

IDEAS for Africa

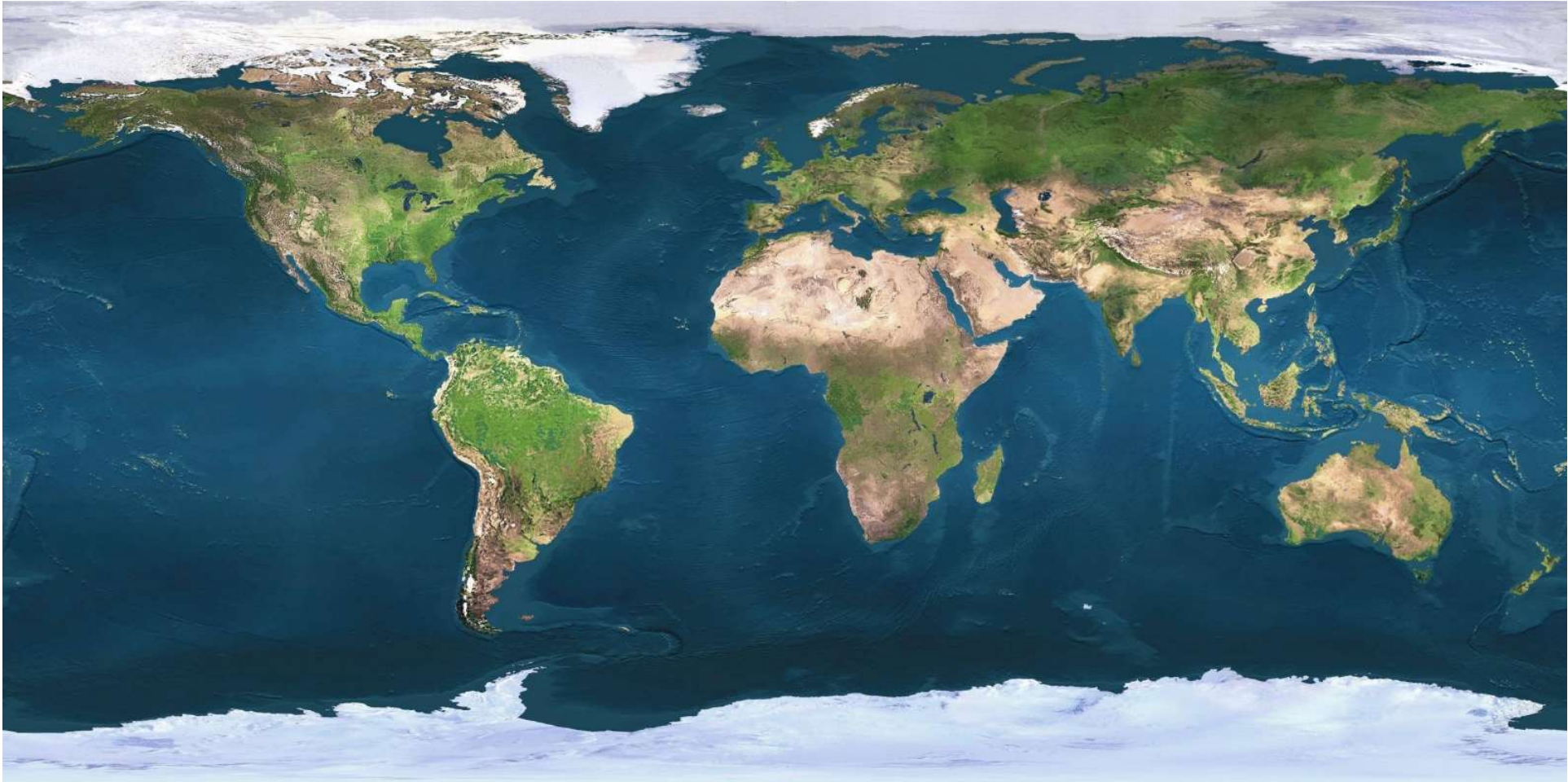
Desert Movement Predictor and FarmaBooths
*Two Earth-Observation Based Applications
for Pan-African Development*

