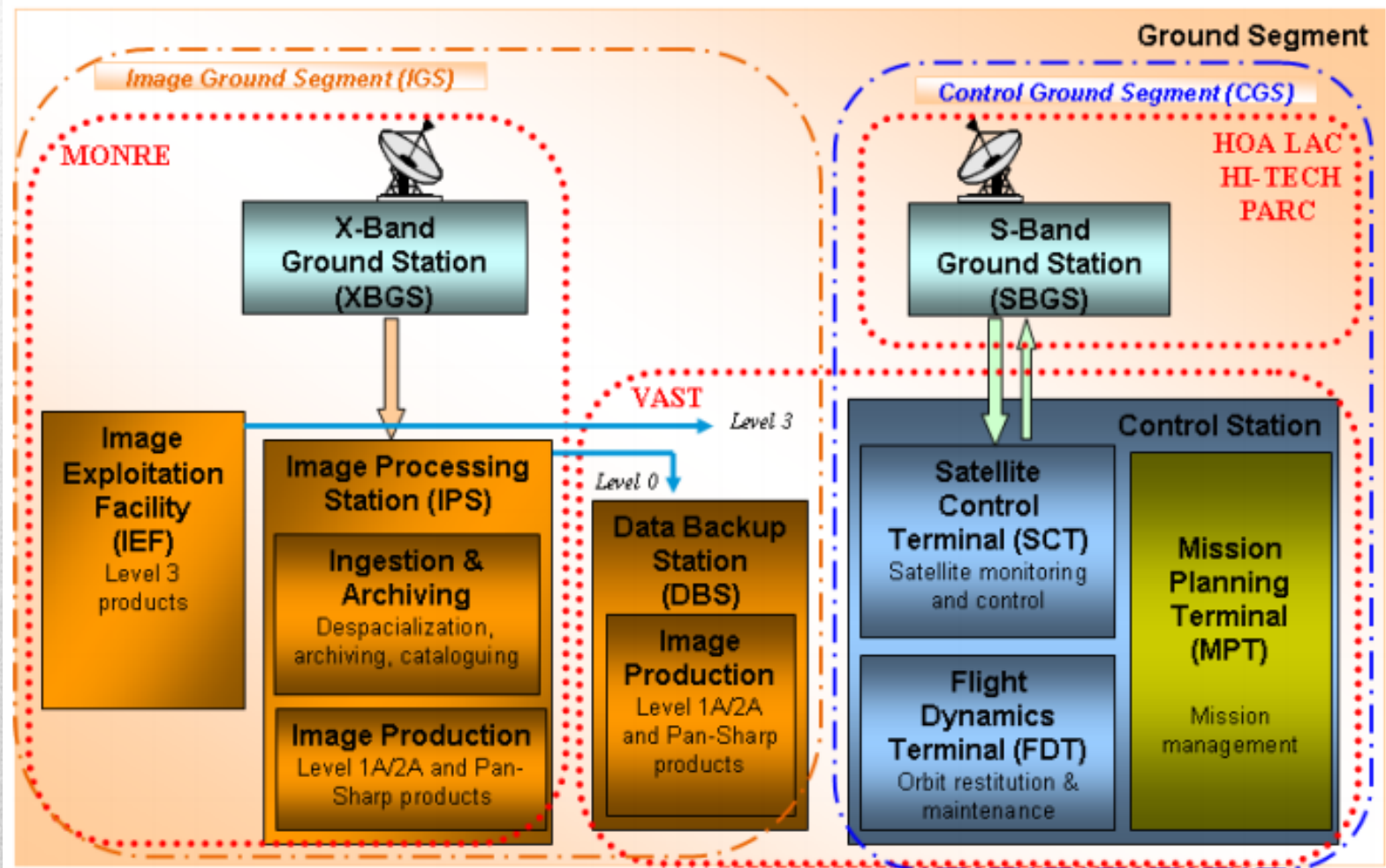


VNREDSat-1 access corridors over 1 day

VNREDSat-1 access corridors over 3 day:
Whole world coverage



VNREDSat-1 Ground segment architecture



S-band Station (Hoa Lac Hi-tech Park)



Image receiving Station (MONRE)

- Operated by MONRE
- Start to operate in November 2007;
- Manufactured by EADS DCS;
- Designed to receive telemetry from SPOT and Envisat satellites, upgraded to receive VNREDSat-1 data.



