



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore - 35**

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DEPARTMENT OF AGRICULTURE ENGINEERING

19AGT302 – GIS AND REMOTE SENSING

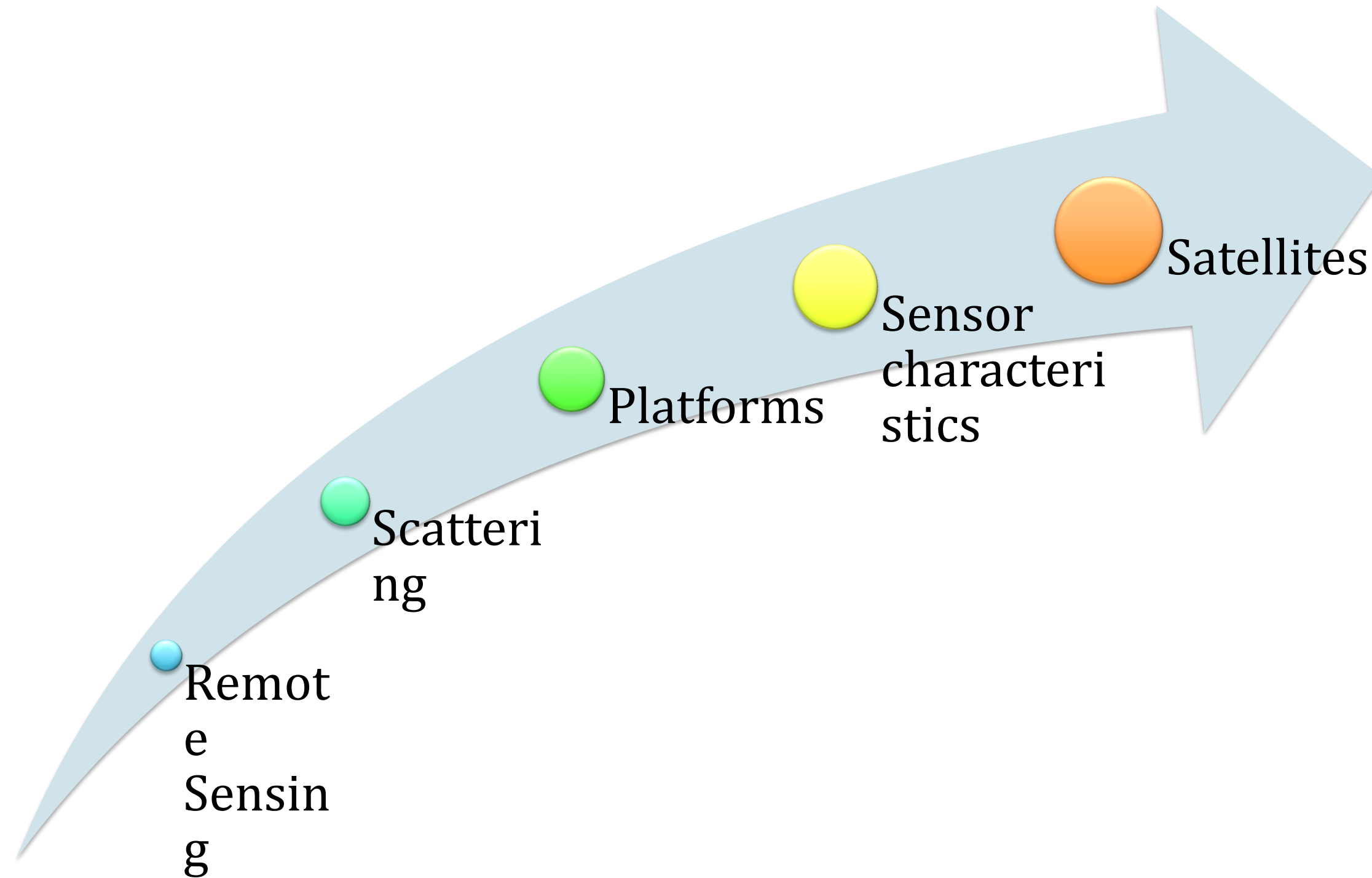
III – YEAR V SEMESTER

UNIT 3 – DIGITAL IMAGE INTERPRETATION AND PROCESSING

TOPIC 1 – INTERPRETATION



Last Class Review





Digital Image

- ❖ A digital image is a two dimensional array of discrete image elements or pixels representing spatial distribution of different parameters such as electromagnetic radiation, emission, temperature, or some geophysical or topographical elevation etc.
- ❖ Each pixel represented by a specific row (i) and column (j) value in an array or matrix. Each pixel associated with a pixel value is also called brightness value (BV_{ij}), represented as Digital Number (DN), which are stored as binary digits in a computer.
- ❖ This BV_{ij}'s represented in a gray level or gray scale is in certain ranges such as 0-255 (8-bit image: $2^8=256$) in a black and white image. 0 and 255 represented as completely black and white respectively.
- ❖ For colour pictures three image matrices (as parallel layers) with same ranges are required. A single image can be represented as a black and white image in a two dimensional (2D) array (matrix) of pixels having rows (i) and columns (j).
- ❖ A multi-spectral or hyper- spectral image can be represented in a 3D array of pixels having rows (i), columns (j) and bands (k). Fig. 10.1. shows a digital image configuration of a single band.



