GEOSCIENCE INFORMATION FOR TEACHERS (GIFT) WORKSHOP

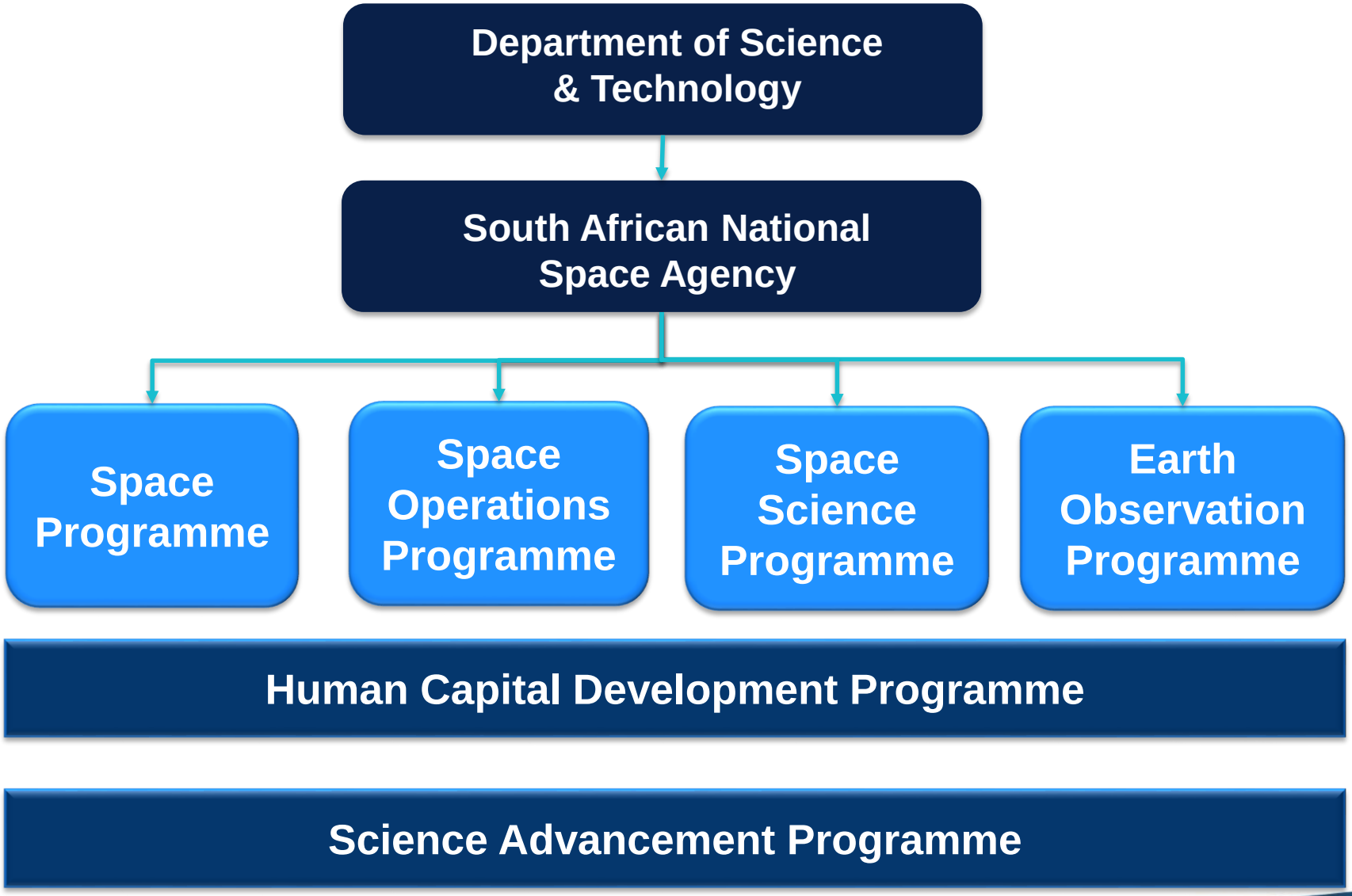
Iziko Museum, Cape Town, 27-28 August 2016

Phila Sibandze, SANSA

Outline

- Introduction to SANSA
- History of Satellite Technology in South Africa
- Remote Sensing Applications in Natural Hazards
- FUNDISA Disk
- Remote Sensing Atlas

Introduction to SANSA



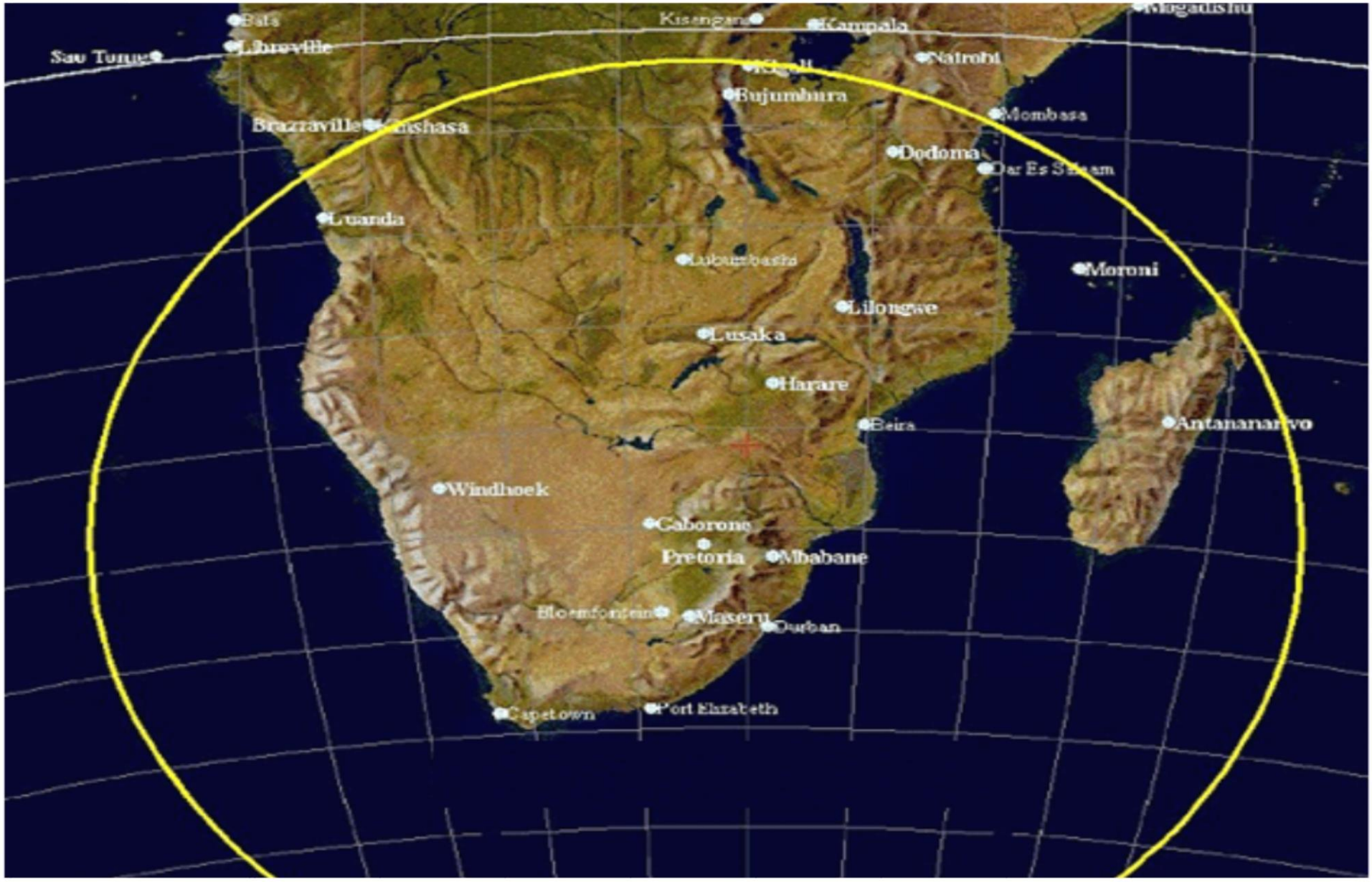
Space Programme

- The coordinated development and operation of satellite systems, sensors and sub-systems
- State of the art satellite assembly, integration and testing services
- An environment conducive to enhancing the competitiveness of the industry

