

# EO Data Today and Application Fields



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## ◆ IGD GROUP AE

- ❖ Infotop SA, Geomet Ltd., Dynatools Ltd.
- ❖ Equipment and know how in many application fields, from surveying till EO data and RS.
  - ◆ Leica, Pentax, DSNP, Quante Baulaster, Moba controls, Damalini, etc.
  - ◆ LH Systems, DVP, etc.
  - ◆ ERDAS, OTT, etc.
  - ◆ SPOT IMAGE, EURIMAGE, EUROMAP, ISTAR, etc.
- ❖ Total solutions, combining “new” and “classic” technology.

## ◆ Presentation phases

### ❖ Categories of Satellite Data

### ❖ Available Satellite Data

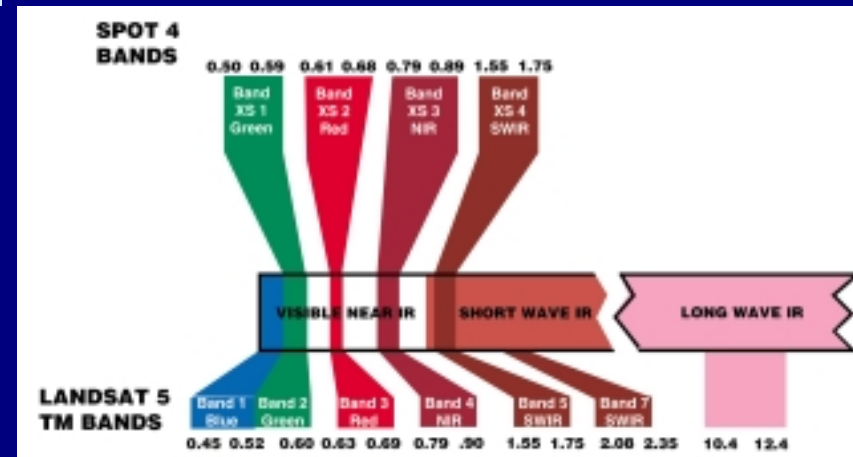
- ◆ Optical Sensors
- ◆ High Resolution & Russian Data
- ◆ Radar Sensors

### ❖ Prospective Satellite Data

### ❖ Geographical Data

### ❖ Remote Sensing Data received by Aeroplanes - Helicopters

- ◆ **Method of acquisition of Satellite data**
- ❖ Digital sensors with thousands tiny detectors that are measuring the reflected electro-magnetic energy (spectral measurements).
- ❖ The spectral measurements are transferred to Earth as numbers and then translated as color or shade through PC, for the creation of an image.
- ❖ Depending on the designed sensitivity of the detectors, the sensors are measuring the reflected energy in different and pre-fixed areas of the spectrum.



## ◆ Categories of Satellite Data

### ❖ Optical Data

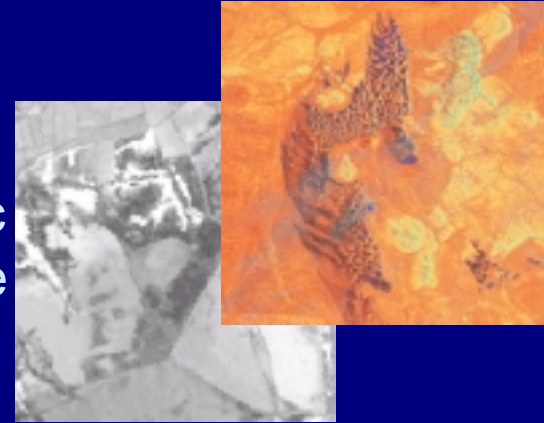
- ◆ Panchromatic Data
- ◆ Multispectral Data

### ❖ Radar Data

## ◆ Categories of Satellite Data

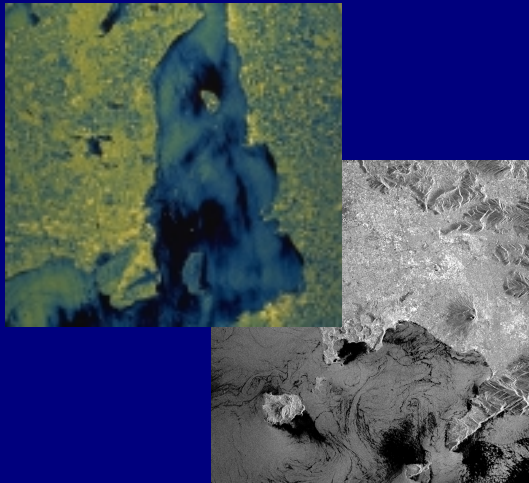
### ❖ Optical Data

- ◆ Passive sensors
- ◆ Measurements of electromagnetic energy, coming primarily from the Sun and bounces off the Earth surface



