



**Asia-Pacific
Economic Cooperation**

2017/SOM3/EPWG/020

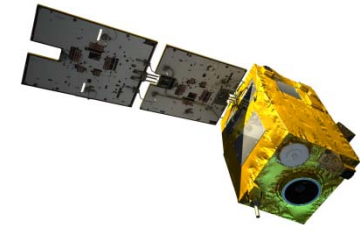
Agenda Item: 7.2.4

Research on Using Space Technology for Disaster Prevention and Control in Viet Nam

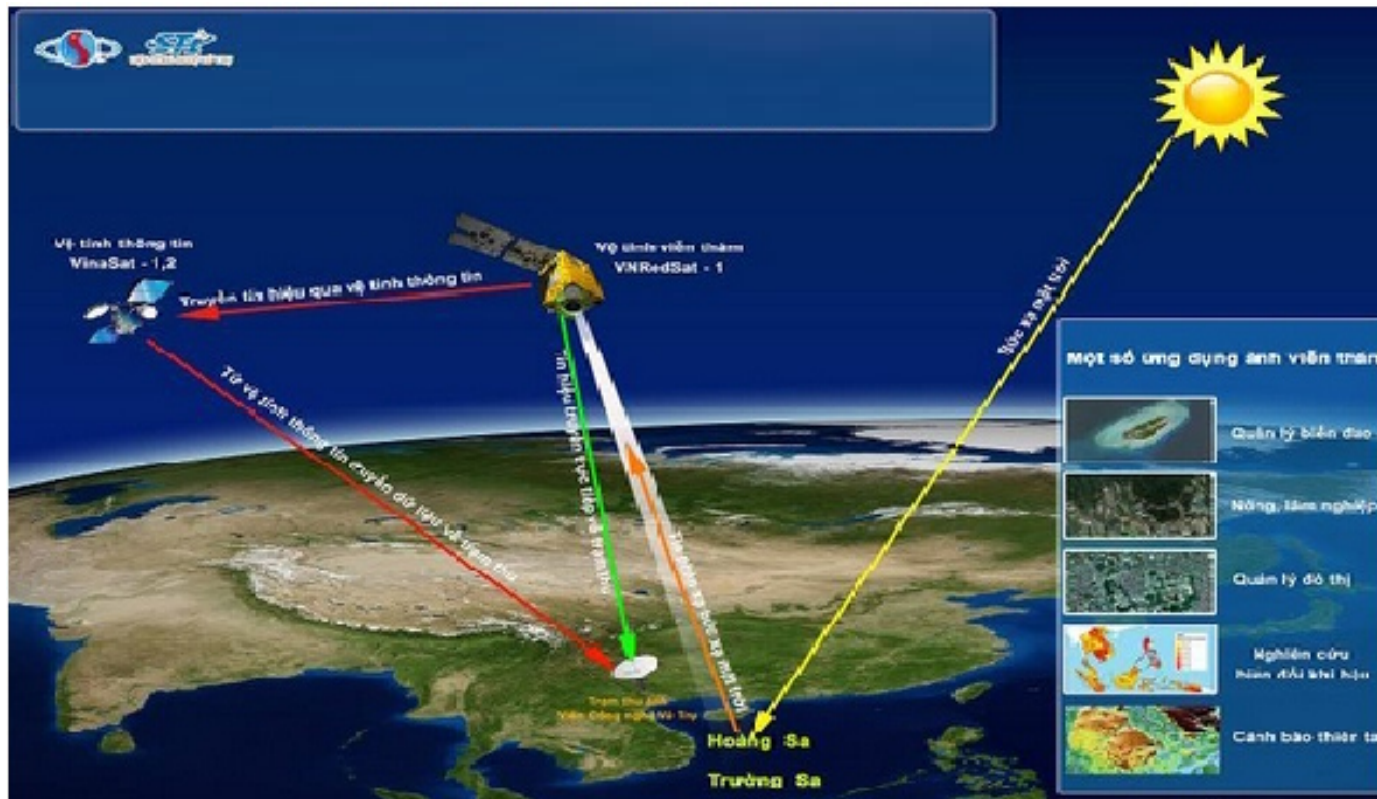
Purpose: Information
Submitted by: Viet Nam



