Salahaddin University - College of Science – Environmental Sciences and Health Department
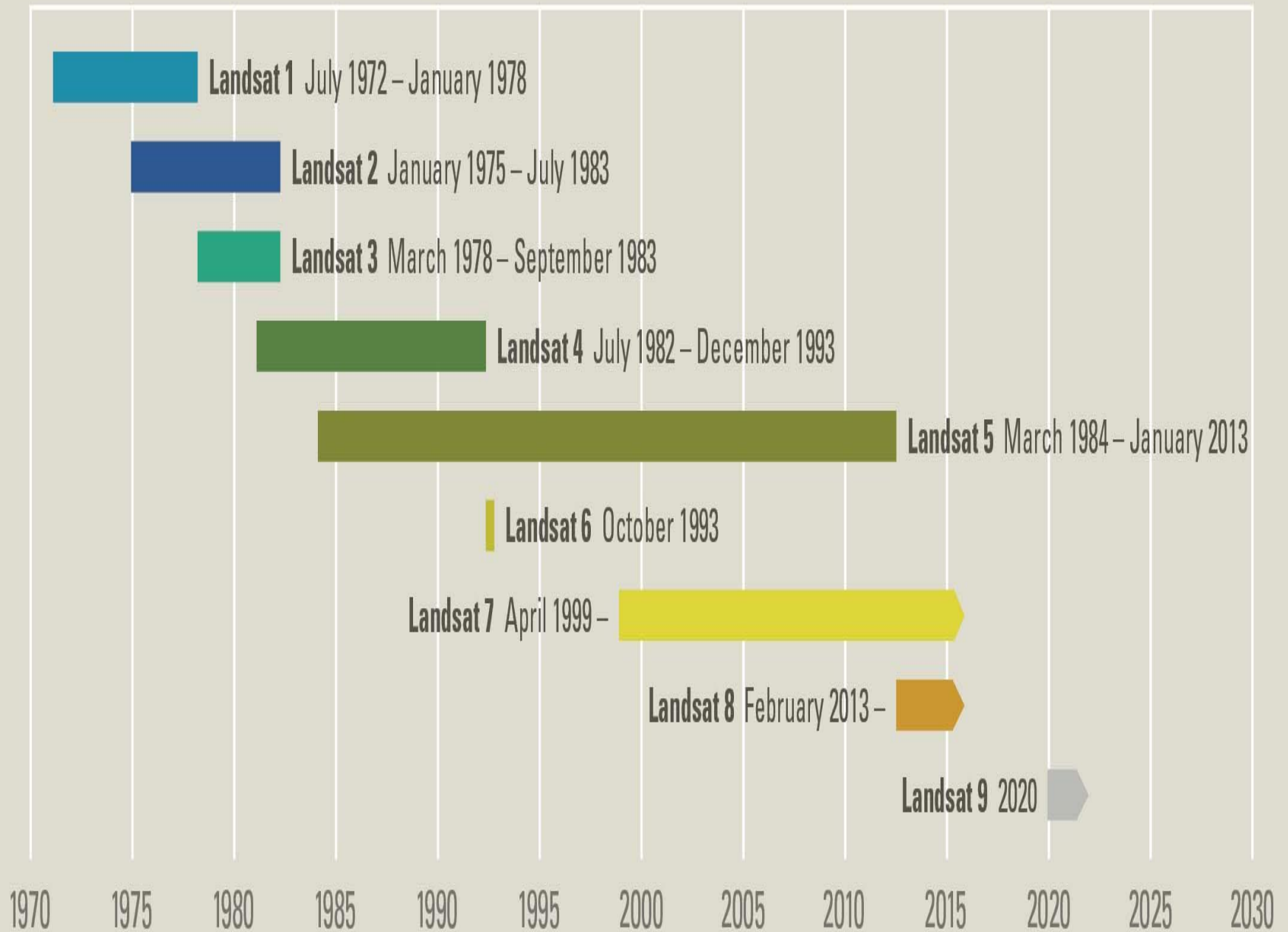
Image Processing in ENVI
(Band Combination)

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Lab -7- 4th Class B.Sc.
2020-2021

Objectives of the Lab

* To display Landsat images and show in grey scale and RGB colour.

* To display nature colour and false colour and other band combinations for detecting various classes of land.

* To use each band combination for specific purpose for distinguishing dissimilar types of land covers.

Landsat 1 July 1972 – January 1978
Landsat 2 January 1975 – July 1983
Landsat 3 March 1978 – September 1983
Landsat 4 July 1982 – December 1993
Landsat 5 March 1984 – January 2013
Landsat 6 October 1993
Landsat 7 April 1999 –
Landsat 8 February 2013 –
Landsat 9 2020

1970   1975   1980   1985   1990   1995   2000   2005   2010   2015   2020   2025   2030

Band combinations

- Landsat images are acquired in grey scale but by combining 3 or more bands, you can display colourful images. Using different band combinations to show your scene, it allows you to see different features within a scene and become more familiar with the scene, for example to identify urban areas, forests, agriculture, and water bodies …etc.

* Band combination is defined as combination of three bands or colours to show and identify the different objects or land classes due to various responded for each individual band.

* Band Combinations and Wavelengths. Objects on the ground – buildings, vegetation, rock outcrops, water – reflect or interact with different wavelengths in different ways. Multispectral data are composed of several different bandwidths of image data taken at the same time.

* Any band combination uses for specific purpose, due to which colours / bands have been selected.

Band Combinations

R,G,B	Description (it is applied on landsat (TM and ETM+))
3, 2, 1	This combination simulates a natural colour image. It is sometimes used for coastal studies and for the detection of smoke plume. The "Nature Colour" combination. It provides the most water penetration. It is also useful for **studying aquatic habitats**.
4,3,2	Standard "false colour" combination. **Vegetation shows in Red**. This has similar qualities to the image with bands 3,2,1 however, since this includes the near infrared channel (band 4) land /water boundaries are clearer and different types of vegetation are more apparent. This was a popular combination **for Landsat MSS data since that did not have a MIR band.**
4,5,3	**The land/water interface is very clear**. **Good for soil and vegetation study**. **Different vegetation types** can be more clearly defined . Variations **in moisture content are evident with this set of bands.**
5,4,3	Separation of urban and rural land uses; identification of land/water boundaries.

7,4,2	The "Nature-like" combination. **Sand, soil and minerals show in multitude of color. Fires would appear in Red**. It provides **clear imagery in desert region**. This has similar properties to the 4,5,3 band combination with the biggest difference being that vegetation is **green**. This **is the band combination that was selected for the global Landsat mosaic created for NASA.**
7,5,3	The "Nature-like" **combination. Sand, soil and minerals appear in variety of color. Also good for fire monitoring**.
5,4,1	**Good for agricultural studies. Healthy vegetation shows in bright green color**. This band combination has similar properties to the **7,4,2 combination, however it is better suited in visualizing agricultural vegetation.**
7,5,4	Provides best atmospheric penetration. Vegetation shows in blue. Useful for geological study.
7,3,1	Rocks may appear in variety of color. Good for the geological study.
4,5,7	Detection of clouds, snow, and ice (in high latitudes especially).

➢ How to do band combination?

➢ Select 3 different bands and Load your data as RGB image in a new display (Display#1 or 2, ... etc.) (If you click the **Load RGB**, the image will load to the **last Display** that you opened.)

➢ Adjust the band combination to find the best combinations for your study propose. If you are using the TM, ETM+ dataset, you can try the given band combinations:

How to save you band combination?

on the image window click file ⟹ save image as ⟹ image file select type of file as JEPG and the n name output and navigate location to your folder