### ❖ Radar Data (SAR)

- ◆ Active sensors
- ◆ Transmission of radar signal (microwave) and measurements of the strength and other characteristics of the return signal after its reflection off the Earth's surface
- ◆ No impact of clouds, fog, haze & darkness



## ◆ Categories of Satellite Data

### ❖ Panchromatic Data

- ◆ One band (visible - near infrared part of the spectrum)
- ◆ B/W
- ◆ Better resolution



### ❖ Multispectral Data

- ◆ Usually 3-7 bands, in various parts of the spectrum
- ◆ Colored
- ◆ Band combinations in the visible and infrared parts of the spectrum

## ◆ Basic characteristics of Satellite data

- ❖ Resolution: the smallest part of an area in the ground, for which we can have a measurement (pixel size).
- ❖ Mode: optical (panchromatic, multispectral), radar
- ❖ Area of coverage: the area in the ground that can be covered by a single image (X km x Y km).
- ❖ Bands: it refers mostly in the multispectral data, where the different combinations of the bands can lead to results and conclusions.
- ❖ Acquisition date: either based on the years (recent or archive data) or by seasons (eg spring)



## ◆ Main advantages of Satellite data

- ❖ Digital
- ❖ Updated
- ❖ Fast delivered
- ❖ Cost effective (especially for large scale projects)
- ❖ World wide coverage without restrictions
- ❖ Synoptic (a single image has technical and environmental information, morphology, land use etc.)
- ❖ Accurate
- ❖ Flexible

## ◆ Satellite data providers

- ❖ SPOT Image (exclusive distributors)
- ❖ EURIMAGE
- ❖ EUROMAP
- ❖ Space Imaging Europe
- ❖ Earthwatch (through EURIMAGE) – Q4/2000
- ❖ Orbimage (through SPOT Image) – Q2/2001

## ◆ SPOT IMAGE - Data

Data	Mode	Resolution	Area	Acq. from
SPOT P	panchromatic	10 m	60 km x 60 km	1986
SPOT XS	multispectral (3 bands)	20 m	60 km x 60 km	1986
SPOT Xi	multispectral (4 bands)	20 m	60 km x 60 km	1998
SPOT Vegetation	multispectral (4 bands)	1 km	2,250kmx2,250km	1998

Processing in many different level, from raw till ortho.  
Programmation and stereoscopic acquisition available.

◆ **EURIMAGE - Data**

Data	Mode	Resolution	Area	Acq. from
Landsat TM 4/5	multispectral (7 bands)	30 m	180km x180 km	1982
Landsat TM 7	multispectral (7 bands) + 1 panchromatic	30 m 15 m	180km x180 km	1999
ERS	radar	12,5m	100km x 100km	1991
JERS	radar	18 m	75km x 75km	1992
Landsat MSS	multispectral (4 bands)	80 m	180km x180 km	mid '70s
Resurs 01	multispectral (5 bands)	170	600km x 600km	1994
NOAA AVHRR	multispectral (4/5 bands)	1 km	840km x 840km	1978
KVR 1000	panchromatic	2 m	40 km x 40 km	1987
TK 350	panchromatic	10 m	200km x 300km	1987
MK4	panchromatic multispectral	6 m 10 m	180km x 180km	1988
KFA 1000	panchromatic mutispectral	6,7m 10 m	120km x 120km	1990
Archived missions				

October  
2000

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### ◆ EUROMAP - Data

Data	Mode	Resolution	Area	Acq. from
IRS-1C/D Pan	panchromatic	5,8 m	70km x 70 km	1996
IRS-1C/D Liss III	multispectral (4 bands)	25 m	141km x 141 km	1996
IRS-1C/D WfS	Multispectral (2 bands)	188 m	804km x 804km	1996

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## ◆ High Resolution Satellite Data

