ITC / Natural Resource Department
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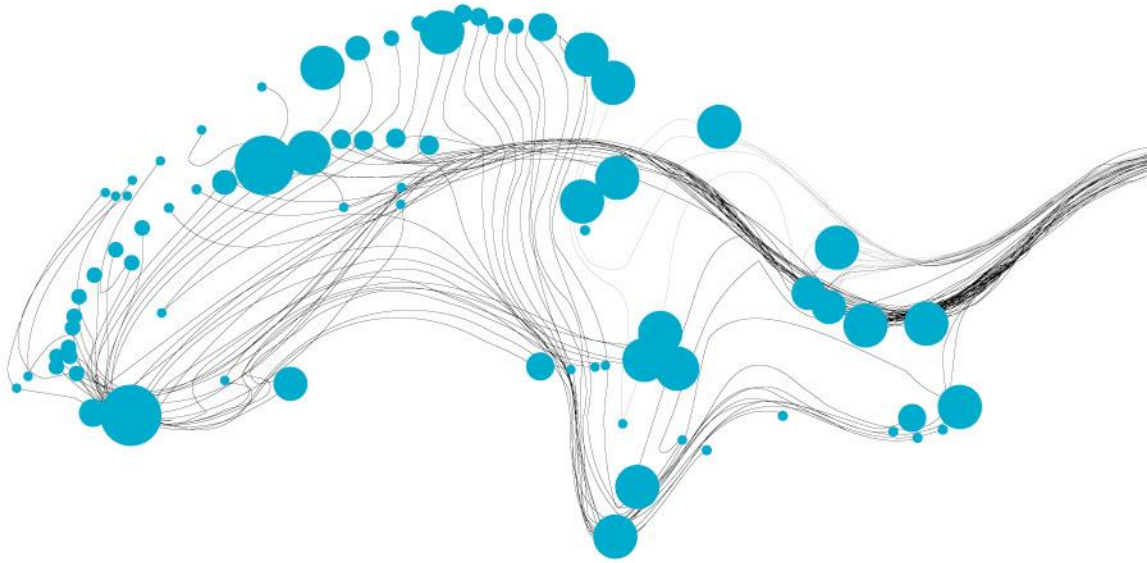
NRS TOOLS

