

# **Acquisition of National Capacity in Space Technology and its Concurrent Applications in National Development: The Early Experience of a Developing Nation**

**Eng. Sanath Panawennage**

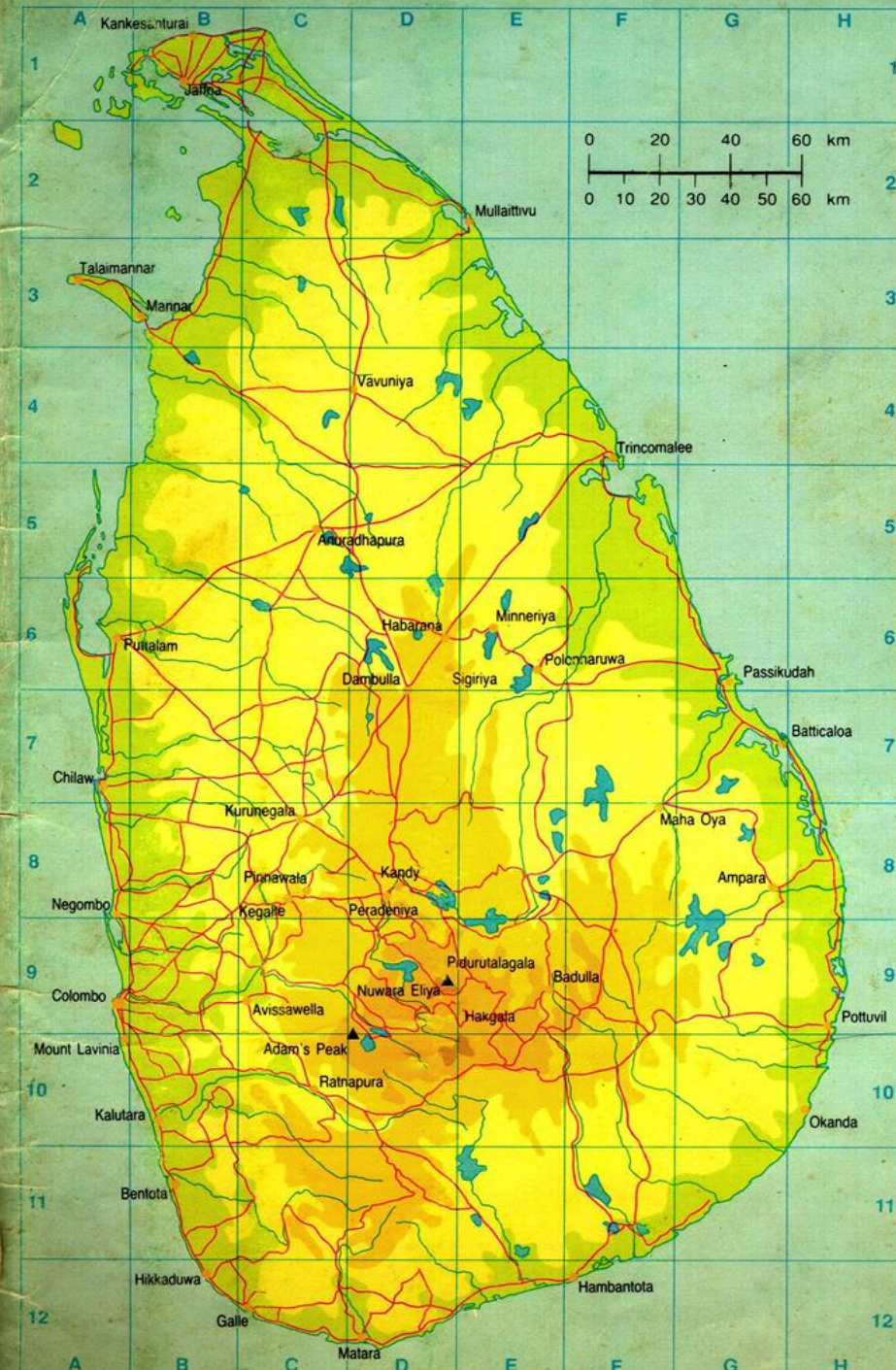
**Arthur C Clarke Institute for Modern Technologies (ACCIMT),  
Sri Lanka**

**UN/Russian Federation Workshop on  
Human Capacity Building in Space Science &  
Technology for Sustainable Social and  
Economic Development**

