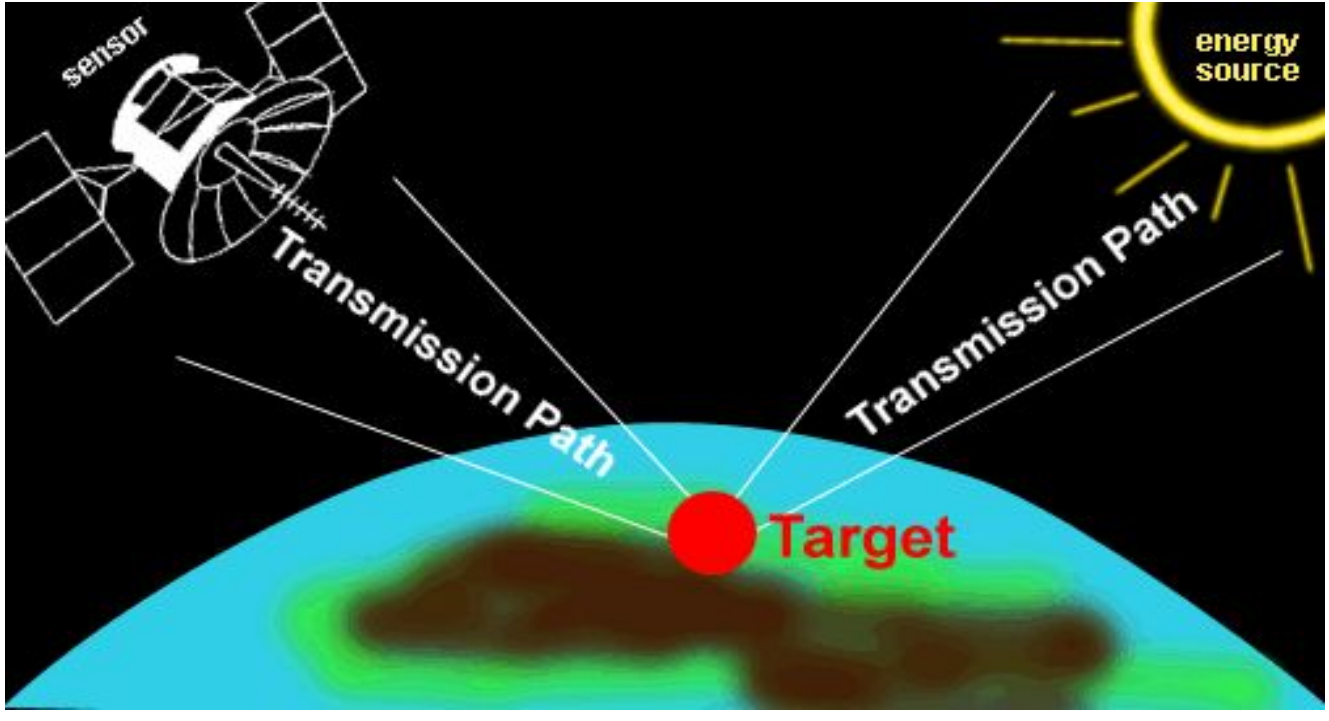
Cihan University-Erbil

Optical communication and remote sensing technique



A. Prof Dr. Abdulrazak A S Mohammed

Definition of Remote Sensing Technique:

It is a science that process of acquiring information about any object, area or phenomenon under investigation without physically contacting it in anyway regardless of whether the observer is immediately adjacent to the object or millions of miles away .

Concept of Remote Sensing

- **Aerial Photography**
- **GIS [Geographical Information System]**
- **GPS [Global Positioning System]**
- **Image Processing**
- **GPR [Ground Penetration Radar]**

