

TINKERING LAB ASSIGNMENT

AKSHAT AHUJA
2020EEB1149

GOOGLE EARTH ENGINE

LAB REPORT
2022

NDVI (Normalized Difference Vegetation Index)

The NDVI is a simple graphical indicator that can be used to analyze remote sensing measurements. It is the most commonly and globally used multispectral vegetation indices.

NDVI positively correlated to measures such as leaf area index and foliage projective cover.

Normalized Difference Vegetation Index

$$(NDVI) = \frac{(NIR - Red)}{(NIR + Red)}$$

For healthy and dense vegetation:

$$\uparrow (NDVI) = \frac{(\uparrow NIR - Red)}{(\uparrow NIR + Red)}$$

For sparse and not so healthy vegetation:

$$\downarrow (NDVI) = \frac{(\downarrow NIR - Red)}{(\downarrow NIR + Red)}$$

where,

NIR – reflection in the near-infrared spectrum

Red – reflection in the red range of the spectrum

This index defines values from -1.0 to 1.0, basically representing greens, where negative values are mainly formed from clouds, water and snow, and values close to zero are primarily formed from rocks and bare soil.

Very small values (0.1 or less) of the NDVI function correspond to empty areas of rocks and snow.



Moderate values (from 0.2 to 0.3) represent shrubs and meadows, while large values (from 0.6 to 0.8) indicate temperate and tropical forests.

When you have negative values, it's highly likely that it's water. On the other hand, if you have an NDVI value close to +1, there's a high possibility that it's dense green leaves.

For the Tinkering Lab Assignment, We have selected the NDVI parameter for the wheat and rice vegetation to be studied for the state of karnataka from the duration 1st January 2015 to 31st December 2015.

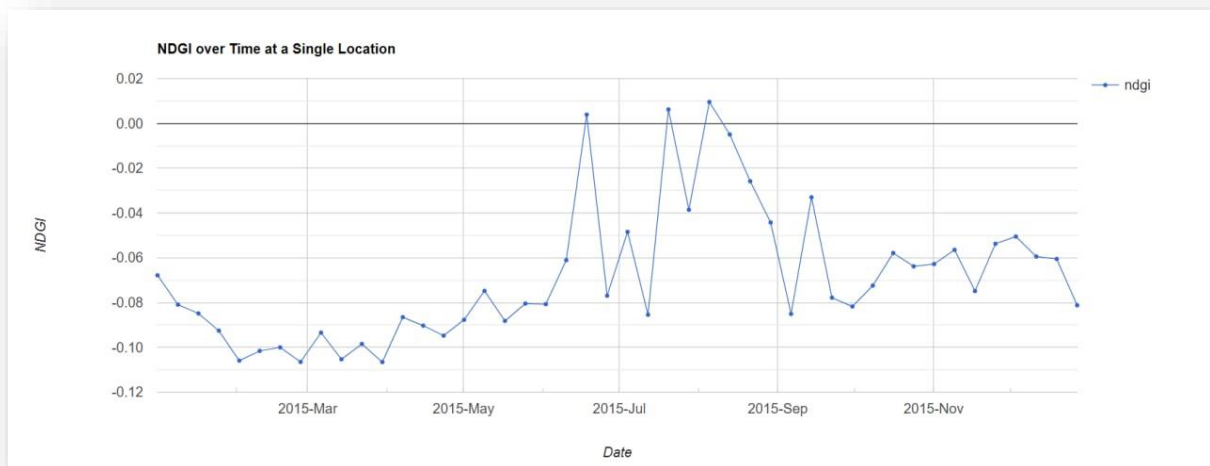
GEE Code Writing Process:

- The necessary links such as (MOD09A1.005 Surface Reflectance 8-Day Global 500m [deprecated], FAO GAUL 500m: Global Administrative Unit Layers 2015, Second-Level Administrative Units) were imported into our code editor on the Google Earth Engine (GEE).
- Using Map.setCenter() the coordinates of the Karnataka were substituted as follows:
`Map.setCenter = (77.59369, 12.97194, 5);`
- Landcover was selected since we want to find out NDVI (vegetation).
- Start date and End Date were also selected. (The year is 2015 since we have imported the 2015 Google Data of the states i.e.,
`gaul = ee.FeatureCollection("FAO/GAUL/2015/level2")`
- The spectral analysis(of bands and NDVI) Maps were also generated and printed using the suitable code.