**Oct 30 – Nov 2, 2017, Samara, Russian Federation**

# Sri Lanka: *Country Profile*



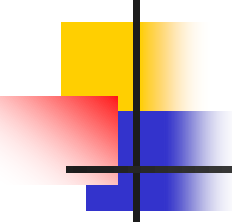


**Area : 65,525 km<sup>2</sup>**

**Population : 21 million**

**GDP: US\$ 81 billion  
(GDP per capita just below  
the Upper Middle Income  
Country Status)**

**Human Development Index  
0.766 (High HDI Category)  
Rank 73 (out of 188  
countries)**



# The Role of Science and Technology in Development: Policy Perspective at the National Level

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Alignment and Commitment of National Development Agenda to SDGs:

Sustainable Economic Growth with,  
Environmental Sustainability (*save the planet*) and  
Social Equity (*leave no one behind*)

Economic Growth Rationale:

Factor-Driven Stage already exhausted..  
Policy and Strategy Emphasis on Advanced-  
Technology based Innovation-Driven Growth

# Areas of Technology Investment Identified for Economic Transformation

- Nanotechnology
- Biotechnology  
(Bio-pharma, Bio-medical, Bio-agri, Bio-industrial, Bio-informatics) - Biotechnology Park
- Robotics
- Programming – Artificial Intelligence
- Solar Energy
- Electronics
- ***Space Technologies & Applications***
- Innovation Space – Silicon Hill
- National Science Centre - for Popularisation of STEM Education



Disrupting  
Sri Lankan  
Exports



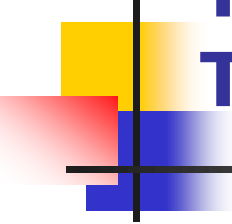
## **Then...What are the Challenges for Space Technology Capacity Development?**

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Capacity Development Approach Largely Characterized by 'Technology-Push' on the part of Technology Development/Promotion Agencies, rather than 'Demand-driven' by 'Technology-user' Agencies

- Significant Awareness Gap – even on the part of potential major 'user-agencies'
- Major awareness gap at the levels of Strategic Management

Advancing the cause of National Capacity Development in Space Technologies and Applications remains a job for the 'technology community', without significant involvement of the 'user-community'.

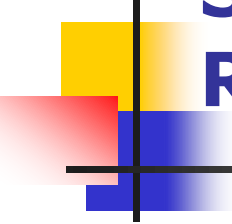


## **Then...What are the Challenges for Space Technology Capacity Development?**

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Developing the 'Critical Mass' of Human Resources:

- In the domain of technology applications (Remote Sensing, Geographic Information Systems, GNSS), numbers produced by National Universities/Technology Institutions not adequate for the 'user agencies'
- In the domain of technology development, the opportunities available for advanced training outside the country not adequate for technology development agencies.



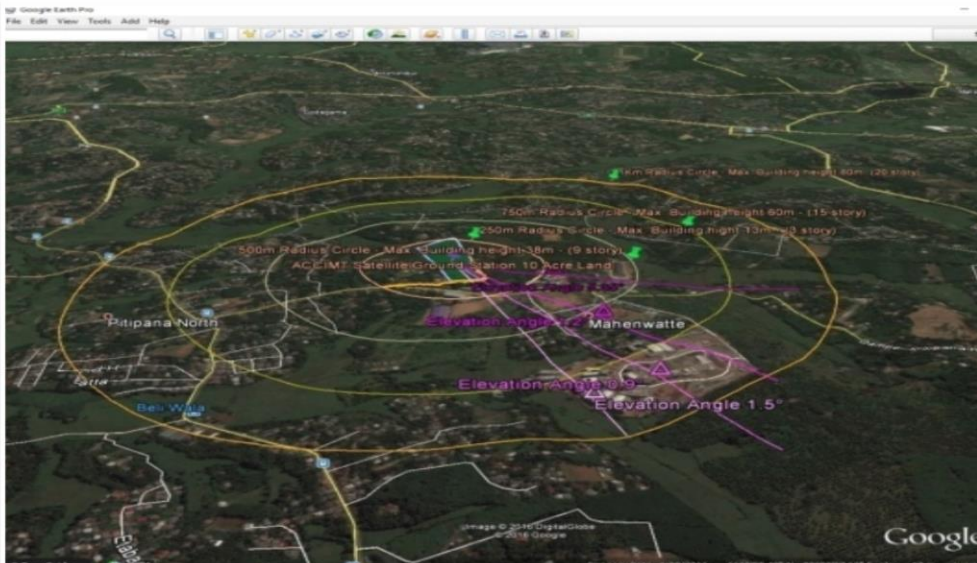
# **Space Technology Capacity Development Road Map: A Few Strategic Elements**

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- Establishment of a National Hub for Receiving and Distribution of Earth Observation Satellite Data
- Acquisition of Basic Space Technology Capabilities: Nano-Satellite Programme
- Domain Specific Collaborative Research on Space Technology Applications