**12th Emergency Preparedness Working Group
Meeting
Ho Chi Minh City, Viet Nam
21-22 August 2017**



SPACE TECHNOLOGY INSTITUTE, VNREDSat-1 and INTERNATIONAL COOPERATION



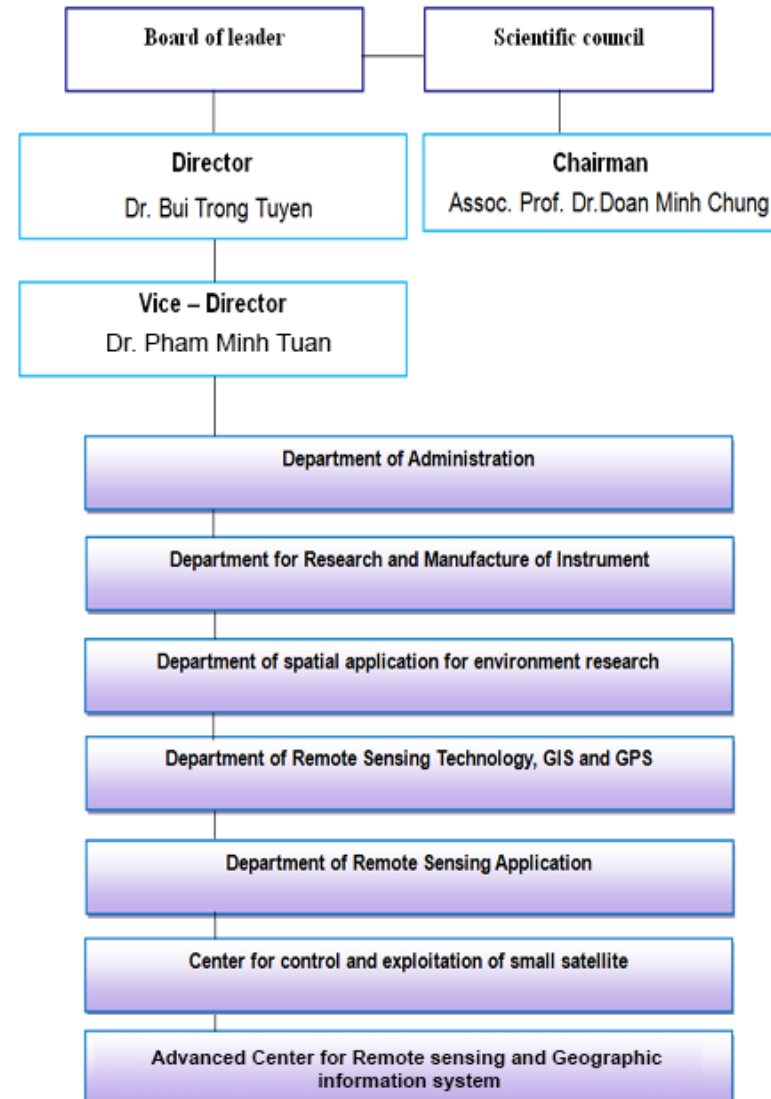
CONTENT

1. **Overview of Space Technology Institute (STI)**
2. **Main activities and achievements by STI**
3. **VNREDSat-1, its applications and SA's DPN**
4. **VAST and MARD cooperation activities**



- STI established in 20/11/2006

Organization



Members: ~60 members

Main activities and achievements by STI

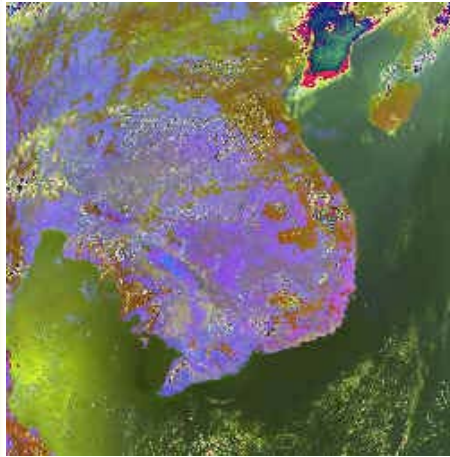
- **Satellite and ground station technology**
- **Applications of remote sensing, GPS and GIS**
- **Control and exploitation of VNREDSat-1 system**

Satellite and ground station technology

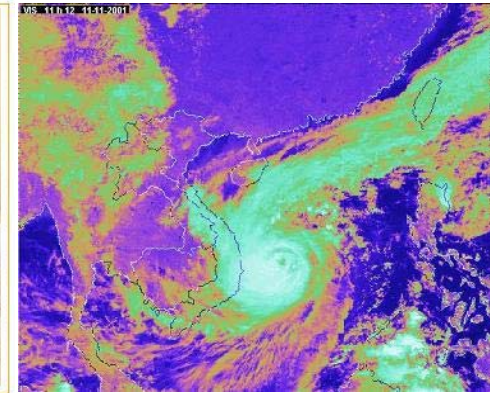
- Pioneer in research, design and manufacture of receiving stations for polar and geostationary metrological satellites.



WEAFAX APT receiving system



GMS/MT-SAT/FY-2 receiving system



NOAA receiving system





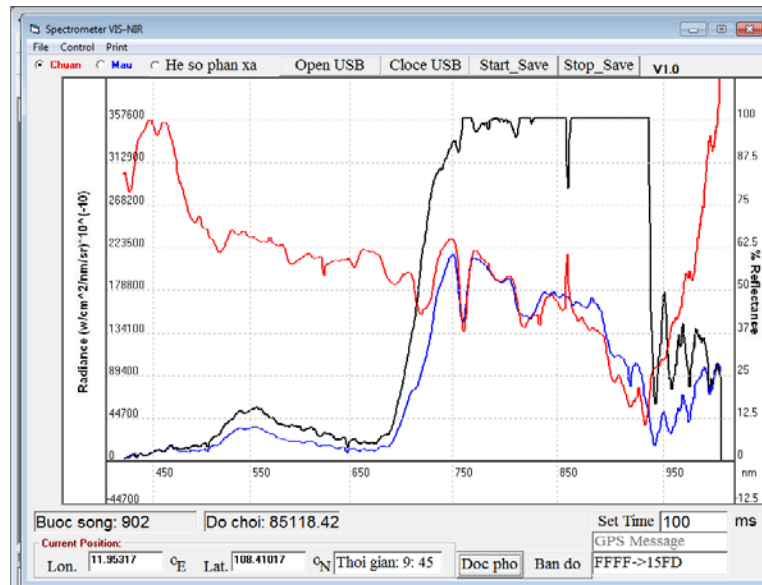
Utilization of NOAA receiving systems in natural disaster management