INTERNATIONAL SPACE UNIVERSITY
2012 Team Project on Africa



Chris Johnson
Presenter





IDEAS for Africa



OBJECTIVE

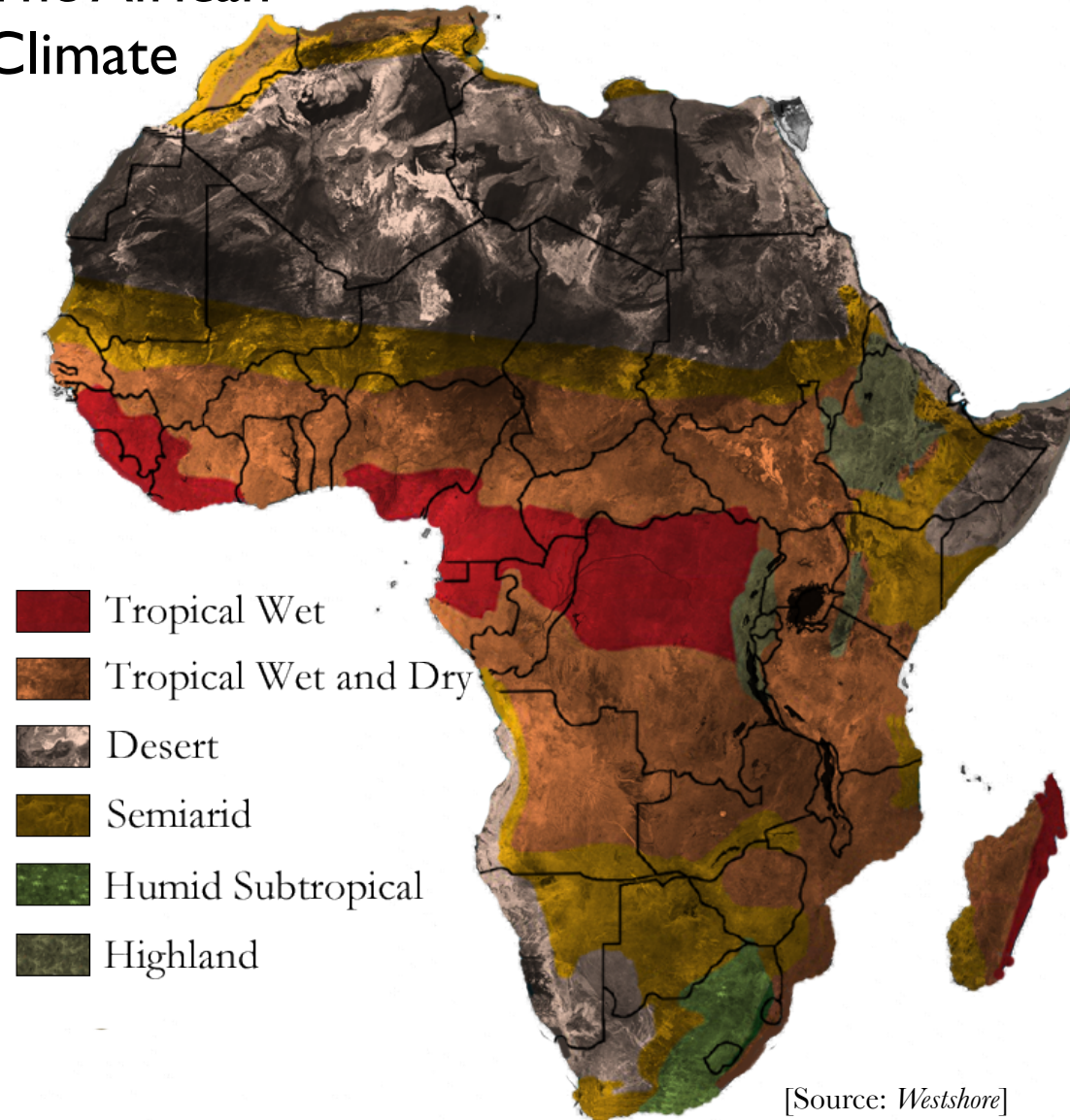
To analyze and propose innovative space spinoff technologies, satellite applications, and space business potentials applicable in fostering sustained social and economic development across the African continent