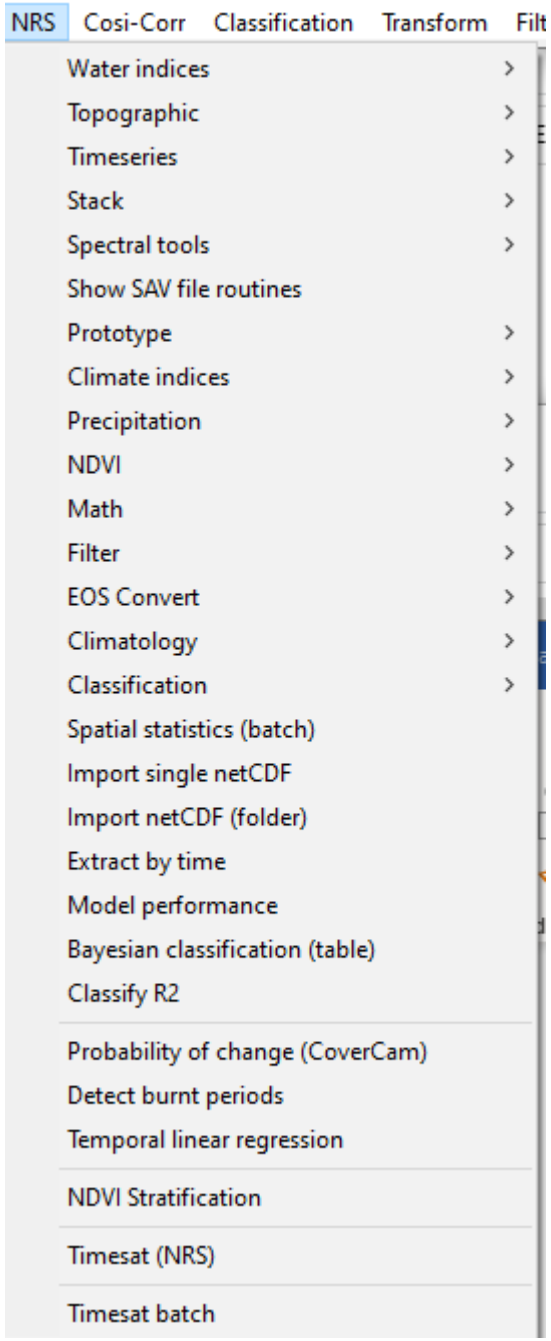
PRE-PROCESSING TOOLS IN ENVI/IDL

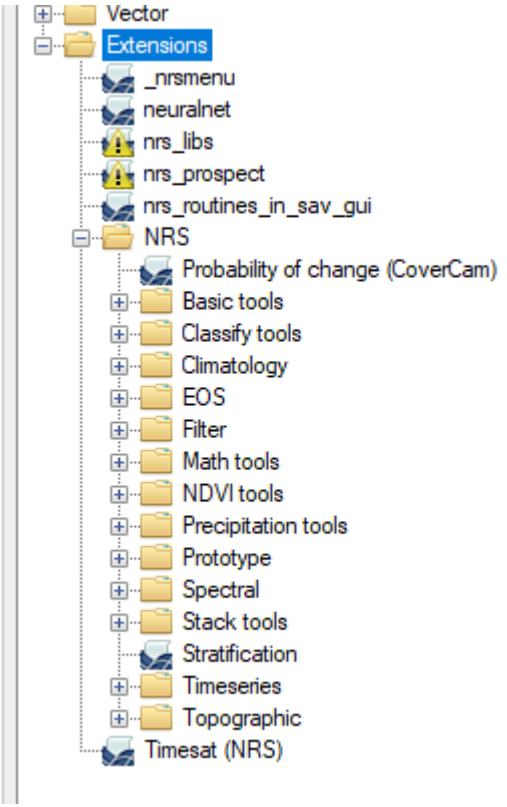


INTRODUCTION

The tools are developed over more than a decade, always on request. The number has grown to 70+. Most tools are available in both ENVI classic as well as ENVI GUI.

The IDL source code and documentation can be found here: [NRS tools on GitHub]





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WHY (WHAT ABOUT CLOUD?)

Local prototyping

Pro:

- ENVI/IDL is extensible
- Find out how to make your idea work
- Easier to test
- Cheaper

Local prototyping

Con:

- Data needs to be downloaded
- Data may need to be converted
- Only for small / medium datasets

OVERVIEW OF TOOLS

Pre-processing tools (selection)

- Timeseries tools
- Stack tools
- Spectral tools
- NDVI tools
- Climate indices
- … many more ..

A few applications

- NDVI stratification
- Inform-prospect model

Conversion

- netCDF import

TIMESERIES TOOLS

For these tools, the input is a 3D timeseries cube (stack). The list is not exhaustive.

- Harmonic analysis: decompose timeseries data using Fast Fourier Transform
- Harmonic composition: from FFT decomposition recreate timeseries
- Time aggregation and interpolation: change the time steps in a timeseries
- Upper-envelope filter (modified timesat). This has since also been ported to ilwispy.

STACK TOOLS

For these tools, the input is a 3D cube. The list is not exhaustive.

- Compare stacks: two stacks are compared band wise
- Reverse layers: Invert the ordering of the bands in the stack
- Remove bias: use a reference stack to remove bias from stack
- Stack statistics: Basic statistics by location in the stack
- Zonal operations (percentiles, threshold, ranking)

SPECTRAL TOOLS

For these tools, the input is a 3D cube.

Given are point or polygon features

- Spectrum extraction: extract spectral data from the cube, using a spatial kernel and spectral aggregation at the locations in the point feature
- Spectrum extraction (polygon): extract spectral data from the cube, using spatial aggregation for all locations delineated by the polygon features

NDVI TOOLS

For these tools, the input is a 3D timeseries cube.

- RPD (GWI): Calculate RPD (Relative phenological development), also called GWI (Green Wave Index)
- GWI Threshold: Find first date in timeseries where NDVI is higher than a threshold (in percentage of the NDVI range at each location).
- Growing Degree Days: Accumulate temperature to calculate onset of spring

CLIMATE INDICES

For these tools, the input is a 3D timeseries cube.