VIS-NIR Spectrometer



Spectrometer onboard UAV



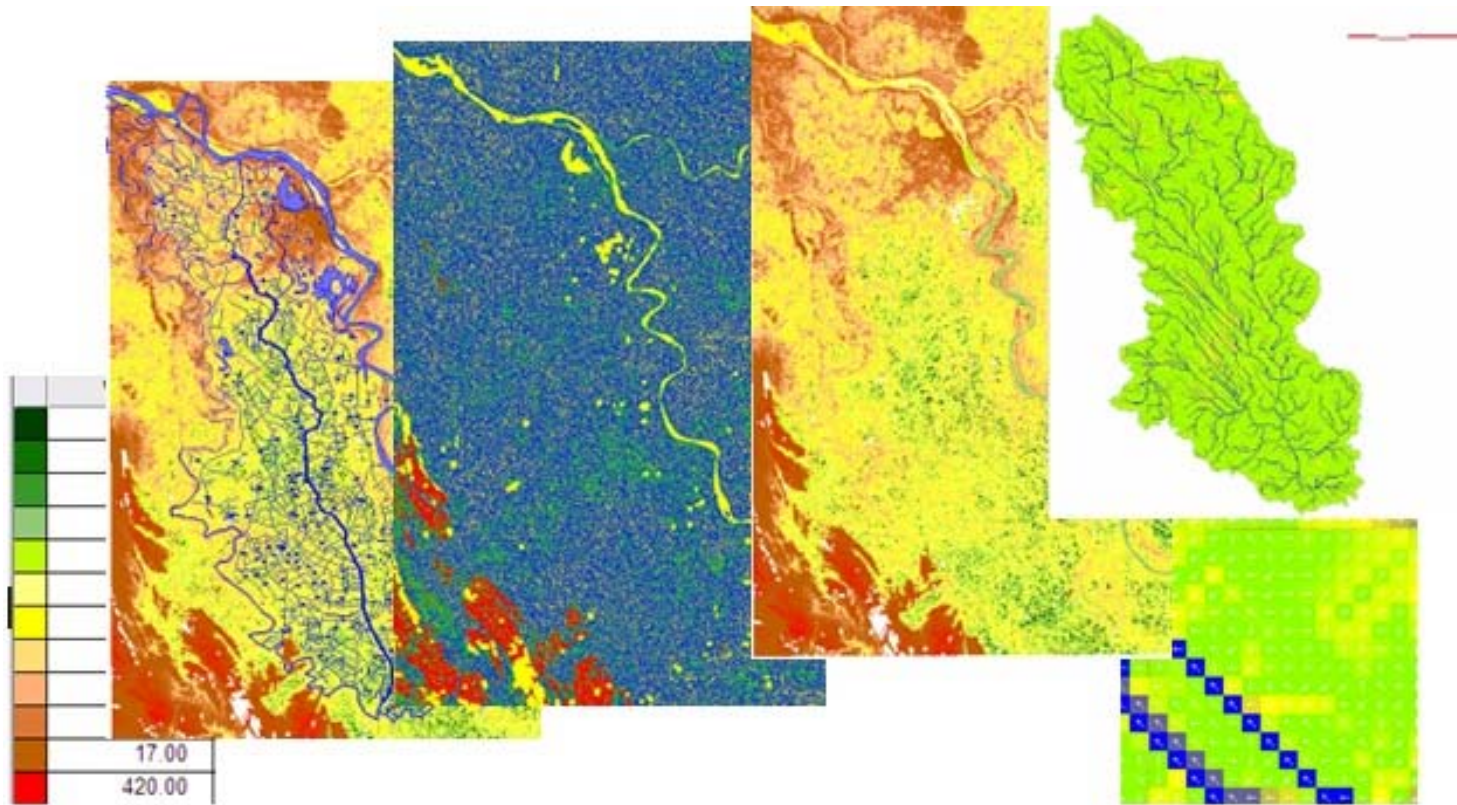
Optical & Near-infrared spectrum



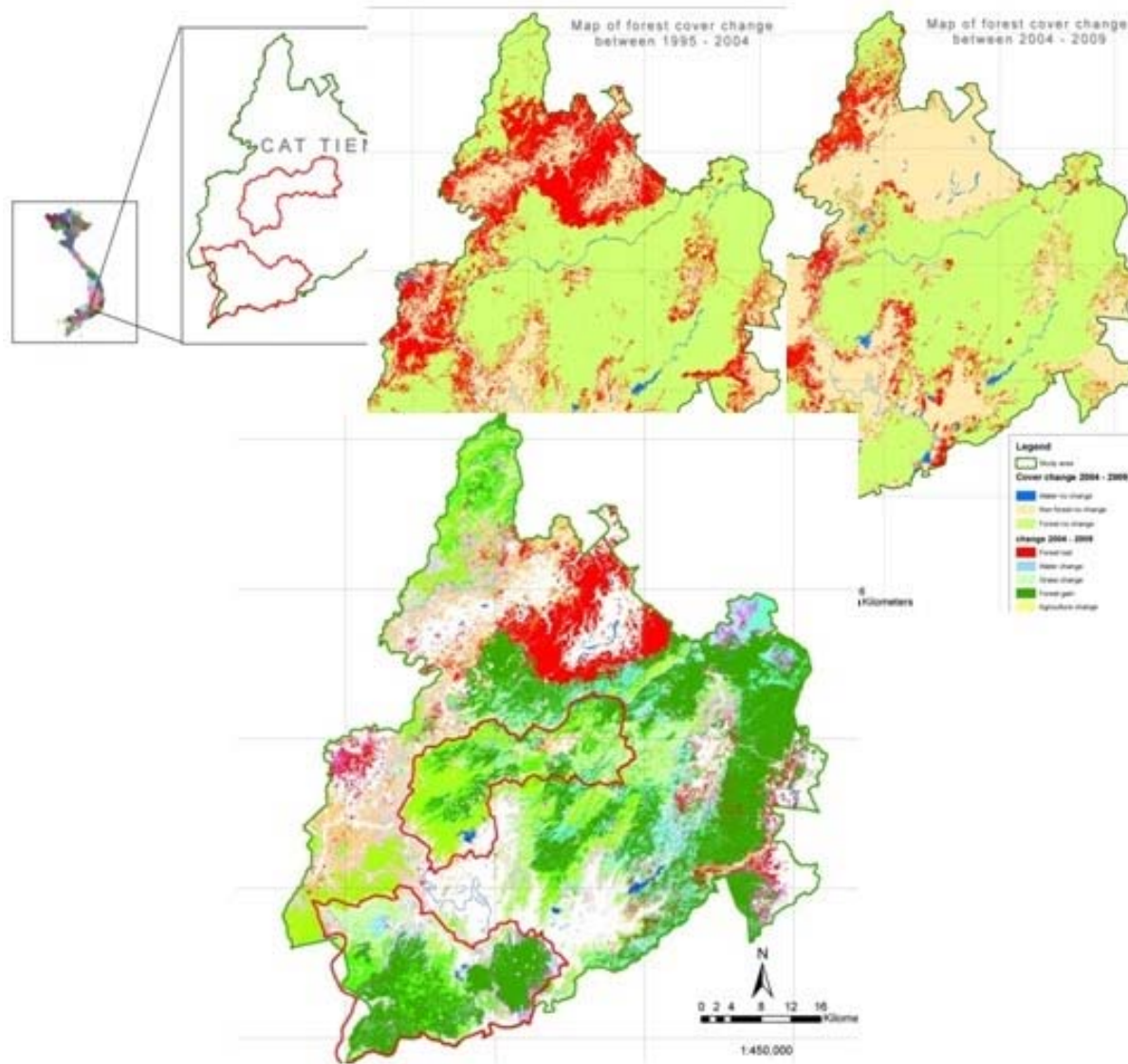
UAV & its application for monitoring forest fires, drought /flood, water quality, ship and oil spill, etc (VAST program)

