Nano-Satellite Applications for the GCC Region and Saudi Arabia

Sultan Hasan AlSultan
TECRS
www.tec-rs.com

1ST UNISEC-Global Meeting
23 Nov. 2013 Tokyo - Japan

Outline

- Objective
- Introduction
- Space Program in Saudi Arabia and GCC
- Exciting Capacity Building Models
- Proposal
- Prospective of UNISEC-SA
- Conclusion

Objective

Encourage and Promote Space Project-Based Education for Capacity Building through Stakeholder Collaboration

Introduction

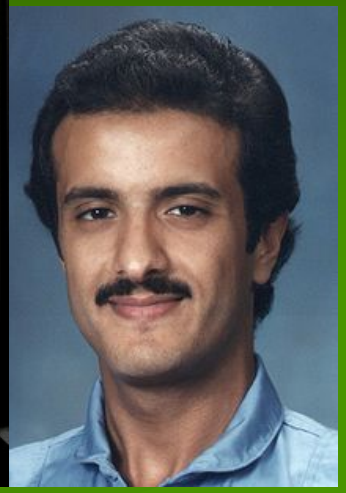
Strategic Technologies

- Water
- Oil and Gas
- Petrochemicals
- Nanotechnology
- Biotechnology
- Information Technology
- Electronics, Communication and Photonics
- Space and Aeronautics Technology
- Energy
- Advanced Materials
- Environment

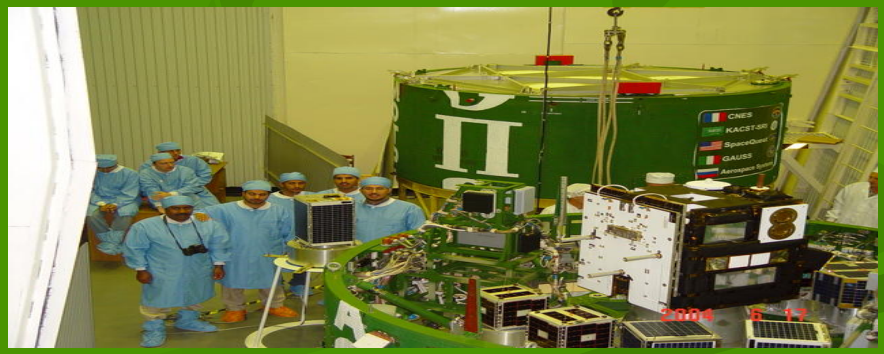
Space Program in Saudi Arabia and GCC

Saudi Arabia:

- First Arabian Astronaut
- KACST: SaudiSat 1 - 12
- Universities
  - KFUPM
  - KAU
  - KAUST
  - KSU (Remote Sensing)
  - CU



Sultan bin Salman STS-51-G



GCC:

UAE: DubiaSat 1,2&3

Kuwait, bahrain, Qatar and Oman (Remote sening)

Sultan Lab

Tokyo Insutute of Technology

ISPRS, Working Group VII/7, Middle East Coordinator

International Society for Photogrammetry and Remote Sensing

Working Group VII/7 - Innovative problem solving methodologies for Less Developed Countries

http://www.itc.nl/external/isprsc7/wg7/

COSTAL LAND SURFACE HEAT RETRIEVAL OVER GOLF REGION

. The study area

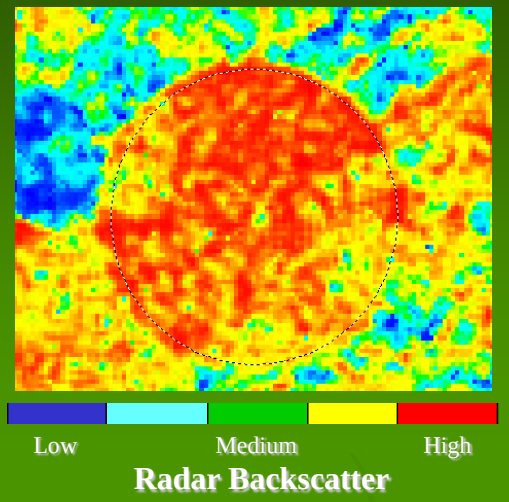
The raw satellite image acquired on 20-01-1999.

