

# Indian Earth Observation Satellite Data for International Projects - **Antrix's Perspective**



**ISPRS TC V**  
Mid Term Symposium



**Arunachalam A**

**Antrix Corporation Limited, India**



# Antrix Corporation Limited



*Satellite  
Communication &  
Navigation*



*Launch  
Services*



*Remote  
Sensing*



*Mission  
Support*



*Satellites  
and Sub-  
Systems*



*Ground  
Segment*

**Products and Services**

**Mandated to market products / services  
emanating from Indian Space program**

- Established in 1992
- Commercial arm of ISRO
- 100% owned by Govt. of India
- Only PSU in Space in India
- Awarded Mini-Ratna Status in 2008
- Operating Revenue ~ US\$ 300 Million
- Profitable since inception



# Antrix's Accomplishments

## Satcom Services



Commercial Transponders > 250  
Users > 100

## Launch Services

239 Satellites  
of 29 countries



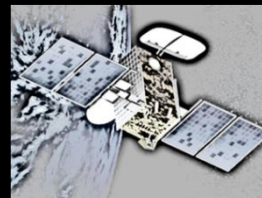
## Remote Sensing Data & Services

Commercial Satellites: 6  
International Ground Stations: 7  
Distributors : 6

### Space Technology Applications

“Sujala Watershed Monitoring & Evaluation” -  
Stockholm award of Sweden

## Satellites, Mission Support, Navigation



Built\* 2 Satellites for European  
Customers  
Mission Support > 35 Mission  
Chipset, Receiver Modules for NavIC  
Applications

\* In association with EADS, Astrium

# IRS Data Products & Services



**First IRS-IGS Station (IRS-1B) at Norman, Okla in June 1994**



**GAF AG, Germany - Resourcesat, Cartosat-1 & Oceansat-2 data**



**AWiFS**



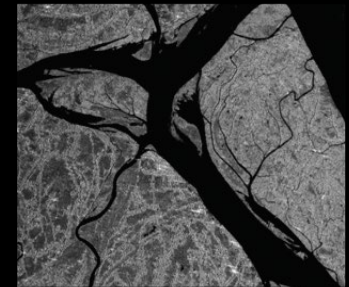
**LISS-III**



**VHR Panchromatic**



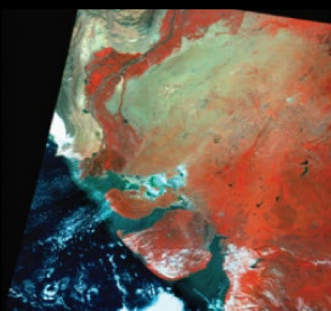
**VHR - Multispectral**



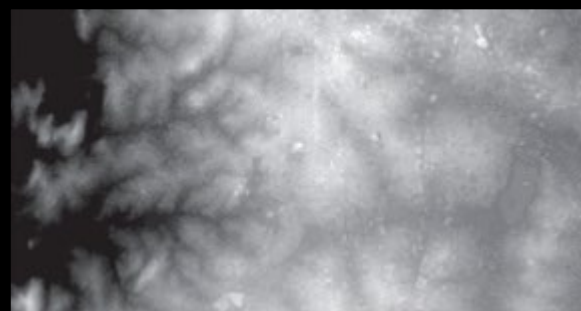
**Microwave**



**LISS-IV**



**OCM**



**DEM**



**Ortho-product**

# Indian EO Satellite Data –Usage by our Customers

Up until 2006, CDLs relied primarily on Landsat (5 and 7) data. An aging Landsat 5, the scan line corrector error (SLC-off) on Landsat 7, and uncertainty regarding the future launch of Landsat 8, forced the NASS to begin exploring alternative satellites to fill the pending data gap. The Indian Space Research Organization satellite Resourcesat-1, launched in 2003 carrying the AWiFS sensor, was selected as the most viable alternative. Bands for the AWiFS sensor were chosen to closely match those of the Landsat 7 Enhanced Thematic Mapper Plus (ETM+). AWiFS had a slightly lower resolution (56 meter) than Landsat Thematic Mapper (TM) and ETM+ (30 meter), but an increased revisit time of 5 days, which was beneficial given the dynamic nature of crops. Between 2007 and 2009, AWiFS provided the majority of imagery for CDLs. The 56-meter resolution of AWiFS, while adequate for mapping homogeneous crops such as soybean and corn, had a low accuracy for smaller, less homogenous crops.