DESERTIFICATION

Fertile lands turning arid



The African Climate



CAUSES

- Deforestation
- Over grazing
- Firewood gathering
- Inefficient use of water
- Excessive harvesting
- Transportation infrastructure
- Winds, erosion & salination

*A major challenge
for sustainable growth*

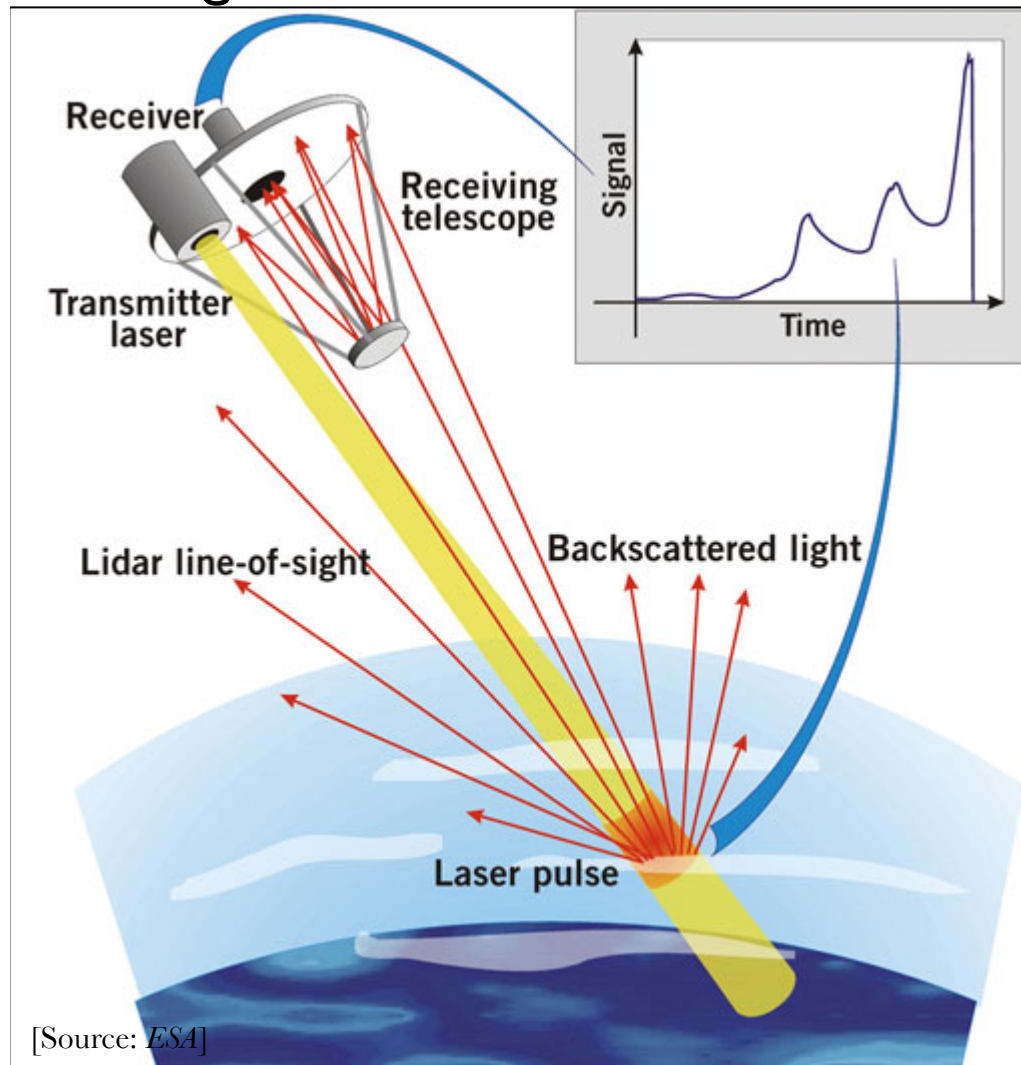
[Source: *Westshore*]