Space Operations

- Tracking, Telemetry & Command (TT&C)
- Launch and Early Orbit Support / Transfer Orbit Support (TOS)
- In-Orbit Testing, Routine Operations & Emergency Support

Space Operations



Space Science

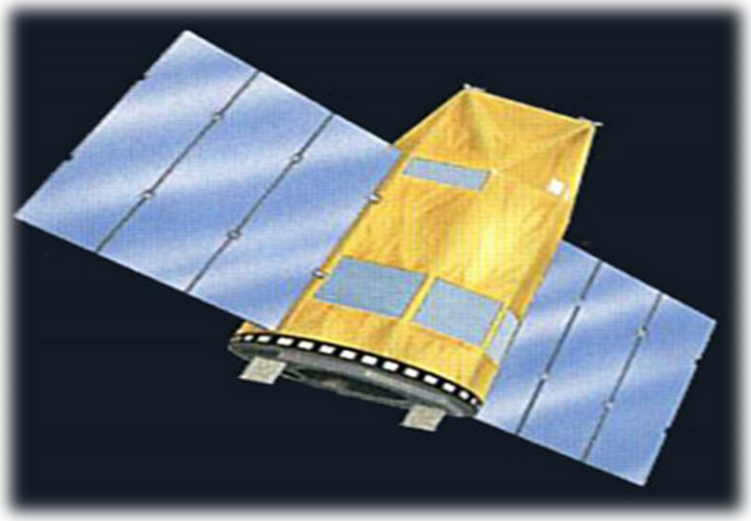
- Part of a worldwide network of magnetic observatories
- Responsible for research, infrastructure and data used to monitor the near earth environment
- The only Space weather centre in Africa, monitoring space weather conditions, providing early warnings, forecasts and predictions to the nation

Earth Observation

- Earth Observation is the gathering of information about our planet's physical, chemical and biological system using Remote Sensing technology. It is used to monitor and assess the status of and changes in, the natural environment and the built environment.
- The information supplied provides valuable input for a wide variety of decision-makers, impacting areas such as food security, water management, disaster management, housing development, infrastructure planning, etc

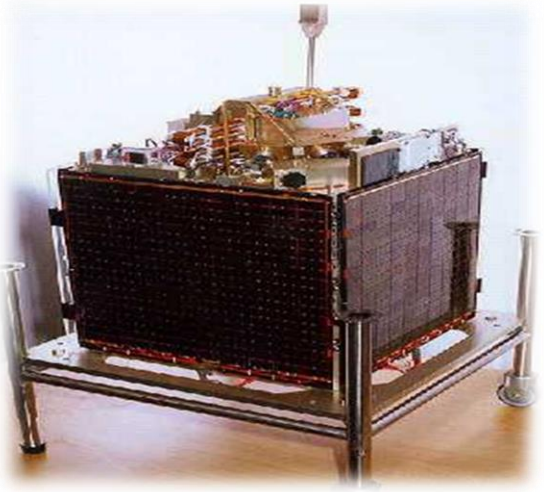
History of South African Satellites

GreenSat



- Started in 1985
- Weight: 330 kg
- 2.5m Resolution
- Project cancelled due to lack of funds

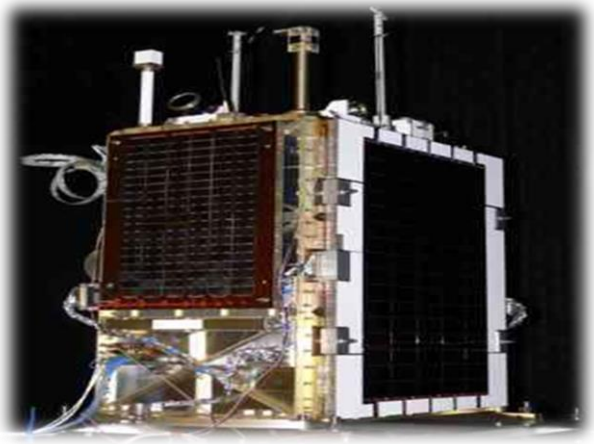
SunSat



- Built by Sun Space in collaboration with Stellenbosch University
- Weight: 64 kg
- Dimensions: 45cm x 45cdm x 60cm
- Polar Orbit: between 620km to 850km above earth’s surface
- Launched in 1999

South African Satellites cont…

SumbandilaSat



- Built by Sun Space in collaboration with Stellenbosch University
- Successfully launched on 17 September 2009 in Baikonur, Kazakhstan
- Weight: 82 kg

CubeSat

- Built by The Cape Peninsula University of Technology (ZACUBE-1)
- Launched 21 November 2013
- Measuring at 10cm x 10cm x 10cm
- Weight: 1.2kg

Remote Sensing in Natural Hazards

Devastating events which result from natural processes of the earth.

Some natural hazards build up overtime :

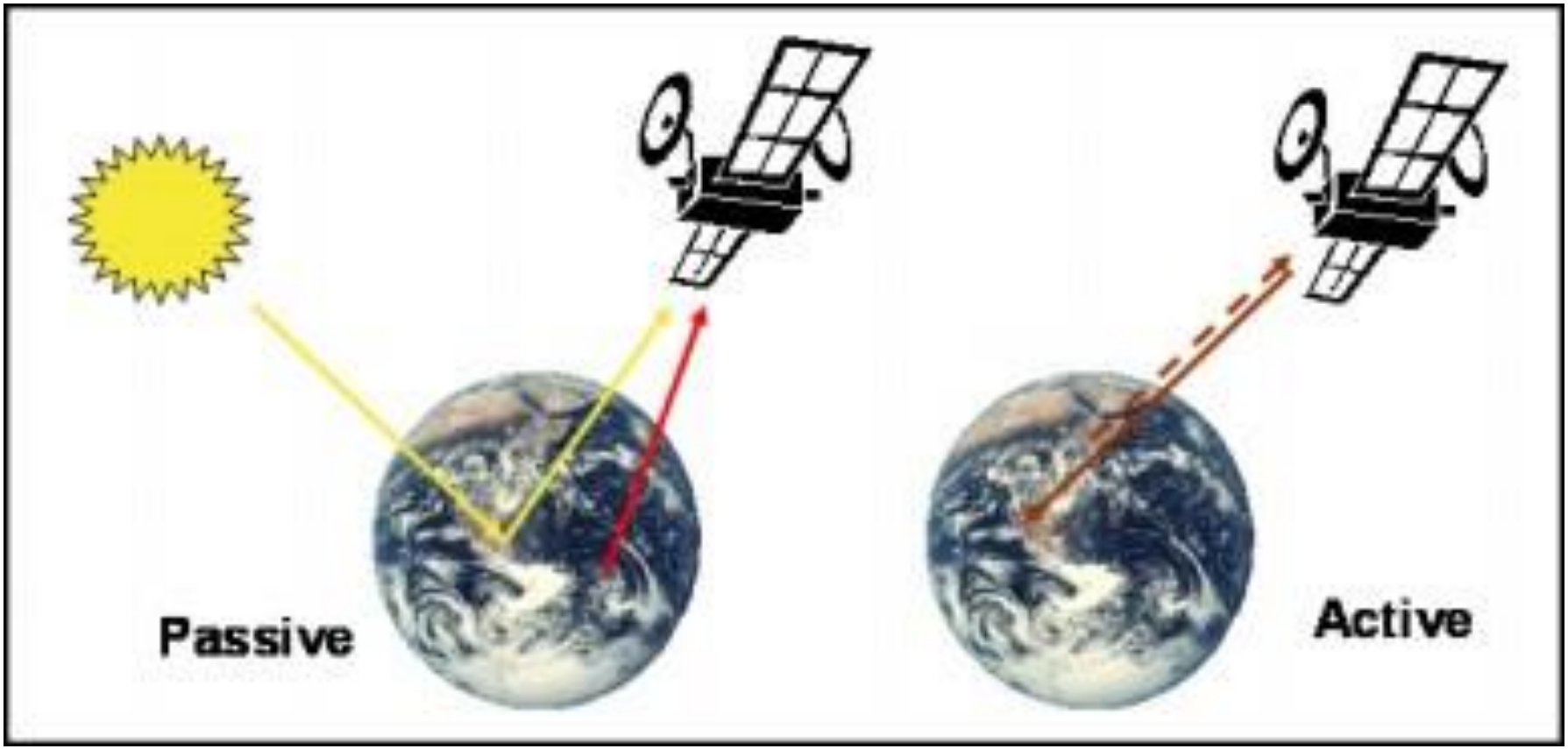
- **Drought***
- **cyclone**
- **Floods***