Spectrometer (manufactured by STI) used for measuring the reflective spectrum of the natural objects

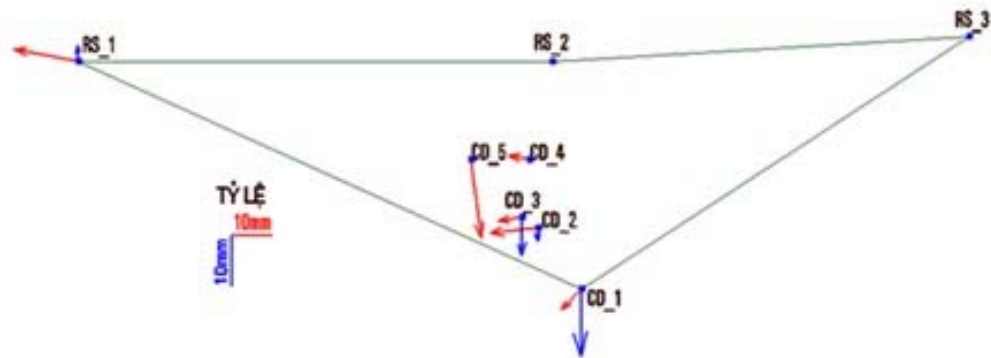
Applications of remote sensing GPS and GIS



Integration and modeling of remote sensing information in GIS for Cau River basin, disaster management



Assessment on change of forest cover, REDD (Reducing Emissions from Deforestation and Degradation) project Viet Nam



Application of high-precision GPS for monitoring of costal building displacement

**VNREDSat-1 system
and its contribution as
SA-DPN**

VNREDSat-1

(1st VietNam Natural Resource, Environment & Disaster monitoring system)

Owner: VAST

Launch date: 07/5/2013 from Kourou, France

Resolution: PAN (2.5m) and 4 MS (10m)

Revisit: **3 days**

Orbit: **SSO, 680 km altitude**

LTAN : **10:42 PM**

Mass: **~130 kgs**

Design lifetime: **5 years**

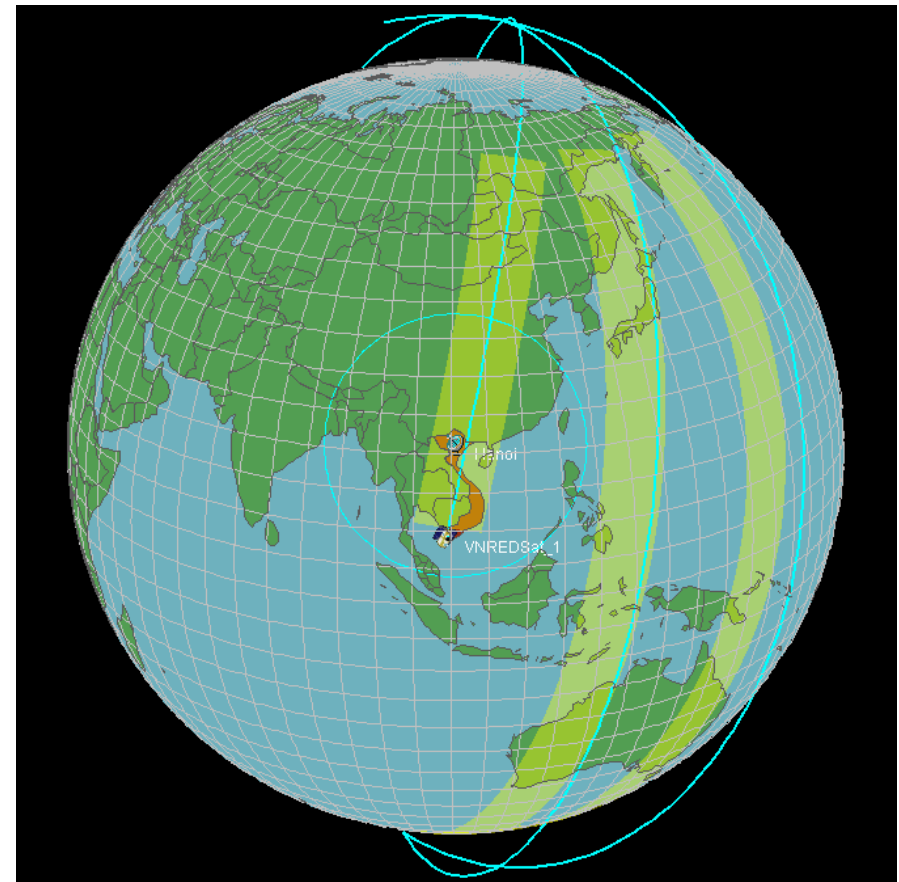
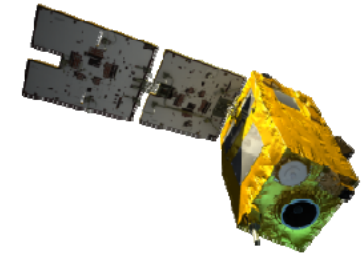
Imaging mode: single shot, scanning, stereo

