
المركز الجغرافي الملكي الأردني
ROYAL JORDANIAN GEOGRAPHIC CENTRE
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THE ROYAL JORDANIAN GEOGRAPHIC CENTER

Outlines:

1- Establishment & Duties

2- Organizational Structure

3- Most Important Achievements

4- Ambitions & Future Vision

Establishment & Duties

Map Production

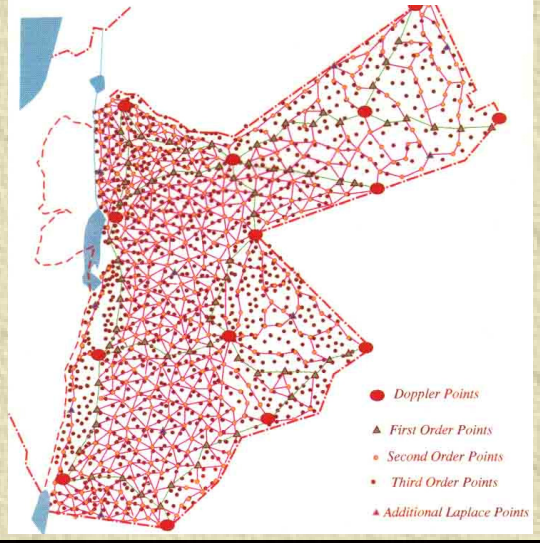
Aerial Photography

The Royal Jordanian Geographic Centre (RJGC) was established in 1975 as a national agency responsible for all the survey work (aerial, spatial and land surveying), and to produce different maps at various scales to meet the needs of Jordan and other Arab countries.

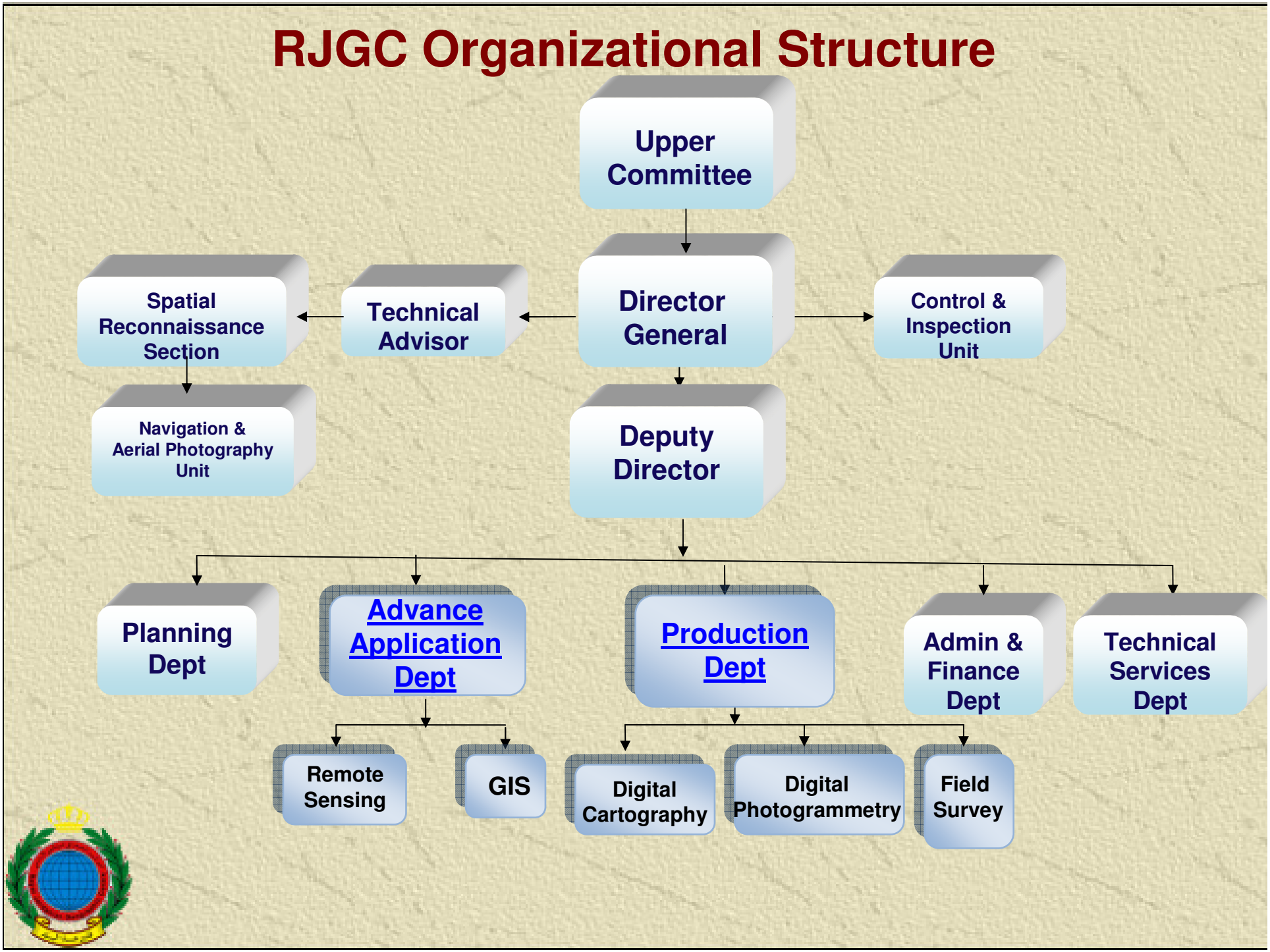
Boundaries Demarcation

Training Courses

Geodetic Network



RJGC Organizational Structure



Most Important Achievements

Hosting the Regional Centre for Space Sciences and Education for Western Asia affiliated to the United Nations in cooperation with Jordan Meteorological Department, Al al-Bayt University and Jordan University of Science & Technology.

