DETECTION OF VARIOUS NATURAL RESOURCES BY REMOTE SENSING TECHNIQUE

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ABSTRACT

Remote sensing is one of the basic enabling technologies for the Internet of Things (IoT), in which almost any imaginable entity can be equipped with unique identifiers and the ability to transfer data over a network autonomously. This paper reveals that the role of remote sensing via Software (IT/GPS) in the field of natural resources detection.

KEYWORDS : Remote Sensing, Sensor, Wavelength, Rocks, Mineral .

INTRODUCTION

Remote sensing is the use of various technologies to make observations and measurements at a target that is usually at a distance or on a scale beyond those observable to the naked eye. Remote sensing technologies include: , radar, infrared radiation by (IR), thermal, seismic, sonar, electric field sensing and GPS by Tech, T.(2018).. Depending on what is being detected, these various sensors might be mounted to a satellite, airplane, boat, and submarine or from another convenient observation point such as a building top

PRINCIPLE

Remote sensing works on the basis of two Satellites (Electromagnetic Spectral System). The require place (Grid) is to be select at first with the help of GPS/Software . From First Satellites the different types of rays (Infrared, UV, Cosmic rays, Gamma Rays, X-rays etc.) have been penetrated beneath the earth and when this rays reflect with color picture (after found any strata, takes picture) another satellite catch the color picture and supporting device interpret it Pandey, S.N. (1993).

TABLE 1: Electromagnetic Spectral Regions

S.No.	Region	Wavelength	Remarks
1.	Gamma Ray	003 mm	Incoming radiation is completely absorbed by the upper atmosphere and is not available for remote sensing
2.	X-Ray	0.03 to 3.0 mm	Completely absorbed by atmosphere. Not employed in remote sensing
3.	Ultraviolet	0.3 to 0.4 µm	Incoming wavelengths less than 0.3 µm are completely absorbed by ozone in the upper atmosphere.
4.	Photographic UV band	0.3 to 0.4 µm	Transmitted through atmosphere. Detectable with film and photo detectors but atmospheric scattering is severe
5.	Visible	0.4 to 0.7 µm	Images with film and photo detectors
6.	Infrared	0.7 to 1.00 µm	Interaction with matter varies with wave length atmospheric transmission windows are separated
7.	Reflector IR band	0.7 to 3.0 µm	Reflected solar radiation that contains information about thermal properties of materials. The bands from 0.7 to 0.9 µm is detectable with film and is called the photographic IR band
8.	Thermal IR	3 to 5 µm	Images of these wavelengths are acquired by optical mechanical and special vidicon systems but not by film. Microwaves 0.1 to 30 cm long wavelengths can penetrate clouds. Fog and rain, images may be acquired in the active or passive mode.
9.	Radio	>30 cm	Largest wavelengths this proportion of electromagnetic spectrum. Some classified radars with very long wavelengths are operated in this region.

METHODOLOGY

The data gathered by remote sensing is used for a large and growing number of applications including cartography, resource exploration, atmospheric chemical measurements, healthcare monitoring, surveillance, navigation and GPS tracking by Pandey, S.N. (1993).

Remote sensing can be conducted through passive or active sensing. In passive sensor technologies, an existing observable phenomenon, such as light from the sun, is captured by a sensor, which might be, for example, a charge-coupled device (CCD) camera mounted on a satellite. In active sensing, the device includes a transmitter that sends out a signal, a particular light wavelength or electrons to be bounced off the target, with data gathered by the sensor upon their reflection.

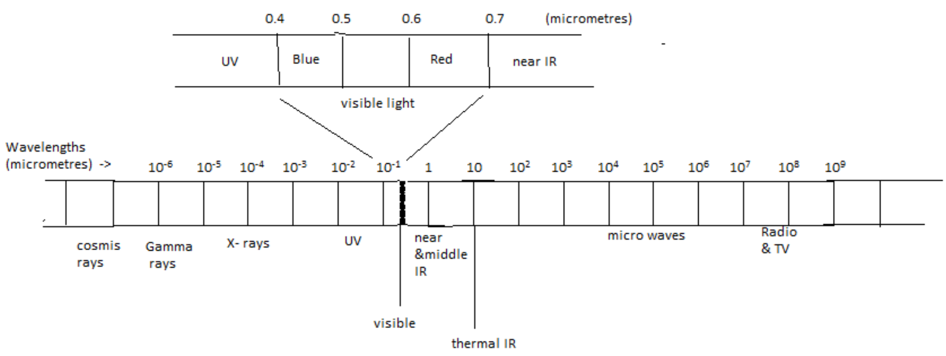

Figure 1: EM Spectrum

Geologists have used aerial photographs for decades to serve as databases from which they can do the following:

i. Determine the structural arrangements of disturbed strata (folds and faults)
ii. ii.. Study the expression and modes of the origin of landforms (geomorphology)
iii. iii.. Pick out rock units (stratigraphy).
iv. iv. Evaluate dynamic changes from natural events (e.g., floods; volcanic eruptions).
v. v. Seek surface clues (such as alteration and other signs of mineralization) to subsurface deposits of ore minerals, oil and gas, and groundwater.
vi. vi. Function as a visual base on which a geologic map is drawn either directly or on a transparent overlay.