Undertaken in parallel with institutional capacity building of the ACCIMT- the implementing agency, and other stakeholder organizations

# National Hub for Receiving and Distribution of Earth Observation Data



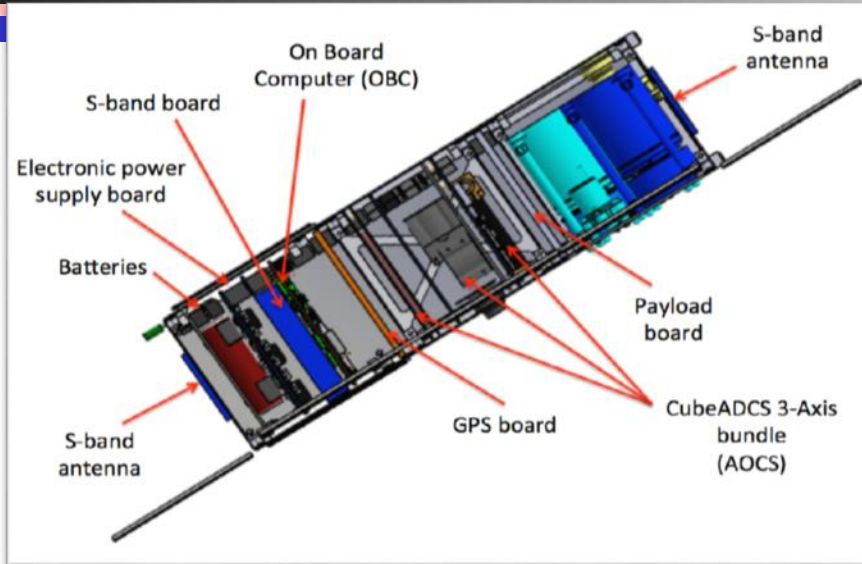
10 acre block of land allocated for construction

Undertaken in Technology Collaboration with Foreign Partners





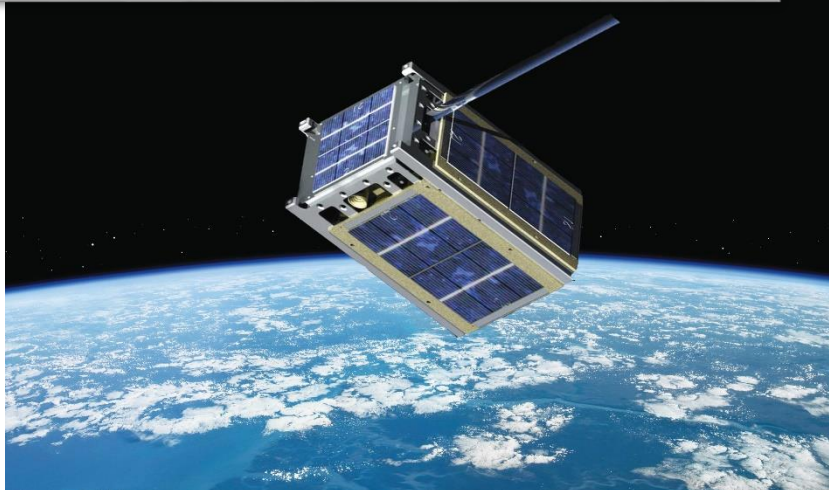
# National Capacity Development in Space Technology Applications: Nano-satellite Development Program



Project planned by the ACCIMT aiming institutional and national capacity development in Space Technology Applications,

Development of system engineering capabilities including integration of different competences of institutions and Universities

Initial project planning has already been initiated



# Objectives

- To acquire national capacity in basic Space Technologies enabling the development of a critical mass of Engineers and Scientists with capability for design, development, constructing and testing of nano-satellites
- Launching of Sri Lanka's first ever nanosatellite, designed and built by Sri Lankan Engineers.
- To promote advanced technology developments in Space Technologies and other allied fields leading to the development of a space technology based industry cluster.