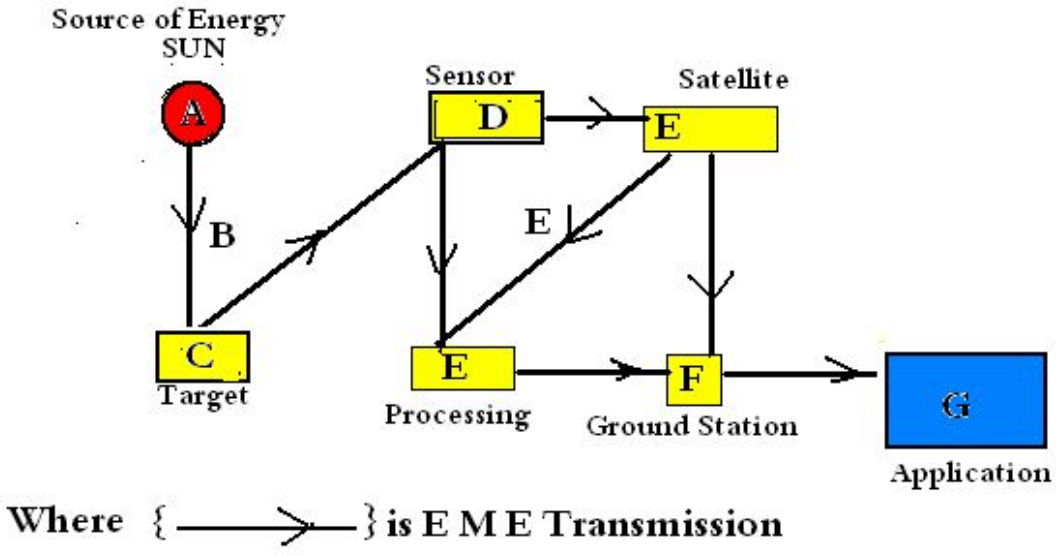
Concept of Optical communication

[1] *Infor mation* has to do with the content or interpretation of something such as spoken words, a still or moving image, the measurement of a physical characteristic, or values of bank accounts or stocks.

[2] *A message* may be considered as the physical manifestation of the information produced by the source. That is, it can range from a single number or symbol to a long string of sentences.

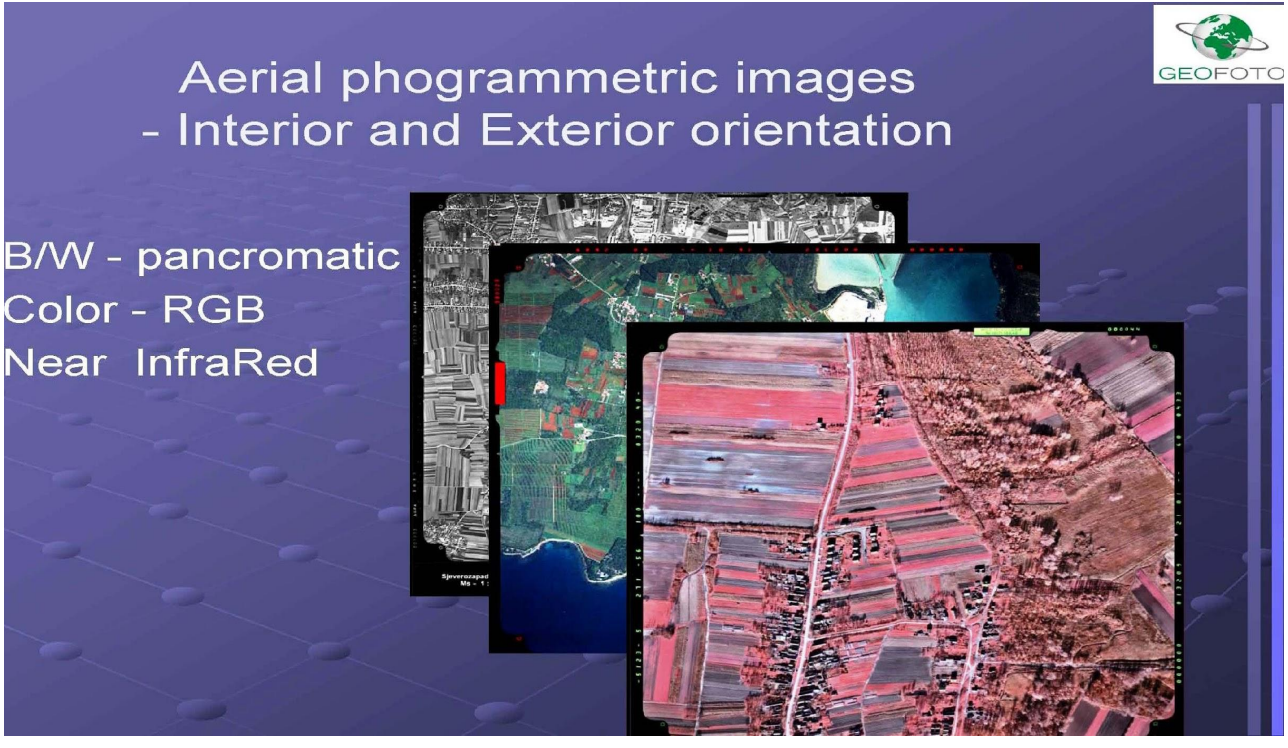
[3] The word *data* refers to facts, concepts, or instructions presented as some type of encoded entities that are used to convey the information. These can include

[4] *Signals* are electromagnetic waves (in encoded electrical or optical formats) used to transport the data over a physical medium.