Establishing the Geomatics Faculty in cooperation with the University of Jordan. The faculty will grant a B.Sc. degree in RS, GIS and survey sciences.

The previous RJGC College for Survey Sciences has been established since 15 years. It offered two-year courses in geodesy, photogrammetry, RS and GIS. It granted Diploma degree for students from Jordan and the Arab countries.

Establishing the Spatial Reconnaissance Section

This section provides orthophoto maps and operational maps at different scales upon request. It provides thematic maps for the UN Peace Keeping Missions. Also produces special maps for civil aviation and certain government departments.

Future Ambitions & Vision

- **Establishing Radio Astrological Observatory** in cooperation with the Institute of Astronomy and Space Sciences in Al al-Bayt University, Arab Union for Astronomy and Space Sciences and the British Godrell Bank.

- **Using Pictometry Technology** (the aerial oblique photography) in cadastral purposes and security applications.

- **Installing a satellite receiving station (MODIS)** at the RJGC
  The project is funded by World Bank and GEF to improve water resources and agricultural management based on quantitative and spatial-based decision making tools. The implementing agency is the MWI in collaboration with RJGC. The station will provide information on land and ocean for drought & flood management & impacts of climate change.

- **Installing Virtual Reference Stations (VRS)**
  This vital project will provide high accurate coordinates which will serve the public and private sectors. The 6 permanent stations will cover most of Jordan. These stations will reduce the cost and manpower.

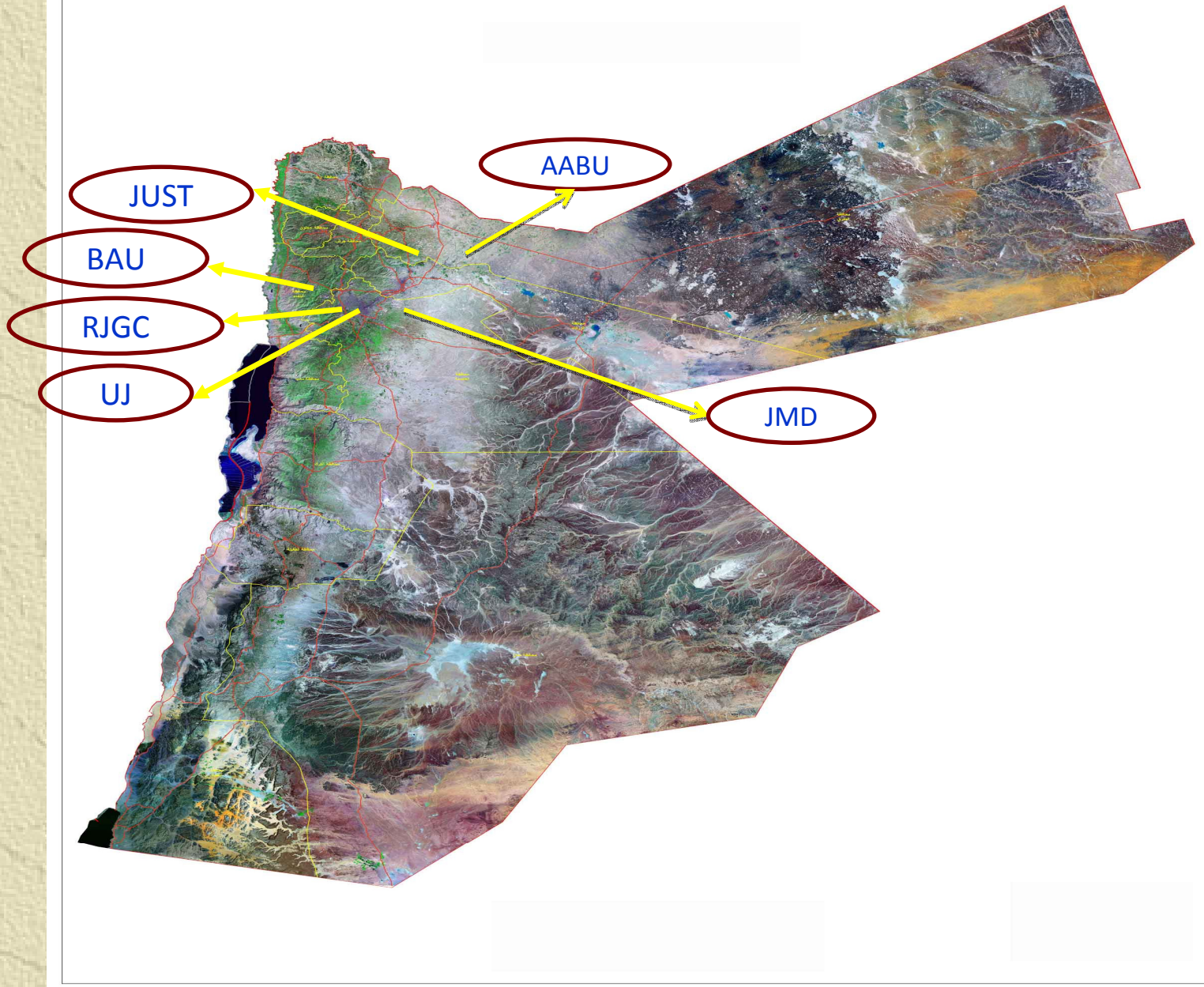
Future Ambitions & Vision

- **Hosting the National Geographic Information System (NGIS)** in coordination with the concerned authorities.