The raw thermal satellite image acquired on 20-01-1999

Temporal Monitoring of Agricultural Crops

RadarSat C-band

→ **RadarSat(DN,x,y)** →

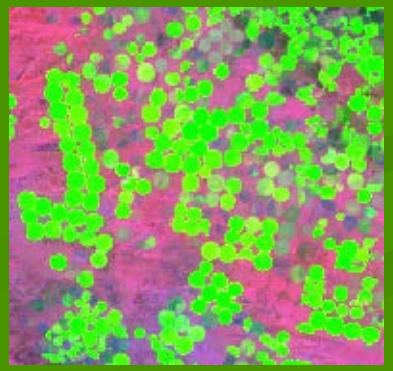


Landsat Thematic Mapper

→

$$NDVI(x,y,w) = \frac{(TM4\{x,y\} - TM3\{x,y\})}{(TM4\{x,y\} + TM3\{x,y\})}$$

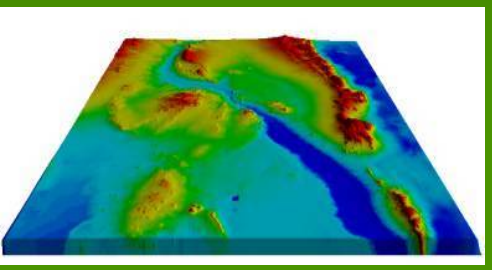
↓

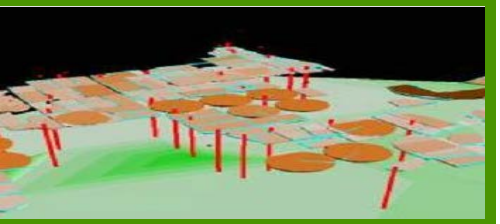


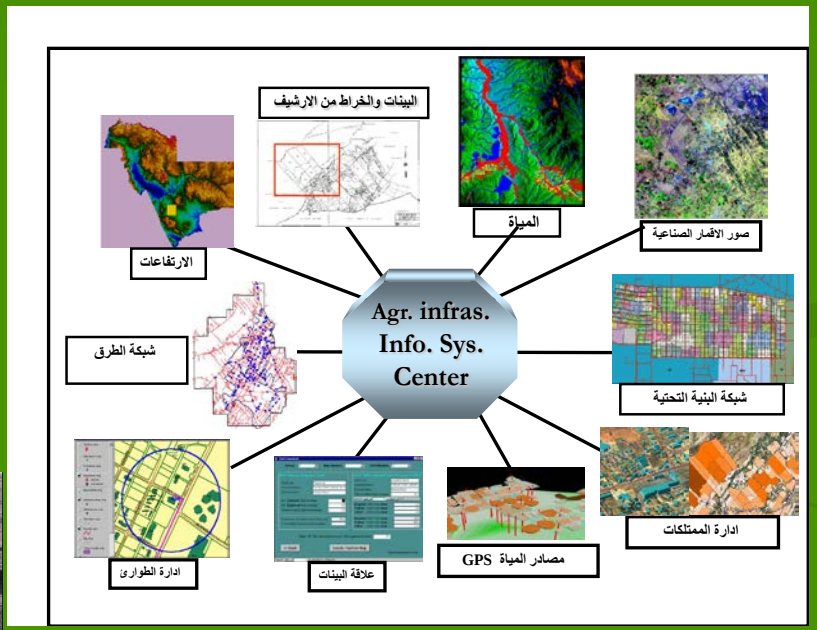