Flow Chart of Remote Sensing System and Optical communiction

WAVELENGTH (λ)		FREQUENCY (f)
10^{25} ---------- 10^{23}	Gama Ray γ-Ray	10^{-17} 10^{-15} -----Cancer treatment
10^{19} ---------- 10^{17}	X-Ray	10^{-11} 10^{-9} Material testing & Diagnostic X-Ray
10^{15} ---------- 10^{13}	UV-Ray	------Identifying atomic structure 10^{-7}
10^{12}	Visible light	-------Human sight
10^{11}	IR –Ray	10^{-5} ------IR photos &Heat lamps
10^{9} ---------- 10^{7}	Micro Waves M. W.	10^{-3} --------Ovens 10^{-1}
10^{5} ---------- 10^{3} ---------- 10^{1}	Radio Waves	10^{1}----Radar & TV -------FM radio & AM radio 10^{3} -----Long wave& Navigation 10^{5}

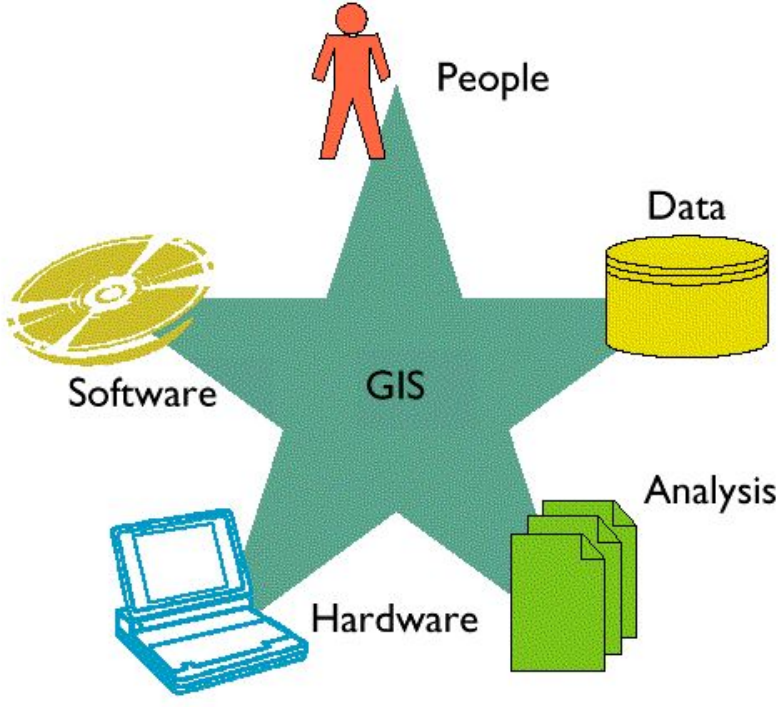


Aerial (Satellite) images [B/W (Panchromatic , Color (R G B) & N-IR]

GIS Geographical Information System :

GIS are decision support computer based system for collecting ,storing , presenting and analyzing geographical spatial information.

GIS is An integration of five basic components



With
Optical
Communication

Map :

The maps are thus the cartographer's representation of an area and a graphic representation of selected natural and man-made features of the whole or a part of the earths surface on a flat sheet of paper on a definite scale

Map Model:

In general there are several types of map-model depending on :

1-Spatial Elements : It is spatial objects in the real world can be through of as occurring in four easily identifiable types namely , points , lines , areas and surfaces.

2-Terminology : It is describing any kind of spatial / geographic features which is related by Elevation or altitude (it is vertical distance between a given point and the datum plane).

3-Datum plane is the reference surface from which all altitudes on the a map are measured in(this is usually mean sea level). A map line connecting points representing places on the earth's surface that have the same elevation is called CONTOUR line .