DESERTIFICATION

Sensing



Using LiDAR to Measure Winds



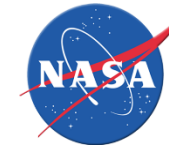
[Source: ESA]

SATELLITE IMAGERY

<i>Parameter</i>	Satellite (Instrument)
<i>Aerosols</i>	MODIS (Aqua & Terra)
	SeaStar (SeaWiFS)
<i>Humidity</i>	MIRAS (SMOS)
<i>Land Cover</i>	MODIS (Aqua & Terra)
<i>Precipitation</i>	TMI (TRMM)
	PR (TRMM)
<i>Vegetation</i>	TM (Landsat)
	MODIS (Aqua & Terra)
<i>Wind</i>	SEVIRI (Meteosat)
	ALADIN (ADM-Aeolus)

DESERTIFICATION

Mitigation



Land
Restoration

Halting
Cultivation

Crop Conversion

Stabilizing the
Sand

Shelterbelts

Fallow Band
Systems



China's "Great Green Wall" preventing the advancement of the Gobi desert

[Source: Buczynski]

DESERTIFICATION

Implementation



Establishing a Desert Movement Prediction Center

Main Functions

- : Collect satellite data
- : Image processing and analysis
- : Dune movement research
- : Desert movement predictions and recommendations

Main Costs

Concept	Annual Cost	Project Cost
Satellite Imagery*	\$ 5 million	\$ 25 million
Human Resources	\$ 1 million	\$ 6 million
Total	\$ 6 million	\$ 31 million

