



# SPOT Satellite



## Training Center

Southern African Development  
Community (SADC)  
Regional Remote Sensing Unit (RRSU)  
Gaborone, Botswana

U.S. Geological Survey  
Center for Earth Resources  
Observation and Science (EROS)  
Sioux Falls, South Dakota, USA

Applications of Coarse to High Resolution Satellite Imagery  
for Land Productivity Assessment & Management



# SPOT Satellite

B. Siwela, SADC-RRSU



Bamako , Mali

6 - 17 February, 2006



# Spot system



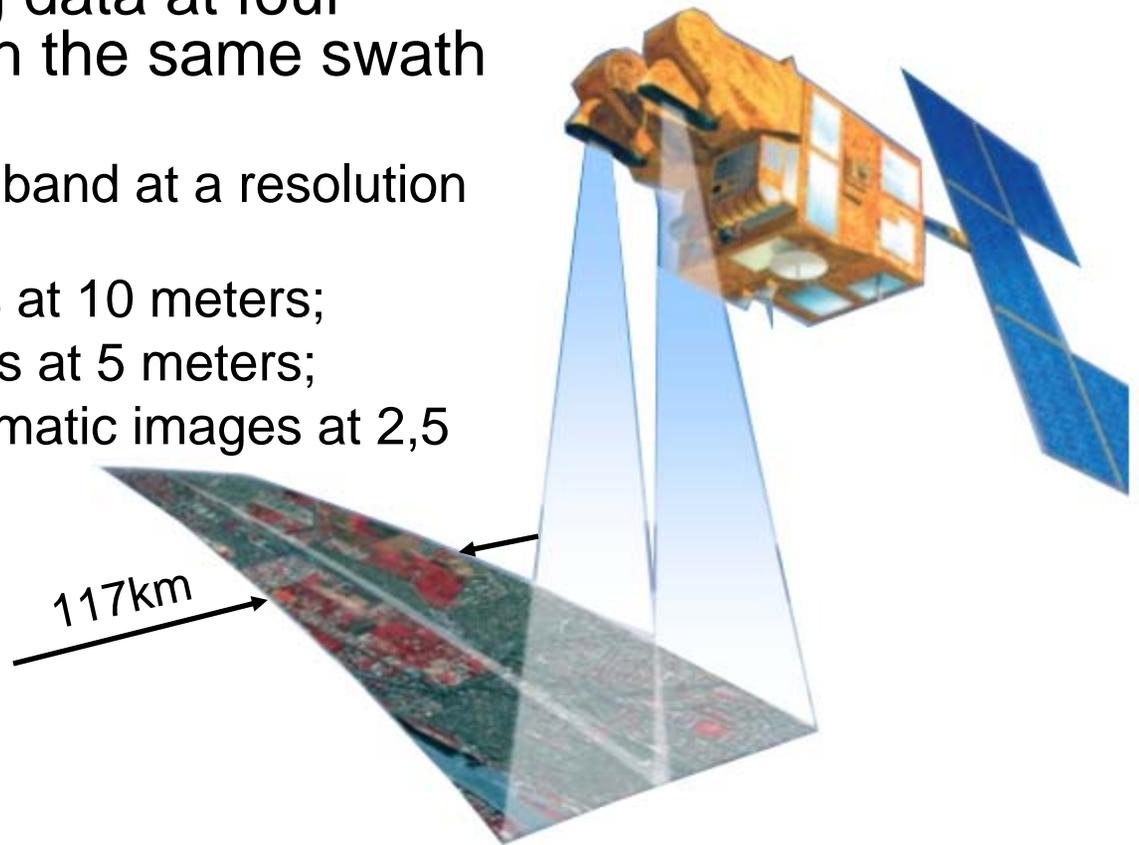
- SPOT - *Satellite Pour l'Observation de la Terre*
- Designed by CNES (Centre national d'études spatiales) and built in partnership with Astrium and Spot Image.
- Currently includes three operational in-orbit satellites, Spot 2, 4 and 5.