Map scale

Map scale determines the size and shape of features

1:500

Large scale
Smaller area
More detail

1:24000

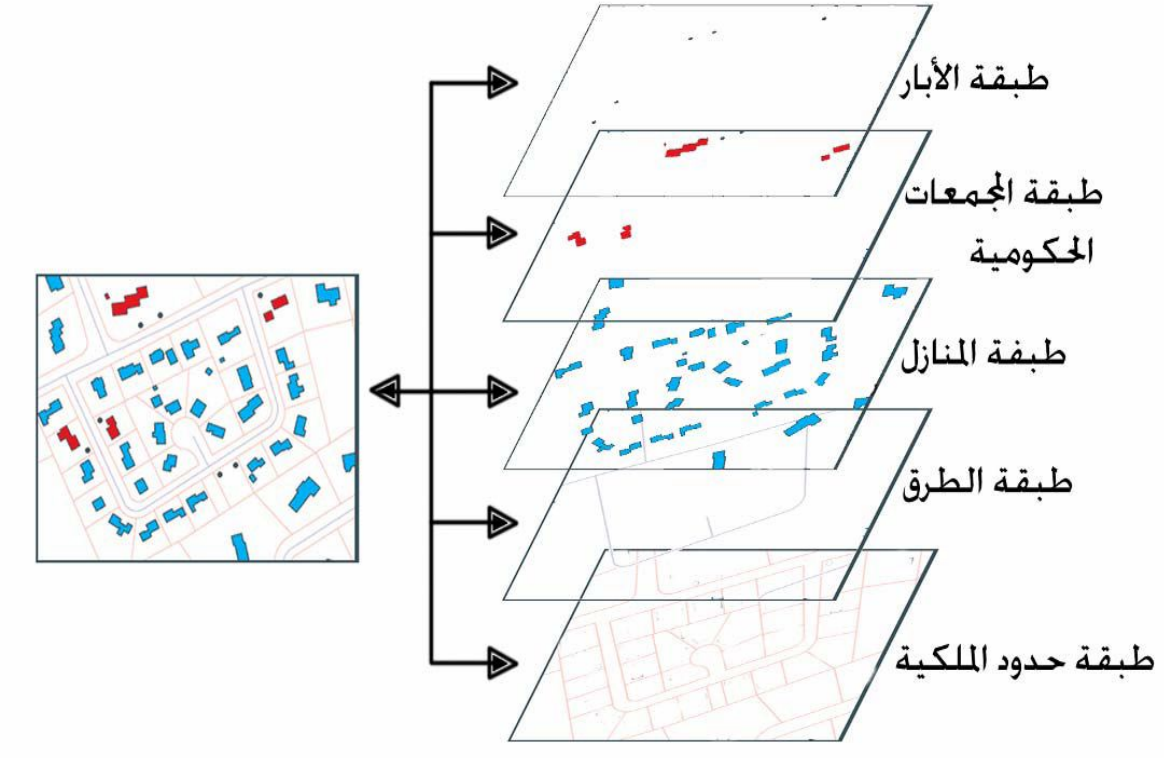
1:24000

Small scale
Larger area
Less detail

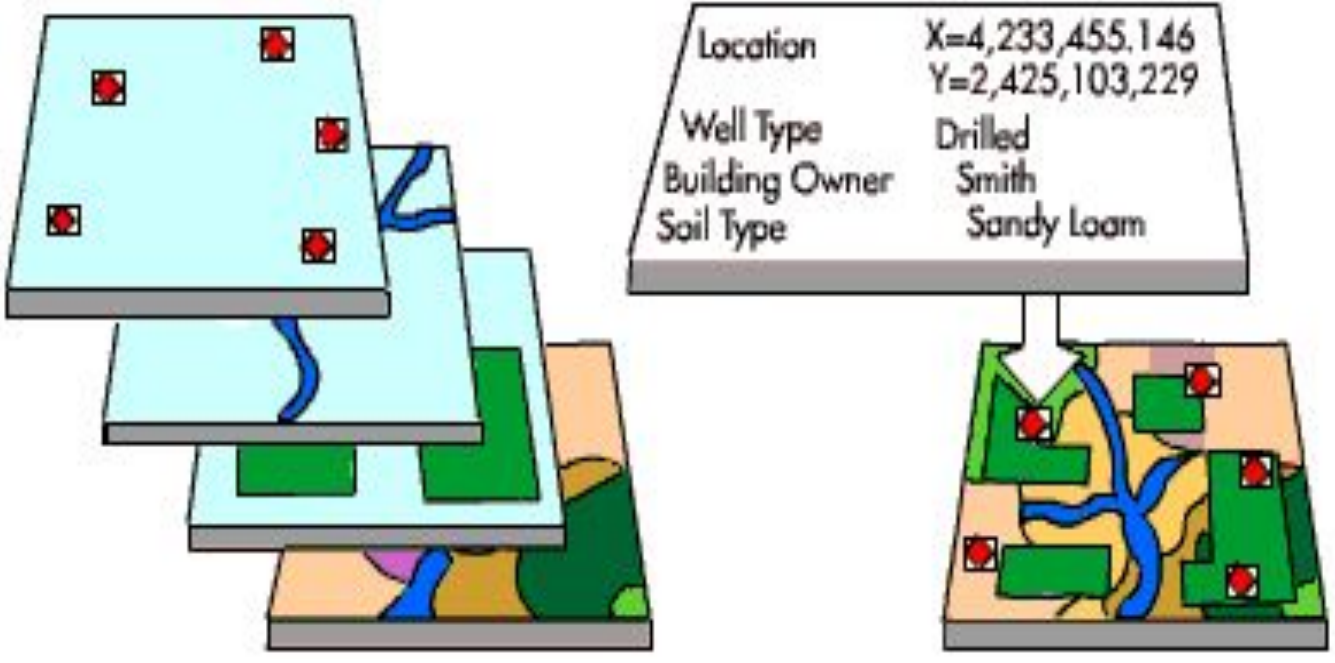
1:250000

Steps of getting map from satellite image