Swath: **17.5 km**

Length: **823 km (PAN + MS)**

Scenes/day: **100**

Agility : +/- 35 degrees



Spectral bands

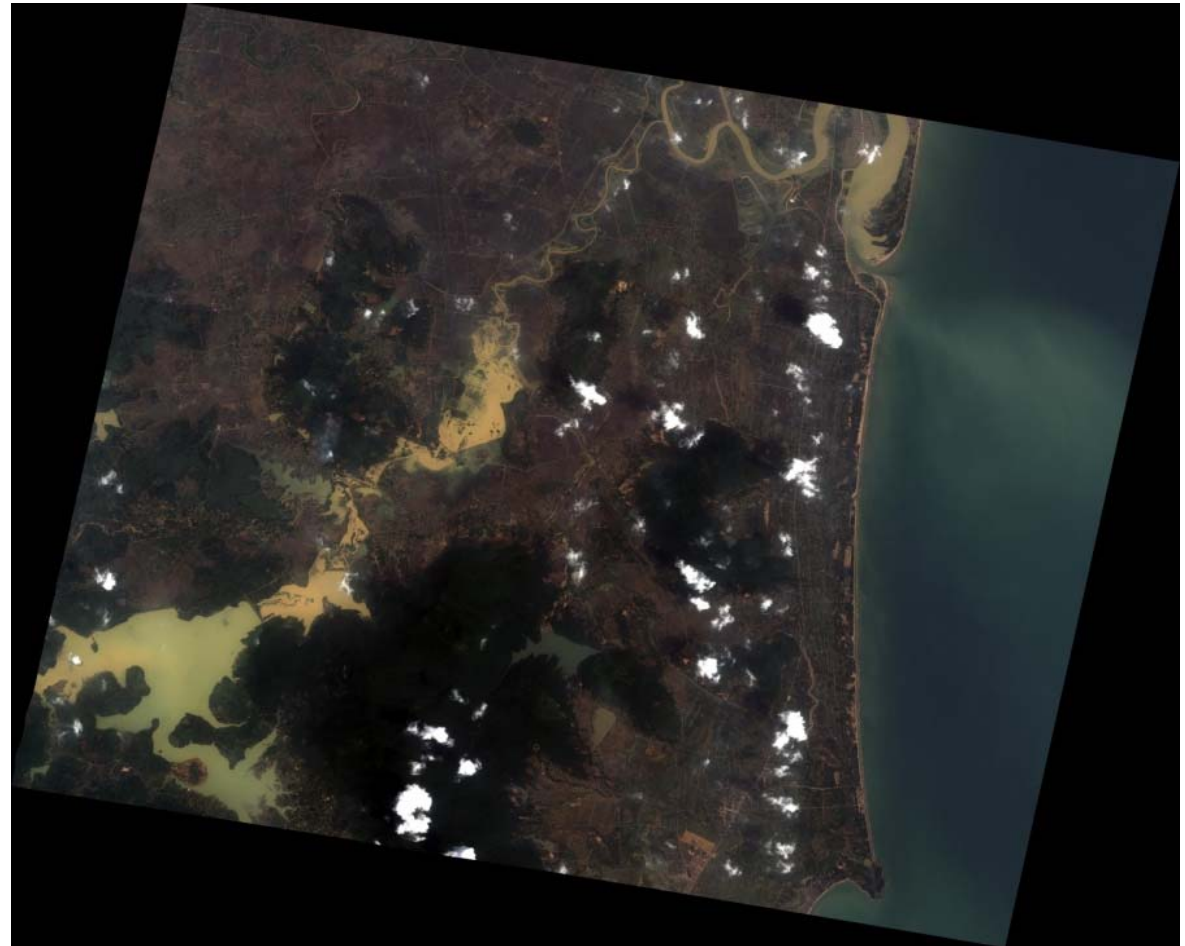


Band	Name	Lower Band Edge (μm)	Upper Band Edge (μm)
Panchromatic	PAN	0.45 +/- 0.02	0.75 +/- 0.02
Blue	B1	0.45 +/- 0.02	0.52 +/- 0.02
Green	B2	0.53 +/- 0.02	0.59 +/- 0.02
Red	B3	0.625 +/- 0.02	0.695 +/- 0.02
Near-Infrared	B4	0.76 +/- 0.02	0.89 +/- 0.02



Typical applications of VNREDSat-1

- Land use mapping
- Agriculture
- Forest management
- Environment and territory (oil spill, water, atmospheric pollution)
- Island and costal management
- Disaster management: monitoring, early-warning, assessment, ...



*VNREDSat-1 image dated 4/10/2013
over Nghe An Province.
Flood caused by hydro-power plant*

VNREDSat-1: a SA's DPN

- 18/11/2015: VNREDSat-1/STI accepted as a SA-DPN/DAN
- Related activities:
 - APRSAF
 - 📁 SCOSA
 - 📁 SA's meeting:
 - 📁 **COORDINATION IMPROVEMENT BETWEEN DISASTER RELATED AGENCIES AND SENTINEL ASIA (GIC, AIT, JAXA, STI, DMC, MONRE), Hanoi, Nov 2016**
 - 📁 **DPN meeting in Sri Lanka**
 - 📁 **SC's meeting, Bangkok, 2016**
 - 📁 ...