- **Establishing the King Abdullah II City for Space Sciences & Astronomy** which will include a planetarium, an optical telescope observatory for astronomical researches and crescent observation.

Main National Institutions Active in Space Science:

1. The Royal Jordanian Geographic Centre (RJGC)
2. Al al-Bayt University (AABU)
3. Jordan Meteorological Department (JMD)
4. Higher Council for Science and Technology (HCST)
5. Jordan University of Science and Technology (JUST)
6. University of Jordan (UJ)
7. Al-Balqa Applied University (BAU)


AABU
JUST
BAU
RJGC
UJ
JMD

RJGC - Available Facilities

- **Personnel:**

  - RJGC, Al al-Bayt University, University of Jordan, Al-Balqa University and Meteorological Dept. have experts in the fields of remote sensing, GIS, photogrammetry, surveying, space science and Astronomy.

  - RJGC can provide the required technical staff to supervise RS & GIS laboratories in the Centre.

- **Facilities:**

  - Allocation of classrooms, working areas as well as offices and equipment rooms that might be required for the Centre.

  - Access to all the facilities in RJGC such as rooms for photo scanning and the Centre's scientific library.

  - Storage facilities for equipment, documents, aerial photos, satellite imagery and other materials.

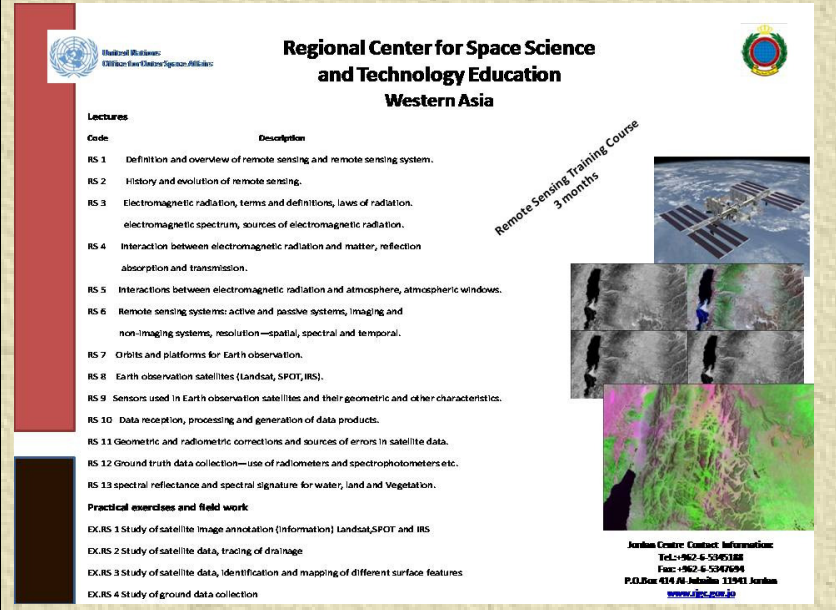
Training Center Facilities

Labs:
- Remote Sensing Labs
- GIS Labs
- Lecture Rooms
- Auditorium
- Library

Equipment:
- Office furnishings
- 15 Workstations for image processing
- 10 Workstations for GIS
- Data Show
- Intranet and internet facilities
- Remote sensed data and aerial photos

Software:
- ERDAS
- ArcGIS v10
- PCI v10

Short and Long Term Courses in RS



Regional Center for Space Science and Technology Education
Western Asia

Lectures

Code	Description
RS 1	Definition and overview of remote sensing and remote sensing system.
RS 2	History and evolution of remote sensing.
RS 3	Electromagnetic radiation, terms and definitions, laws of radiation. electromagnetic spectrum, sources of electromagnetic radiation.
RS 4	Interaction between electromagnetic radiation and matter, reflection absorption and transmission.
RS 5	Interactions between electromagnetic radiation and atmosphere, atmospheric windows.
RS 6	Remote sensing systems: active and passive systems, imaging and non-imaging systems, resolution—spatial, spectral and temporal.
RS 7	Orbits and platforms for Earth observation.
RS 8	Earth observation satellites (Landsat, SPOT, IRS).
RS 9	Sensors used in Earth observation satellites and their geometric and other characteristics.
RS 10	Data reception, processing and generation of data products.
RS 11	Geometric and radiometric corrections and sources of errors in satellite data.
RS 12	Ground truth data collection—use of radiometers and spectrophotometers etc.
RS 13	Spectral reflectance and spectral signature for water, land and Vegetation.

