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BIOGRAPHY

- Since Aug. 2012 and on, Dr. Elhag is practicing his field of expertise as assistant professor in King Abdulaziz University, Department of Hydrology and Water Resources Management on both of academic and research levels.
- Dr. Mohamed Elhag had obtained his PhD degree from the School of Agricultural Sciences, University of Thessaly, Greece in Water Resources Management. He is the author of several articles published in reputed journals and is a member of different international working groups related to his background.
- A substantial portion of his work at the graduate level has involved groundwork and teaching the applications of Remote Sensing in Natural Resources Management as a part of multi prospective of Earth Science.
- Earlier, his PhD thesis in which he conducted a full literature search, investigate and analyse original documents, synthesized hisresearch, and wrote on water resources management using integrated Remote Sensing applications and Geographical Information System techniques.

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Remote Sensing and GIS in Water Management

What is GIS ?

An Information System that is used to input, store , retrieve, manipulate, analyze and output geographically referenced data or geospatial data, in order to support decision making for planning and management of land use, natural resources, environment, transportation, urban facilities, and other administrative records

Components of GIS

- Key components of GIS are:
  - Computer system, geospatial data, and users
- Sources of geospatial data are:
  - Digitized maps, aerial photographs, satellite images, statistical tables, and other related documents

Classification of Geospatial Data

- Graphical data (called geometric data)
- Attributes (called thematic data)

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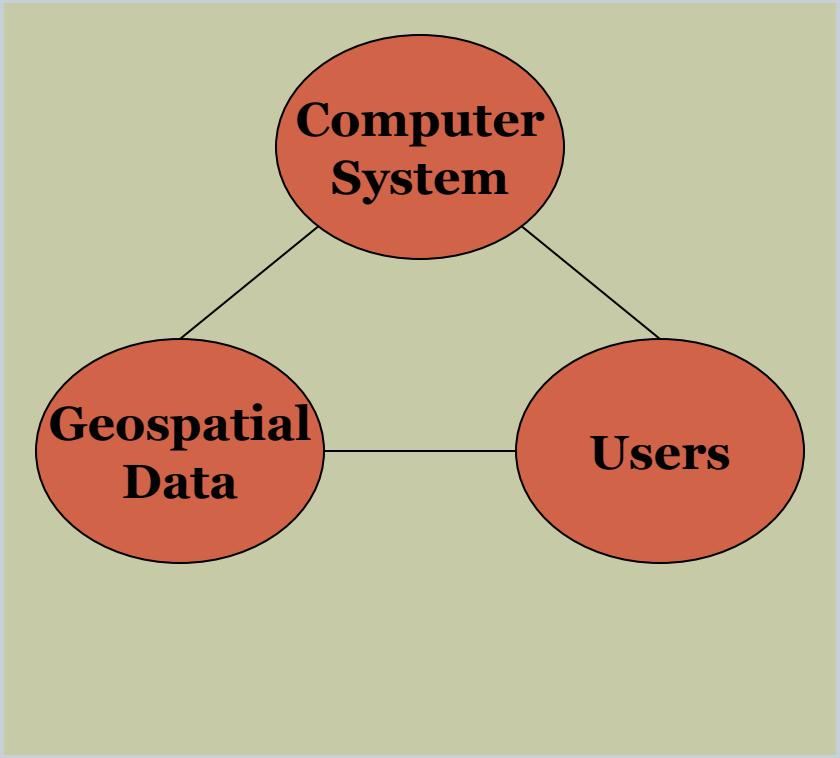