- Calculate precipitation indices
- Calculate climate indices (subset of the core indices of the ETCCDI/CRD Climate Change Indices)

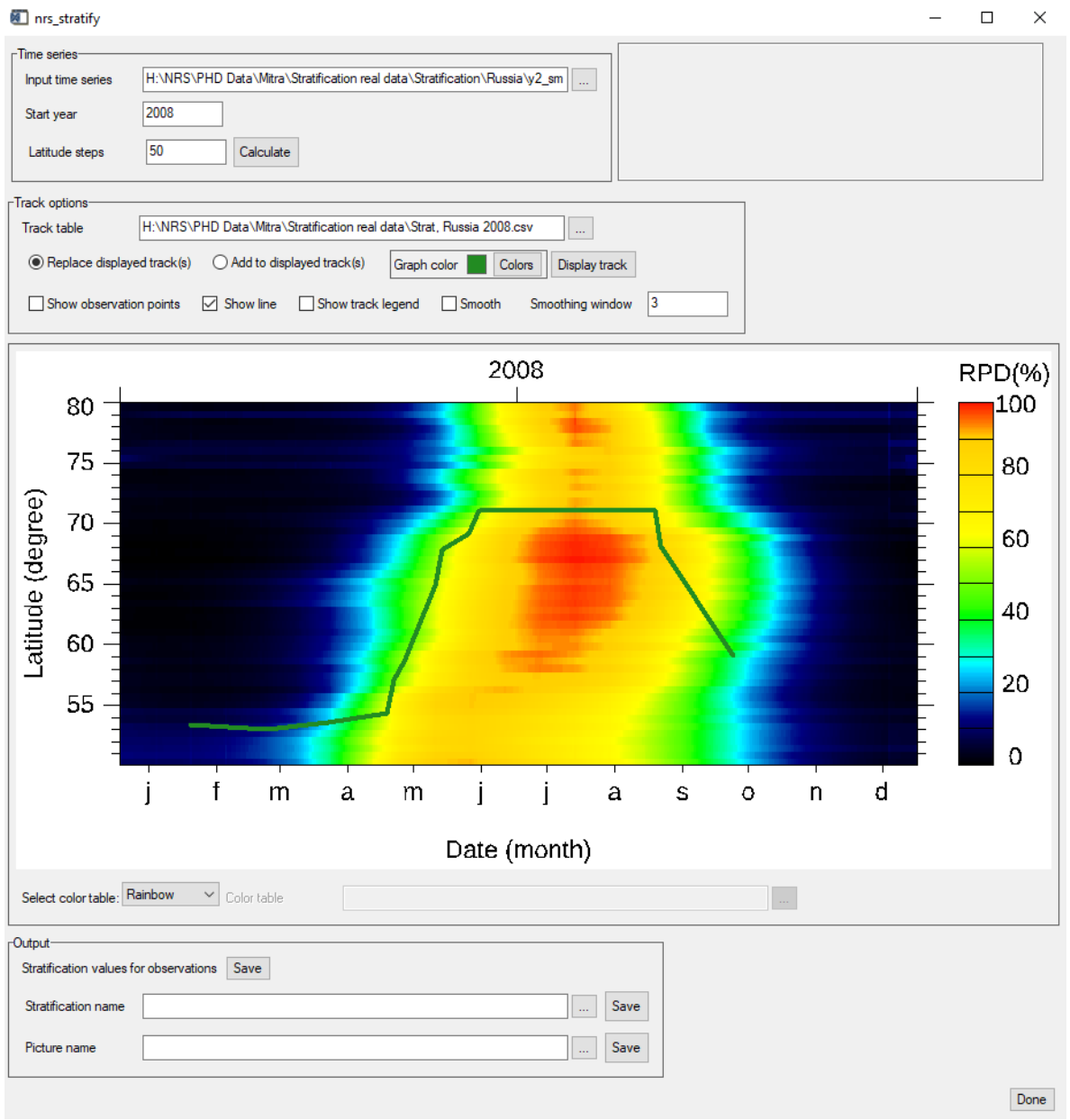
APPLICATION 1:
USING NDVI STRATIFICATION

For tracking geese: the goose follows NDVI during migration

RPD = relative phenological development:

(NDVI – NDVImin) / (NDVImax – NDVImin)

RPD is used instead of the NDVI itself, because high latitude are involved where the NDVI values are dropping compared to lower latitudes.