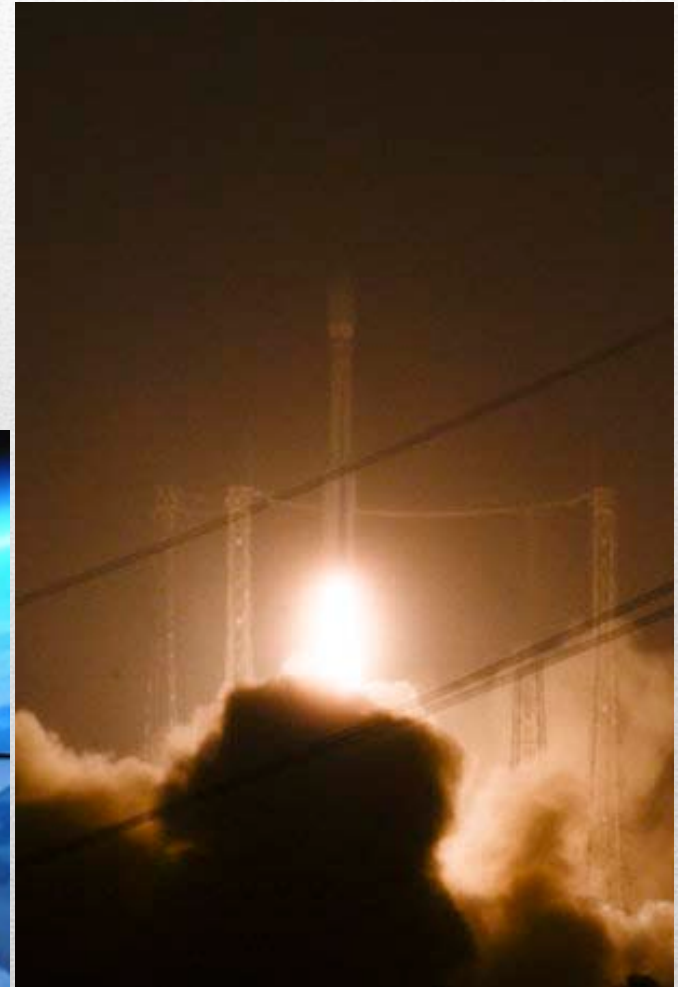
Visibility

- The lowest receiving angle of the antenna is 5 degree.
- The active range of the station is 2500 km.



Launch of VNREDSat-1

- Launcher: VEGA
- Launch date: May 7, 2013 (as a secondary payload to the PROBA-V minisatellite of ESA and CNES)
- Launch site: French Guyanna



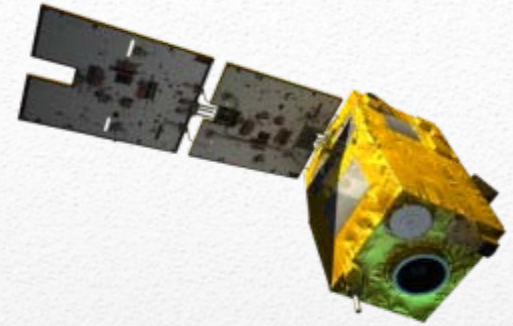
1st VNREDSat-1 image (48 hours after launch)