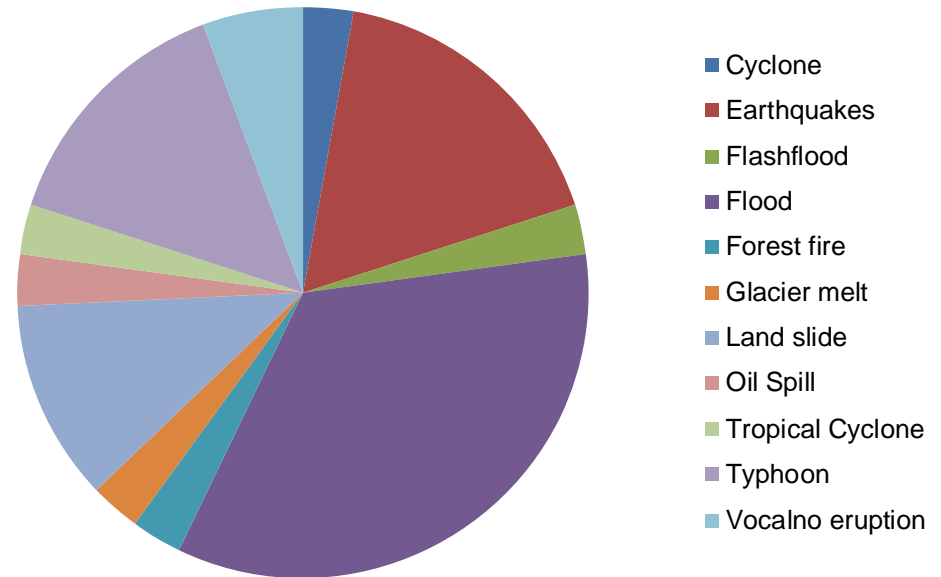
VNREDSat-1 responses

No	Date	Disaster	Location	Requester
1	16/01/2014	Flood	Jakarta, Indonesia	SA
2	10/12/2015	Typhoon	Tacloban, Philippine	SA
3	8/11/2015	Flood	Tamil Nadu, India	SA
4	6/2/2016	Earthquake	Taiwan	SA
5	22/02/2016	Typhoon	Fiji Island, Pacific Ocean	SA
6	25/02/2016	Glacier melt	Northern of Myanmar	SA
7	1/3/2016	Flood	Northern of Myanmar	SA
8	2/3/2016	Flood	Jakarta, Indonesia	SA
9	14/03/2016	Flood	Bandung, Indonesia	SA
10	1/4/2016	Forest fire	Philippines	SA
11	1/4/2016	Oil Spill	Taiwan	SA
12	6/4/2016	Land slide	Pakistan	SA
13	14/04/2016	Earthquake	Myanmar	SA
14	16/04/2016	Earthquake	Japan	SA
15	16/04/2016	Earthquake	Ecuador	SA
16	16/05/2016	Flood	SriLanKa	SA
17	23/05/2016	Vocalno eruption	Indonesia	SA
18	20/06/2016	Land slide	Indonesia	SA
19	06/07/2016	Flood	Nepal	SA
20	11/07/2016	Typhoon	Taiwan	SA

Year	No. of scences
2014	6
2015	15
2016	335
2017	69

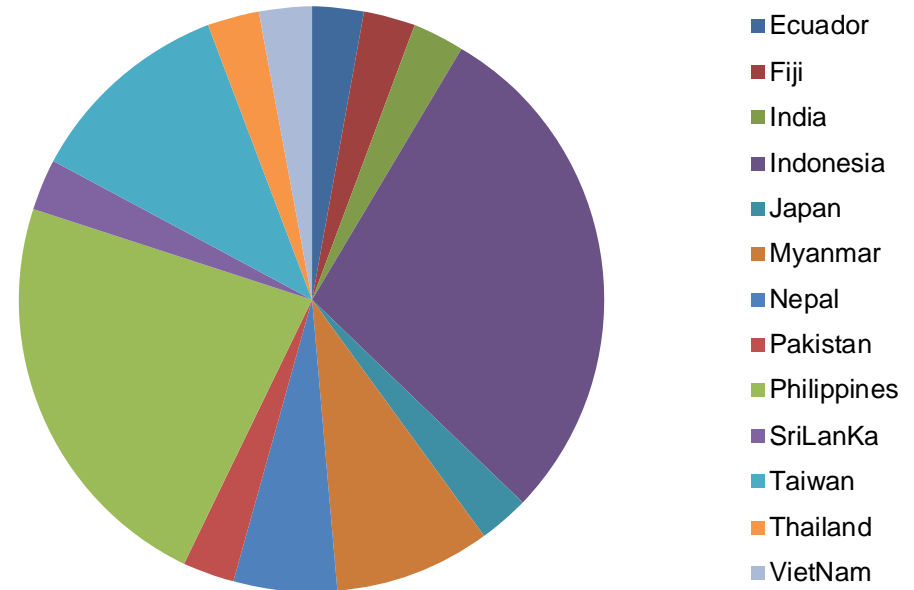
VNREDSat-1: Type of disaster

Cyclone	1
Earthquakes	6
Flashflood	1
Flood	12
Forest fire	1
Glacier melt	1
Land slide	4
Oil Spill	1
Tropical Cyclone	1
Typhoon	5
Vocalno eruption	2