TECRS

isprs
information from imagery

Water Infrastructure Information System

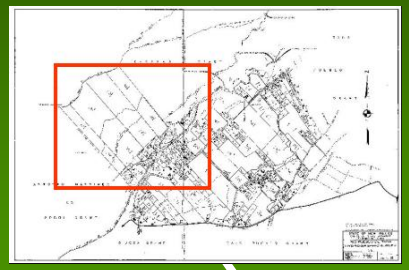


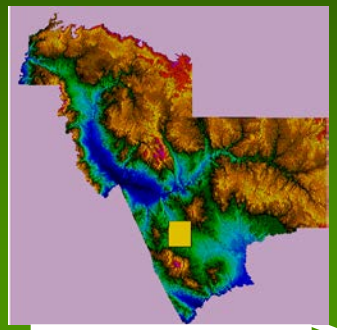




Regional Water Information System

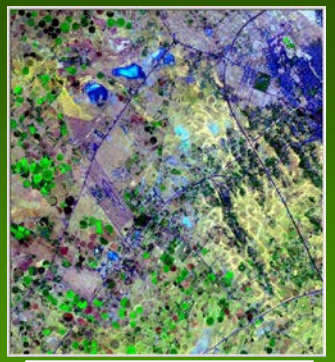
Archived Planning Map





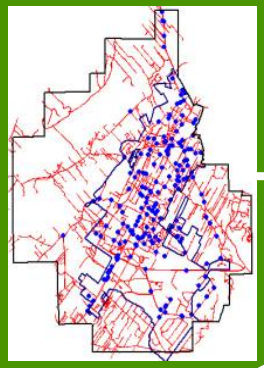
Digital Elevation

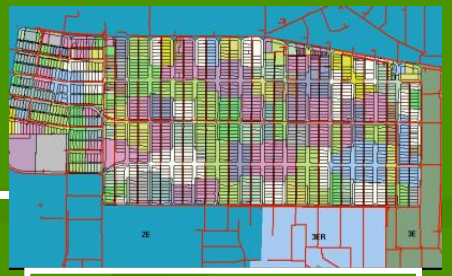
Hydrology



Satellite Imagery