# WORKSHOP ON DEVELOPMENT OF SRI LANKA'S FIRST EVER REMOTE SENSING NANOSATELLITE

At ACCIMT



18th & 19th  
August 2016

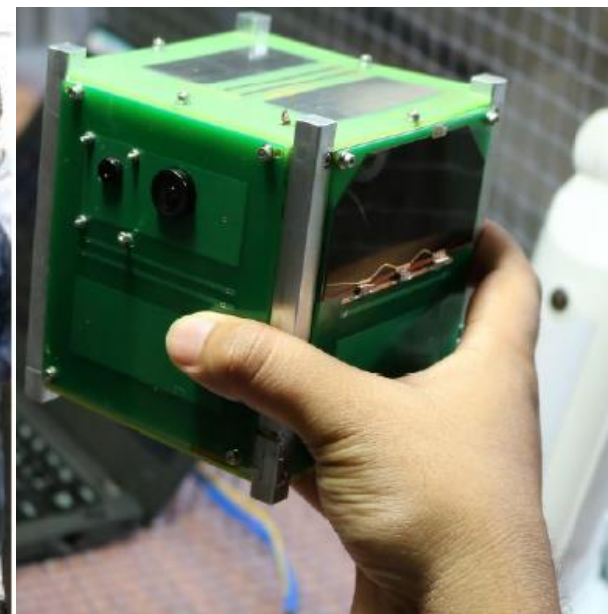
Conducted by  
**Arthur C Clarke Institute for Modern Technologies**  
*in collaboration with*  
**Samara State Aerospace University in Russia**

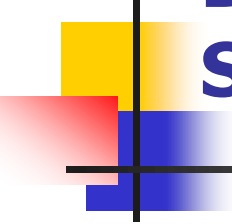




# Nano Satellite Project with Kyushu Institute of Technology, Japan – BIRDS 3 Programme

- Two ACCIMT Research Engineers are working under the BIRDS -3 Programme developing a 1U Nano Satellite at the Kyushu Institute of Technology, Japan,





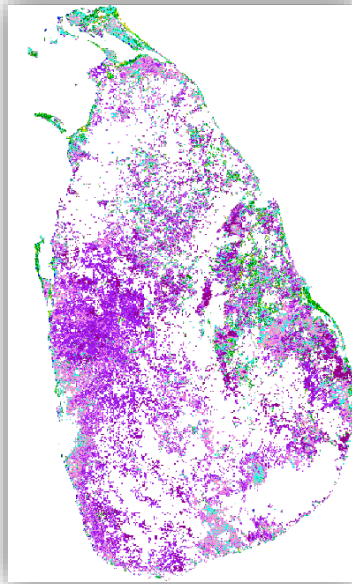
# **Domain Specific Collaborative Research on Space Technology Applications**

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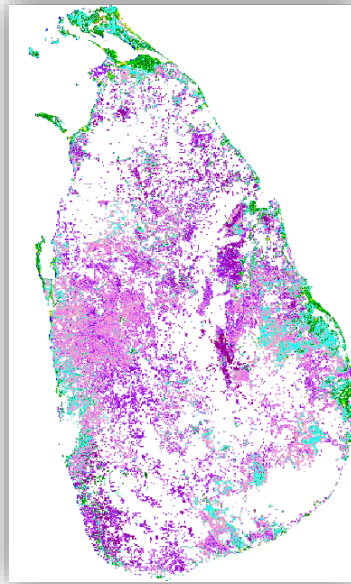
**UNESCAP – Sri Lanka Pilot project on  
Applications of Space Technologies for  
Agricultural Drought Monitoring & Early  
Warning**