Hand-over ceremony on Sep. 04, 2013



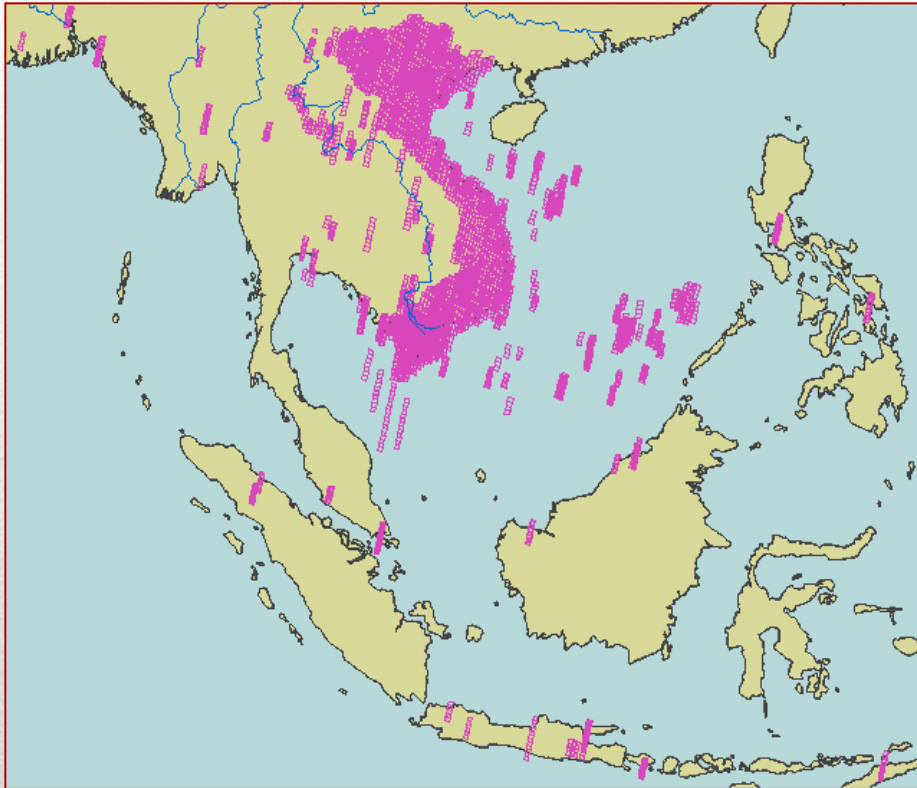
VNREDSat-1 over one year operation



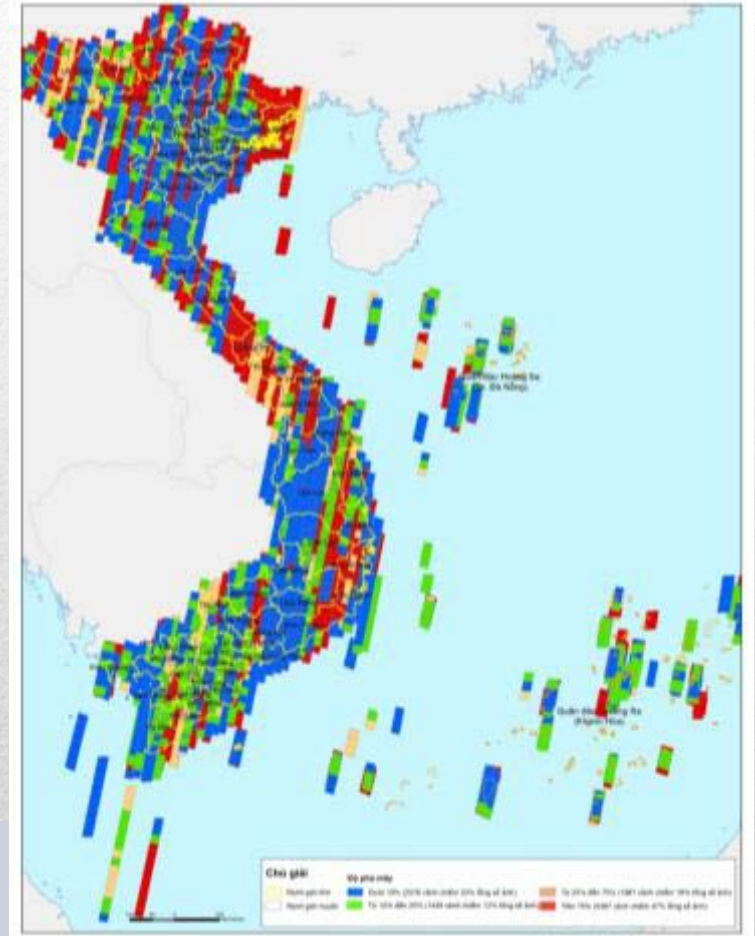
- Number of orbits: 8071
- Number of passes over Vietnam: 2063
- 8 Station-keeping maneuvers
- 2 Collision avoidance maneuvers
- Planning for 2389 acquisition requests
(Counting up to October 31, 2014)

