

# Applications of CHRIS Satellite Data

~ Aditya Ahuja

## Introduction

Name : Proba1 - CHRIS [Compact High Resolution Imaging Spectrometer]

Purpose : targeted to help with environmental monitoring applications.

Launched By : European Space Agency

Links : [ [Proba CHRIS Level 1A](#) ] [ [About CHRIS](#) ]

### About :

- Access : Need to register to access.
- Resolution : 18 or 36m
- Spectral Range : 410nm to 1050 nm
- Spectral Bands :
  - 19 bands at a spatial resolution of 18m
  - 63 bands at a spatial resolution of 36m
- Return Interval : 7 days.

Main Applications: Environmental Monitoring, Forestry Inventory and Precision Farming.

### Literature on CHRIS:

- Duca R and Del Frate F (2008) : Creating land cover maps.
- Jin HR et al.(2012) : Performing Land cover classification.
- Verrelst J et al. (2012) : Estimating Leaf Chlorophyll Content.
- Vuolo F et al. (2008) : Estimating Leaf Area Index.
- S Mannheim et al. (2004) : Monitoring Lake water quality.
- S Raval et al. (2007) : Mining Environment Monitoring.

### Five imaging modes of CHRIS:

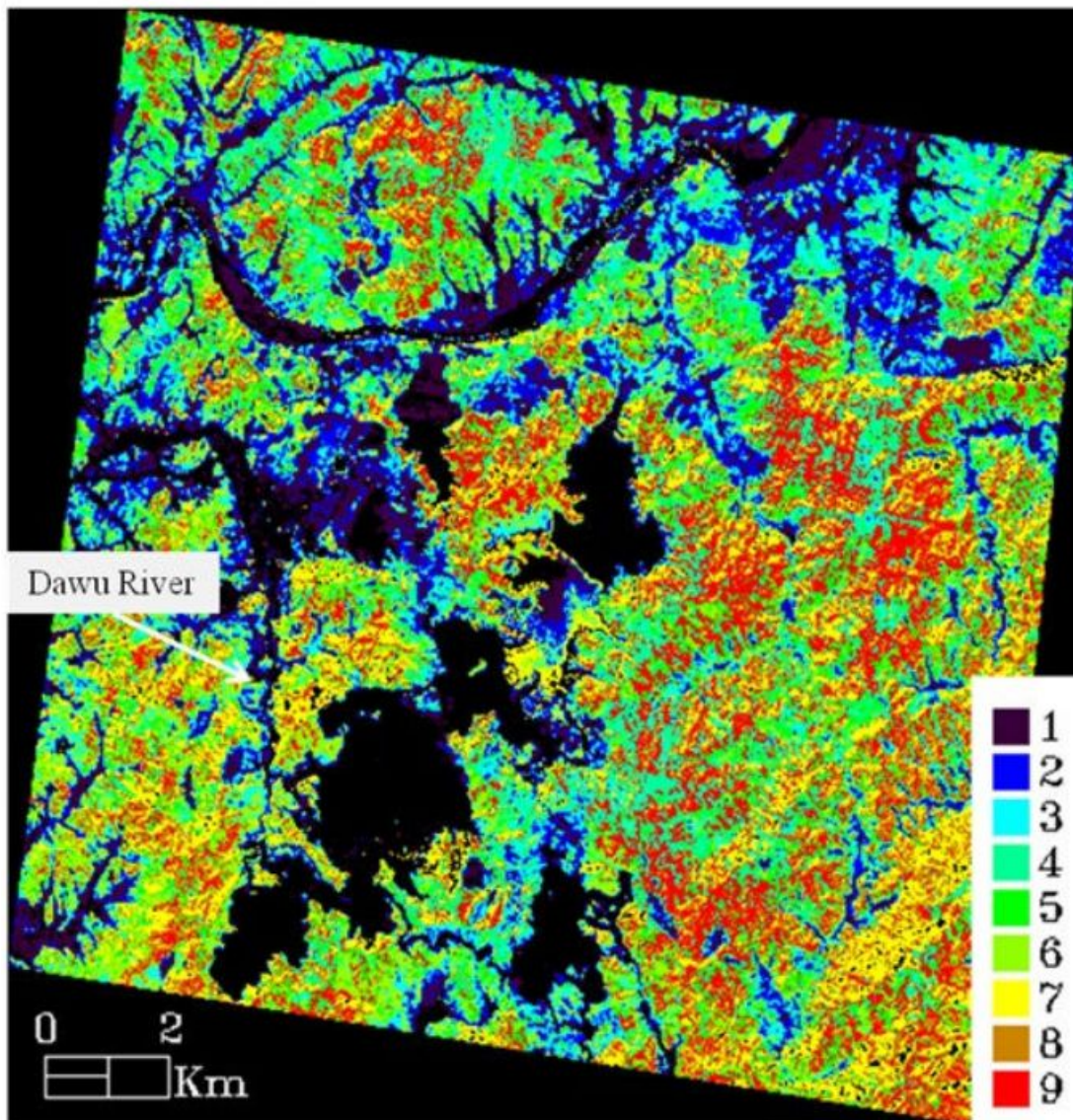
- [1] Full swath width, 62 spectral bands, 773nm / 1036nm, nadir ground sampling distance 34m @ 556km.
- [2] WATER BANDS: Full swath width, 18 spectral bands, nadir ground sampling distance 17m @ 556km
- [3] LAND CHANNELS: Full swath width, 18 spectral bands, nadir ground sampling distance 17m @ 556km
- [4] CHLOROPHYLL BAND SET: Full swath width, 18 spectral bands, nadir ground sampling distance 17m @ 556km
- [5] LAND CHANNELS: Half swath width, 37 spectral bands, nadir ground sampling distance 17m @ 556km