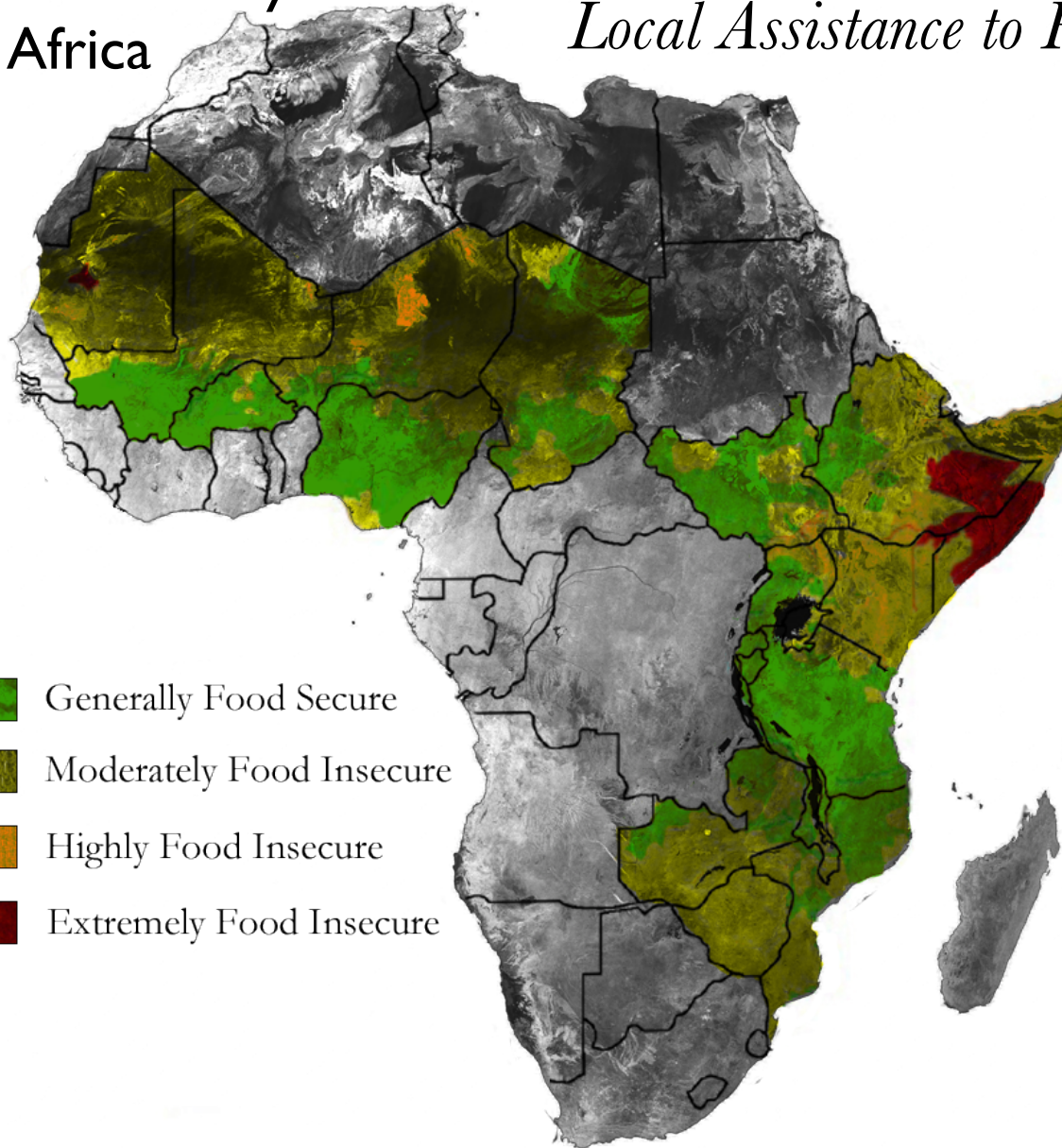
* Cost of SAR images for 3 million km² target area





FARMABOOTHS

Local Assistance to Farmers



Food Security
in Africa



-  Generally Food Secure
-  Moderately Food Insecure
-  Highly Food Insecure
-  Extremely Food Insecure