<https://www.fort.usgs.gov/sites/case-studies/us-department-agriculture-national-agricultural-statistics-service-cropland-data>

## 4. CONCLUSIONS

Based on the experiment and analysis of CARTOSAT-1 stereo pair conducted in this paper, it is concluded that the planimetry and height accuracy of CARTOSAT-1 stereo pair could reach 5-meter, which meets the national 1:50,000 topographic maps survey specifications.



# Indian EO Satellite Data –Usage by our Customers

**ScanEx**  
RESEARCH AND DEVELOPMENT CENTER

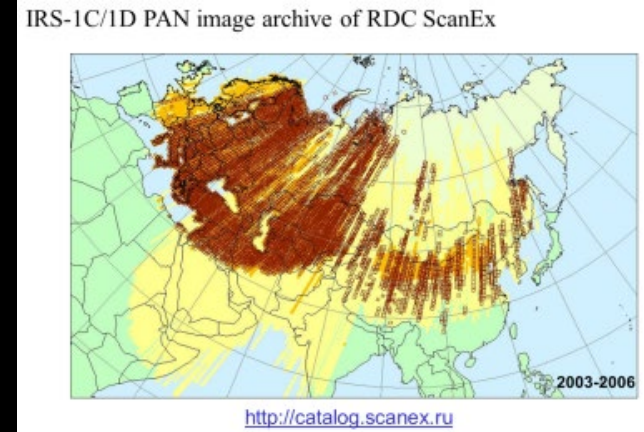
About the company  
Receiving stations

**UniScan™ — universal hardware/software complex**

Flexible possibilities of receiving a wide range of data from different RS satellites

Receiving now      UniScan™-36      UniScan™-24      Planning to receive

software@scanex.ru      www.scanex.com



<http://www.racurs.ru/download/conf/Greece2009/Presentations/Fedotkin.pdf>

AWiFS creates new opportunities in land imaging for Australia. The instrument has a large (740 kilometre) swath width, allowing a 5-day revisit time, with a pixel size between 56 and 70 metres.

<http://www.ga.gov.au/ausgeonews/ausgeonews200809/inbrief.jsp>

# Indian EO Satellite Data –Usage by our Customers



The University of Dundee has entered into an agreement with Antrix Corporation Limited, the commercial arm of the Indian Space Research Organisation (ISRO), to receive data from one of its satellites for use in environmental research.

<https://www.dundee.ac.uk/news/2016/university-to-provide-data-reception-and-processing-facilities-for-indian-satellite-.php>

# Indian EO Satellite Data –Usage by our Customers

## GAF AG looks back at 20 years of handling Indian Earth observation satellite data in Neustrelitz

This year marks the 20th anniversary of signing an agreement with Antrix, the commercial arm of the Indian Space Research Organisation (ISRO), to receive and distribute Indian EO satellite data on an exclusive basis for European customers. As a consequence of this contract, GAF also entered into a long term cooperation and service agreement with the German Aerospace Center (DLR) regarding the provision, by the latter, of downlink capabilities at its ground station in Neustrelitz. In order to handle the archiving and distribution of the data, GAF formed the wholly-owned subsidiary Euromap and based it on the DLR campus in Neustrelitz. This has resulted in 20 years of close cooperation with DLR and an important presence at Neustrelitz, consisting of a permanent staff that currently numbers 25 scientists and technicians. Euromap has now become a GAF branch, with offices on the DLR campus and in central Neustrelitz.