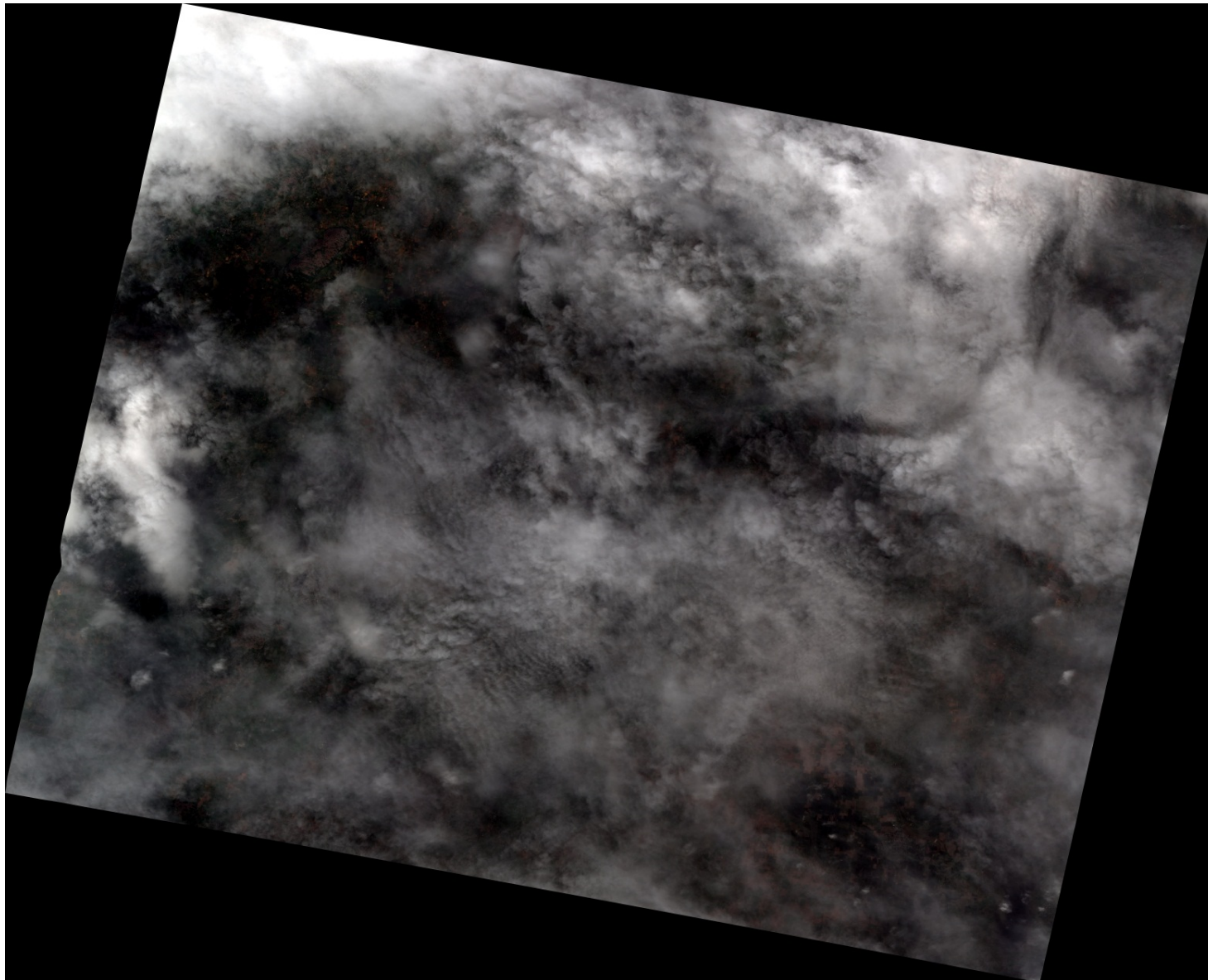


VNREDSat-1: by country

Ecuador	1
Fiji	1
India	1
Indonesia	10
Japan	1
Myanmar	3
Nepal	2
Pakistan	1
Philippines	8
SriLanKa	1
Taiwan	4
Thailand	1



VNREDSat-1 image of Tamil Nadu, India (3/12/2015) –
EOR dated 2/12/2015



VNREDSat-1 of Tacloban, The Philippines (10/12/2015) –
EOR dated 9/12/2015



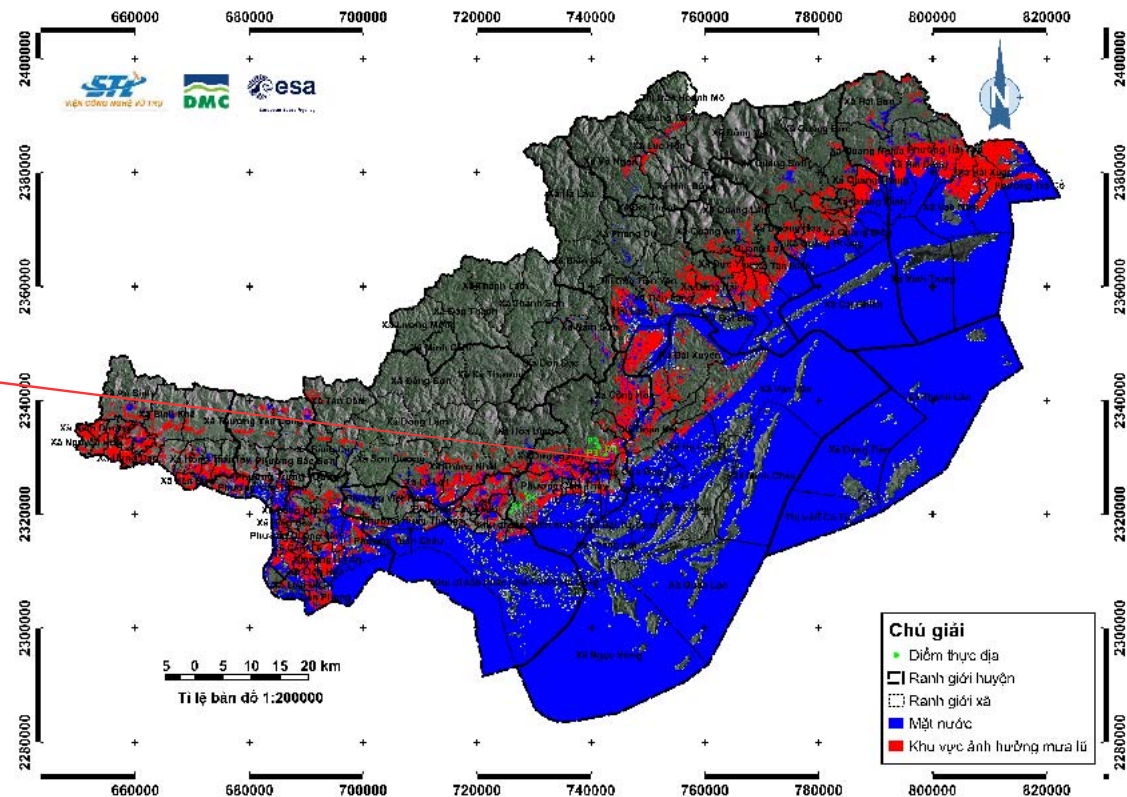
**VAST and MARD
cooperation activities on
disaster management**

VNREDSat-1 in flooding damaged assessment Quang Ninh province, July 2015



VNREDSat-1 (STI, VAST)
and ASTER GDEM
(METI/NASA)

BẢN ĐỒ KHU VỰC ẢNH HƯỞNG DO MƯA LŨ TRÊN ĐỊA BÀN TỈNH QUẢNG NINH
(ẢNH VỆ TINH SENTINEL-1, THÁNG 07/2015)



Sentinel-1 (ESA) captured flooding area in Quang Ninh province. The product is generated by Resfe (RS software is developed by STI)

Requested by: MARD

Mekong watching is developed by VNREDSat-1 and Landsat-8

Multi-spectral image analysis in Resfe (Dat and Hubert, IOCS, 2017) is developed and used for multi-task like water quality assessment, flooding, coastal erosion, etc... (Landsat-8, Sentinel-2, SPOT-6-7 và VNREDSat-1)