Transportation Network

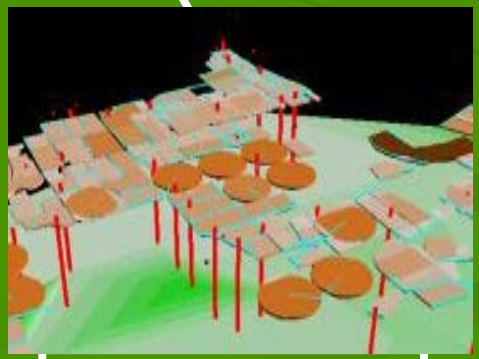




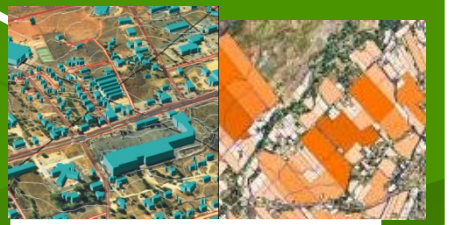
Utility Network

Emergency Management

Relational Database

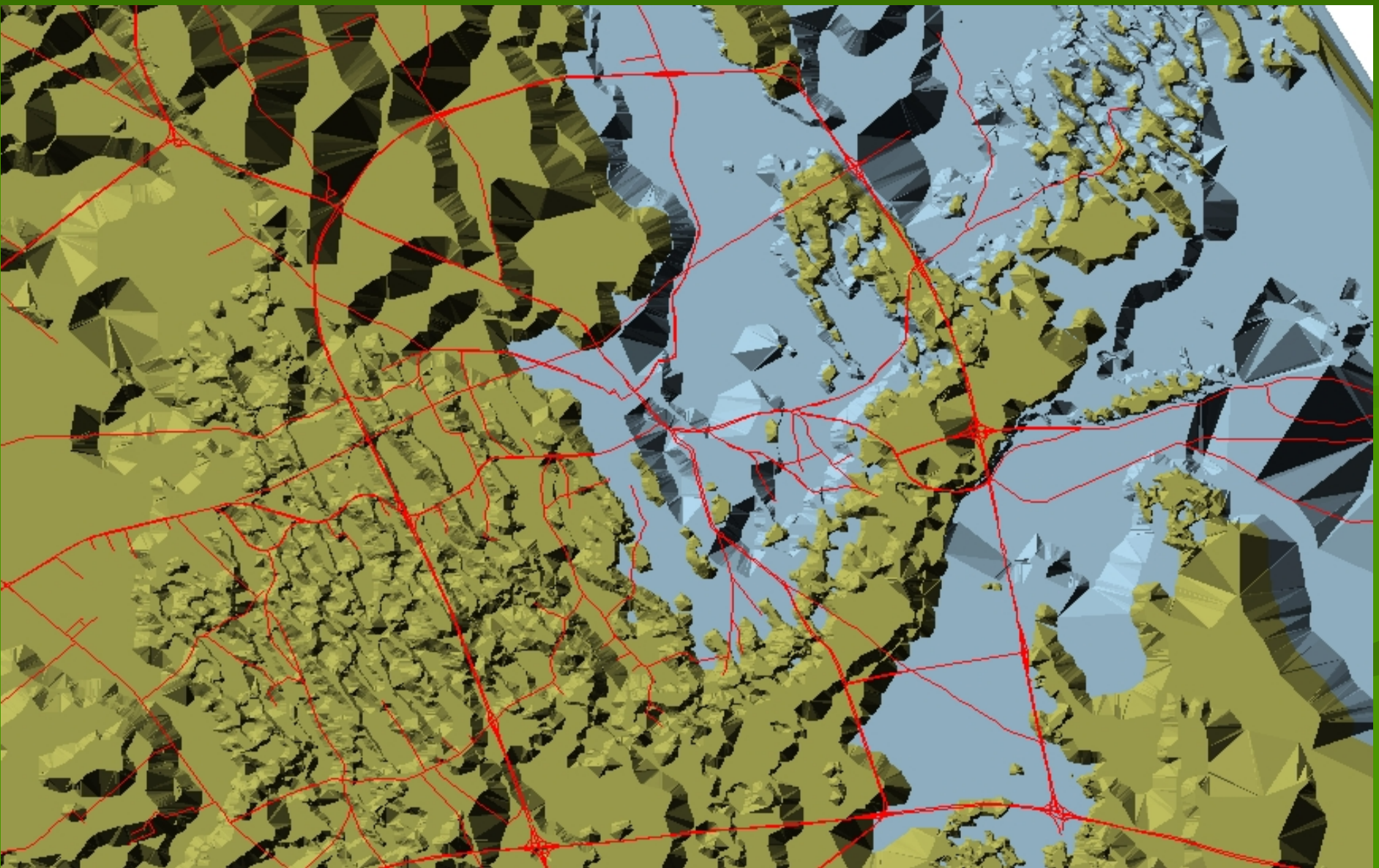


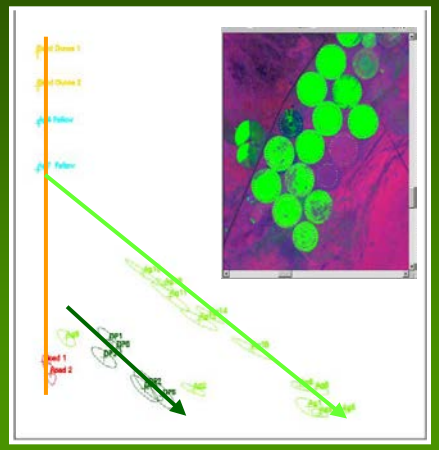
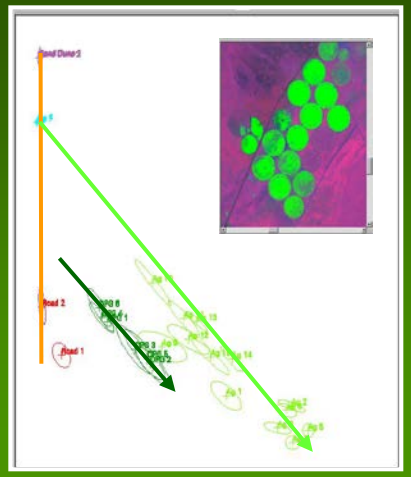
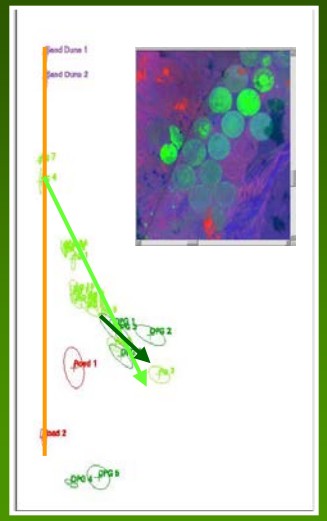
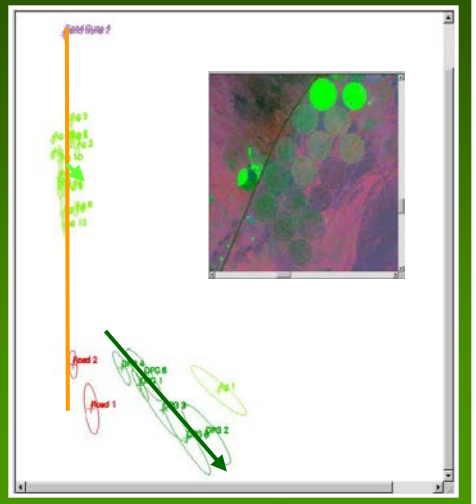
Water source Management