Configuration

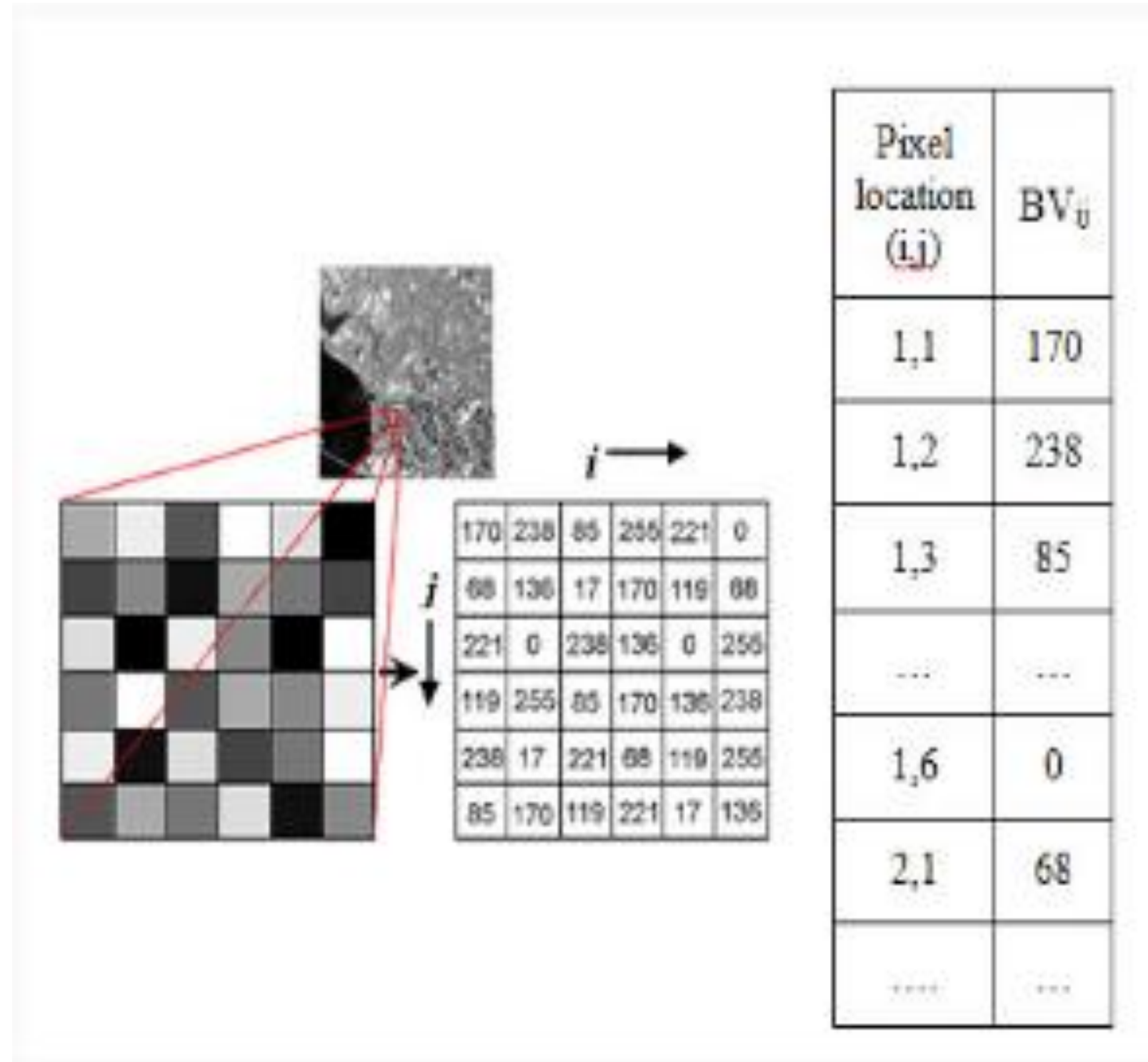




Image Rectification and Restoration

- ❖ Remotely sensed images are taken from a great distance from the surface of the earth affected by various parameters such as atmosphere, solar illumination, earth rotation, sensor motion with its optical, mechanical, electrical components etc. which causes distortion in the imagery.
- ❖ The intent of image rectification and restoration is to correct these distortions arises in image acquisition process both geometrically and radiometrically.
- ❖ Obviously, the nature of such procedures varies considerably with factors such as the digital image acquisition type (digital camera, along-track scanner, across-track scanner), platform (airborne, satellite), atmosphere and total field of view.



Image Rectification



- ◆ **Detection:** such as search for hot spots in mechanical and electrical facilities and white spot in x-ray images. This procedure is often used as the first step of image interpretation.
- ◆ **Identification:** recognition of certain target. A simple example is to identify vegetation types, soil types, rock types and water bodies. The higher the spatial/spectral resolution of an image, the more detail we can derive from the image.
- ◆ **Delineation:** to outline the recognized target for mapping purposes. Identification and delineation combined together are used to map certain subjects. If the whole image is to be processed by these two procedures, we call it image classification.
- ◆ **Enumeration:** to count certain phenomena from the image. This is done based on detection and identification. For example, in order to estimate household income of the population, we can count the number of various residential units.
- ◆ **Mensuration:** to measure the area, the volume, the amount, and the length of certain target from an image. This often involves all the procedures mentioned above. Simple examples include measuring the length of a river and the acreage of a specific land-cover class. More complicated examples include an estimation of timber volume, river discharge, crop productivity, river basin radiation and evapotranspiration.



Geometric Correction



- ❖ Raw digital images acquired by earth observation systems usually contain geometric distortions so they do not reproduce the image of a grid on the surface faithfully.
- ❖ Geometric distortions are the errors in the position of a pixel relative to other pixels in the scene and with respect to their absolute position in a particular projection system.
- ❖ The geometric distortions are normally two types: (i) systematic or predictable, and (ii) random or unpredictable.
- ❖ Due to rotation of earth and platform's forward motion the scan lines are not perpendicular to the direction of ground track, which makes the scanned area skewed and scale variation due to earth's curvature found in both push-broom and whisk-broom scanner. But in case of whisk-broom scanner, there are additional two errors founds (a) scale variation along the scan direction due to its scanning process, (b) error due to nonlinearity in scan mirror velocity.