Sometimes they are rapid:

- **Volcanic eruption**
- **Flash floods***
- **Earthquake**
- **Tsunamis**
- **Fires***

Remote Sensing in Natural Hazards

Types of Sensors



Remote Sensing in Natural Hazards

Disaster Life Cycle

Remote Sensing in Natural Hazards

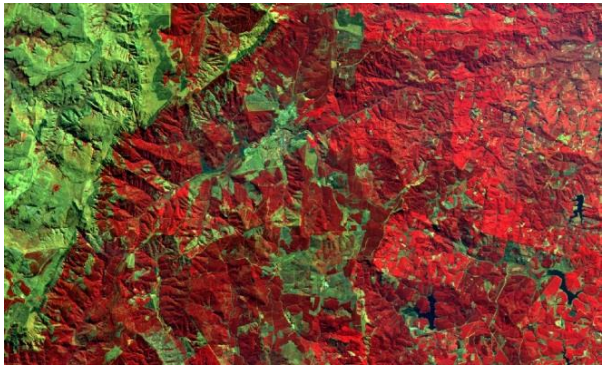
Applications

Disaster	Mitigation	Preparedness	Response	Recovery
Drought	Risk modelling;	Weather forecasting;	Monitoring vegetation;	Informing drought mitigation.
	vulnerability analysis;	vegetation monitoring;	damage assessment.	
	land and water management planning.	crop water requirement mapping;		
		early warning.		
Fire	Mapping fire-prone areas;	Fire detection;	Coordinating fire fighting efforts.	Damage assessment.
	monitoring fuel load;	predicting spread/direction of fire;		
	risk modelling.	early warning.		
Flood	Mapping flood-prone areas;	Flood detection;	Flood mapping;	Damage assessment;
	delineating flood-plains;	early warning;	evacuation planning;	spatial planning.
	land-use mapping.	rainfall mapping.	damage assessment.	

Remote Sensing in Natural Hazards

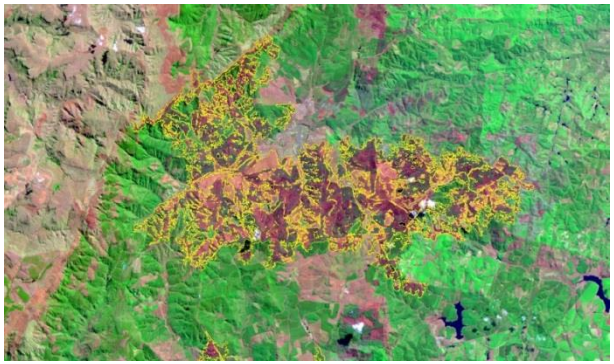
Advantages

- Better ground coverage
- Accurate and valuable information to disaster relief agencies
- Multiple satellite datasets provide a valuable perspective of the disaster affected area
- Importance of RADAR data
- Important in assessing the impact of the disaster on the affected area



Pre-Event

Post Event

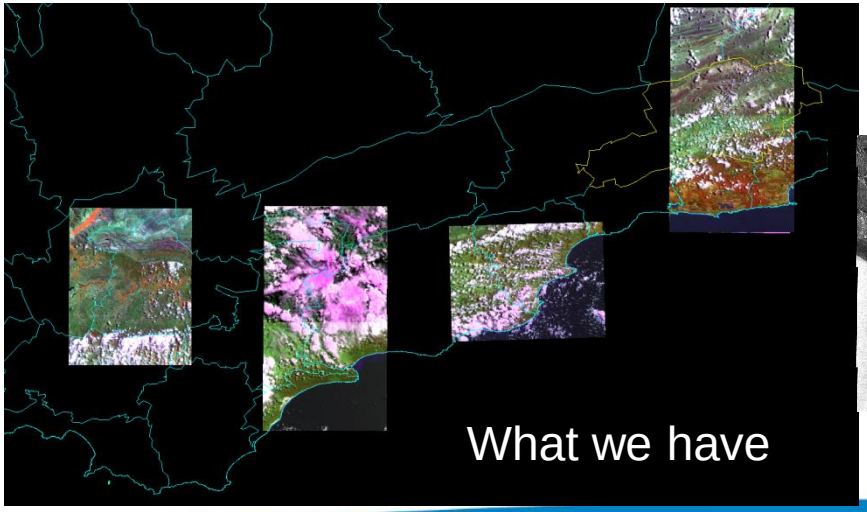


Assessment

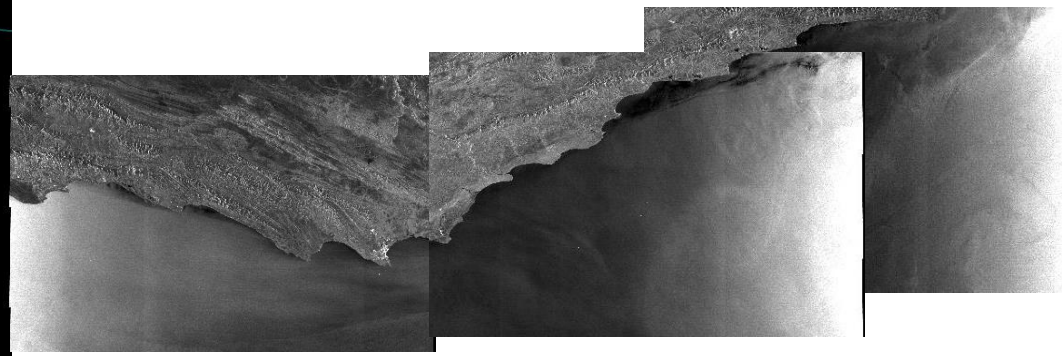
Remote Sensing in Natural Hazards

Disadvantages

- Insufficient spatial and temporal resolution for a number of applications.
- Delayed image acquisition, especially for non-pointing sensors.
- High cost of imagery.
- Insufficient radar sensors (flood applications).
- Limited use of optical sensors (cloudy and night time).
- Lack of knowhow in image interpretation and development of value added products.