Practical exercises and field work

EX.RS 1 Study of satellite image annotation (Information) Landsat,SPOT and IRS
EX.RS 2 Study of satellite data, tracing of drainage
EX.RS 3 Study of satellite data, identification and mapping of different surface features
EX.RS 4 Study of ground data collection

Remote Sensing Training Course
3 months

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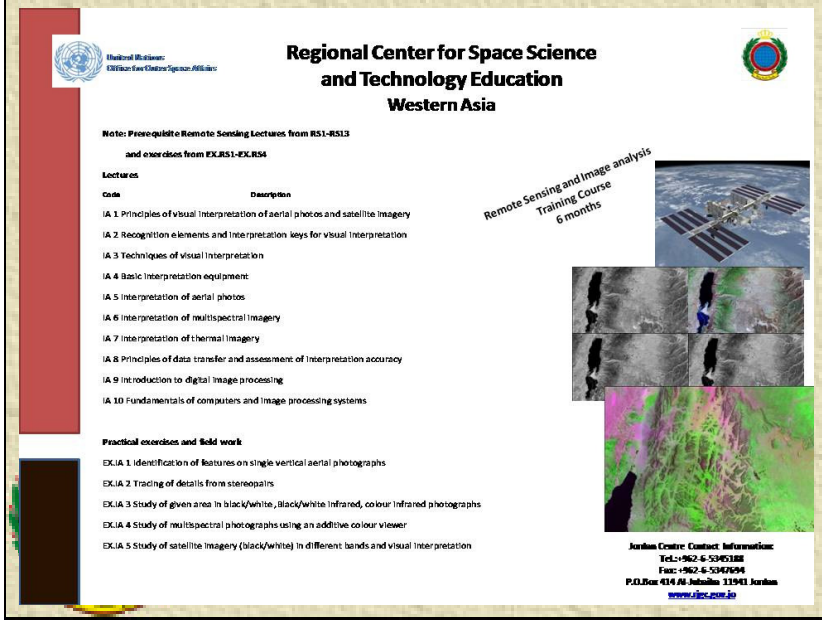

Regional Center for Space Science and Technology Education
Western Asia

Note: Prerequisite Remote Sensing Lectures from RS1-RS13 and exercises from EX.RS1-EX.RS4

Lectures

Code	Description
IA 1	Principles of visual interpretation of aerial photos and satellite imagery
IA 2	Recognition elements and interpretation keys for visual interpretation
IA 3	Techniques of visual interpretation
IA 4	Basic interpretation equipment
IA 5	Interpretation of aerial photos
IA 6	Interpretation of multispectral imagery
IA 7	Interpretation of thermal imagery
IA 8	Principles of data transfer and assessment of interpretation accuracy
IA 9	Introduction to digital image processing
IA 10	Fundamentals of computers and image processing systems

Practical exercises and field work

EX.IA 1 Identification of features on single vertical aerial photographs
EX.IA 2 Tracing of details from stereopairs
EX.IA 3 Study of given area in black/white, Black/White Infrared, colour Infrared photographs
EX.IA 4 Study of multispectral photographs using an additive colour viewer
EX.IA 5 Study of satellite imagery (black/white) in different bands and visual interpretation

Remote Sensing and Image analysis
Training Course
6 months

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Code	Description
RS 1	Definition and overview of remote sensing and remote sensing system.
RS 2	History and evolution of remote sensing.
RS 3	Electromagnetic radiation, terms and definitions, laws of radiation.
RS 4	Interaction between electromagnetic radiation and matter, reflection absorption and transmission.
RS 5	Interactions between electromagnetic radiation and atmosphere.
RS 6	Remote sensing systems: active and passive systems, imaging and non-imaging systems, resolution—spatial, spectral and temporal.
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RS 8	Earth observation satellites (Landsat, SPOT, IRS).
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RS 12	Ground truth data collection—use of radiometers and spectrophotometers etc.
RS 13	Spectral reflectance and spectral signature for water, land and vegetation.

Short and Long Term Courses in GIS

3 Months Courses

- Introduction to GIS
- Hardware and software requirement of GIS
- Database structures and formats
- Vector data structures
- Raster data structures
- Data inputting, editing and topology in GIS

6 Months Courses

- Integration of spatial and non-spatial data
- Map Projections and data transformation in GIS
- Spatial data analysis (vector-based)
- Spatial data analysis (raster-based)

Short and Long Term Courses in Photogrammetry

Regional Center For Space Science And Technology Education

Western Asia

The objective of the photogrammetry course is to acquire a basic .understanding of mapping and geopositioning techniques using satellite aerial photo, and terrestrial platforms.
The development of photogrammetry clearly depends on the general development of science and technology. It is interesting to note that the four major phases of photogrammetry are directly related to the technological inventions of photography, airplanes, computers and electronics

- Fundamentals of aerial photogrammetry
- Aerial cameras
- Processing of black/white, colour, black/white infrared , colour infrared films, film density and characteristic curves
- Aerial flight planning
- Basic geometric characteristics of aerial photographs
- Scale, ground coverage and resolution of aerial photo, tilt-and-relief displacement
- Stereo vision, stereomodel and stereoscopes
- Measurement of height from aerial photos, parallax and parallax measurement
- Satellite sensors for stereo coverage, along track/across track stereo scanning
- Principles of stereo photogrammetry
- Principles of satellite photogrammetry
- Principles of radargrammetry and synthetic aperture radar interferometry
- Plotting instruments (stereoplotters)
- Aerial triangulation, control and mapping
- Principles of digital photogrammetry
- Principles of cartography and map making
- Project

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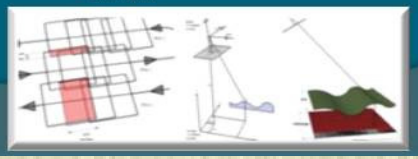


The Institute of Astronomy & Space Science (IASS) at Al al-Bayt University (AABU)

Historical background:

IASS-AABU was established in September 1994.

Its Goals:

- Building national capacities in A&SS
- Doing research in A&SS
- Organizing conferences, seminars & specialized lectures in A&SS.