RGB
composited

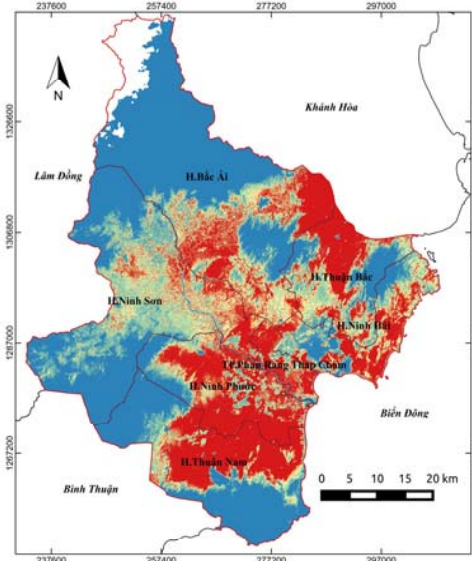


Water extraction
for VNREDSat-1

VNREDSat-1 and other multi-spectral satellite image in drought effected assessment

TVDI (Sandholt et al, 2002) is used to generate drought map from MODIS, Landsat, Sentinel-2-3 và VNREDSat-1...

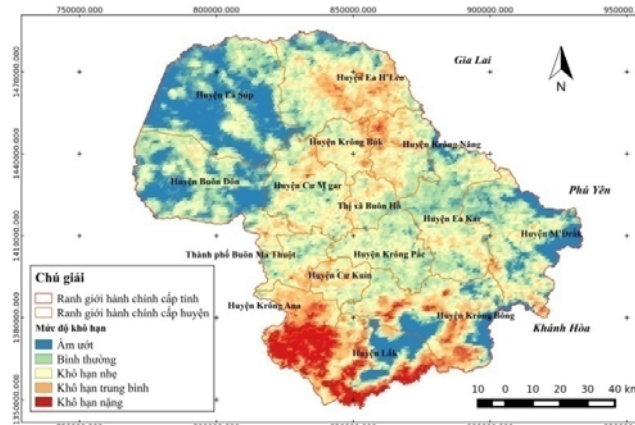
Bản đồ chỉ số khô hạn tỉnh Ninh Thuận tháng 9 năm 2015 từ ảnh vệ tinh Landsat 8



- Chú giải**
- Ranh giới tỉnh
 - Ranh giới huyện
 - Ranh giới giáp ranh
- Mức độ khô hạn**
- Am ướt
 - Không khô hạn
 - Khô hạn nhẹ
 - Khô hạn trung bình
 - Khô hạn nặng

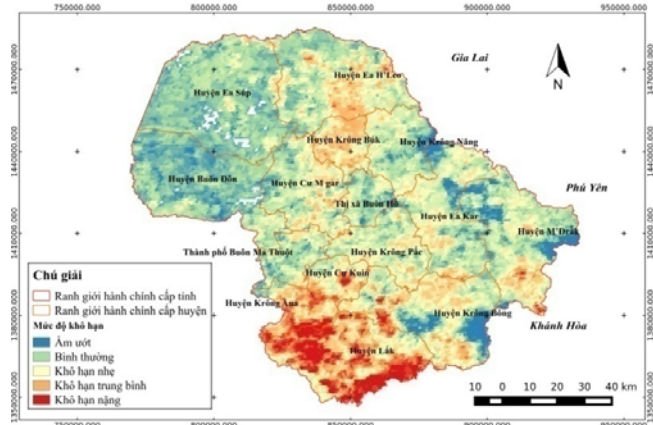


Bản đồ chỉ số khô hạn tỉnh Đắk Lắk tháng 03/2010 từ ảnh vệ tinh MODIS



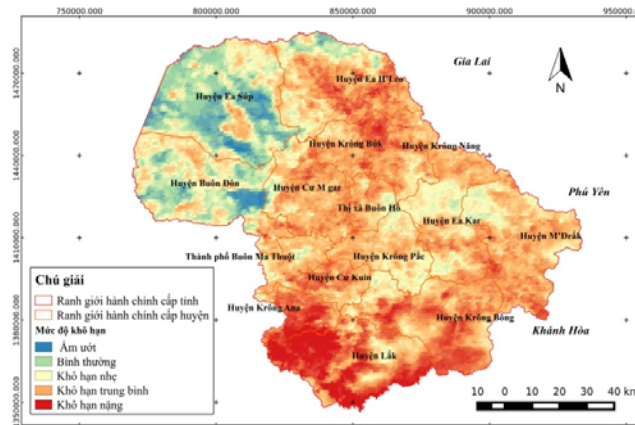
- Chú giải**
- Ranh giới hành chính cấp tỉnh
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Bản đồ chỉ số khô hạn tỉnh Đắk Lắk tháng 03/2011 từ ảnh vệ tinh MODIS



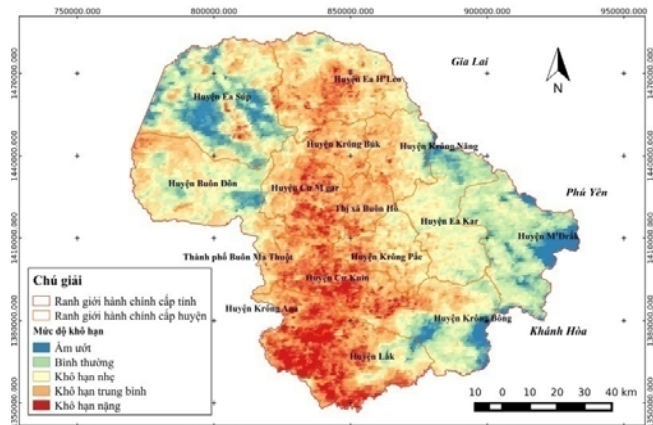
- Chú giải**
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 - Ranh giới hành chính cấp huyện
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Bản đồ chỉ số khô hạn tỉnh Đắk Lắk tháng 03/2012 từ ảnh vệ tinh MODIS



- Chú giải**
- Ranh giới hành chính cấp tỉnh
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Bản đồ chỉ số khô hạn tỉnh Đắk Lắk tháng 03/2013 từ ảnh vệ tinh MODIS



- Chú giải**
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VIỆN CÔNG NGHỆ VŨ TRỤ
Space Technology Institute

THANK YOU VERY MUCH

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