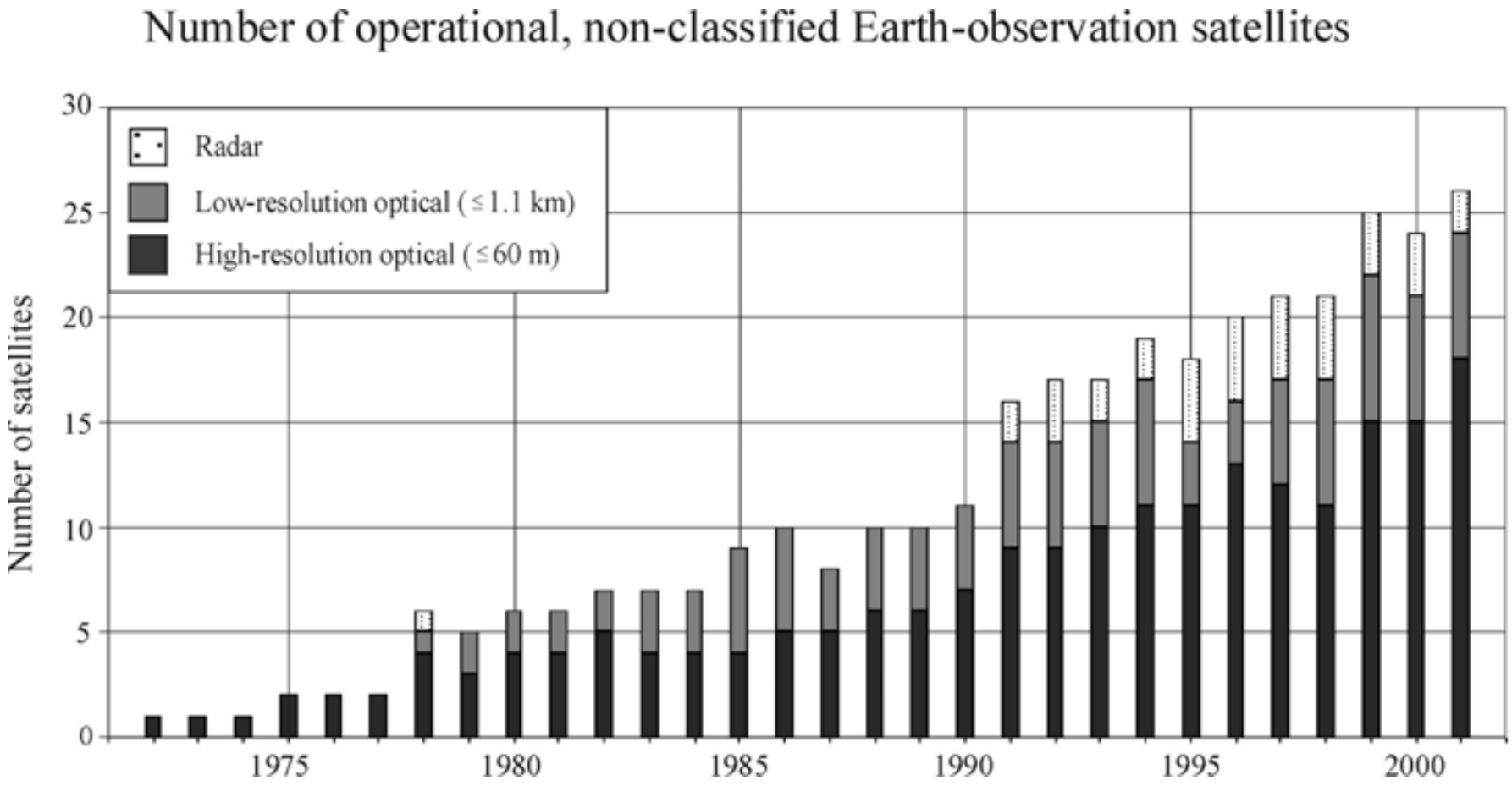


VS



Remote Sensing in Natural Hazards

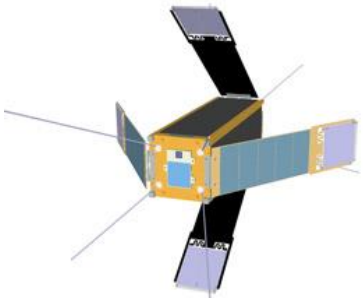
Trends in data access



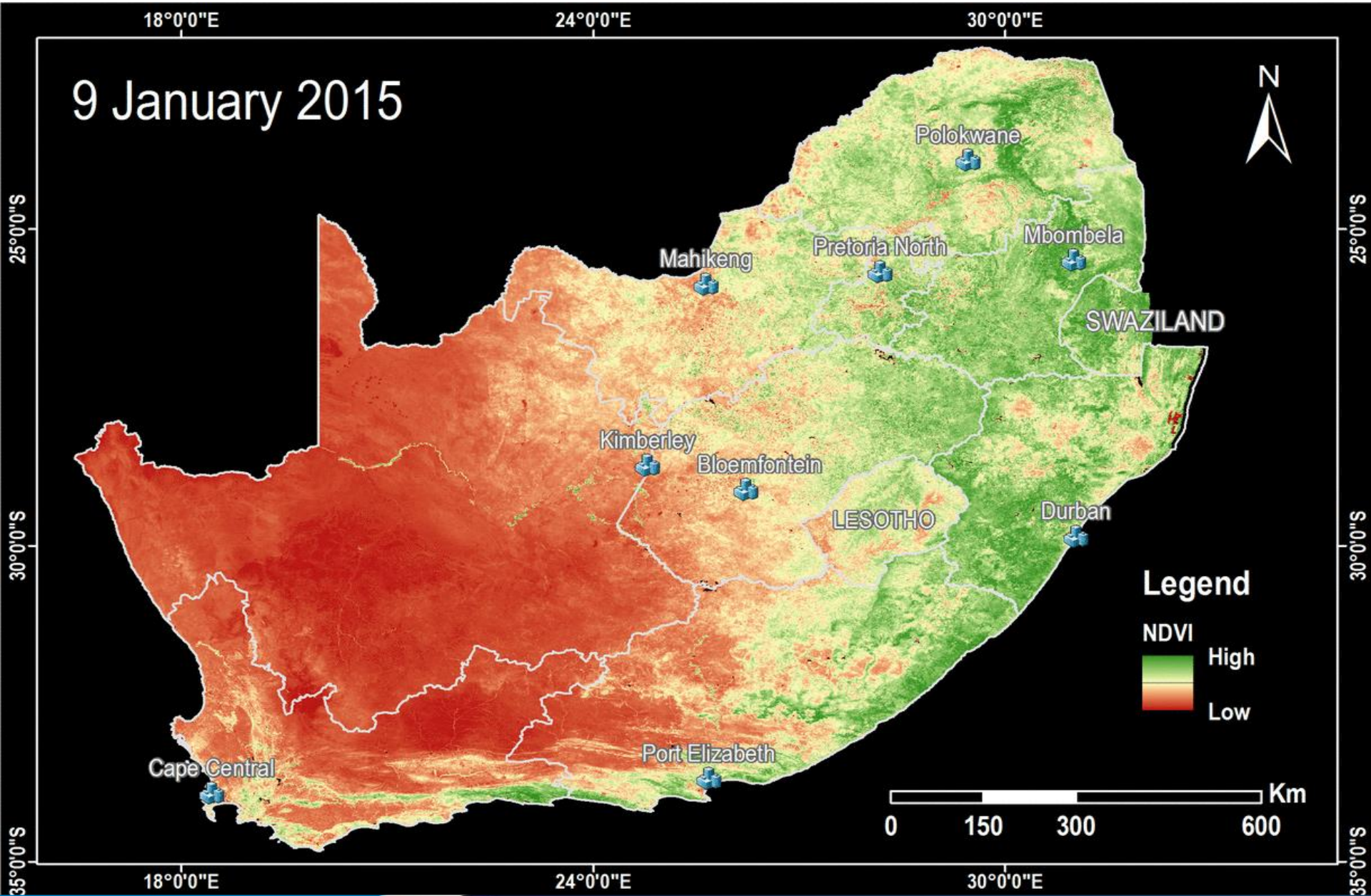
Remote Sensing in Natural Hazards

Future Trends

- Microsatellites and CubeSat (Cost effective)
- Unmanned Aerial Vehicles (UAV)
- Constellations of LEO (frequent revisits)