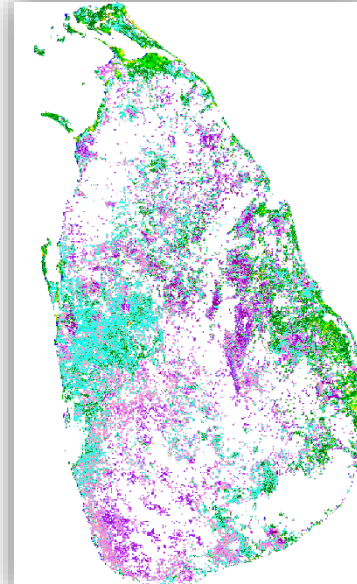
# 2016 – MODIS\_NDVI



2016/Jan/01

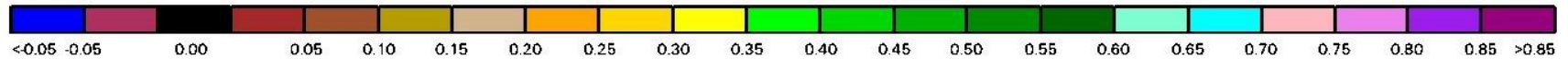


2016/Jan/17

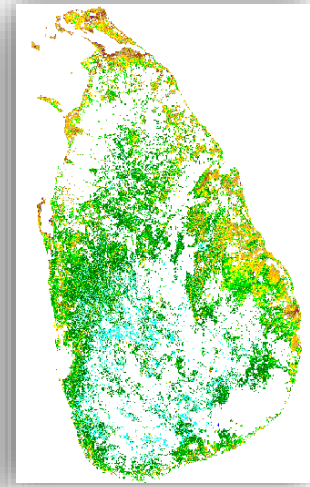
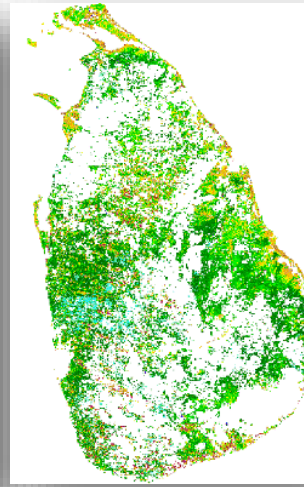
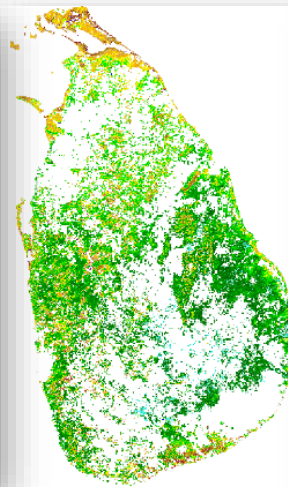
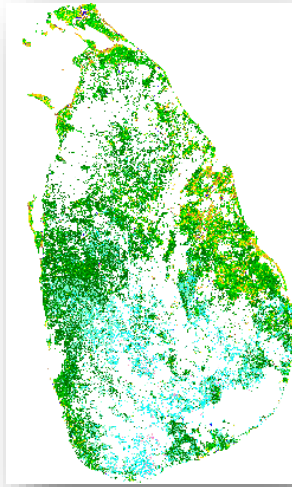


2016/Feb/02

 Non agriculture area



# 2016 NDVI



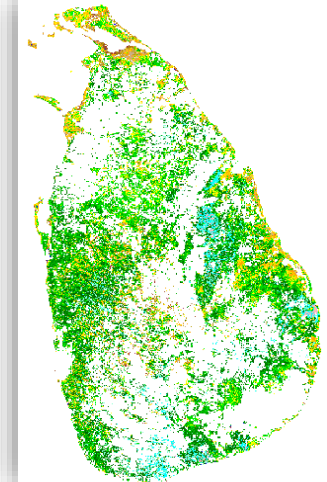
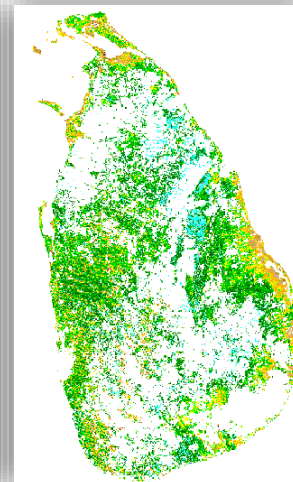
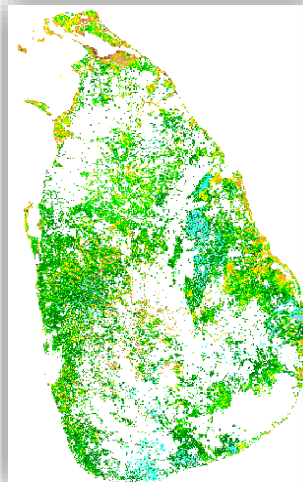
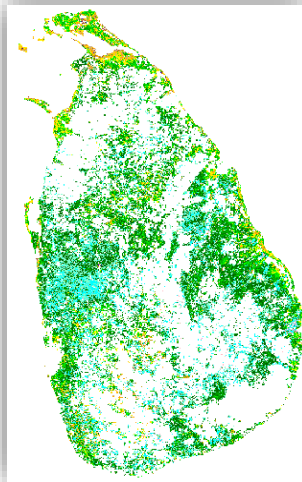
# AWiFS