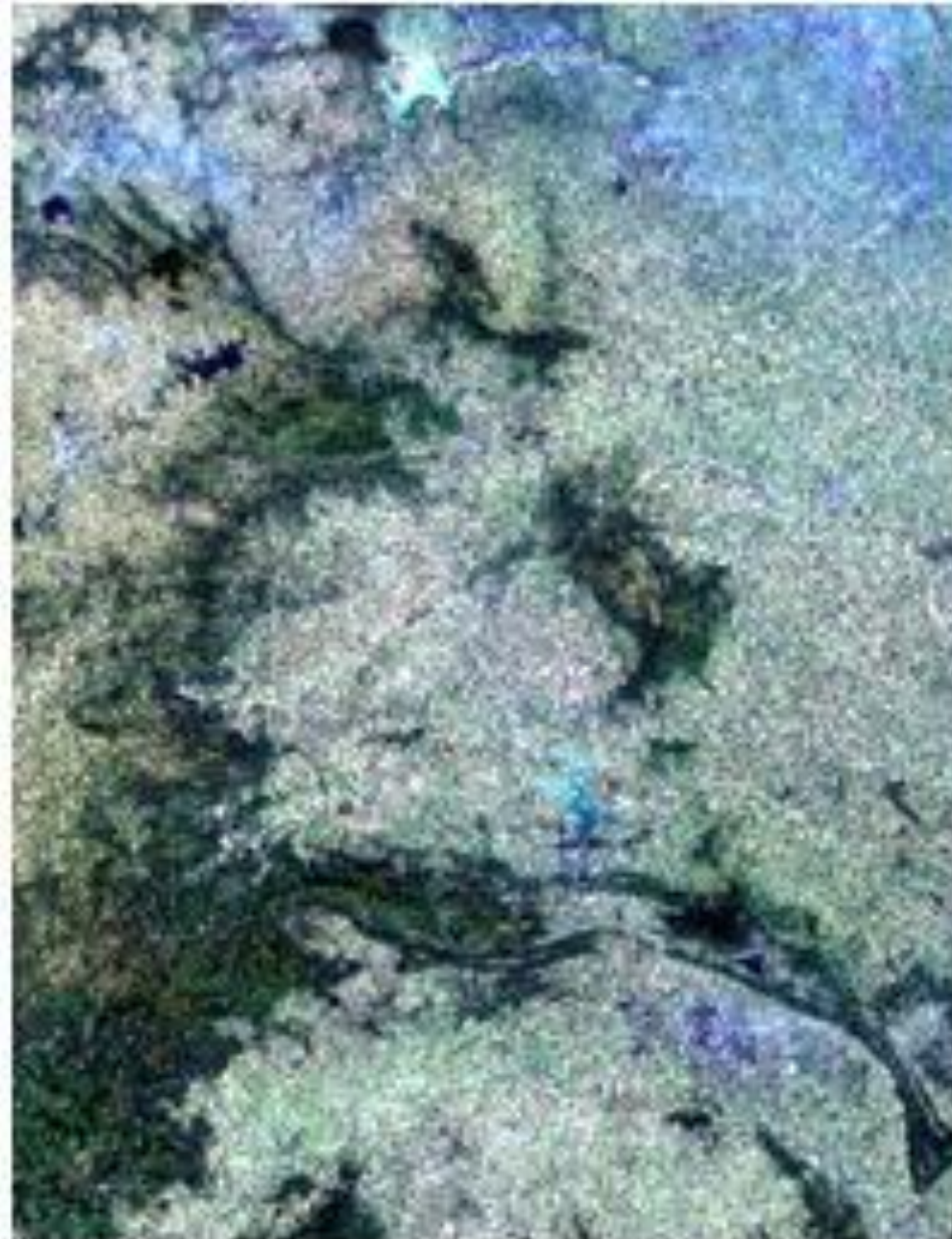


Rectified map



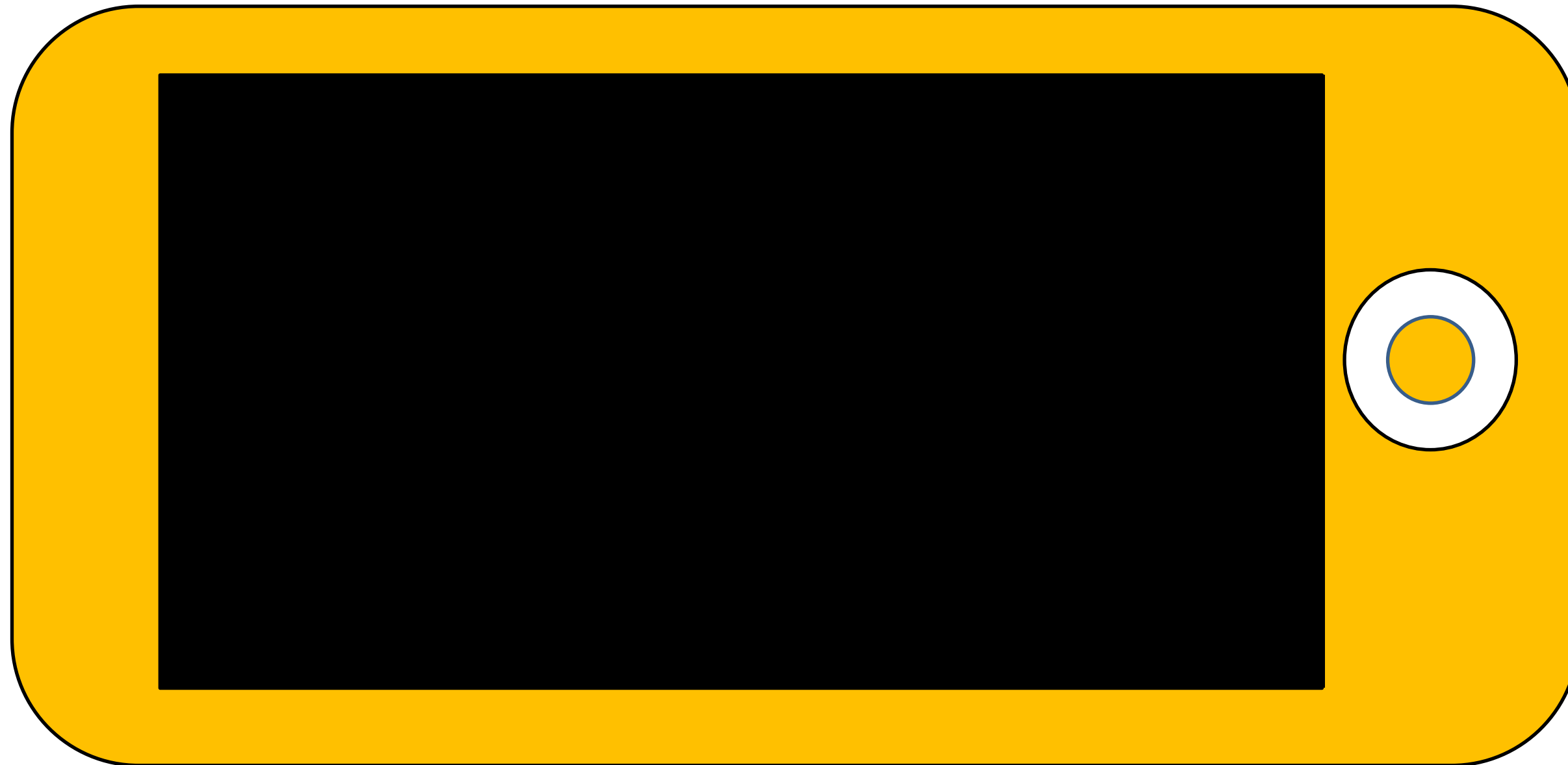


Unrectified image





Reference Videos





See You at Next Class!!!!