- Ecliptic orbits (longer staring time)

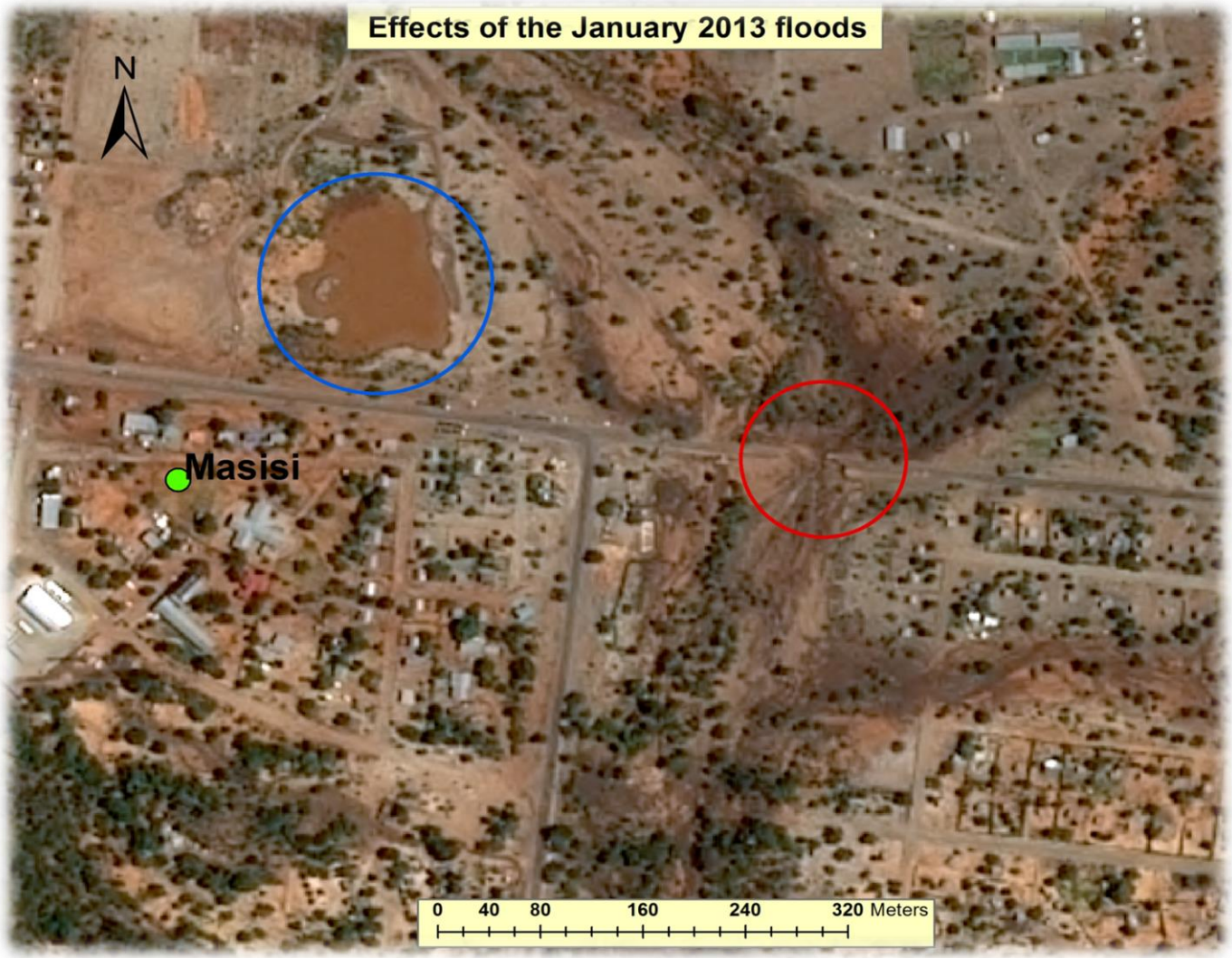


Drought


18°0'0"E
24°0'0"E
30°0'0"E
25°0'0"S
30°0'0"S
35°0'0"S
9 January 2015
N
Polokwane
Mahikeng
Pretoria North
Mbombela
SWAZILAND
Kimberley
Bloemfontein
LESOTHO
Durban
Cape Central
Port Elizabeth
Legend
NDVI
High
Low
Km
0
150
300
600