# SPOT 5

<b>Orbit Altitude</b>	<b>822 Km</b>
<b>Orbit Inclination</b>	<b>98.7°, sun-synchronous</b>
<b>Speed</b>	<b>7.4 Km/second – 26,640 Km/hour</b>
<b>Equator Crossing Time</b>	<b>10:30 a.m. (descending node)</b>
<b>Orbit Time</b>	<b>101.4 minutes</b>
<b>Revisit Time</b>	<b>2-3 days depending on Latitude</b>
<b>Swath Width</b>	<b>60 Km x 60 Km to 80 Km at nadir</b>
<b>Geometric Accuracy</b>	<b>&lt;50-m horizontal position accuracy (CE90%)</b>
<b>Digitization</b>	<b>8 Bits</b>

# SPOT 5

- Spot 5 payload comprises two identical *Haute Resolution Geometrique* (HRG) instruments capable of acquiring data at four resolution levels with the same swath of 60 km:
  - images in the SWIR band at a resolution of 20 meters;
  - multispectral images at 10 meters;
  - panchromatic images at 5 meters;
  - supermode panchromatic images at 2,5 meters.



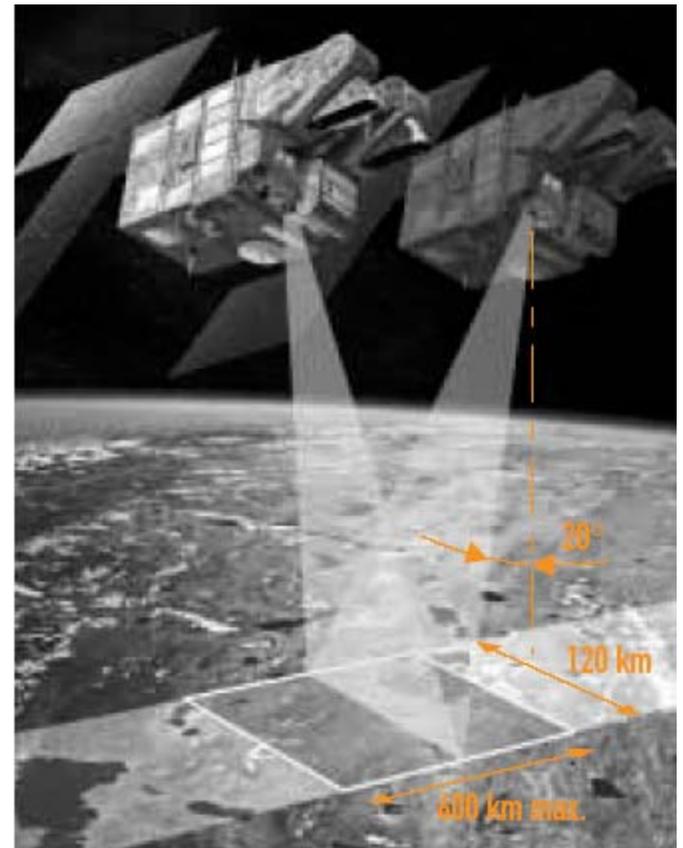
# SPOT-5

- HRG Image bands

Pan:	480 - 710 nm	2.5m, 5m
Green:	500 - 590 nm	10m
Red:	610 - 680 nm	10m
Near IR:	780 – 890 nm	10m
Short Wave IR:	1,580 – 1,750 nm	20m

# High Resolution Stereoscopic (HRS) *instrument*

- Acquires images almost simultaneously in front of and behind the satellite to allow acquisition of stereo pair images in a single pass.
- Swath: 120 km centred on the satellite ground track
- Repeat cycle of 26 days
- Resolution: 10 metres in panchromatic mode
- DEM accuracy better than 15 metres
- Allows orthorectification of HRG (High Resolution Geometric) images