January

Feb

March

May



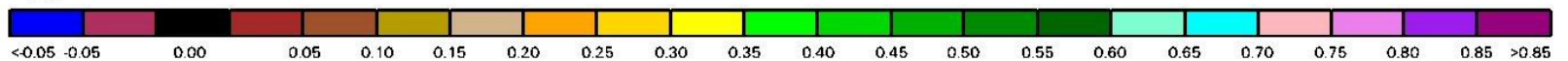
June

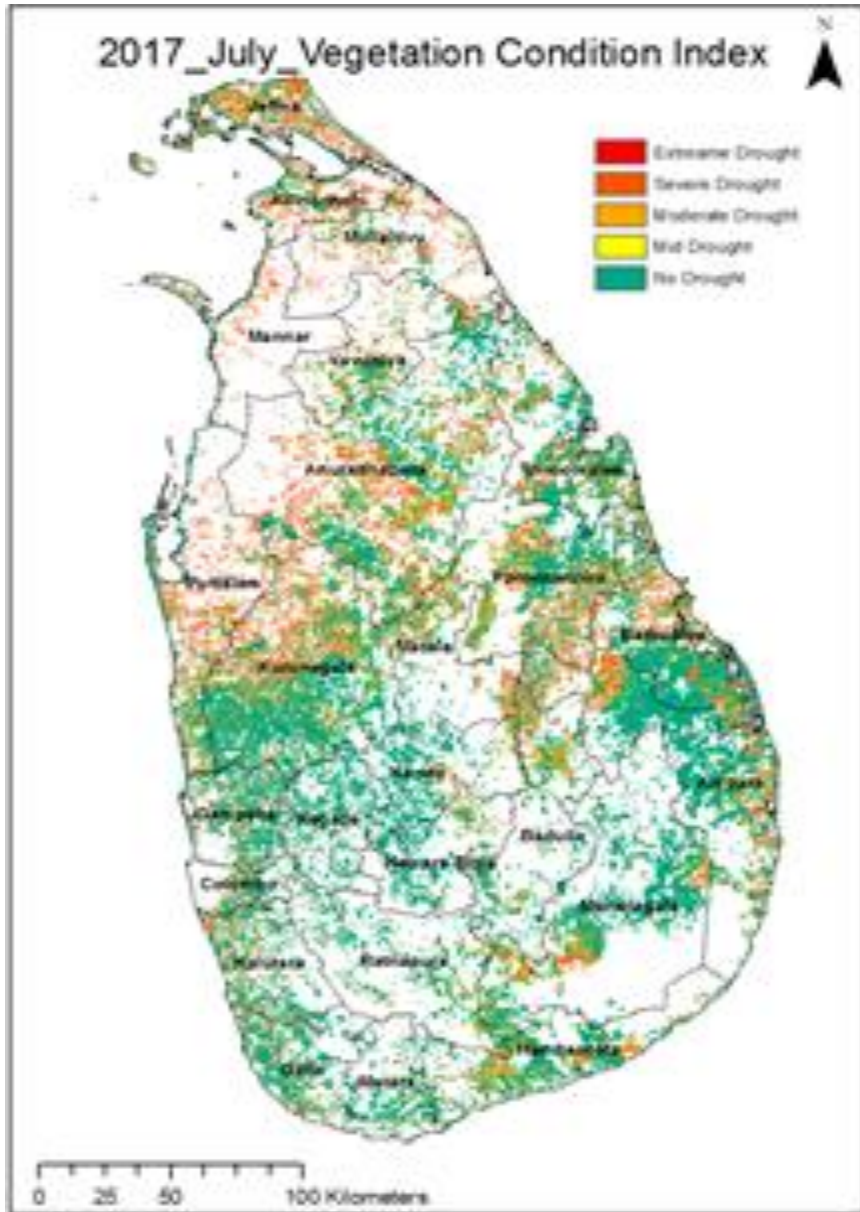
July

August

Sep

 Non agriculture area

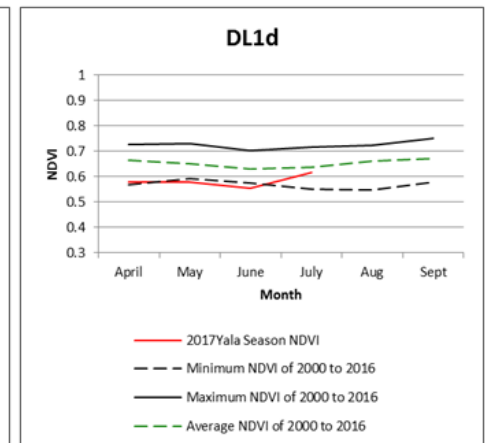
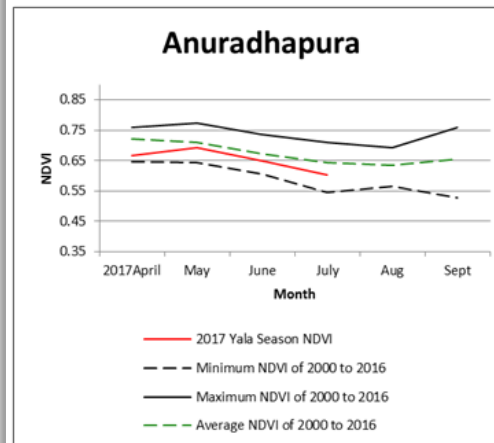