Acquired Images

VNREDSat-1 images over ASEAN



VNREDSat-1 images over Viet Nam



As of 31th October 2014, VNREDSat-1 has captured and downlinked:

- In total: **28285** scenes (14171 MS and 14114 PAN)
- In Vietnam: **13633** scenes (6770 MS and 6821 PAN)

VNREDSat – 1 acquisition monthly report

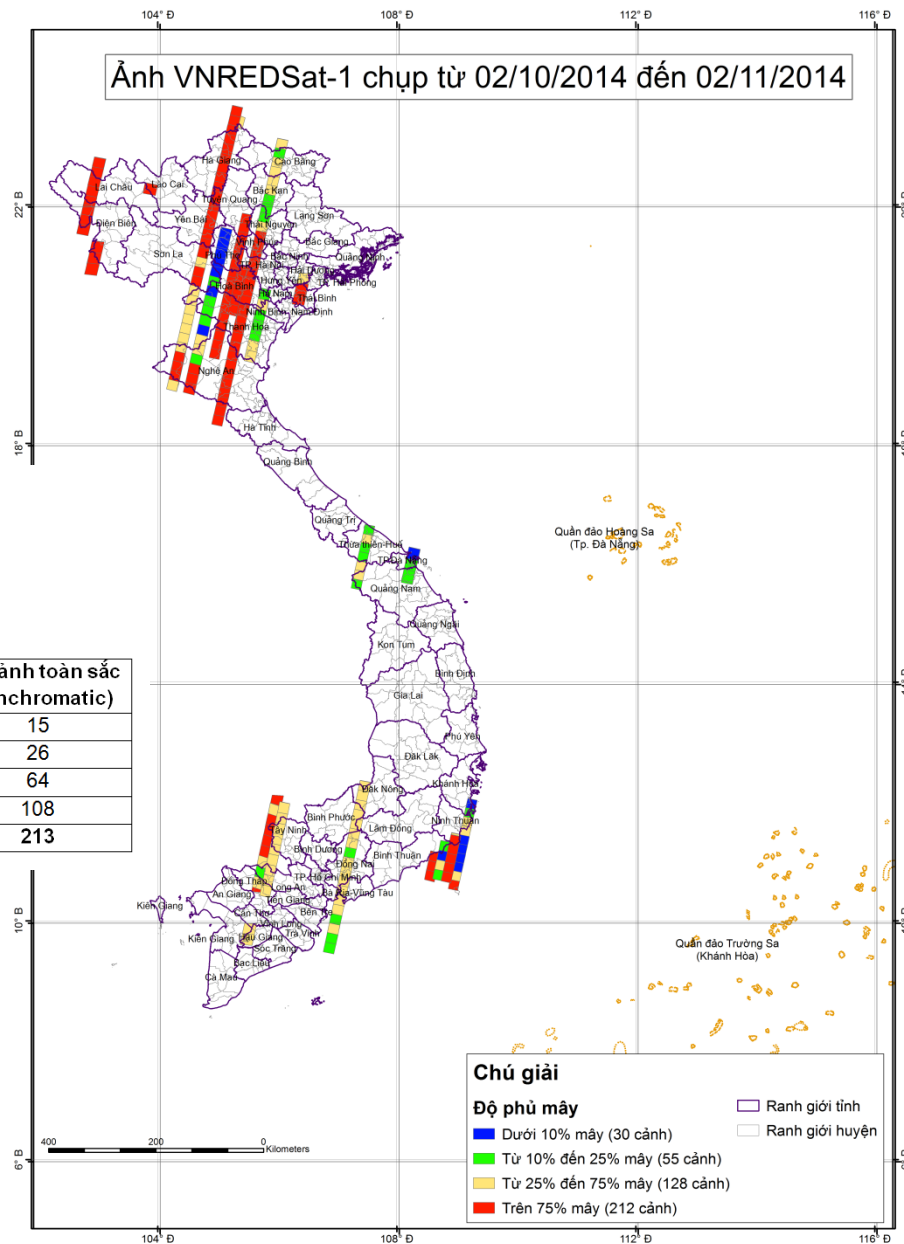
Bản tin số: 13/2014
Ngày: 05/11/2014

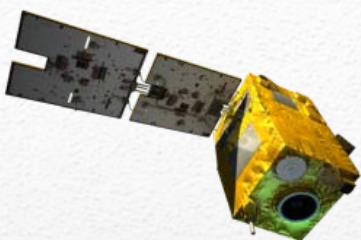
1. Tình hình hoạt động của vệ tinh :

Tình trạng vệ tinh :	Tốt
Số vòng bay quanh Trái đất:	460
Số phiên làm việc với trạm mặt đất ở Việt Nam:	119
Số dải đặt chụp trên Việt Nam:	23
Số cảnh đặt chụp trên Việt Nam:	463
Số cảnh thu về Đài Viễn thám Trung ương, Cục Viễn thám Quốc gia (Bộ TNMT):	425
Số cảnh lưu trữ dự phòng tại Trung tâm ĐKKVTVN (Viện Hàn lâm KHCNVN):	425

2. Kết quả ảnh thu nhận được:

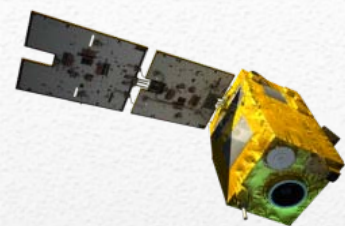
Độ phủ mây	Số cảnh đa phổ (Multispectral)	Số cảnh toàn sắc (Panchromatic)
< 10%	15	15
10% – 25%	29	26
25% – 75%	64	64
> 75%	104	108
Tổng số	212	213





