

# RS AND GIS STUDIES IN MINERAL EXPLORATION - A Scientific Approach

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## GRAPHICAL ABSTRACT

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In recent years, large and voluminous information is available on the management and use of remote sensing and GIS techniques and several websites of leading agencies are providing distinct analyses with the available geodata sets and their applications in different fields of earth sciences.

The latest advancements in the field of remote sensing and origin of new computer softwares such as ENVIS (Environmental Information Software) and GIS (Geographical Information Software) have revolutionized the world and made it easier for carrying research studies in different fields of interest.

*Keywords—Remote Sensing, GIS, Software, geodata sets, ENVIS*

## INTRODUCTION

Remote Sensing is a technique in which acquisition of data for deriving information about objects or materials (targets) located on the earth surface or on its atmosphere is made without any direct contact. Lillisand, T. M and Keifer, R. W., 1979)

There are a number of websites that deal exclusively with remote sensing studies for instances:

(<http://terra.nasa.gov>, <http://www.nima.mil>, <http://infoserver.ciesin.org>, <http://www.geographic.com>, <http://www.landinfo.com>, <http://www.grida.no>, <http://www.geospatial.online.com>, <http://www.ogis.org>, <http://www.asprs.org>)

The scientific process of management of resources requires detailed ground surveys, geological and geomorphological mapping of these resources using the toposheets and satellite images of the area or region of study.

## APPLICATIONS OF REMOTE SENSING

The applications of air photo interpretations on a variety of areas, viz, land cover mapping, soil and geologic mapping, zones of mineralisation, agriculture, forestry range, land management, water resources, urban and regional planning, wet land mapping, wild life ecology, archaeology, environmental assessment, land form identification and evaluation is the real time programme of different agencies.

With the help of remote sensing, geological contacts, faults, and fractures are brought out clearly which help in prospecting mineralized areas

Remote sensing has proven to be a valuable tool in exploring the mineral resources and isolating the favourable areas from unfavourable areas.

Remote sensing data provide the litho logical, geomorphological and structural guides essential for understanding various parameters responsible for localization of most of the ore deposits. (Rawashdeh, S.A 2007).

### **GIS IN MINERAL EXPLORATION**

GIS is a digital database, which facilitates the integration of various datasets for spatial analysis and modeling with a common spatial coordinate system.

GIS is highly useful for handling images, maps, data tables, visualization, analysis, modeling and spatial decision support. GIS is used to identify mineral potential zones.

and satellite images of that particular area or region.

GIS also facilitates in organizing several variable datasets for querying, analysis and is thereby helpful in drawing meaningful inferences from the data generated.

It is also useful in the identification of various parameters, which help in decision-making. It also emphasizes on the spatial context by focusing on geological features that may have localized mineral deposition.

Several authors have studied on the importance of GIS in mineral exploration (Wilkinson, I, et al, 2001).

### **MINERAL MAPPING ON GIS PLATFORM**

The generation of thematic maps requires data from different disciplines which needs to be integrated for the zonation, integration and modelling of geoscientific data is useful for preparing the thematic layers.

The technology is coherently utilised for ground based data acquisition, information extraction and analytical GIS.

It contributes to rapid and efficient mapping of geology, structure, and geomorphology in the area with limited IT infrastructure and data using modern methods and using geoinformation technologies (Chung, C. F., Jefferson, C. W. and Singer, D. A., 1992).

GIS is a tool for analyzing geological, geochemical, remote sensing data etc. It is extremely useful in generation of mineral potential maps. In recent years, few authors have discussed the role of GIS in mineral exploration. (Bonham-Carter, 1994)

Geographical Information System is a system of Hardwares, Software's and operational procedures very useful to store vast amount of information or database, editing and manipulation of data as well as interpretation and analysis of the larger volume of data which is provided as an input by the toposheets

Geographical Information Software have been found to be very useful in providing the required inputs related to the geological resources of an area or region of study.

Remote sensing, and GIS have played an important role in the study of mineralized areas by evaluating different thematic layers (Viz., geology, structure, and geomorphology) using spectral anomalies.

There have been some GIS methodologies for developing conservation strategies (Thomas E. Lacher).

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It develops theoretical understanding of those fundamental geologic processes, which control the nature of the Earth's surface and near surface environments depending upon the preparation of different layers.

## CONCLUSIONS

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From the above details, it can be concluded that the various computer hardwares and software's along with the latest technologies of remote sensing and information technology, are highly important and essential for the understanding and assessment of the present or current status of the existing geological resources in any part of the world.

Use of computer models have also been useful in the interpretation of the past and present data as well as predicting the future status of these resources. in any given area or region which help in adopting and implementing the scientific methods and techniques for the management and conservation of these geological resources.

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