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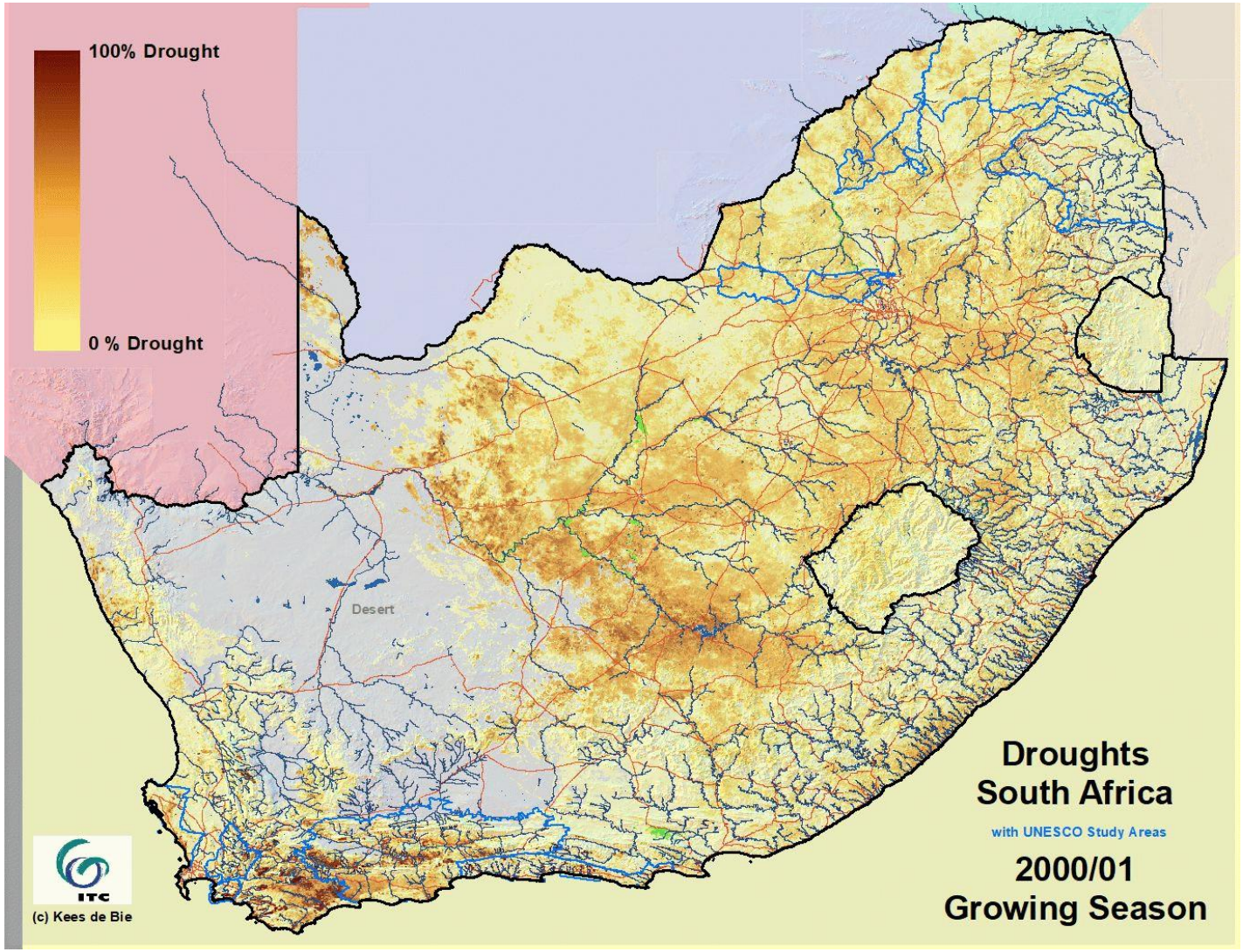
APPLICATION 2:
DROUGHT MONITORING

Pre-processing step using the modified timesat filter (upper envelope)

- Using NDVI
- Two step approach, both using the timesat filter
  - Determine climatology (medium NDVI by dekads, annual repeats)
  - Monitor current year NDVI



