INTRODUCTION TO REMOTE SENSING

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Introduction to remote sensing, remote sensing system and components; Physics of remote sensing including wave equation and EMR propagation through medium, EMR source characteristics, Role of atmosphere, Physics of EMR interaction with objects, BRDF, EMR (optical and microwave) interaction with soil, vegetation, water, rocks etc. Concept of digital image and CCD; Sensor characteristics: various resolutions, FOV, IFOV, point spread function, push broom, whisk broom, side looking sensors, PAN, MS, SLAR; image recording formats; Various operational satellites and their data products. Image processing; interpretation elements, manual versus digital interpretation, image histogram and histogram manipulation, image convolution, high and low pass filters, directional and non-directional image derivatives; Image classification, unsupervised and supervised-various methods, training data selection, classification accuracy measures-error matrix, khat index. Geometric distortion in remotely sensed data, parametric and non-parametric methods of distortion removal, Geo-referencing and GCPs, accuracy indices, resampling methods; Atmospheric errors in data, models for removal of atmospheric errors. Satellite orbits; terminology, characteristics of ideal and actual orbit, equations governing satellite orbits, geostationary orbit, sun-synchronous orbit, exactly repeating orbits, orbital sub-cycles, examples of operational satellite orbits. Application of optical and microwave remote sensing techniques in problem solving: Civil Engineering related examples/projects.