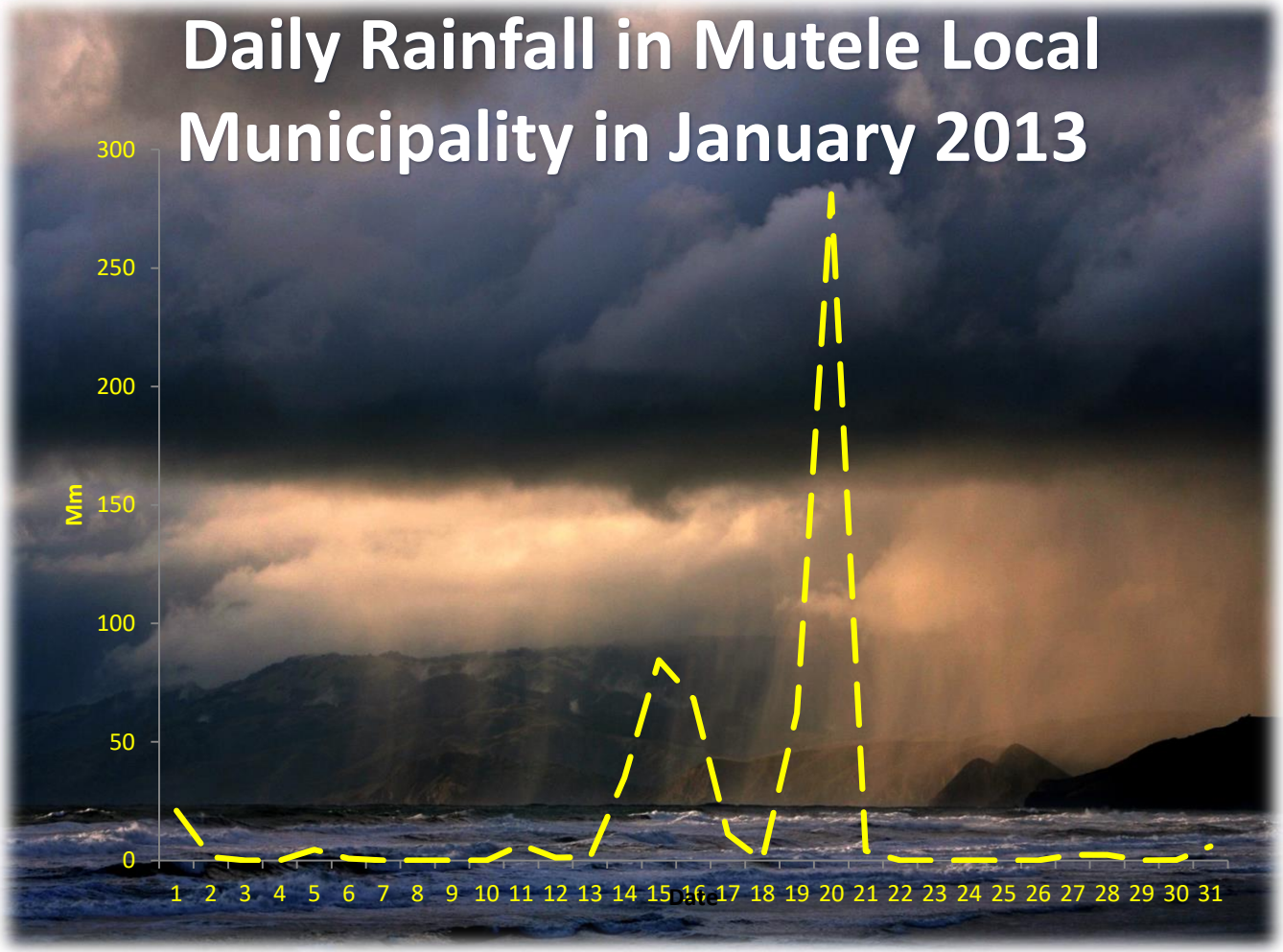
Remote Sensing in Natural Hazards

Post Flood Analysis

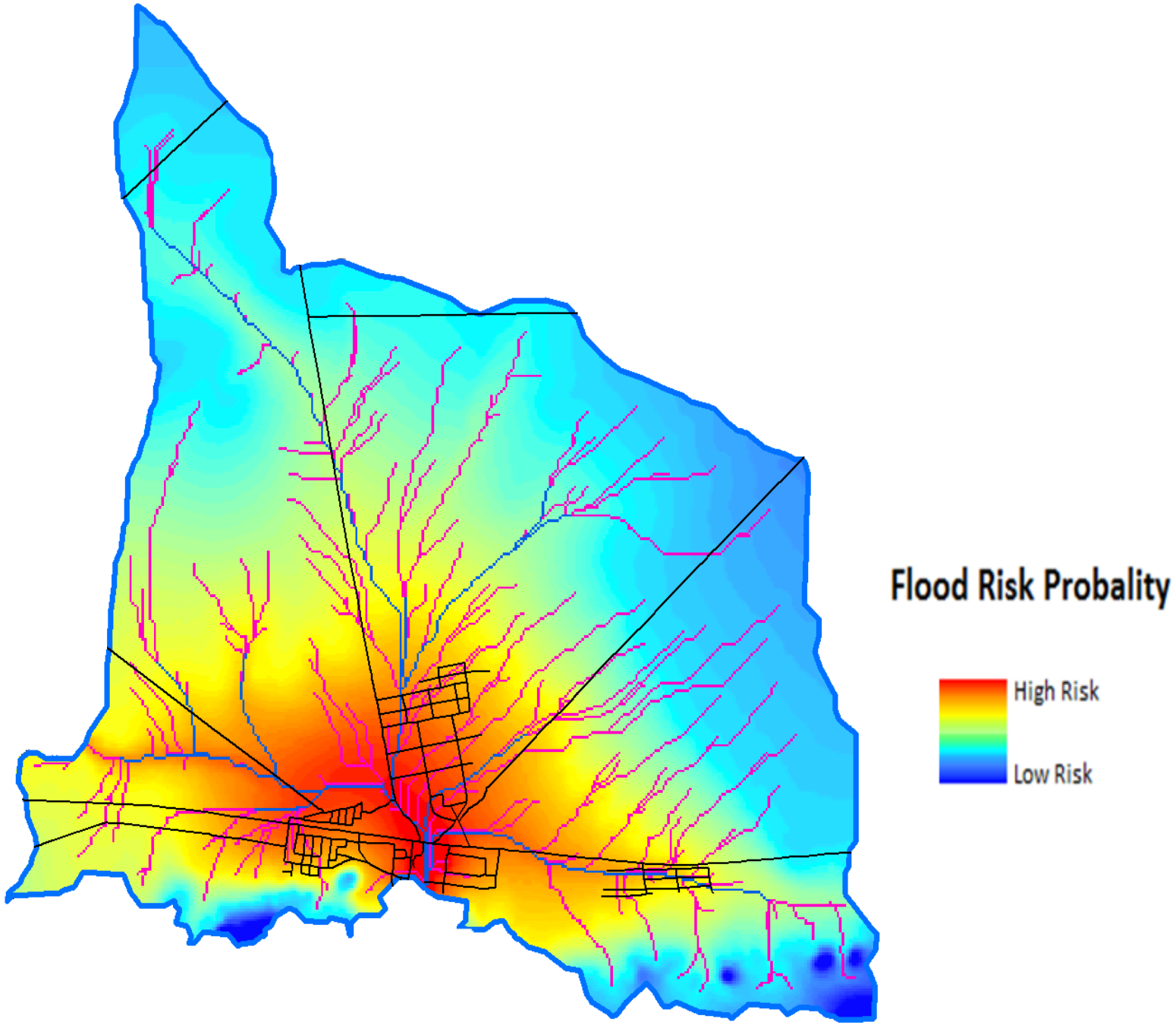


Remote Sensing in Natural Hazards

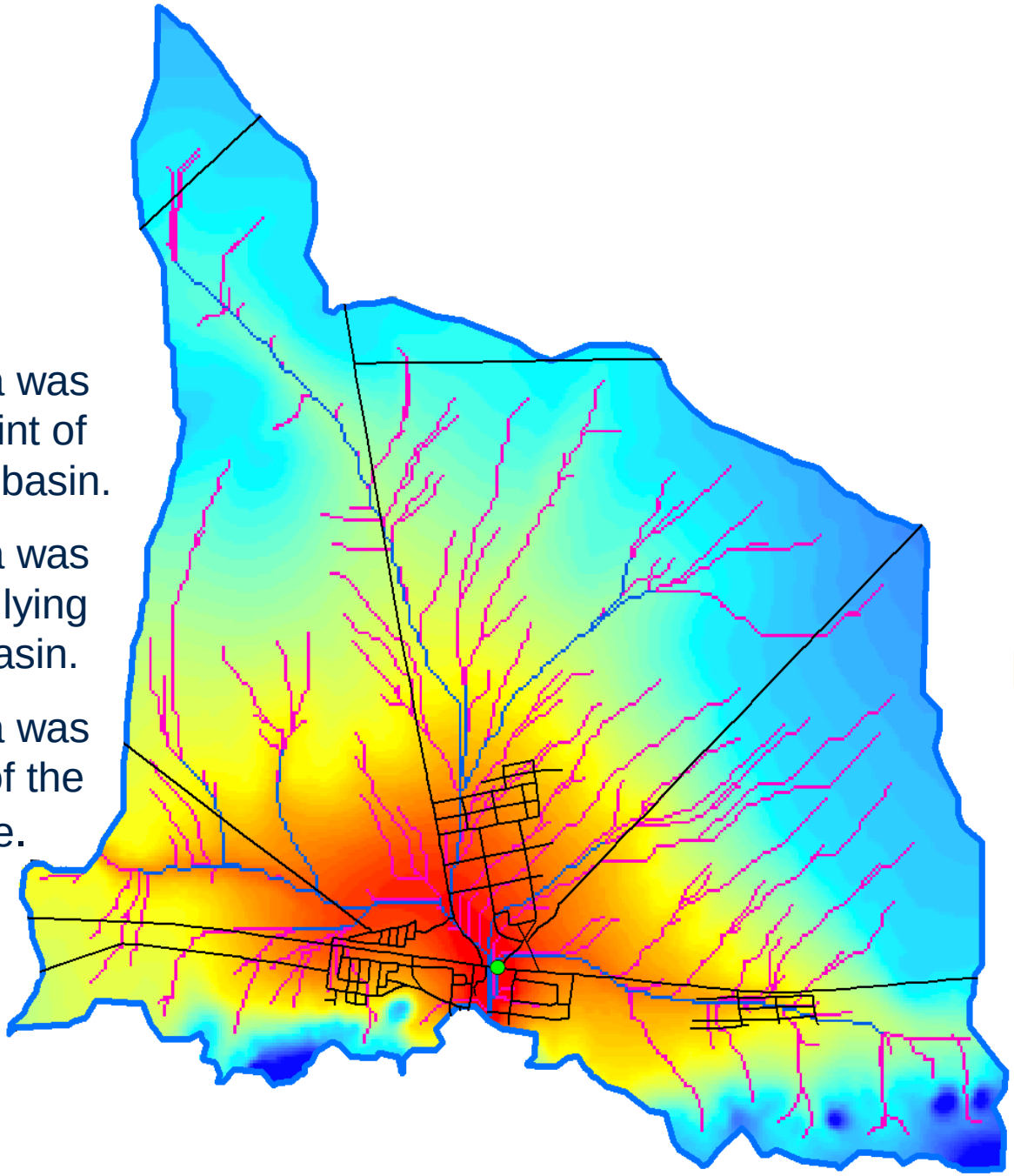
Post Flood Analysis



Source: SAWS


Flood Risk Probality
High Risk
Low Risk

- Affected area was at the exit point of the drainage basin.
- Affected area was at the lowest lying area of the basin.
- Affected area was at the heart of the high risk zone.



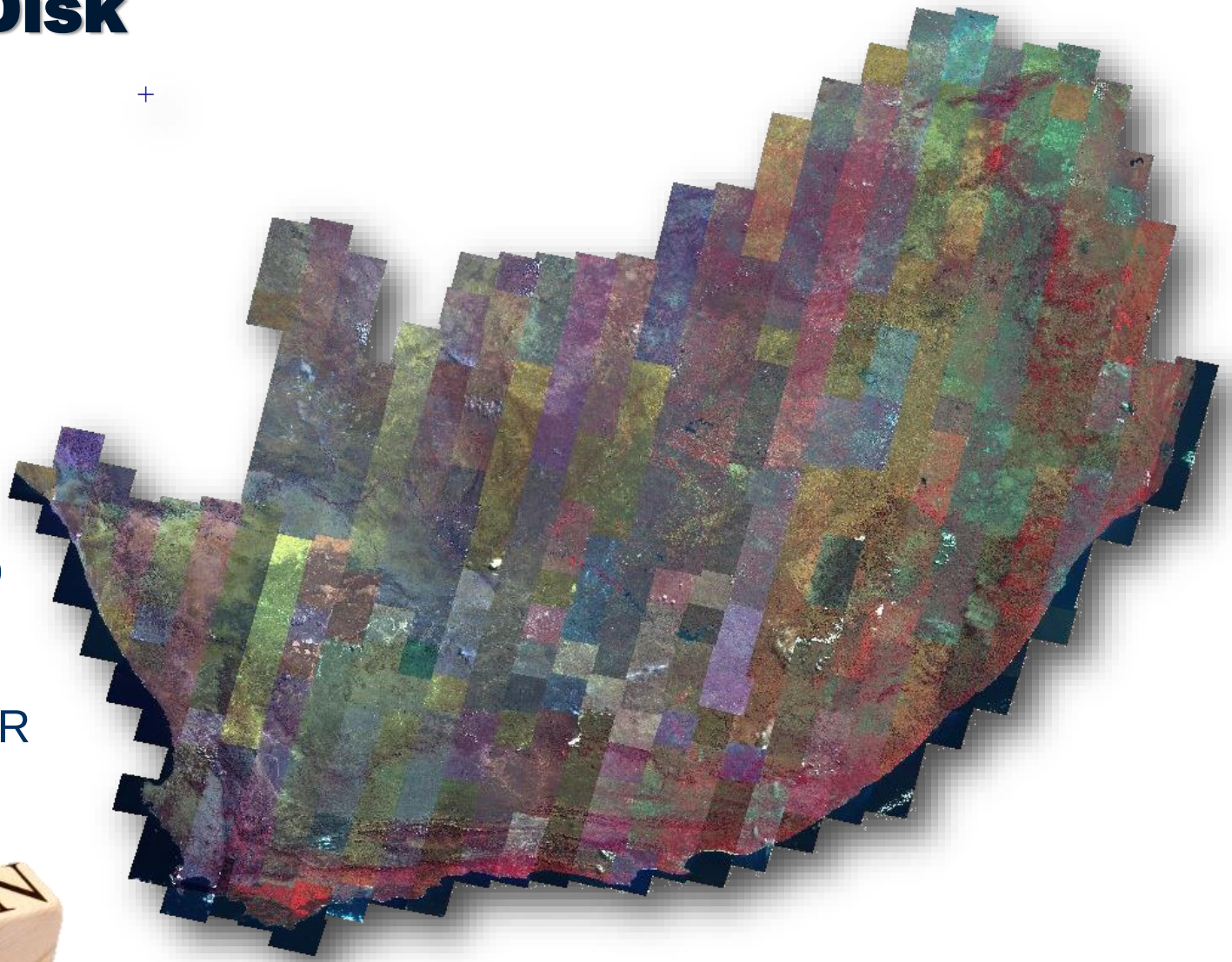
FUNDISA Disk

Background

- Fundisa means to teach in the Nguni languages
- Developed annually and distributed on hard disks