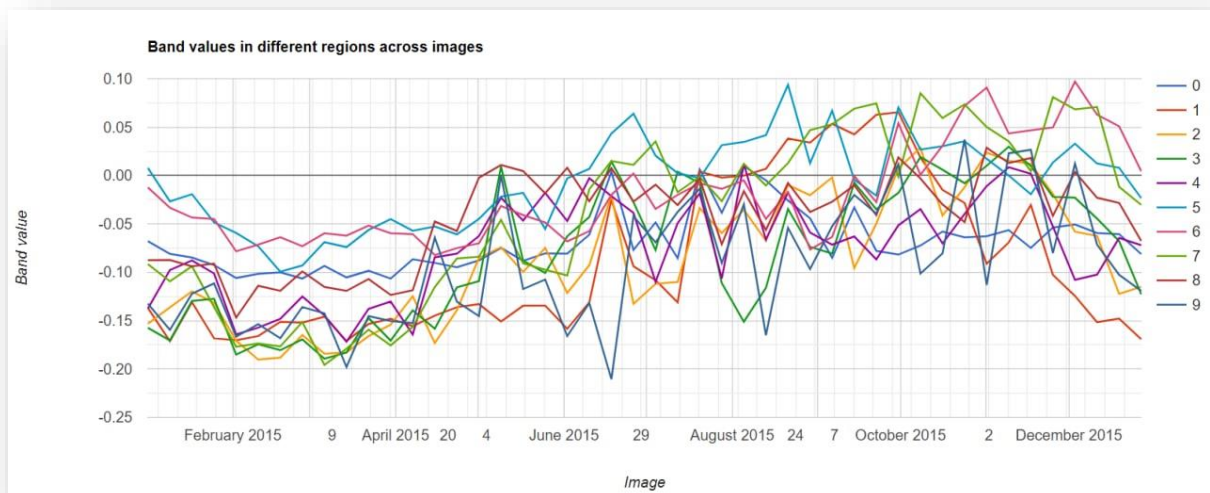


Observations and Plots obtained:

Time Series Graphs

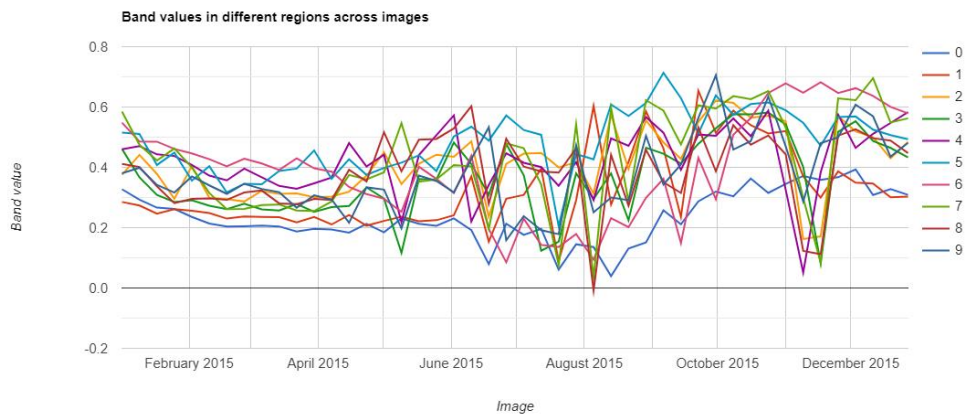


Graph 1: Cumulative Time Series Graph of the 10 regions - NDGI vs Date Plot

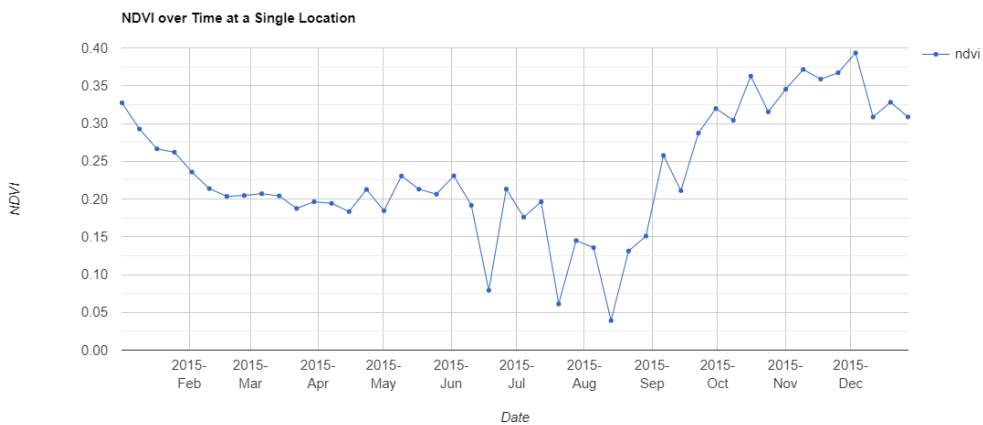


Graph 2: NDGI vs Date Graph for 10 different regions. (Test Points)





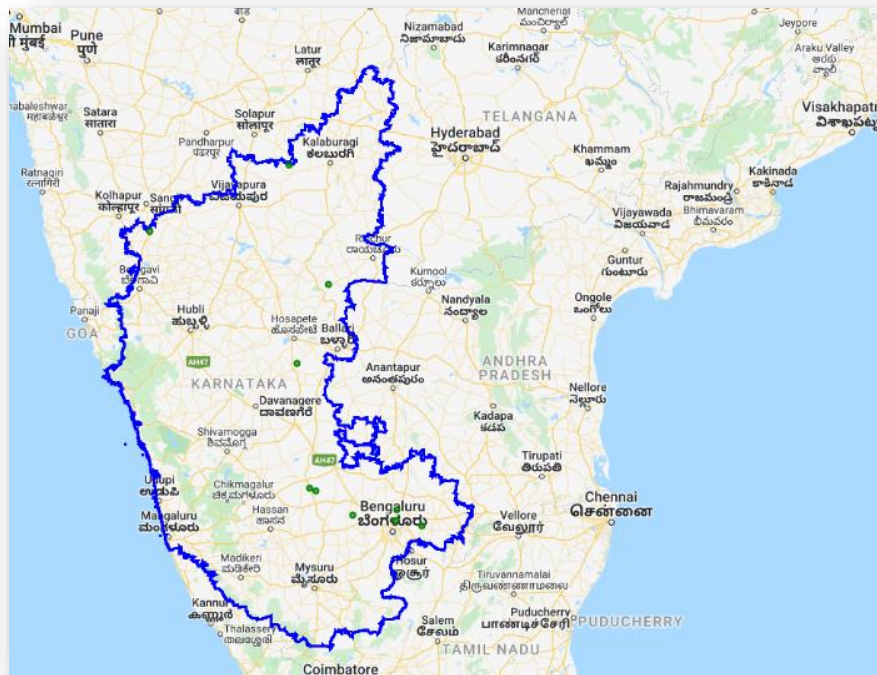
Graph 3: NVDI vs Date Graph for 10 different regions. (Test Points)



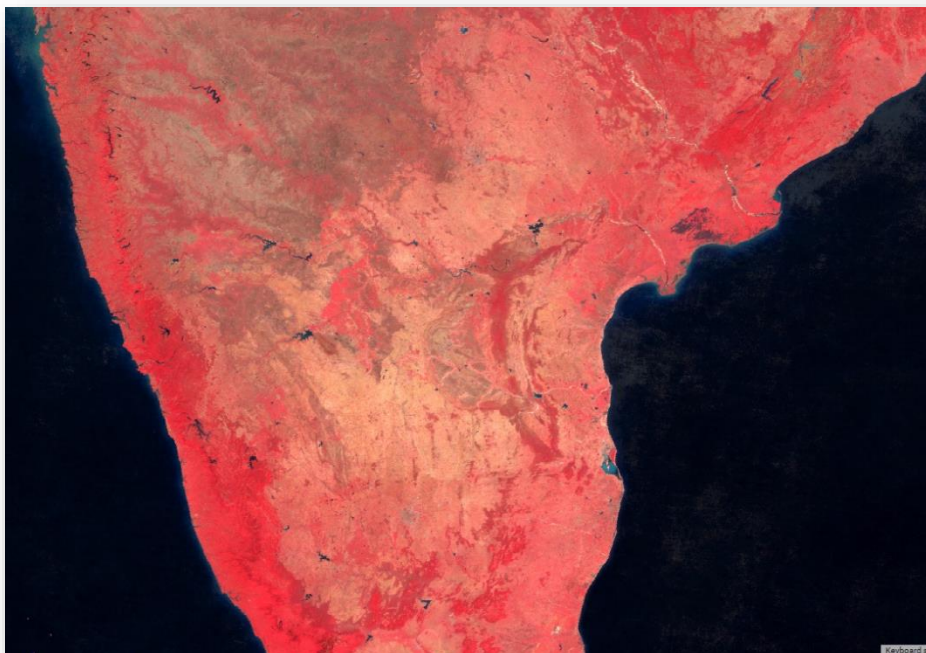
Graph 4: Cumulative Time Series Graph of the 10 regions - NDVI vs Date Plot