Figure: Key components of GIS

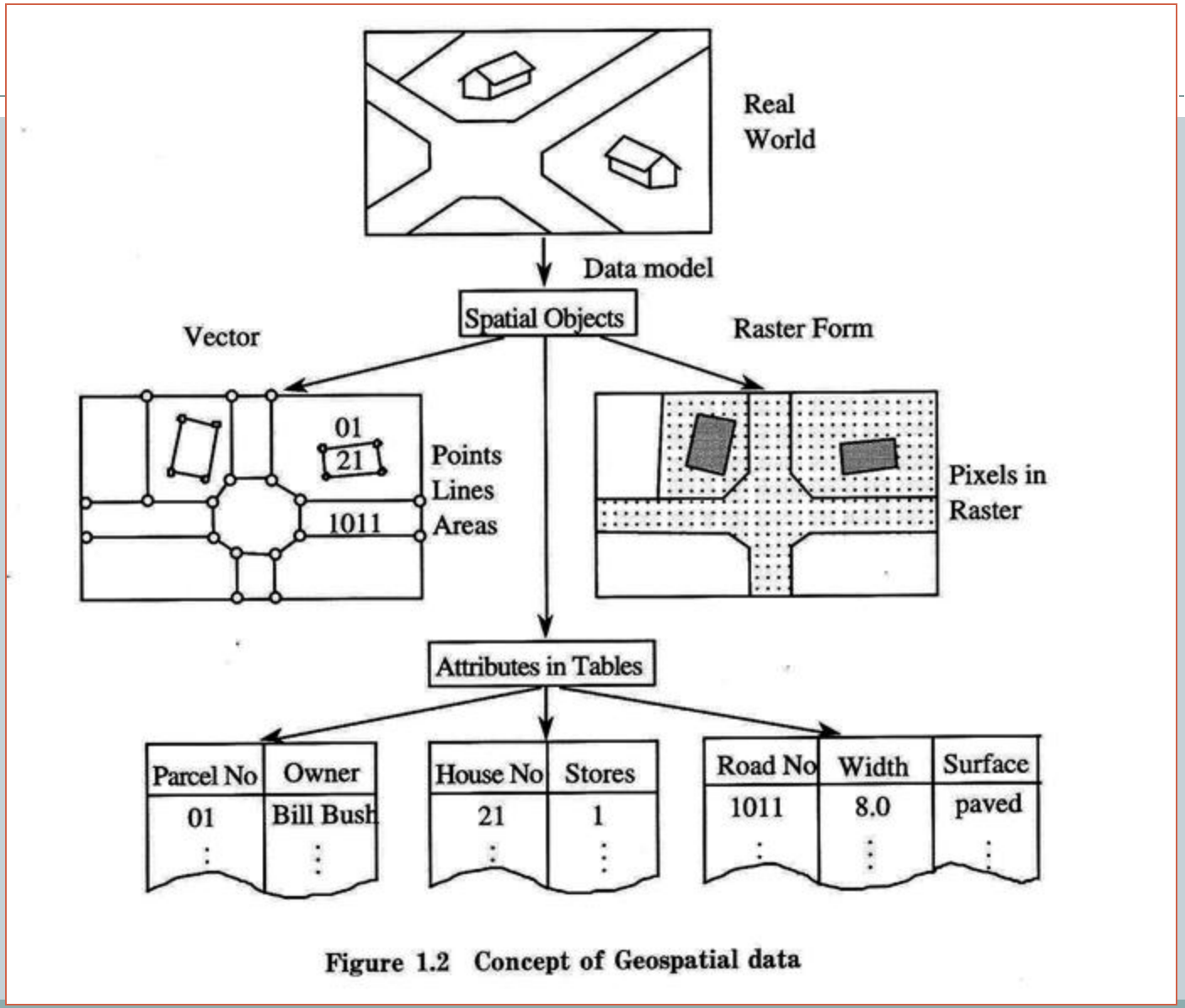

Figure 1.2 Concept of Geospatial data

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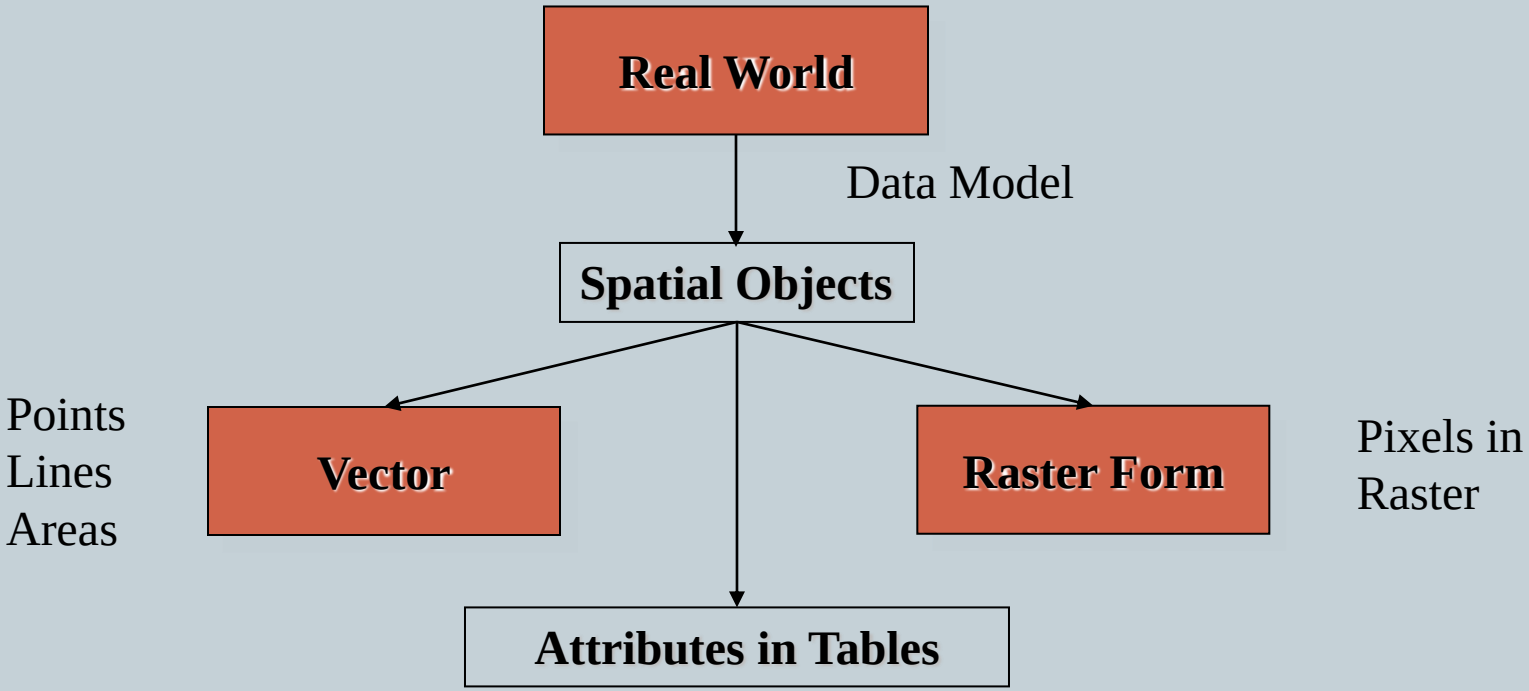


Figure: Concept of Geospatial Data

Why GIS is needed ?

Common problems of handing geospatial information:

- Geospatial data are poorly maintained.
- Maps and statistics are out of date.
- Data and information are inaccurate.
- There is no data retrieval service.
- There is no data sharing.

Benefits once GIS is implemented

- Geospatial data are better maintained in a standard format.
- Revision and updating are easier.
- Geospatial data and information are easier to search, analysis and represent.
- More value added product.
- Geospatial data can be shared and exchanged freely.
- Productivity of the staff improved and more efficient.
- Time and money are saved.
- Better decision can be made.

Computer System for GIS

- Hardware System
  - Central Processing Unit (CPU)
  - Memory (RAM) > 64 MB
  - I/O Device
    - Plotters, printers, mouse, digitizers, scanners, digital camera
- Software System
  - Operating System
    - DOS, Windows
  - Compiler
    - C++, Pascal, Fortran, BASIC
  - Application Programs
    - ArcGIS, MGE, Geo/SQL, GFIS, IDRISI*, GRASS*
      - * public domain software

Area of GIS Applications

Area	GIS Applications
Facilities Management	Locating underground pipes & cables, planning facility maintenance, telecommunication network services
Environmental and Natural Resources Management	Environmental impact analysis, disaster management and mitigation
Street Network	Locating houses and streets, car navigation, transportation planning
Planning and Engineering	Urban planning, regional planning, development of public facilities
Land Information	Taxation, zoning of land use, land acquisition