## Use Cases

### Use Cases Analysed:

- Vegetation Health Mapping.
- Estimation of leaf area index.
- Generation of Land Cover maps.

### Vegetation Health Mapping



### Introduction :

- Paper : Mine environmental monitoring using CHRIS Proba imagery of the Dexing Copper Mine, China.
- As seen in image, it is possible to analyse vegetation health especially in areas near commercial activity that seriously affects forest cover.
- The black areas contain the mine. Areas immediately adjacent to it show serious damage and strain (coloured in purple and cyan).
- As CHRIS uses a spectral resolution of 36m, it should be possible to conduct such an analysis with the pixxel data as it is supposed to have a resolution of 30m.

### Applications :

- Determining forest and vegetation health, as well as evaluating impact on commercial activities on vegetation.
- Forecasting crop yield using vegetation conditions.
- Predicting soil quality and environmental conditions using forest and vegetation health.

### Other literature [Papers in related folder]:

- Application of Hyperspectral Remote Sensing in Forest Health Assessment and Mapping
- Hyperspectral Image Processing for Forest Types Mapping and Forest Health Monitoring
- Early forecasting corn yield using field experiment datasets and Vegetation Health Indices
- Potential use of hyperspectral data to classify forest tree species.

### Related Datasets :

- [Global Vegetation Health](#)
- [Global - Vegetation Health Index - NOAA](#)
- [Vegetation Indice](#)
- [NASA earth observations](#)
- [Rainfall dataset](#)

## Leaf Area Index (LAI)

- LAI is used to predict photosynthetic primary production, evapotranspiration and as a reference tool for crop growth.
- The hyperspectral images needed to train this particular task have to be of high resolution.
- However the images obtained by Pixxel are of a somewhat lower resolution and thus, doing this analysis (without modification) will not be feasible.
- This task would also not be feasible in Rajasthan as the area has sparse vegetation cover.

## Generation of Land Cover Maps

- This uses satellite imagery to generate maps of how the land cover in a particular area looks like, such as the forest and vegetation in the region.
- Use Case: Can be used to track deforestation.
- The hyperspectral image resolution necessary for this task is not that high, so we can use the imagery we get from our satellites for this purpose.
- However we feel that vegetation health mapping is a better application for the satellites with respect to Rajasthan, keeping in mind our original work done in mining.