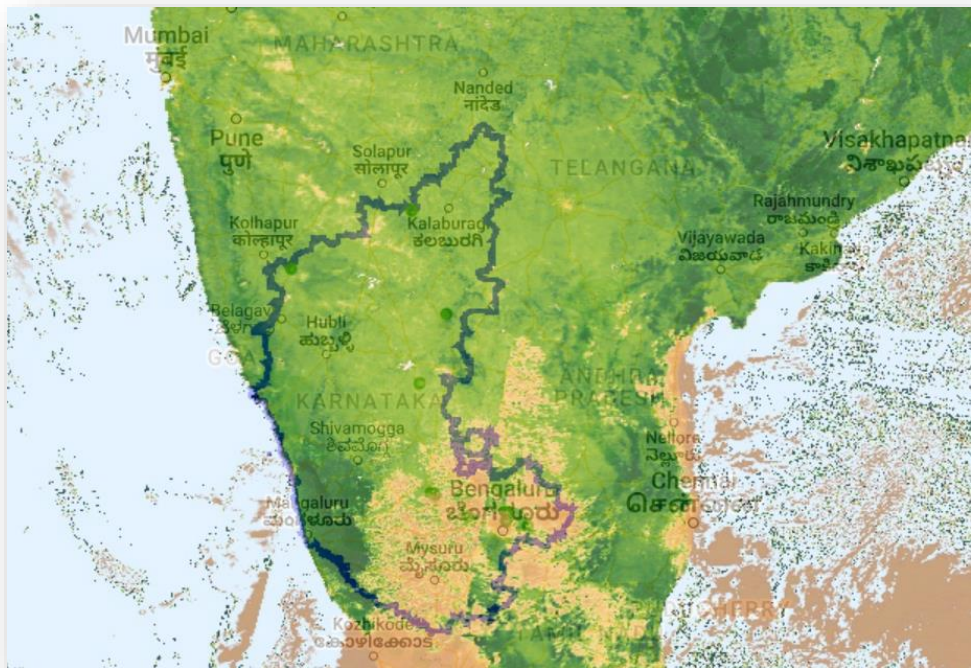
Spectral Analysis Maps



Farm Locations (. Blue Dots) and Border of the selected state (Maharashtra)



MODIS/NDVI Composite



Colorized view

Analysis:

- This shows that the vegetation is moderate
- Also from the colorized version we observe that there is a vast majority of green patches in the state
- This is also observant to us as Karnataka is a state with green vegetation.



- The Green cover in Karnataka can be observed to increase after the Rainy season and toward the middle of the winter season
- Almost all of the peaks of the 10 points seem to behave in a similar fashion

Test Point	Average NDVI	Test Point	Average NDVI
0	0.235043	5	0.483783
1	0.324696	6	0.397
2	0.413	7	0.424
3	0.363	8	0.384
4	0.425	9	0.3785
Overall Average		0.38	

Conclusion:

- In this tinkering lab, I have learned about the NDVI and its uses and how its different values indicates about health of vegetation.
- The time series analysis of NDVI (the selected Spectral Index) for the year 2015 for the state of Karnataka was successfully studied by plotting graphs.
- ALSO through this lab I have learned about leaf area index and explored about the Karnataka state also