<https://www.gaf.de/content/gaf-ag-looks-back-20-years-handling-indian-earth-observation-satellite-data-neustrelitz>

## Euro-Maps 3D – countrywide, precise and cost-efficient

Euro-Maps 3D is a 5 m spaced DSM at a very attractive price. It is semi-automatically derived from Indian IRS-P5 Cartosat-1 satellite data and provides a very detailed and accurate representation of the Earth's surface.

This new and innovative product has been developed in close co-operation with the Remote Sensing Technology Institute (IMF) of the German Aerospace Center (DLR). A sophisticated and tailored algorithm based on semi-global matching is applied and the reliability of the information is increased by using multiple overlapping stereo pairs. The product is accompanied by an ortho-corrected image and includes detailed auxiliary information such as pixel-based quality and traceability layers.

Our image archive is well stocked - thus we can produce the DSM product for large (transnational) areas within a short time frame and for very attractive prices.



# Earth Observation Data - Categories

## Optical

- Coarse & Medium Resolution Data
- Ocean Data
- Meteorological Data

- High & Very High Resolution Data
- Stereo Data

Earth System  
Science

High Resolution  
(Large Scale)  
Application

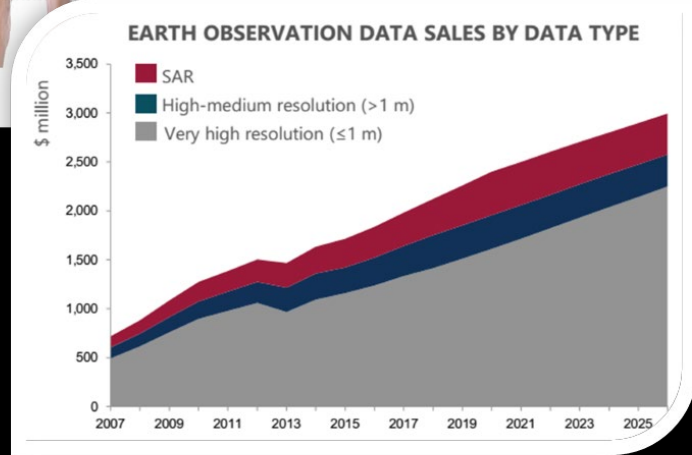
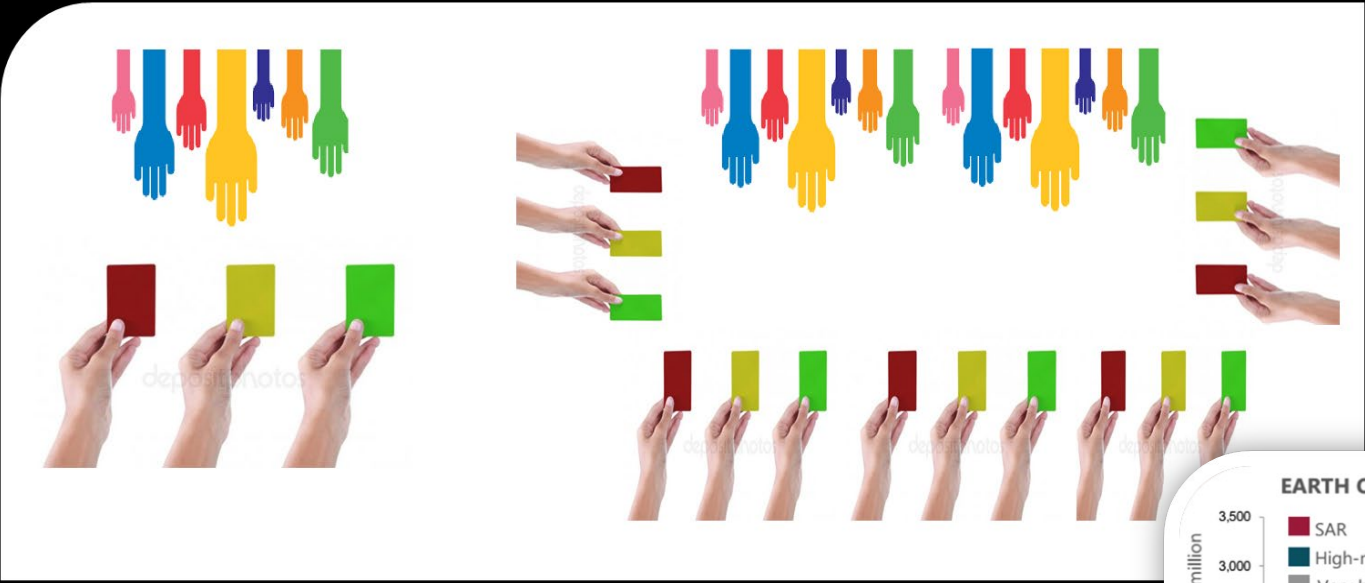
## Microwave