1-Creating Layers

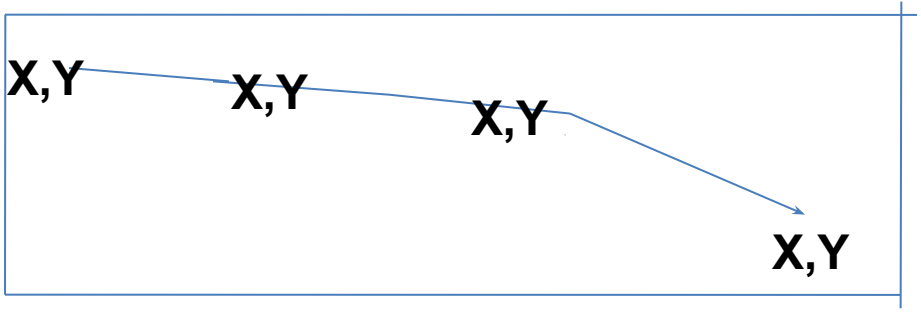


2- Specifying the Layers



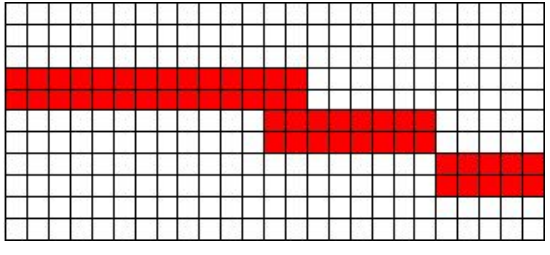
3- Storing data

Discrete representations of reality



Raster formats

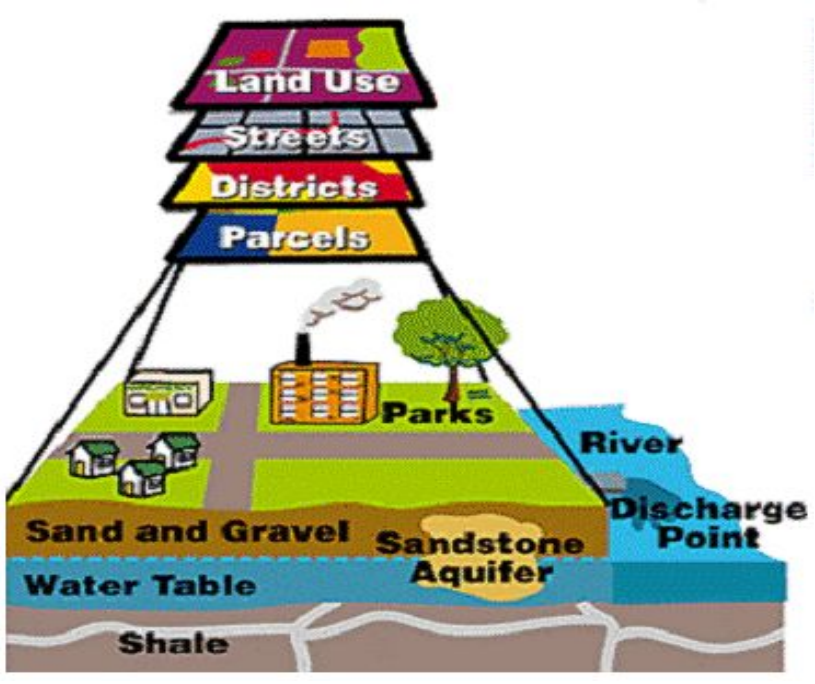
Use square cells to model reality



Reality
(A highway)