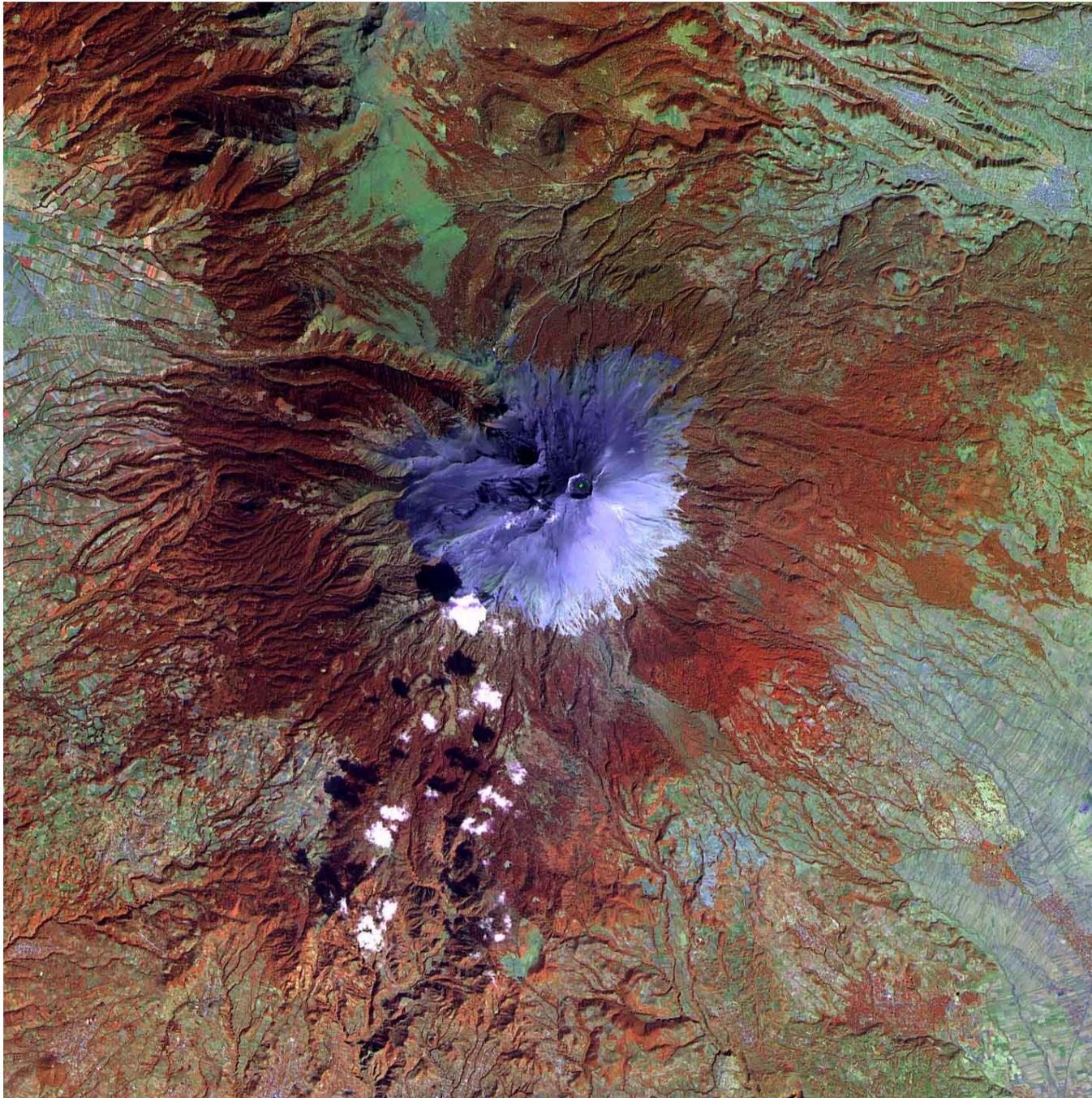
# SPOT-5

- The SPOT imaging instruments' oblique viewing capability means they can acquire imagery of any point on the globe within less than five days at the Equator, and in less than three days at temperate latitudes ( $45^{\circ}$ ).
- The SPOT system's three satellites are thus able to observe any area of interest almost daily.