- SAR Data
- Scatterometer
- Altimeter
- .....

- HR SAR Data

Many datasets in Free and Open Domain - Initiatives by GEO, GEOSS, CEOS

# Earth Observation Data - Commercial Scenario



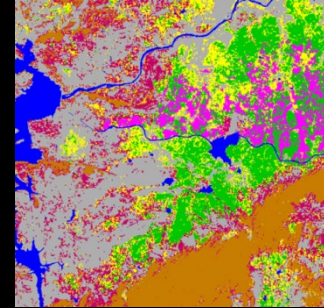
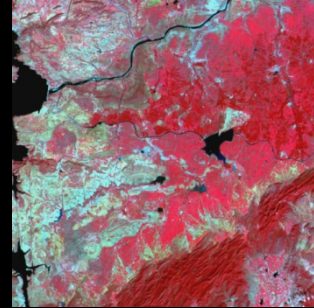
Source: EuroConsult 2017

# Application is the Key

**GEO** GROUP ON  
EARTH OBSERVATIONS



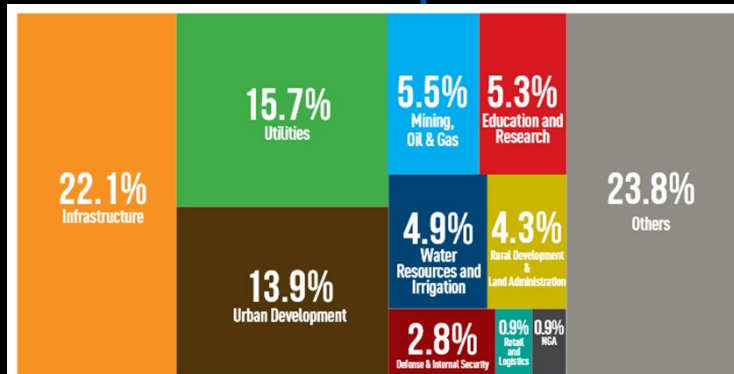
## The Value of Open Data Sharing



**Cotton** **Paddy** **Other** **Crops**  
**Forest** **Scrub** **Fallow** **Water**

**SATELLITE  
IMAGERY**

**INSIGHTS + DATA  
ANALYTICS**



Source: Geospatial Media Analysis

**VALUE ADDED  
SERVICES (VAS)**

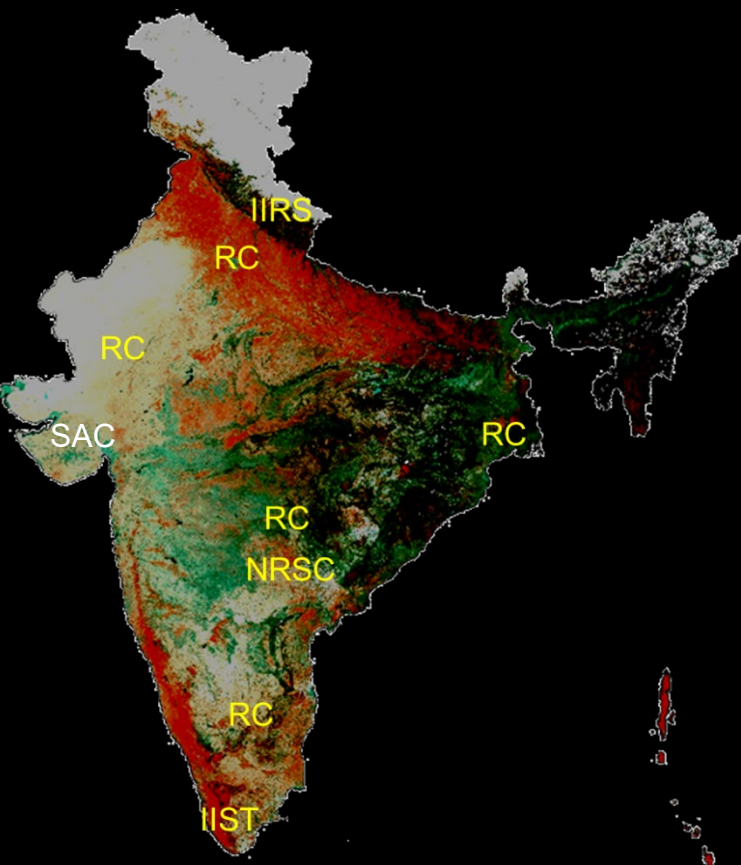
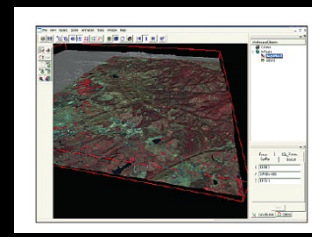
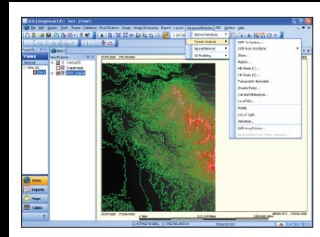
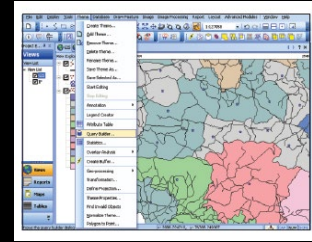
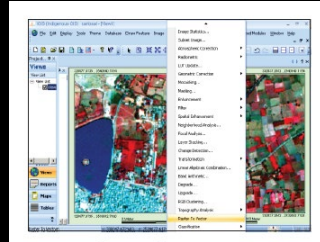


# Earth Observation Data Users – Shift in Approach

## SHIFT FROM PIXEL TO INSIGHT AND NEW SERVICE STRUCTURE

TRADITIONAL EO	INFORMATION SERVICE ERA
<b>ORDERING</b>	
On-demand data	On-demand analysis
Reactive tasking based on single satellites	Reactive tasking based on constellations
Data cost is driven by the data source (higher CAPEX system equates to higher data prices); lower-cost systems would imply lower data prices and services development.	
<b>PROCESSING</b>	
Owned data analysis	Cloud approach
Manual/automated operations on desktop or internal network	Big Data and Deep Learning computation
<b>DELIVERING</b>	
Ad hoc services, ordering through reseller or web-portal tasking	Service subscription basis
Reselling network, privileged distributors (government user focused)	Platform deliveries (private sector focused) and reselling network for governments

# Capacity Building & Data Democracy



Data Democracy – Antrix Perspective

# To Conclude- Collaboration is the Key

No Single Country can make all the Satellites for diversified science applications.

Collaboration is the Key.

Application - independent of Data sources

Data Democracy is order of the day (exceptions...)

“Collaborate, Cooperate & Compete!”







Lets  
Us grow  
Together

**Thank You for  
your kind  
attention**

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