- Packaged with satellite imagery, GIS data, open source software.
- Hands-on exercises
- Data provided for research and teaching purposes.

FUNDISA Disk

SPOT 5



Imagery collection

Spatial resolution

- 2.5m Pan
- 10m MS
- 2.5m Pan-Sharp

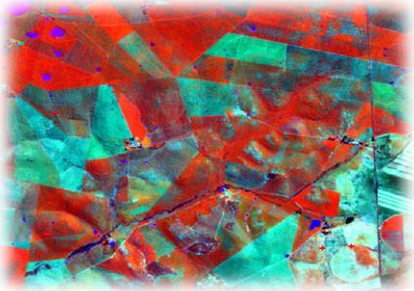
Spectral resolution

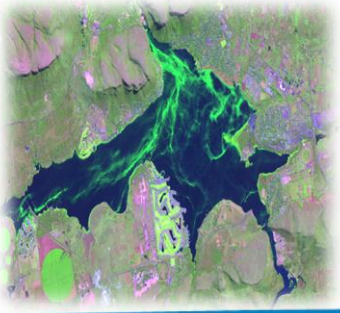
- R,G, NIR & SWIR

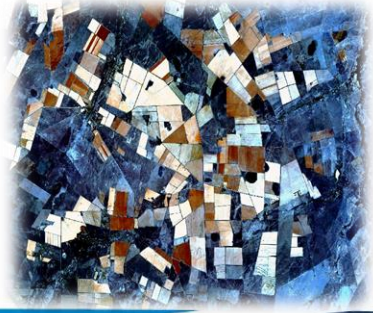
FUNDISA Disk

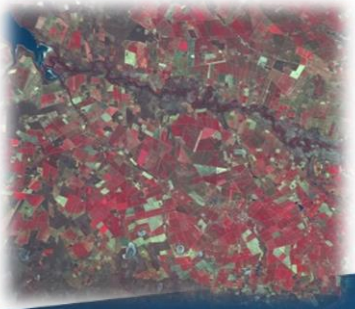
Image Applications

- Forestry
- Farm boundaries
- Crop health
- Environmental analyses
- Water quality assessment
- Land cover and land use mapping
- Flood mapping
- Change detection