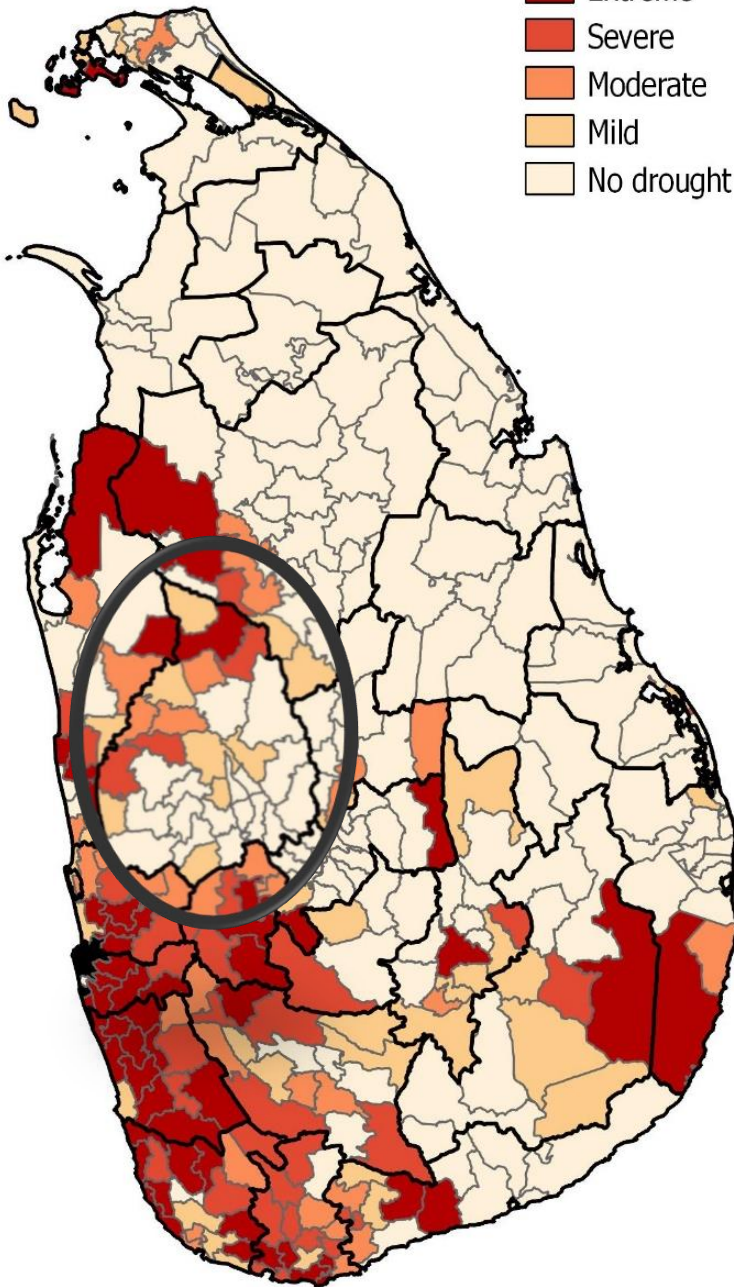
» Process and analyze MODIS data, generate monthly Drought severity maps and Circulate to Stakeholder Agencies.

» Represents the time series Drought Severity, Graphically for the 2 Crop seasons 'Yala' and 'Maha' for every District/ Agro ecological zone

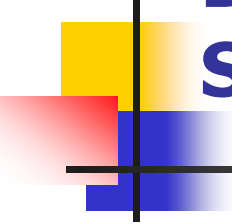
» Field data collection for Ground Truth Validation by Divisional Area S&T Centre Network.



2012\_January



| Disaster Records |            |              |       | MODIS_VCI        |
|------------------|------------|--------------|-------|------------------|
| Event            | District   | DS Division  | Month |                  |
| DROUGHT          | Kurunegala | Ambanpola    | Jan   | Moderate Drought |
| DROUGHT          | Kurunegala | Alawwa       | Jan   | Mild Drought     |
| DROUGHT          | Kurunegala | Bamunukotuwa | Jan   | Mild Drought     |
| DROUGHT          | Kurunegala | Ehetuwewa    | Jan   | Severe Drought   |
| DROUGHT          | Kurunegala | Galgamuwa    | Jan   | Extreme Drought  |
| DROUGHT          | Kurunegala | Kobeigane    | Jan   | Severe Drought   |
| DROUGHT          | Kurunegala | Kotavehera   | Jan   | Mild Drought     |