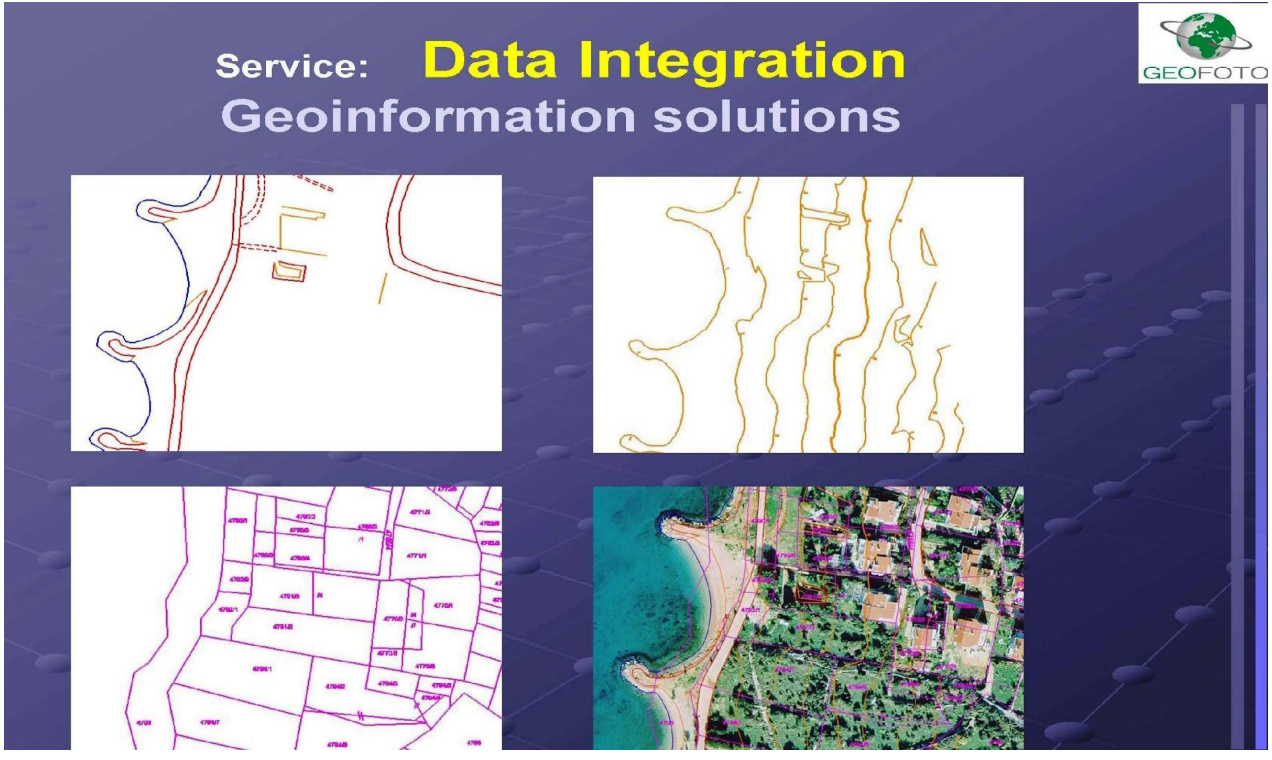
4- Organizing spatial data

A GIS works with thematic layers of spatial data

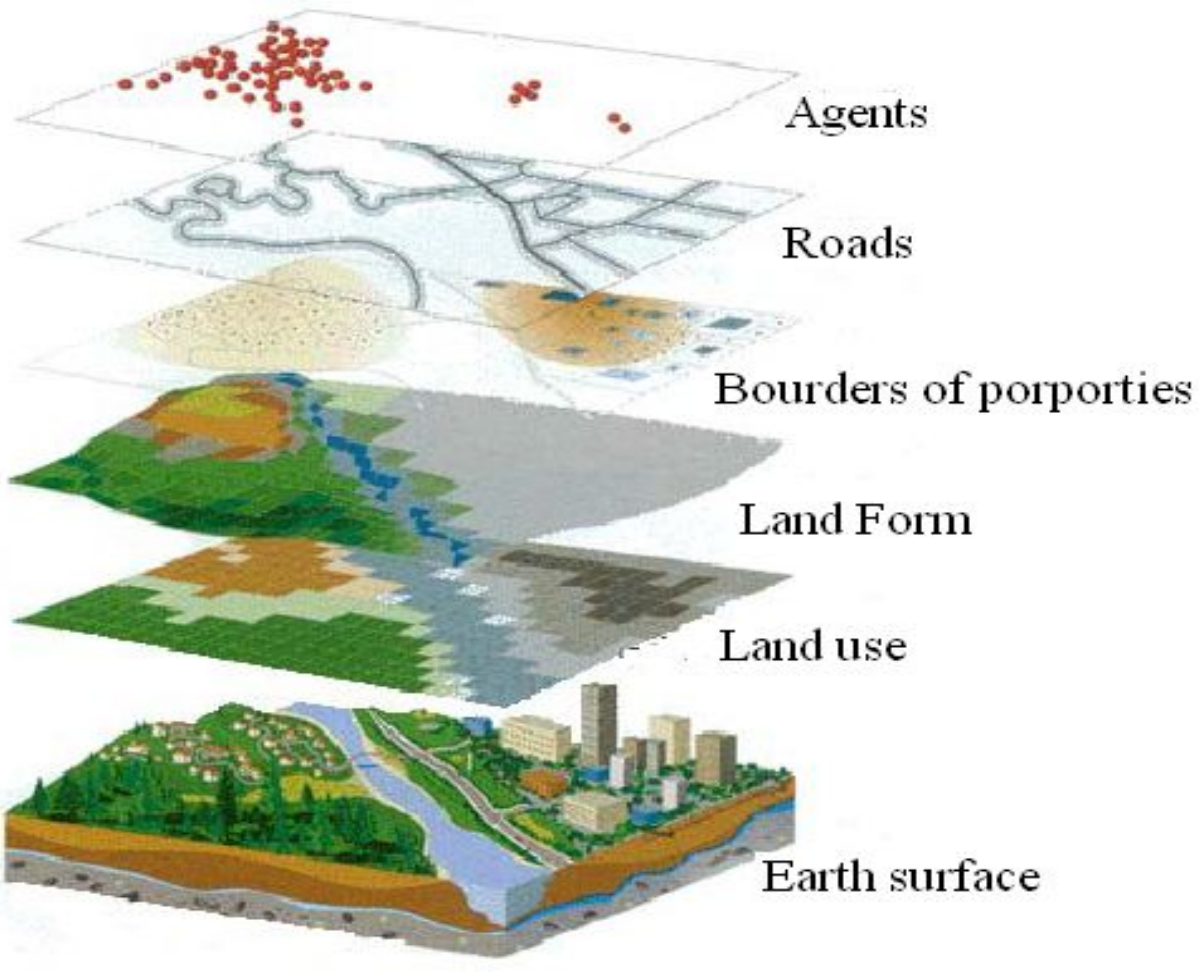