Astronomy at Universities Graduate Level

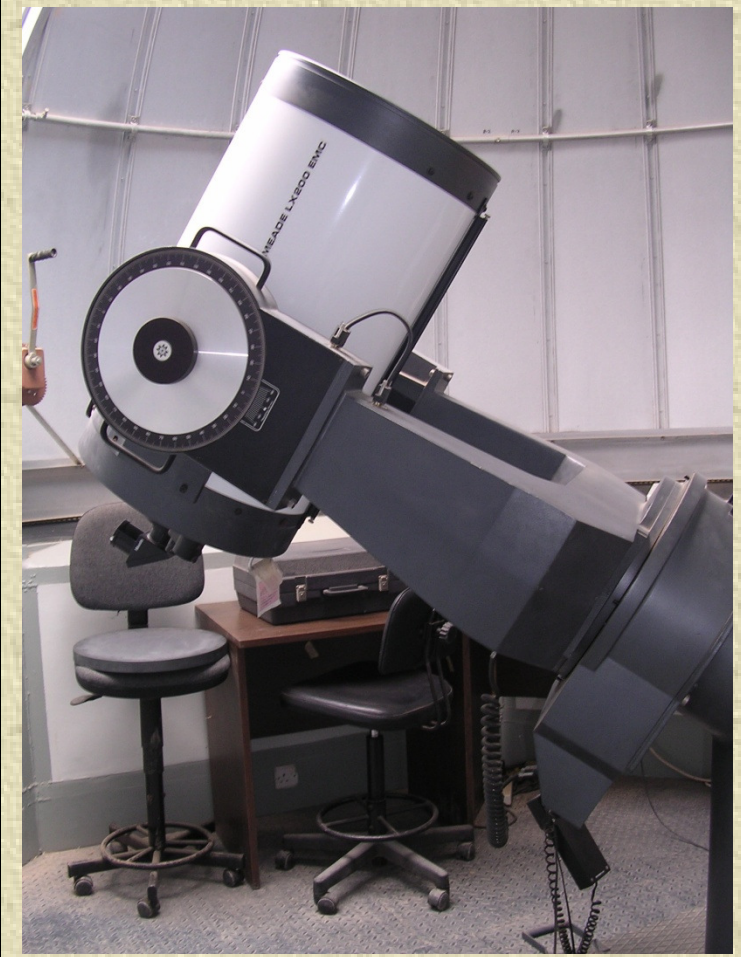
- Some Jordanian universities offer astronomy/ astrophysics courses as electives (e.g. University of Jordan, Yarmouk University, Hashemite University, AABU, Islamic Science University …)

- Al al-Bayt University is the only one that offers a degree-leading program in A&SS.

- IASS-AABU offers the M.Sc. Degree in two disciplines:
  - Astronomy/ Astrophysics
  - Space Science

Maragha Observatory at AABU

Maragha Observatory at AABU



Schmidt-Cassegrain Reflector

16-inch Meade
LX200
CCD
Pictor 1616

The Jordan Astronomical Society

Has three Observatory

Telescopes of 14”, 10” and 8”

Future Perspectives

Installing an Atmospheric Weather Electromagnetic

System for Observation and Education (AWESOME)

receiver in collaboration with Stanford University.

Jordan Meteorological Department (JMD)
Meteorological Training Center (MTC)

In 1951, the JMD was established as part of the Civil Aviation Authority. The department operates 36 stations: 17 Synoptic, 9 climatological, 9 Agro-meteorological Stations and 1 Radiosond Station.

MTC was established as an agency of the JMD in 1972.

The center provides training courses and graduates weather forecasters, observers and technicians.

All teachers and trainers in the MTC are staff of JMD and graduates of MTC. They are sufficiently qualified academics, well experienced and already participated in many training courses.

Activities held at the MTC

1 – Weather Observation Course:

Duration: six months, including four months in the form of theoretical and practical lectures, and two months as practical training in a monitoring weather station.

2 – Weather Forecasting Course:

Duration: nine months, including six months in the form of theoretical and practical lectures, and three months as practical training in the National Forecasting Center.

3 - Workshops

MTC held training workshops in the fields of meteorology, as well as intensive weather observation and forecasting courses on demand.

Workshops

MTC holds intensive forecasting and observation training courses on demand, as well as specialized workshops in the fields of applied meteorology (Satellite, Applied Climatology, Rain Enhancement, Numerical Weather Prediction, etc).

MTC also holds training courses in supported fields such as computer science and statistics upon request.

Facilities Available at the Center

A classroom of sixteen student capacity

Al- Balqa' Applied University (BAU)

- **About BAU:**
  Al-Balqa' Applied University (BAU) was founded in 1997, a distinctive state university in the field of Bachelor and Associate degree Applied Education, at the capacity of 47,500 student distributed into 32,000 at the Bachelor degree program and 15,500 at the Associate degree program.

- **Faculty of Engineering:**

Surveying and Geomatics Engineering

A BSc. program in surveying, RS and GIS.

Jordan University of Science and Technology (JUST)

- Jordan University of Science and Technology was founded as an independent university on September, 1st, 1986 in Irbid. The University currently hosts ten faculties in addition to Faculty of Graduate Studies and Deanship of Research.

- JUST is one among many other national universities and research centers that have great human and technical resources welling to convene to keep up with scientific developments in space science and astronomy technology.