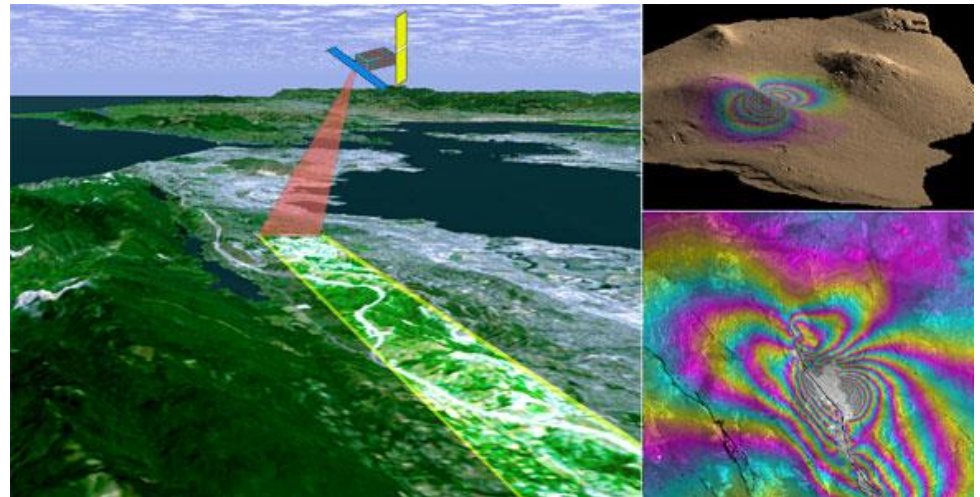
# **Domain Specific Collaborative Research on Space Technology Applications**

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**Other areas of on-going and proposed research activities, undertaken in collaboration with the Member Agencies of the Inter-Agency Network of Space Technology Users (public sector), coordinated by the ACCIMT (as the national focal agency) involve,**

**Agriculture, Environmental Management, Natural Resources Management, Irrigation, Ocean Resources Management, Urban Development, Public Health, Education, and Disaster Risk Reduction**

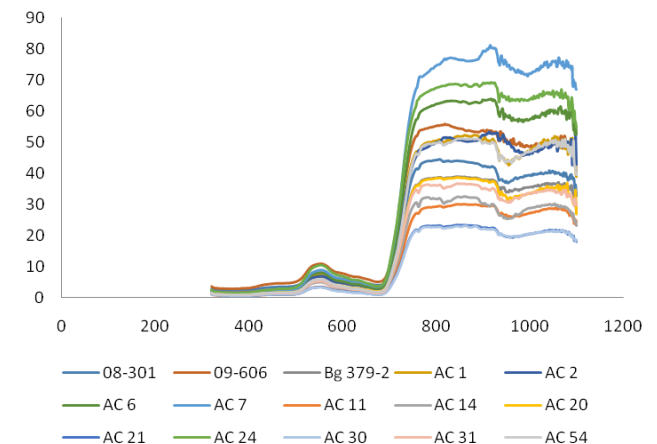
# Domain Specific Collaborative Research on Space Technology Applications

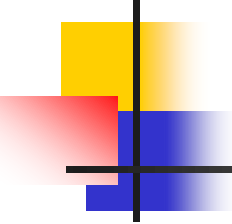


Unmanned Aerial Vehicle (UAV) for aerial imaging applications in areas of Agriculture, irrigation, urban planning, forestry and archeology etc.

# Domain Specific Collaborative Research on Space Technology Applications

- **Establishment of Spectro-Radiometry Laboratory and a spectral signature bank**
  - A research project initiated to develop a spectral signature library (bank) for identifying spectral signatures for our home-grown crops, in particularly paddy, using a spectroradiometer.





# Capacity Building Support from International/Regional/Bi-Lateral Cooperation Platforms

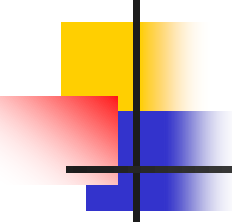
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## International/Regional

- UNESCAP RESAP
- CSSTEAP
- UNOOSA
- APRSAF
- HIST

## Bilateral/Inter-agency

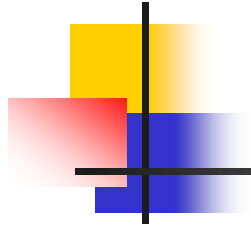
- ISRO (India)
- SSAU (Russia)
- RADII (China)
- KyuTech (Japan)



# Capacity Building Support from International/Regional/Bi-Lateral Cooperation Platforms

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- Interventions
  - Postgraduate Training
  - Short term specialized training for experts
  - Expert Missions
  - Collaborative Research
  - Technical Assistance



Thank You!