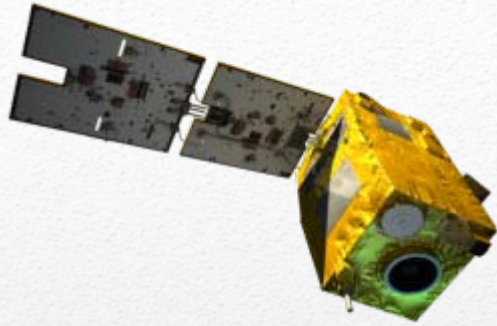
Ha Noi





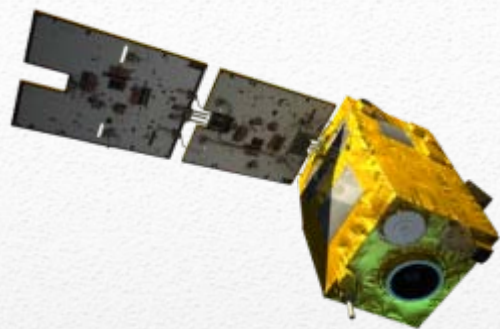
Hue





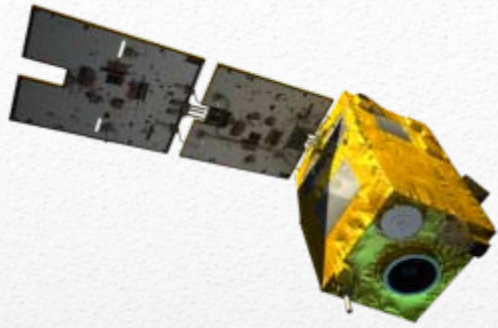
Da Nang





Nha Trang





Ho Chi Minh
city



Bangkok (Thailand), Acquired by VietNam Satellite on 17/12/2013

Jakarta (Indonesia), Acquired by VietNam Satellite on 22/08/2013

Kuala Lumpur (Malaysia), Acquired by VietNam Satellite on 28/06/2013

Manila (Philippines), Acquired by VietNam Satellite on 11/05/2014

Naypyidaw (Myanmar), Acquired by VietNam Satellite on 27/10/2014

PhnomPenh (Cambodia), Acquired by VietNam Satellite on 28/06/2013

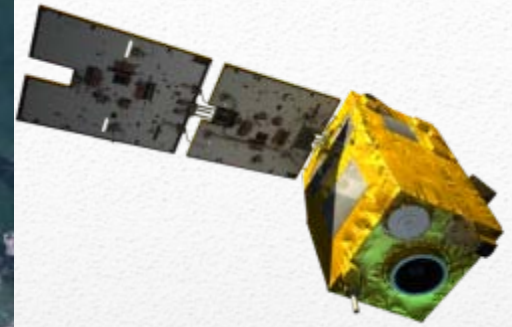
Singapore (Singapore), Acquired by VietNam Satellite on 06/10/2013

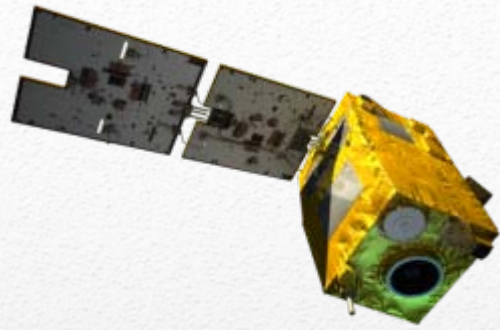
Vientiane (Lao PDR), Acquired by VietNam Satellite on 14/12/2013