On-going Projects

- Previous mentioned organizations and institutions along with The Arab Union for Astronomy and Space Science (AUASS) are working to construct the following projects:

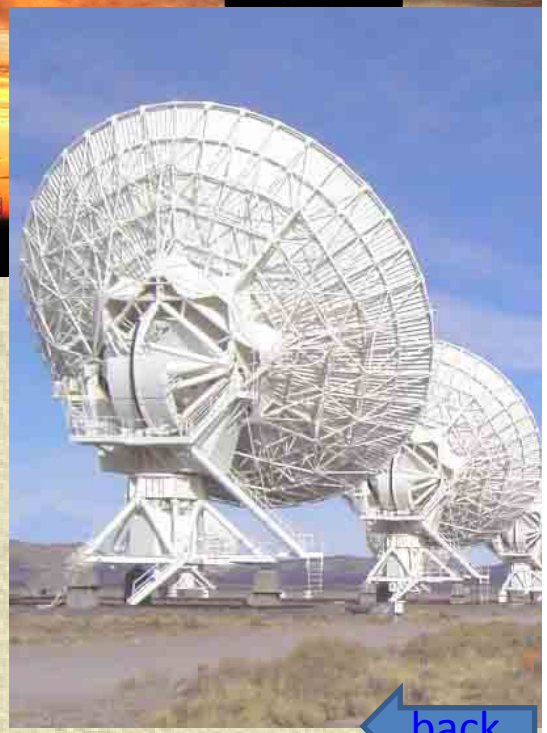
1. Planetarium at the site of Ahel Al-Kahef (The Seven Sleepers Cave), which consider as a holy shrine .
2. Radio Telescope.
3. Optical Telescope of 2m diameter.

Thank You for Your Attention

Building and transferring the communication satellite dish to a radio telescope and connecting it to the Global European Network (VLBI)

The project aims to connect Jordan to the Global Very Long Base Line Interferometer Network (VLBI). The global network incorporates a set of radio telescopes distributed all over the world, except the Arab-Muslim world, where they lack the radio telescope. So it was necessary to plan for selecting a site in the Arab world in order to connect it to the global network.

Currently there is a project in Jordan to transform the satellite communication dish in the Baqa' area near Amman city to a large telescope (Millimetric Radio Observatory). This telescope will be used for radio astronomy meteorology, radio communications, studying the continental drift, earthquakes and natural disasters prediction as well as the importance of including Jordan and the Arab countries within the developed countries in astronomical field by linking it to VLBI network to complement the global network.



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Advanced Applications Department Main Duties

- Carrying out projects, researches and studies related to urban planning, geological and environmental issues using remote-sensed data and GIS.
- Providing the government and private sectors with the needed orthorectified satellite imagery.
- Updating base maps using high resolution satellite imagery.
- Establishing a National Geographic Database.
- Building a Digital Topographic Geo-database.