Geological applications of remote sensing include the following:

i. Surficial deposit / bedrock mapping
ii. Lithological mapping
iii. Structural mapping
iv. Sand and gravel (aggregate) exploration/ exploitation
v. Mineral exploration
vi. Environmental geology
vii. Baseline infrastructure
viii. Sedimentation mapping and monitoring
ix. Event mapping and monitoring
x. Geo-hazard mapping

Most geologic maps are also stratigraphic maps, that is, they record the location and identities of sequences of rock types according to their relative ages. The fundamental rock unit is the **formation** (abbreviated as Fm or fm), defined simply as a distinct mappable set of related rocks (usually sedimentary) that has a specific geographic distribution. A formation typically is characterized by one or two dominant types of rock materials.

The term "formation" is most commonly associated with strata, namely layers of sediments that have hardened into sedimentary rocks. Under most conditions, sediments are laid down in horizontal or nearly so layers on sea floors, lake bottoms, and transiently in river beds. Here is a typical set of sedimentary layers exposed in a road cut (note that the layers have been cut and slightly offset by a break which is termed a "fault"):

Remote-sensing displays, whether they are aerial photos, space-acquired images, or classification maps, show the surface distribution of the multiple formations usually present and, under appropriate conditions, the type(s) of rocks in the formations. The formations show patterns that depend on their proximity to the surface, their extent over the surveyed area, their relative thicknesses, their structural attitude (horizontal or inclined layers), and their degree of erosion. Experienced geologists can recognize some rock types just by their appearance in the photo/image. They identify others types from their spectral signatures. Over the spectral range covered by the Landsat TM bands, the types and ages of rocks show distinct variations at specific wavelengths.

COLOR INTERPRETATION TECHNIQUE

Remote sensing is the process of inferring surface parameters from measurements of the upwelling electromagnetic radiation from the land surface. This radiation is both reflected and emitted by the land. The former is usually the reflected solar while the latter is in both the thermal infrared (TIR) and microwave portions of the spectrum. There is also reflected microwave radiation as in imaging radars. The reflected solar is used in hydrology for snow mapping vegetation/land cover and water quality studies by Pandey S.N.(1993). The thermal emission in the infrared is used for surface temperature and in the microwave for soil moisture and snow studies. We will not discuss the use of radars for precipitation studies as that is the topic of another paper in this issue. We will concentrate on the visible and near-infrared (VNIR) for snow mapping and water quality; the TIR for surface temperature and energy balance studies; passive microwave for soil moisture and snow. Active microwave or radar has promise because of the possibility of high spatial resolution. However, surface roughness effects can make it difficult to extract soil moisture information. Remotely sensed observations can contribute to our knowledge of these quantities and, especially, their spatial variation. With remote sensing we only observe the surface but can obtain the spatial variability by Punamia, B.C(2015)..

Color Name	Interpretation
black	Water Genetic Area
brown	Iron Ore
red	Sedimentary Rocks
orange	Sedimentary + Metamorphic Rocks
yellow	Gold
green	Copper Minerals
blue	Spicily Limestone Strata
violet	Igneous rocks strata
grey	Coal deposit
golden	Gold + Copper (together)
silver	Aluminum ore

Figure 2: Color Interpretation

Remote sensing techniques to assess water quality Water quality is a general descriptor of water properties in terms of physical, chemical, thermal, and/or biological characteristics. In situ measurements and collection of water samples for subsequent laboratory analyses provide accurate measurements for a point in time and space but do not give either the spatial or temporal view of water quality needed for accurate assessment or management of water bodies. Substances in surface water can significantly change the backscattering characteristics of surface water. Remote sensing techniques for monitoring water quality depend on the ability to measure these changes in the spectral signature backscattered from water and relate these measured changes by empirical or analytical models to water quality parameters. The optimal wavelength used to measure a water quality parameter is dependent on the substance being measured, its concentration, and the sensor characteristics. Major factors affecting water quality in water bodies across the landscape are suspended sediments (turbidity), algae (i.e., chlorophylls, carotenoids), chemicals (i.e., nutrients, pesticides, metals), dissolved organic matter (DOM), thermal releases, aquatic vascular plants, pathogens, and oils. Suspended sediments, algae.

An adequate and continuous supply of water for drinking, agriculture, and industry is basic for all societies. Significant deviations from normal water supplies generally bring disaster in the form drought or flood. To avoid the problems resulting from excess and shortage of water, societies have invested enormous sums of money and employed hydrologists and civil engineers to develop systems to control and distribute water. With nearly three-quarters of the Earth being covered with oceans. It is not a question of a global shortage of total water, but the challenge is to overcome the uneven distribution of water in space and time on land areas and to supply adequate quality to meet local needs. For example, about 20 per cent of the Earth`s land area is classified as arid and an additional 15 per cent is classified as semiarid. Here, water has been the limiting factor in the development of agriculture and most industries. Yet, even these dry areas are periodically devastated by floods. The requirement placed on technology is to supply, at an affordable cost, a dependable supply and quality of water where and when it is needed.

Systems to control water supplies have consisted of wells, canals, levees , and dams Because available information is almost always inadequate, wells have been dug that fail to produce adequate quantities or quality of water, dams have leaked or totally failed, and waste waters have contaminated drinking water. These disappointing results could have been avoided if sufficient hydrologic, geologic and climatologic information for resource planning had been available.

CONCLUSION

The purpose of this paper is to inform civil engineers/geologist and water resource planners, primarily in developing countries, of the general capabilities of remote sensing techniques to obtain Mineral resources, hydrologic data and to examine remote sensing as a possible aid in operational function of mineral/rocks & hydrology status in the future.

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