- **Data Integration By Multilayer's** 1

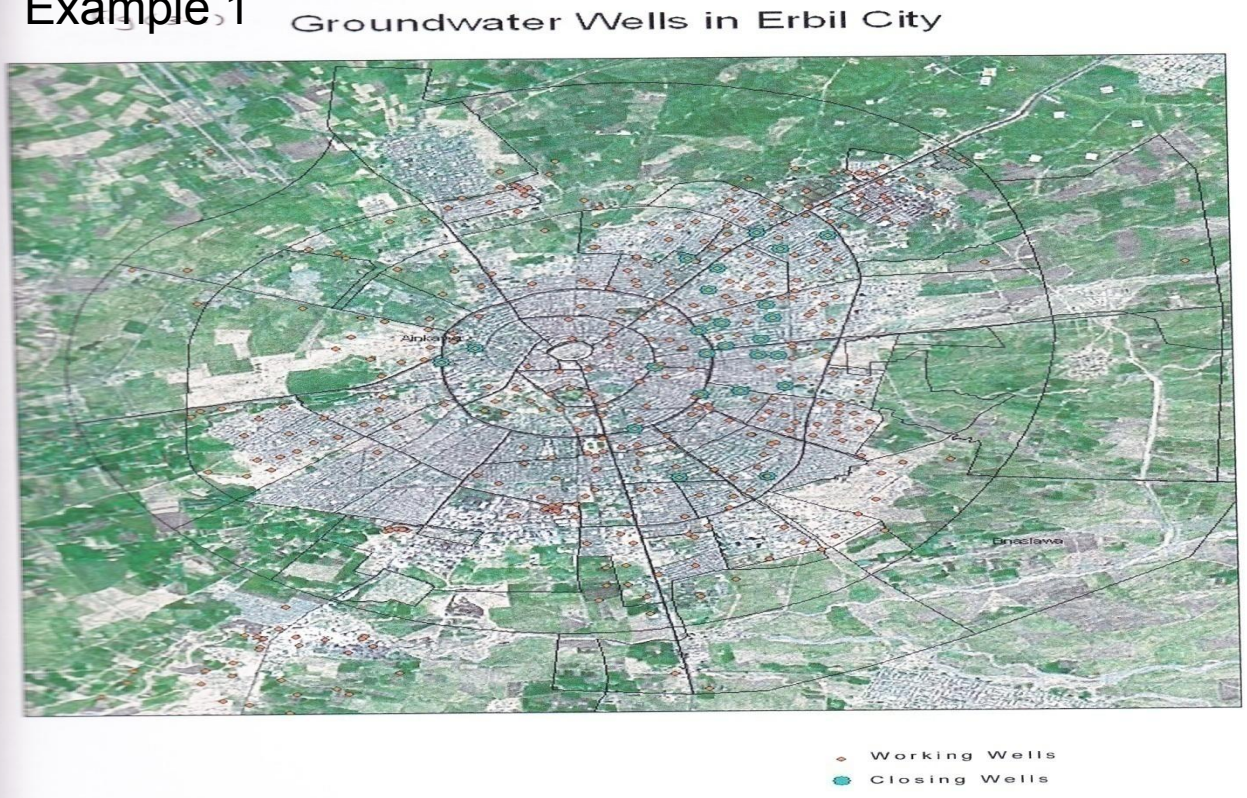
5)a- Data Integration By Multilayer's



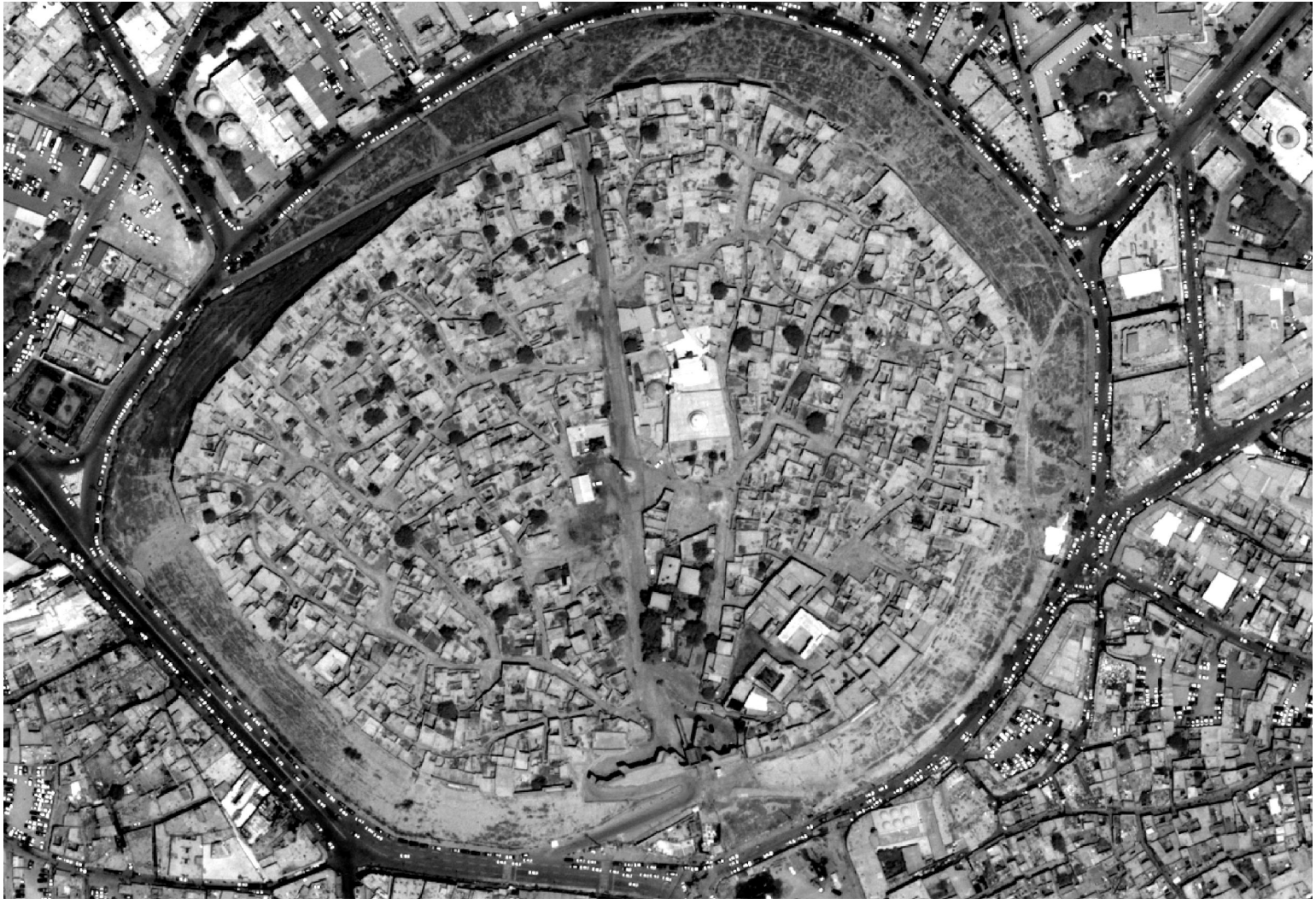
5)b- Data Integration By Multilayer's



Example 1


Groundwater Wells in Erbil City
Working Wells
Closing Wells

Example 2



THANK YOU FOR YOUR ATTENTION