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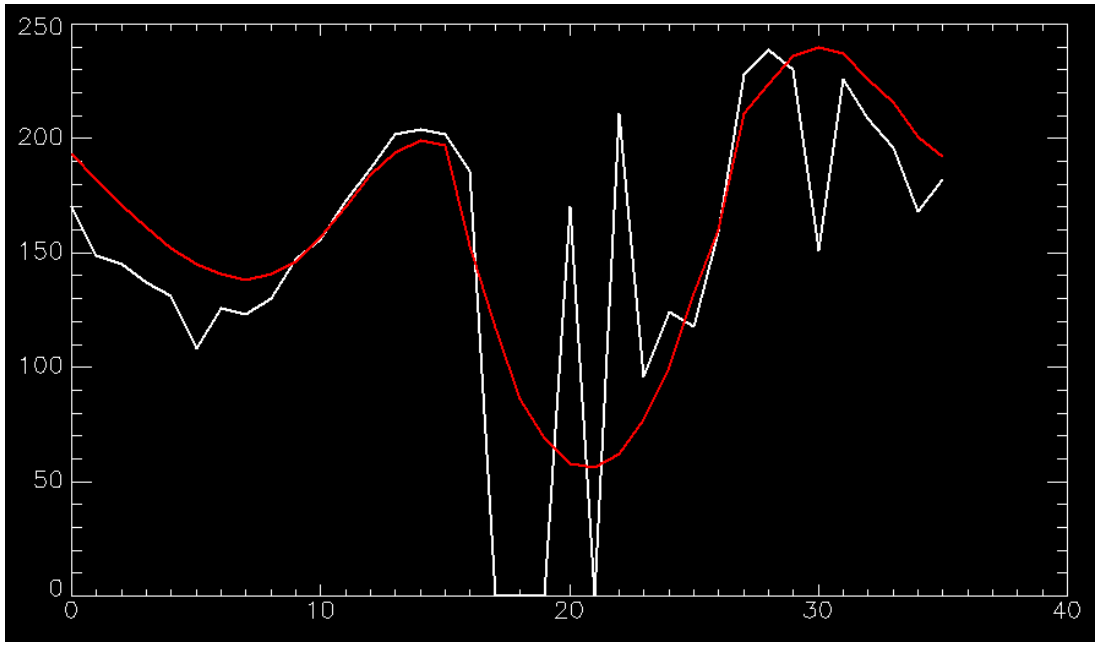
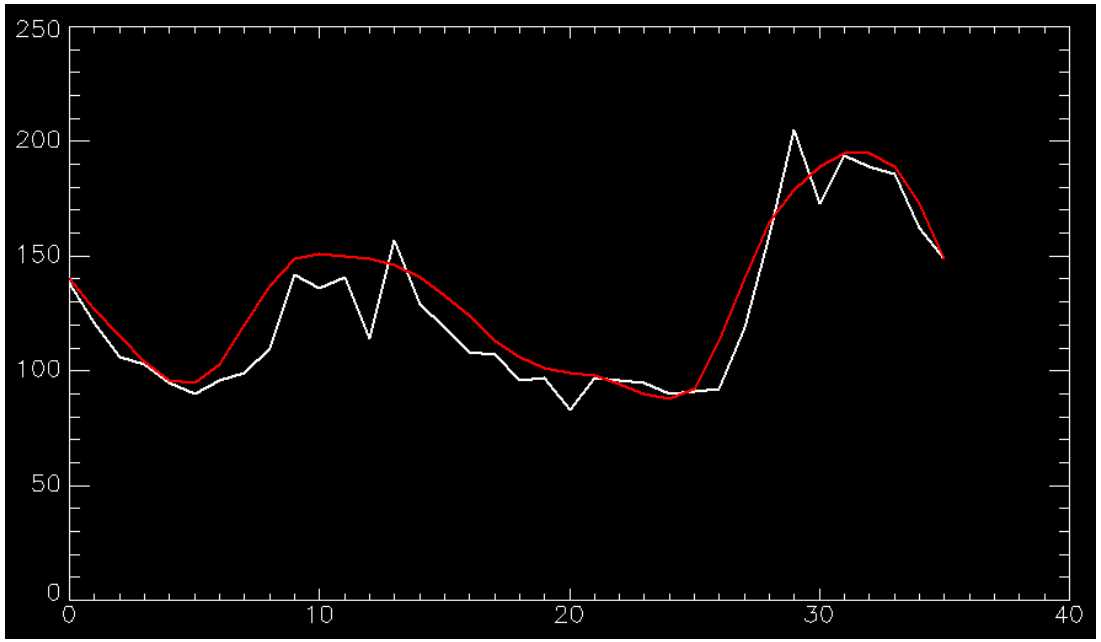
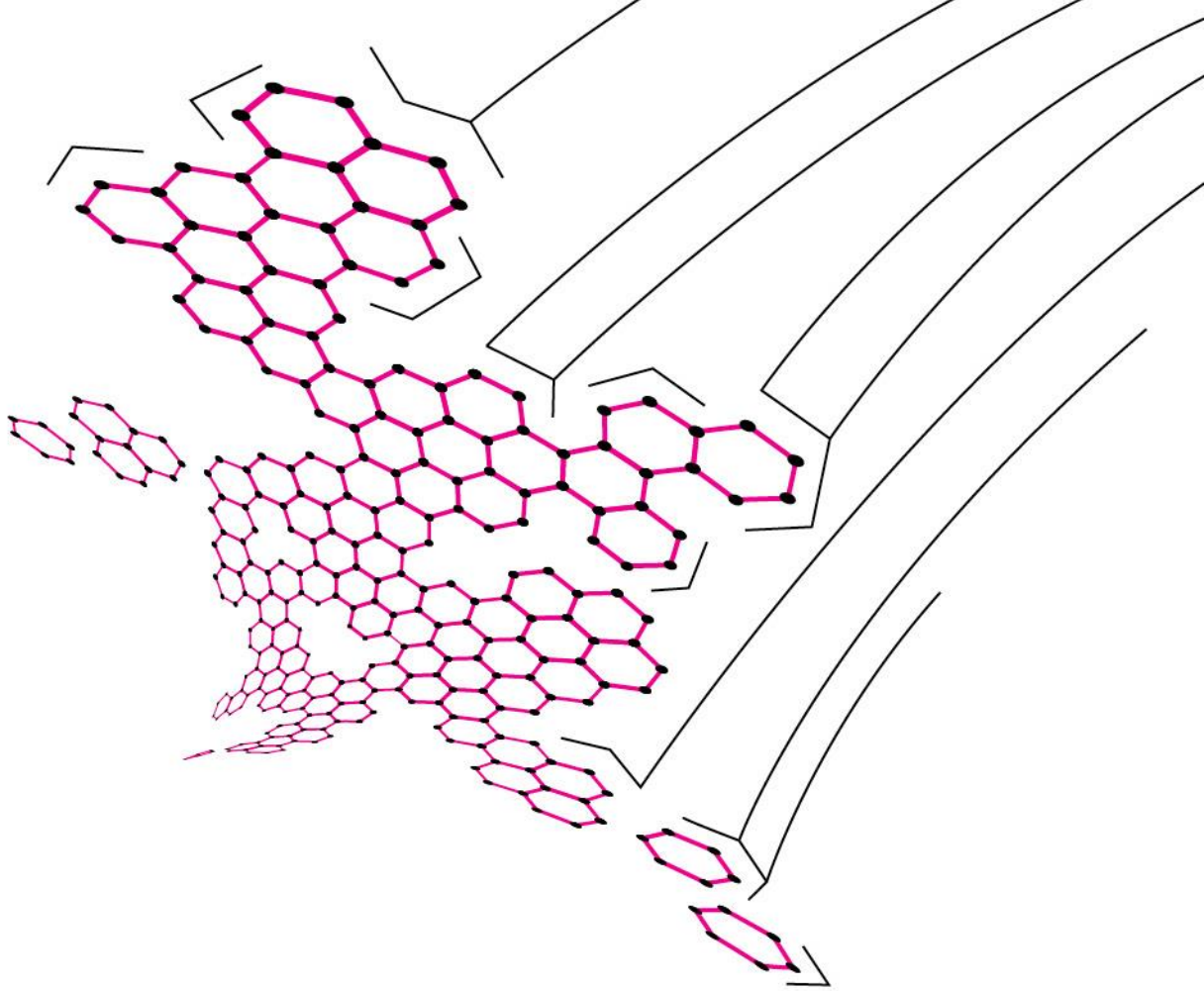
APPLICATION 2 (CONT):
DROUGHT MONITORING

In white the input NDVI, in red the result after timesat filter on two different locations (Ethiopia





QUESTIONS



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