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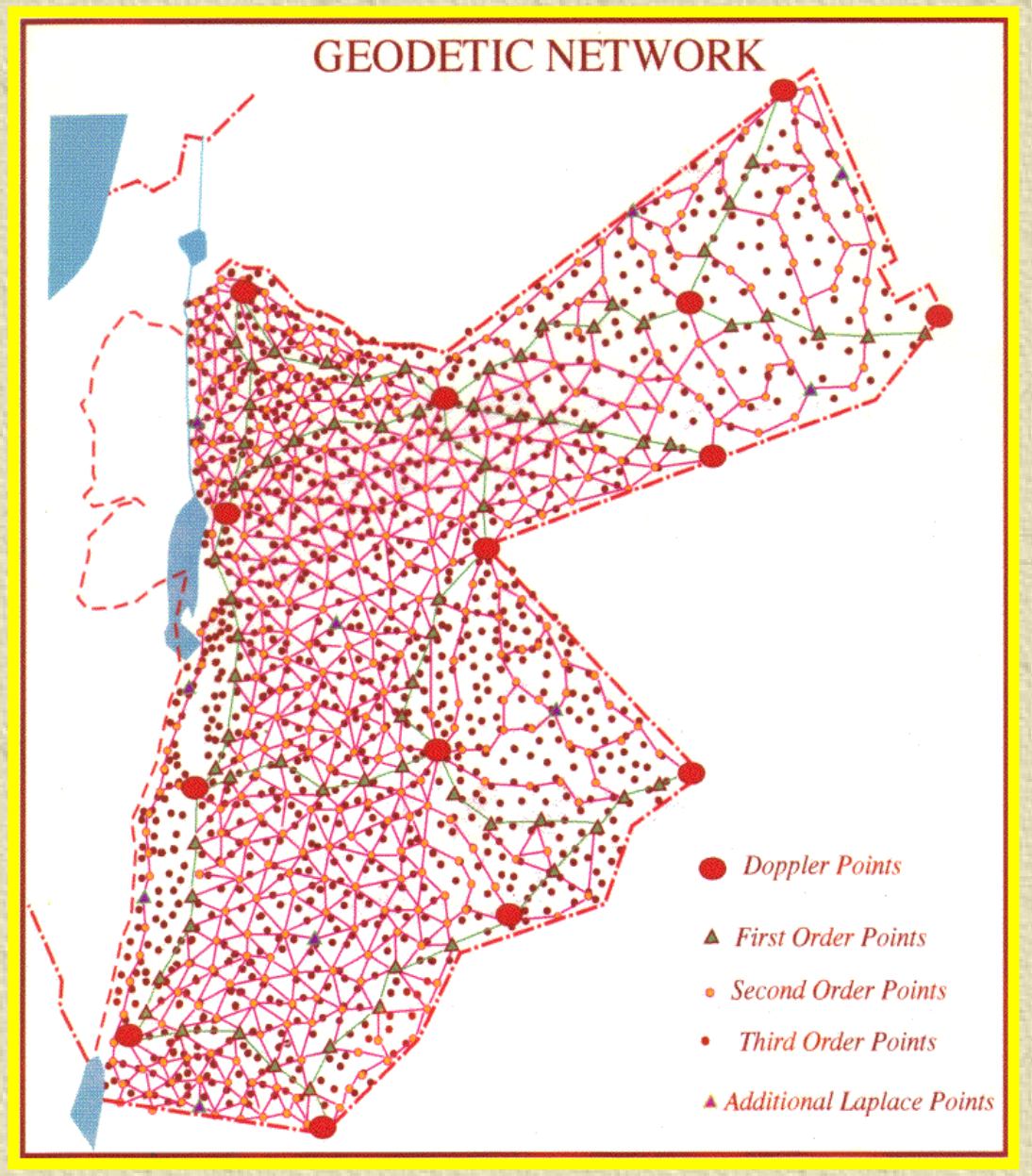
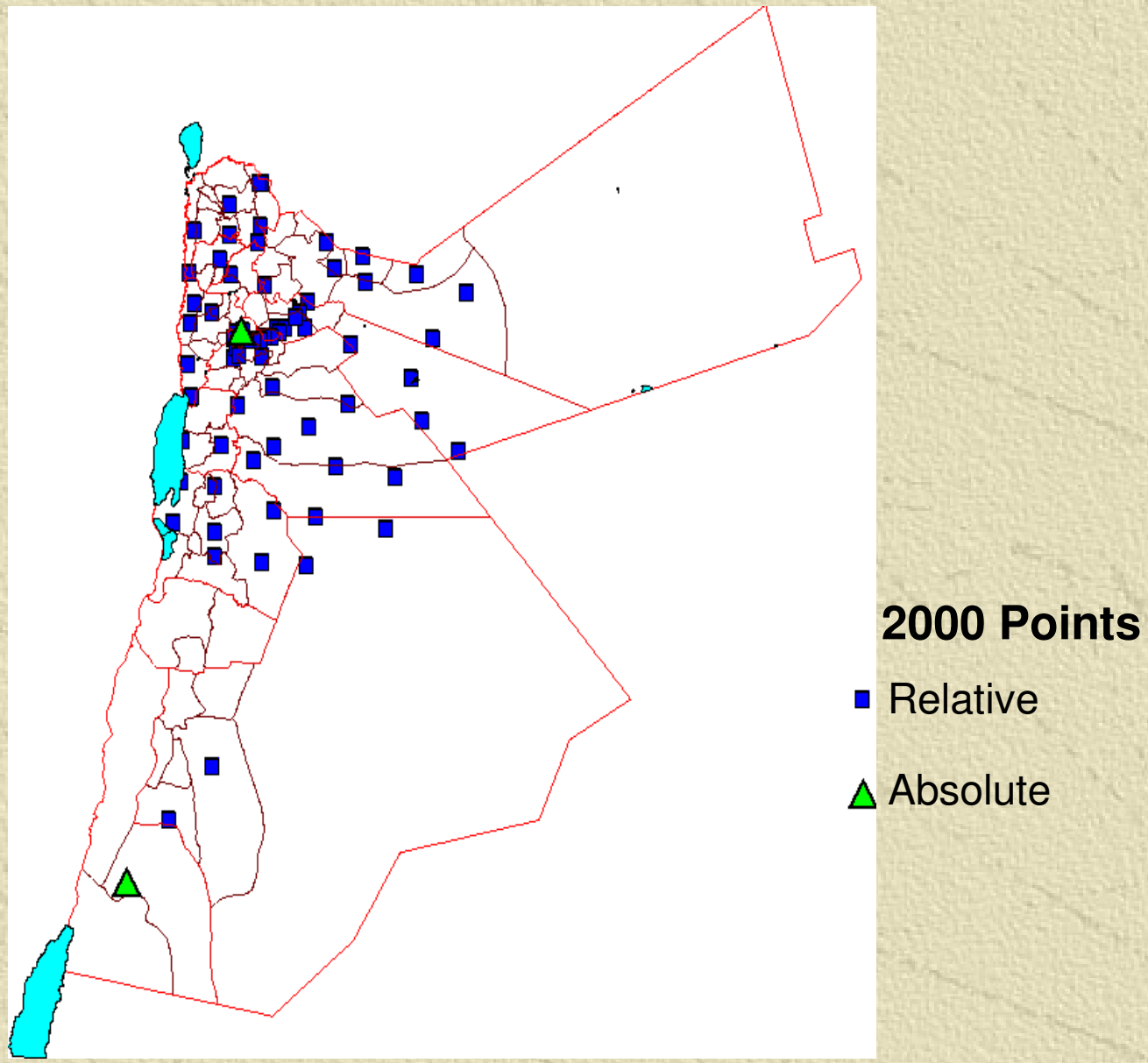
Production Department Main Duties

- Planning and carrying out aerial photography for both public and private sectors.
- Producing orthophoto maps using aerial photos of high resolution.
- Maintaining the networks of: National Geodetic, GPS, Gravity and precise leveling.
- Field completion for map production and other projects.
- Carrying out field survey using high tech instruments (Ashtech Total Station and GPS receivers).
- Producing topographic, tourist maps and atlases in digital format.