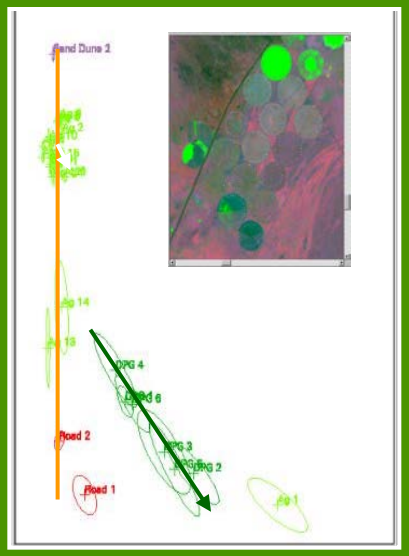
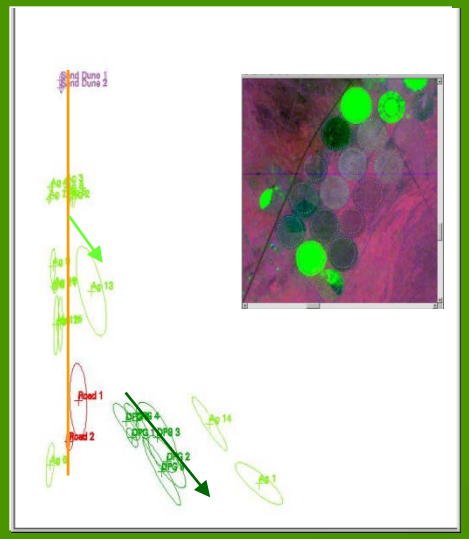
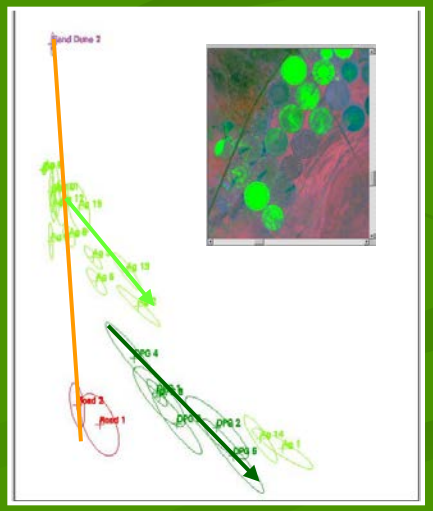
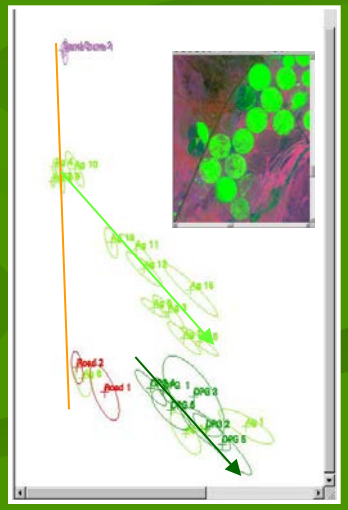
Land and Building Management

With rainfall data (?), water level can be simulated to predict flood



ADVI: Albedo vs. NDVI Feature Space Distribution Plots, 1994
Wadi Ar Rumah Area, Al Qassim, Saudi Arabia

Exciting Capacity Building Models

- First Phase
  - MOE and KACST
  - Initiative to co-operate with NASA and ANL
  - Space Based-Project Education (CubeSat, Nano-Satallites)
- Second Phase
  - KACST and USA NanoRacks co-operation
  - Saudi Spin-off Businesses

Proposal

- UNISEC-Saudi Arabia (Space Engineering)
- Encourage and Promote Space Project-Based Education for Capacity Building
- International Collaboration
- Regional Expansion (Gulf Countries Cooperation-GCC)

Prospective of UNISEC-SA

- Candidate members
  - **KACST**
  - **KFUPM**
  - **KAU**
  - **KAUST**
  - **KSU (Remote Sensing)**
  - **QU**
  - **CU - TECRS**
- Call for a workshop hosted by KACST
- UNISEC-SA and Join UNISEC-Global

Conclusion

- Extend the existing capacity building model to include not only MOE but also MOHE.
- Establish UNISEC-SA and extend it to GCC.
- Expand collaboration for capacity building working with UNISEC activities (e.g. CLTP, MIC, ..etc)

Conclusion

- Joint-Space Project-Based Education for Capacity Building by Investing in the human factor and resources that consequently contribute to supporting industries based on knowledge and transferring into the knowledge society.

- Provides Saudi Arabia and GCC government data needs for development (water, desert Environment, infrastructure..ext.)

- Motivate more students and decision maker to Space Project Program.