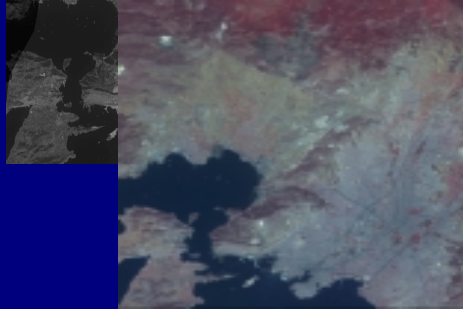
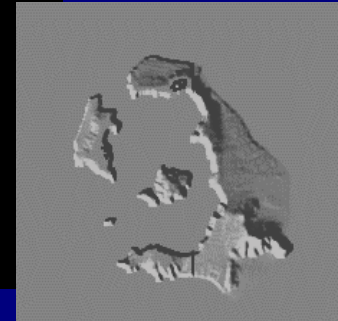
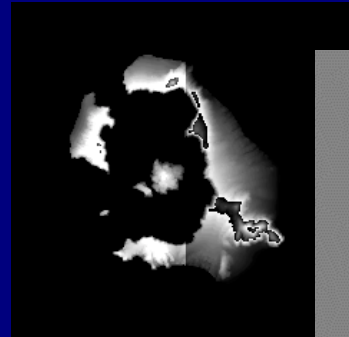
Data	Mode	Resolution	Area	Acq. from
Ikonos (SIE)	panchromatic	1 m	11 kmx 11 km	1999
	multispectral (4 bands)	4 m	11 kmx 11 km	1999
Quick Bird	panchromatic	1 m	22 kmx 22 km	2000
	multispectral (4 bands)	4 m	22 kmx 22 km	2000
Orbview 3	panchromatic	1 m	8 kmx 18 km	2001
	multispectral (4 bands)	4 m	8 kmx 8 km	2001
Orbview 4	panchromatic	1 m	8 kmx 8 km	2001
	multispectral (4 bands)	4 m	8 kmx 8 km	2001
	hyperstpectral (200 bands)	20 m	5 kmx 5 km	2001
SPOT 5	panchromatic	2.5 m–5 m	60 kmx 60 km	2002
	multispectral (4 bands)	10 m	60 kmx 60 km	2002

## ◆ Application fields & project examples

- ❖ Geographical data production: DEM, Ortho, Land use maps, vector
- ❖ Controls of set-aside
- ❖ SISMOSAT: Creation of seismic hazard maps
- ❖ Athens from Space: multimedia tourist guide
- ❖ Environment management and monitoring
- ❖ Change detection, etc.

## ◆ Geographical Data

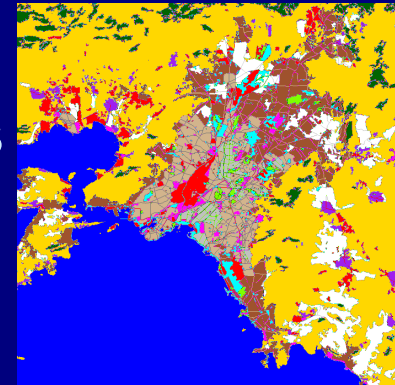
### ◆ DEM



◆ Ortho panchromatic or multispectral

◆ Clutter 5-class or 15-class

◆ Vectors 7-class





## ◆ Geographical Data

Data	Type	Resolution	Area	Accuracy
DEM from SPOT P	raster	20 m	Whole Greece	25-30 m
Ortho SPOT P	raster	10 m	Whole Greece	20 m
Ortho SPOT XS	raster	20 m	Many areas of Greece	25-30 m
Ortho Landsat 5	raster	30 m	Whole Greece	30-45 m
Clutter - 5class	thematic	20 m	Whole Greece	25-30 m
Clutter - 15class	thematic	20 m	Cities	25-30 m
Linear data-7 class	vector		Whole Greece	

For the production of all the above, knowledge and techniques of Remote Sensing, Photo-interpretation, Digital Image processing, Cartography, Surveying and GPS were combined.

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- ◆ **Remote Sensing – Airborne EO data**
  - ❖ **By helicopters**
  - ❖ **By airplanes**
  - ❖ **New high resolution camera (up to 24 cm) – Pilot in Greece within 2000**

## ◆ Airborne Remote Sensing Data

### ❖ Acquired by Helicopters

- ◆ Real time topographical data acquisition, with the help of differential GPS and laser scanner.
- ◆ Two video cameras for acquisition of vertical and oblique images, simultaneously with the laser scanner function.
- ◆ Based on these data, DTM is processed and images rectified in the same projection system.



## ◆ Airborne Remote Sensing Data

### ◆ Acquired by Aeroplanes

- ◆ Real time data acquisition, using radar systems.
- ◆ Processing, projection of the SAR data and DTM production, simultaneously with the data acquisition.
- ◆ Production of data and accessional processing of the data and the DTM, depending on the demands of the end user.



## ◆ Airborne Remote Sensing Data

### ❖ New high resolution camera

- ◆ 3 strips (forward, nadir, backward)
- ◆ each point is captured 26 times
- ◆ true ortho
- ◆ Resolution: 24 cm in 6,000 m
- ◆ RMS: X/Y 20 cm, Z 30 cm in 6,000 m
- ◆ Pilot in Greece within 2000