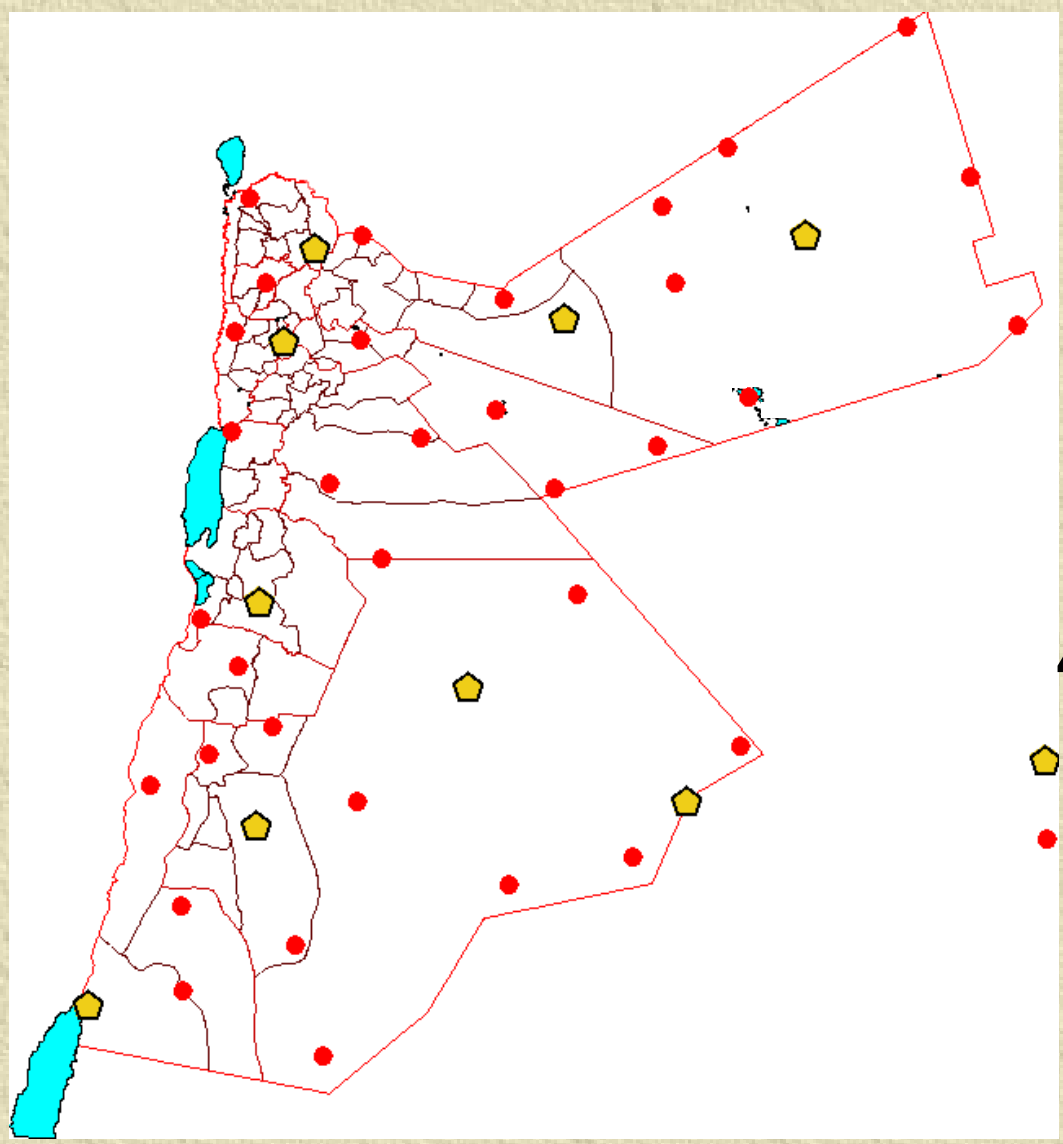
Maintaining the National Geodetic Network



Maintaining the National Gravity Network



Maintaining the GPS Network



44 Points

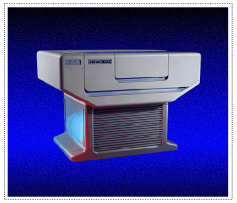
Absolute

Relative

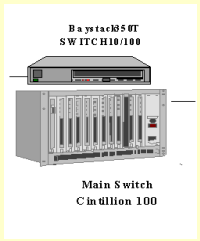
Digital Photogrammetry Network

SUN
ULTRA

Tape EXB



DSW



Network

SUN ULTRA

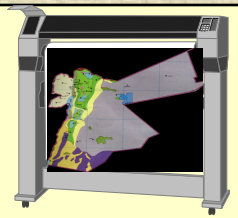
Tape EXB

Stereo

DPWs

Mono

DPWm



HP Plotter

DLT/ GB

CD writer

NT

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Courses Held at RJGC

- Basic Remote Sensing
- Advanced Remote Sensing
- Basic Geographic Information System (GIS)
- Advanced Geographic Information System (GIS)
- ArcScan
- Spatial Analyst
- 3d Analyst
- Watershed and Hydrology
- Aerial Photo Interpretation & Map Reading
- Basic Survey
- Advanced Survey
- Total Station
- Global Positioning System (GPS)
- “Qibla” Determination
- Cadastral Surveying
- Photogrammetry
- Cartography
- Geographical Names

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