# SPOT-5

- Common applications
  - Oil & Gas Exploration
  - Agriculture
  - Urban Planning
  - Forest Management
  - Disaster Management
  - Flight Simulations
  - Defense
  - Telecommunications

- Pricing
  - 10m multispectral:  
\$3,375
  - 5m panchromatic:  
\$3,375
  - 2.5m  
panchromatic:  
\$6,750



Popocatepetl  
Volcano

Dec. 22, 2000

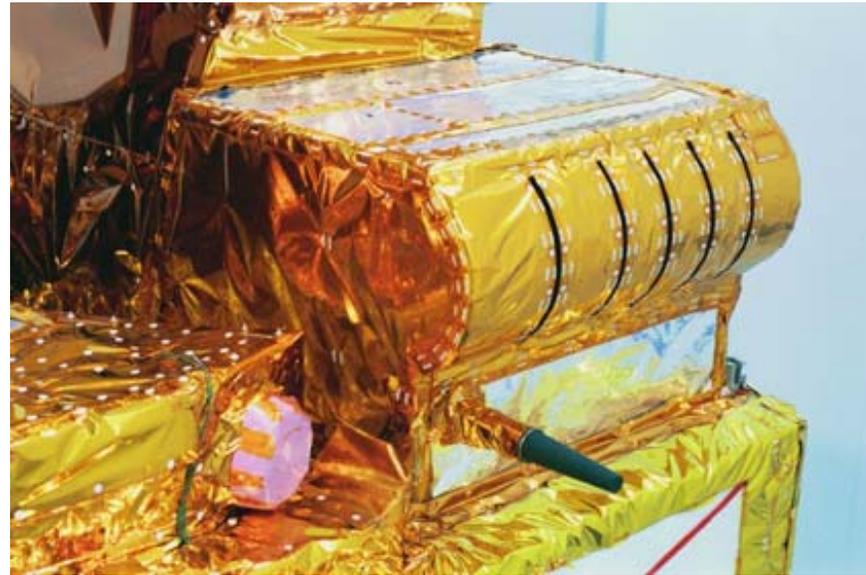
SPOT 4 HRV

# VEGETATION Instruments

- VEGETATION 1: passenger aboard SPOT 4, launched on March 24, 1998  
VEGETATION 2: passenger aboard SPOT 5, launched on May 3, 2002
- to observe the Earth's biosphere and crops on a regional and global scale
- long-term environmental change at regional and global scales
- Cover almost all of the globe's land masses in one day

# VEGETATION Instruments

- **Resolution:** 1 km
- **Swath:** 2250 km
- **4 spectral bands**
  - Red: 0.61 to 0.68  $\mu\text{m}$
  - Near-infrared: 0.78 to 0.89  $\mu\text{m}$
  - Mid-infrared: 1.58 to 1.75  $\mu\text{m}$
  - Blue: 0.43 to 0.47  $\mu\text{m}$ (for atmospheric corrections)



# VEGETATION Instruments

## Products

- **primary products (P)**, extracted from a single image segment
- **daily (S1) or ten-day (S10) syntheses** - mosaics of acquired image segments, for 24h periods and for the last 10 days respectively
- **vegetation indices (NDVI)** calculated from daily or ten-day syntheses



# VEGETATION Instruments

## **Other Applications**

- production and updating of forest maps to help manage local resources, and for long-term continental and global studies of climate change
- monitoring of crop acreage to aid yield forecasting
- observation of ocean colour to aid fishing vessels
- daily monitoring of specific areas to help combat locust swarms effectively and prevent forest fires.