Emergency Acquisition

Tacloban, Philippines
after Haiyan storm
Nov. 15, 2013

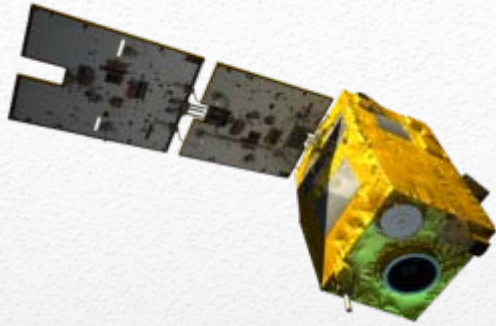




Emergency Acquisition

Flood in
Srinagar, India
Sep. 18, 2014

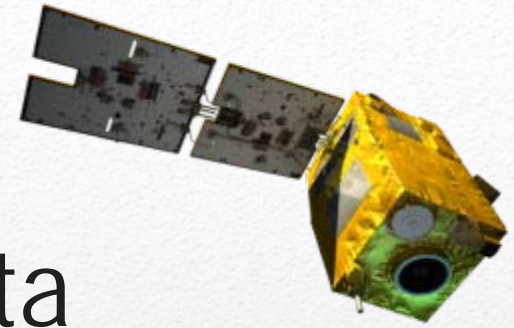




Emergency Acquisition

Flood in
Muzaffargarh,
Pakistan
Sep. 18, 2014



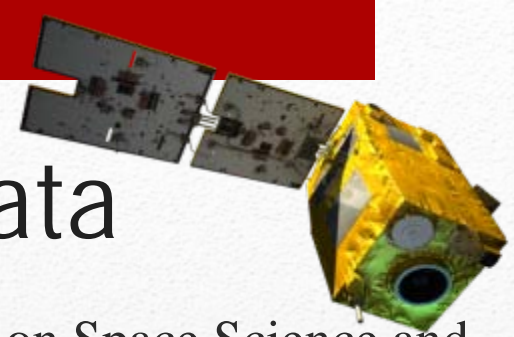


Applications of VNREDSat-1 data

VNREDSat – 1 images are now widely used for various purposes:

- In national forest inventory programme;
- For topographic and land-use map updating;
- Environment surveillance;
- Coastal management
- Oceanography
- Disaster monitoring;
- Scientific research.

Applications of VNREDSat-1 data



Considering just inside the National Research Programme on Space Science and Technology, the VNREDSat – 1 images are used in 11 different projects:

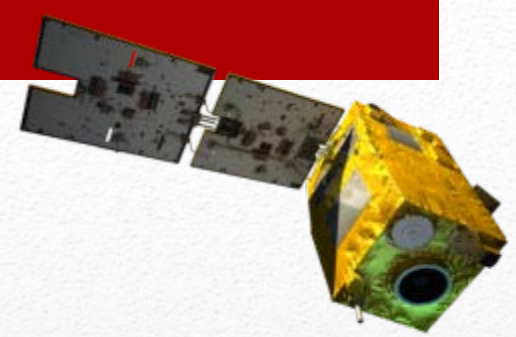
- Application of the VNREDSat – 1 in study, forecast and assessment of the geological calamity affecting on hydropower reservoir and road network in North West region.
- Application of the VNREDSat – 1 and GIS for monitoring the changes inside Vietnam and boundary region.
- Application of the VNREDSat – 1 images and GIS for monitoring and forecast the coffee production in Tay Nguyen plateau. A case study in DakLak province.
- Application of the VNREDSat – 1 for monitoring the use of agricultural land in South West region.
- Development of a system to monitor the border and sea port, using the VNREDSat – 1. A pilot study in Sai Gon and Phu Quoc ports.
- Application of the VNREDSat – 1 images and GIS for reservation of natural and cultural heritage in the Middle part. A case study in Hue city and Phong Nha Ke Bang National Park.



Applications of VNREDSat-1 data

- Application of the VNREDSat – 1 images to establish the topographic and GIS database in bordering area.
- Establishment of a digital database of oceanographic parameters derived from VNREDSat – 1 images for Ninh Thuan – Binh Thuan coastal area.
- Establishment of an information system for monitoring and management of the natural resources in some Natural Reservation Areas in North – West region, using remote sensing and GIS, including VNREDSat – 1 images.
- Research on the methods for analysis, assessment and monitoring the water quality in coastal area, using multi-temporal high and medium resolution remotely sensed images. Testing on the VNREDSat – 1 images.
- Research on using the VNREDSat – 1 for monitoring and management of the natural resources and environment of the Northern high plateau.

Conclusion



- The VNREDSat-1 project has been implemented based on the research, assessments of Vietnam's practical needs, as well as current technologies and trends in the world.
- For the purposes of uniform administrative management and cost-effectiveness, the system has been designed to take advantage of the existing infrastructure and technologies in Vietnam including the Vietnam Natural Resources and Environment Monitoring System, implemented by MONRE.
- With the VNREDSat – 1, Vietnam possesses a complete and independent monitoring system, including infrastructure, human resources, to meet the increasing requirement on remotely sensed data of various Vietnamese national as well as local agencies.

THANK YOU!