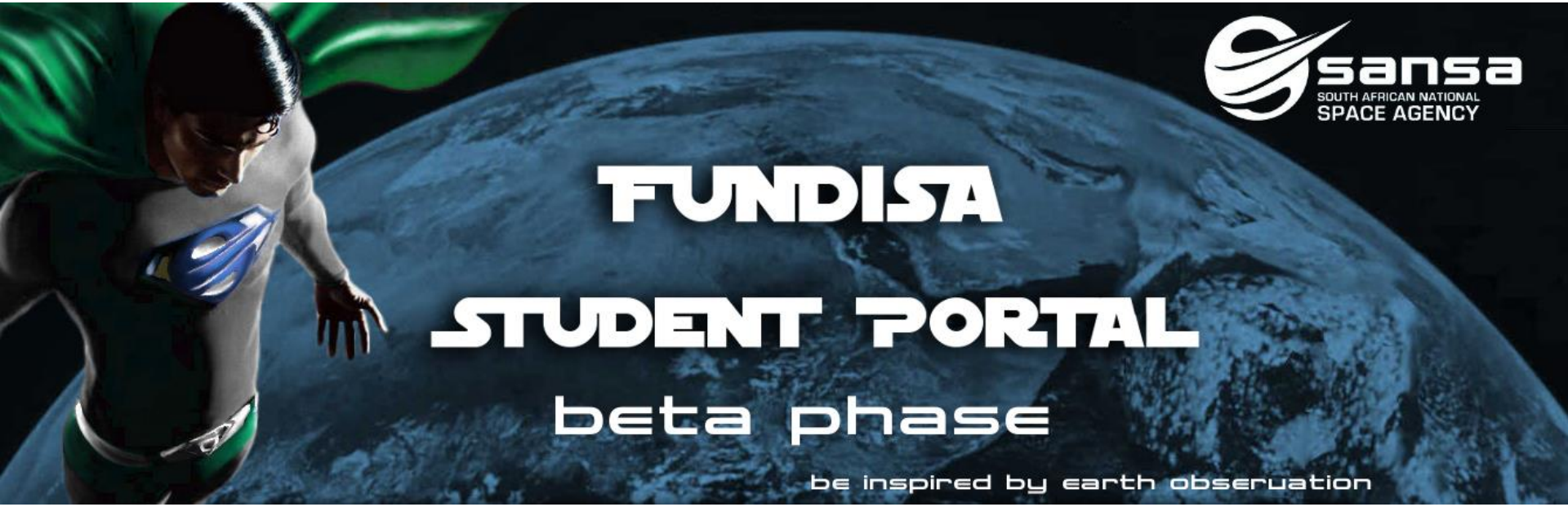






FUNDISA Disk

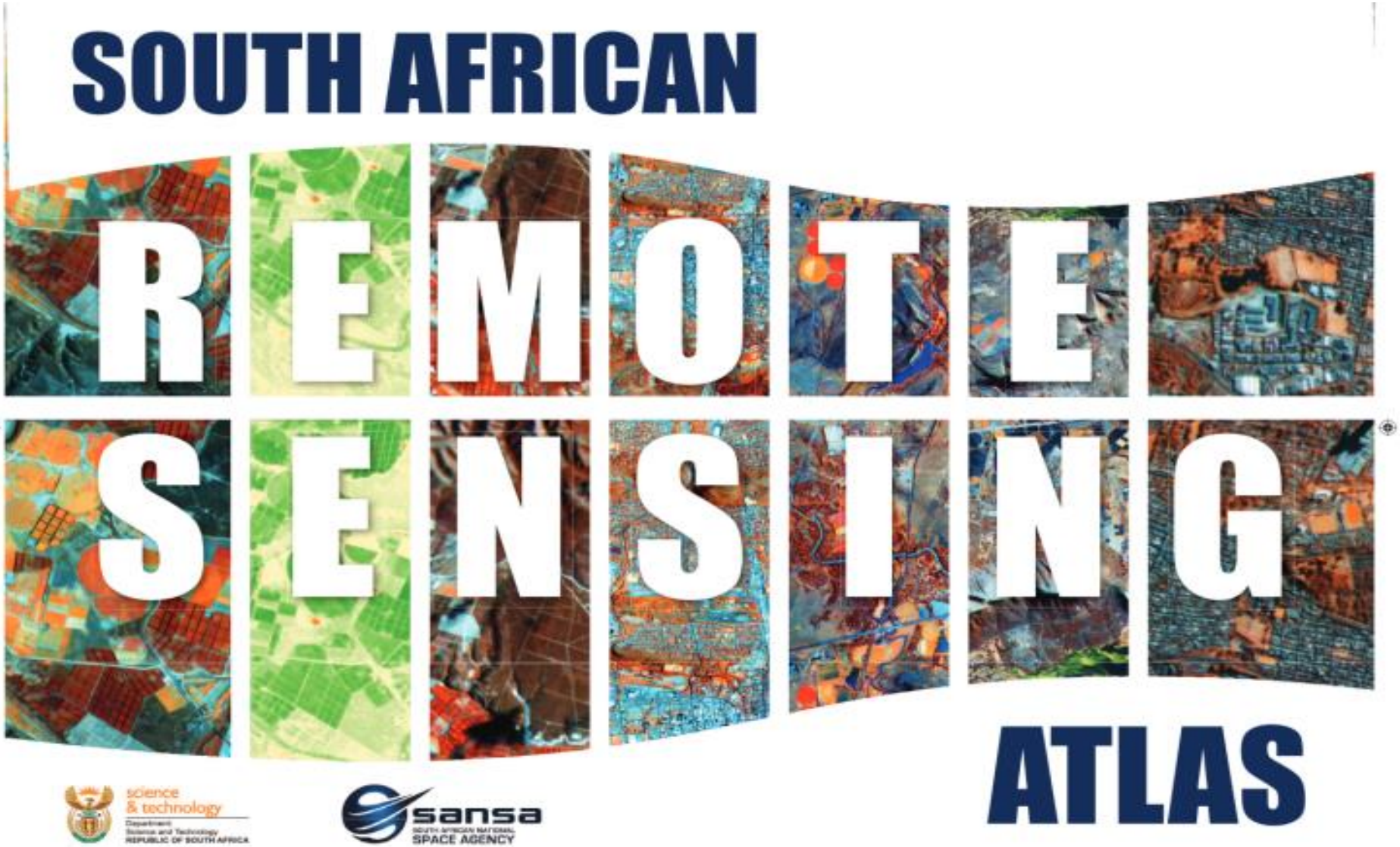
Fundisa Online



http://fundisa.sansa.org.za

www.sansa.org.za

Remote Sensing Atlas



Thank You

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