2.3 Earth Observation

Length: 8 hours
Requirements:

- Equipments:
  - Laptops
  - Access to Internet
- Softwares: QGIS/Grass

Prerequisite:

Introduction:
Earth observation is the collection of data using remote sensing technologies, typically using satellites carrying imaging equipment, regarding the physical, chemical, and biological processes of planet Earth. Earth observation is used to track and evaluate changes in the environment, both natural and artificial, as well as their condition.

Learning outcomes: By the end of this day, participants will be able to:

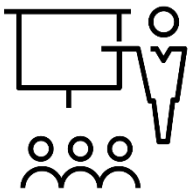
- Understand the concept of Earth observations and DIP.
- Perform image classification using machine learning algorithms.
- Examine the change of land cover using satellite image processing techniques.

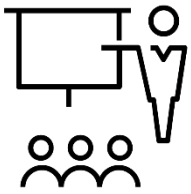
Summary Agenda

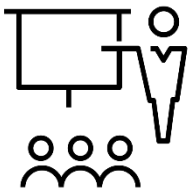
Minutes	Example Time	Activity	Description	Presenter
30	08:30 – 09:00	Registration	**Participants signing up**	
30	09:00 – 09:30	Lecture	**Introduction to EO**	Mustafa
15	09:30 – 09:45	Discussion	Q&A	
50	09:45 – 10:35	Lecture	**Introduction to Digital Image Processing**	Mustafa
25	10:35 – 11:00	Discussion	Q&A	
30	11:00 – 11:30	BREAK	Breakfast	
45	11:30 – 12:15	Lecture	**Introduction to Image Classification**	
45	12:15 – 13:00	Exercise	**Image Classification (ML Methods) /Accuracy Assessment**	Mustafa
30	13:00– 13:30	BREAK	Coffee Break + Prayer	
120	13:30 – 15:30	Exercise	**Image Classification (ML Methods) /Accuracy Assessment**	
15	15:30 – 15:45	BREAK	Coffee Break	
45	15:45 – 16:30	Exercise	**Change Detection**	Mustafa

15	16:30 – 16:45	Wrap-up	

Guide

Activity / Time	Description	Resources / Materials
Registration 30 minutes	**Participants signing up**	**Appendix 1**
	Record the name, contact, and signature of each participant so that you can stay in touch.	Attendance list
Lecture 60 minutes	**Introduction to EO**	**IntrotoEO.ppt**
	• Data Acquisition • EO basics • Sensor classification and properties • Images examples	• Projector • Flipchart or whiteboard
Lecture 60 minutes	**Intro to digital Image processing**	**Introtoimageproc.ppt**

	• Image pre-processing
	  ○ Image enhancement
	  ■ Histogram operations
	  ■ Spatial filter operations
	  ■ Image fusion
		• Projector
		• Flipchart or whiteboard

Exercise 60 minutes	**Image pre-processing - NDVI calculation**	
		

Exercise	**Image Classification (ML Methods)**	
	- Generate/ Import Training Samples. - Apply a Random forest for classifying land use in satellite images	• Exercise • QGIS software • "dzetsaka" plugin • Data
Exercise	**Accuracy Assessment**	
	- Use "AcATaMa" Plugin to apply Accuracy Assessment. - Assess the accuracy of a supervised classification.	• Exercise • QGIS software • "AcATaMa" Plugin • Data
Wrap-up 15 minutes		