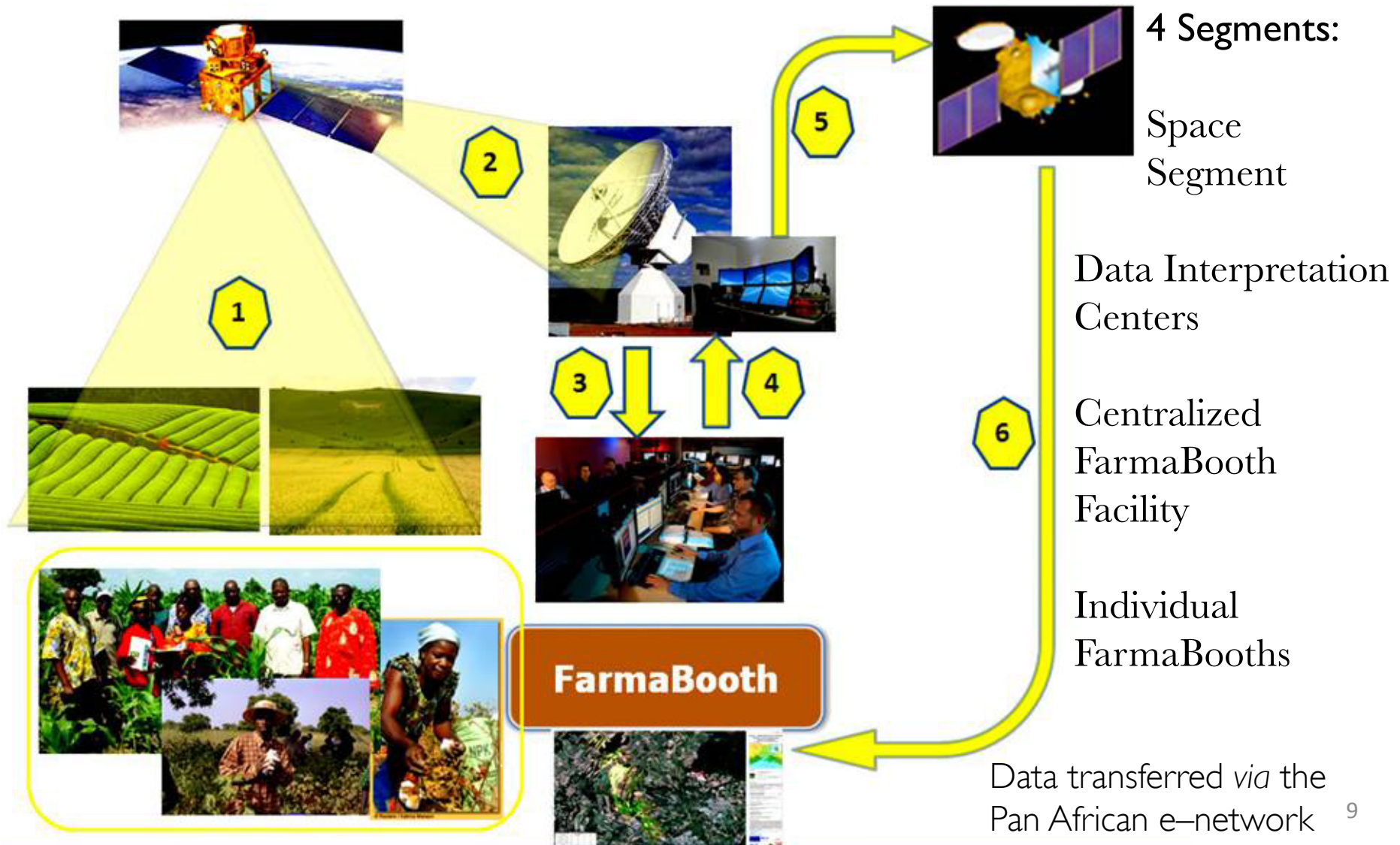
Providing satellite
information for agriculture

*Agriculture is a critical part
of the economy, yet food insecurity is
major concern*

**FarmaBooths
based on Indian Village
Resource Centres**

FARMABOOTHS

The Concept



FARMABOOTHS

Instruments Used



Instrument (satellite)

Application

AVHRR (NOAA)

Soil moisture and vegetation indices

HRG (SPOT 5)

Agricultural land management

LISS (IRS)

Improved crop discrimination & crop yield info

MODIS (Aqua & Terra)

Chlorophyll fluorescence

TM (Landsat)

Vegetation state and change



Costs for Establishing One FarmaBooth

Item	Start-up Cost	Annual Cost
<i>Centralized FarmaBooth Centers</i>		
Human Resources	–	\$11,000
Building Rental Fees	–	\$1,000
<i>FarmaBooth</i>		
Satellite Connectivity	\$1,000	–
Construction	\$2,000	–
Power Requirements	\$6,000	–
<i>Interpretation Center</i>		
VRC Services	–	\$20,000
<i>Imagery</i>		
SPOT Imagery	–	\$15,000
Total	\$9,000	\$47,000

FARMABOOTHS

Implementation

Village Resource Center (VRC) services based on human resources costs per year

Imagery costs: assume 12 photos per year with scene size of 20km x 20km

IDEAS for Africa



Africa.isunet.edu
click on
Final Report in PDF

Thank You