What is remote sensing

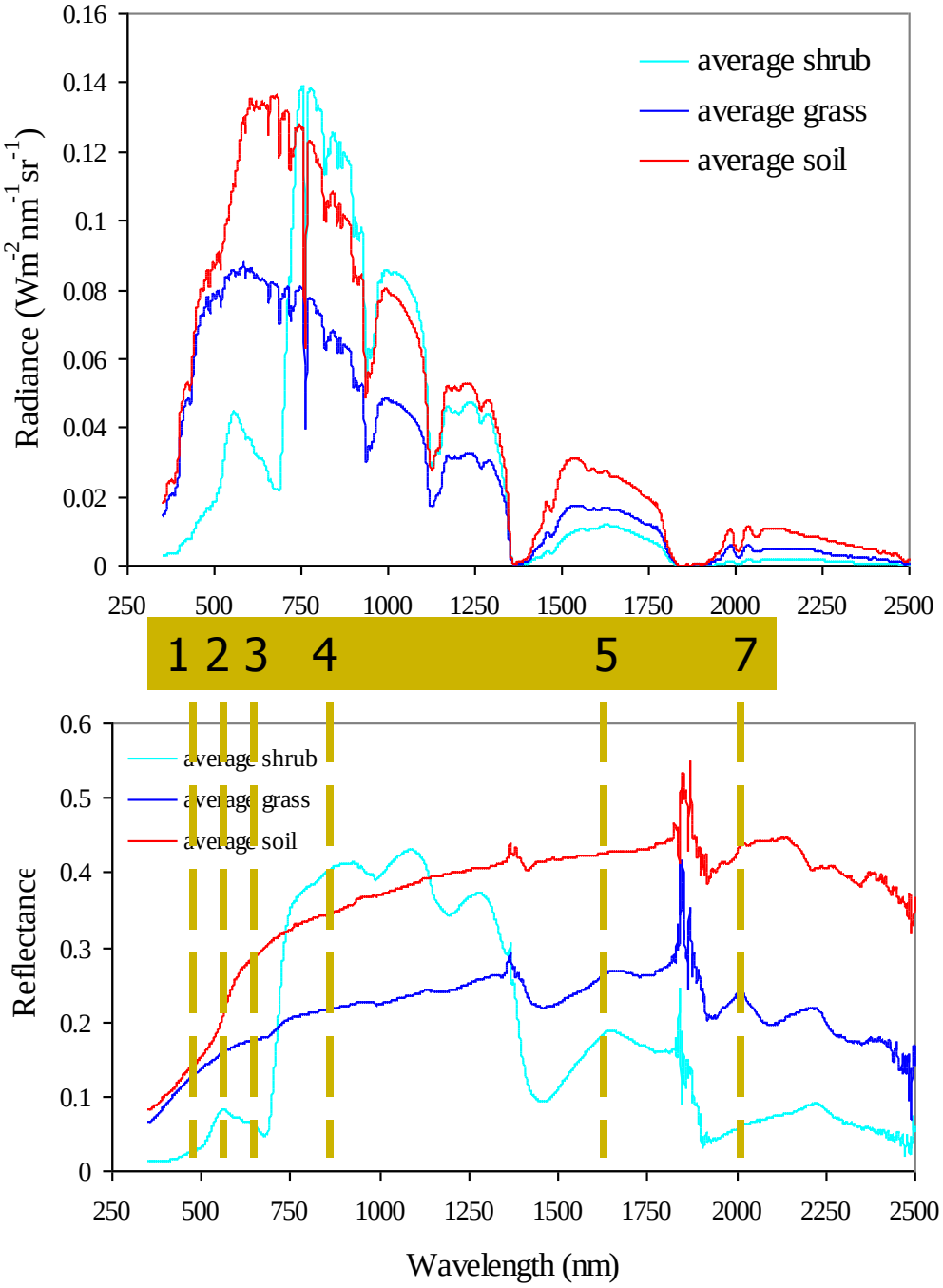
- **Remote Sensing:** remote sensing is science of
  - acquiring,
  - processing, and
  - interpreting

  images and related data that are obtained from ground-based, air-or space-borne instruments that record the interaction between matter (target) and electromagnetic radiation.

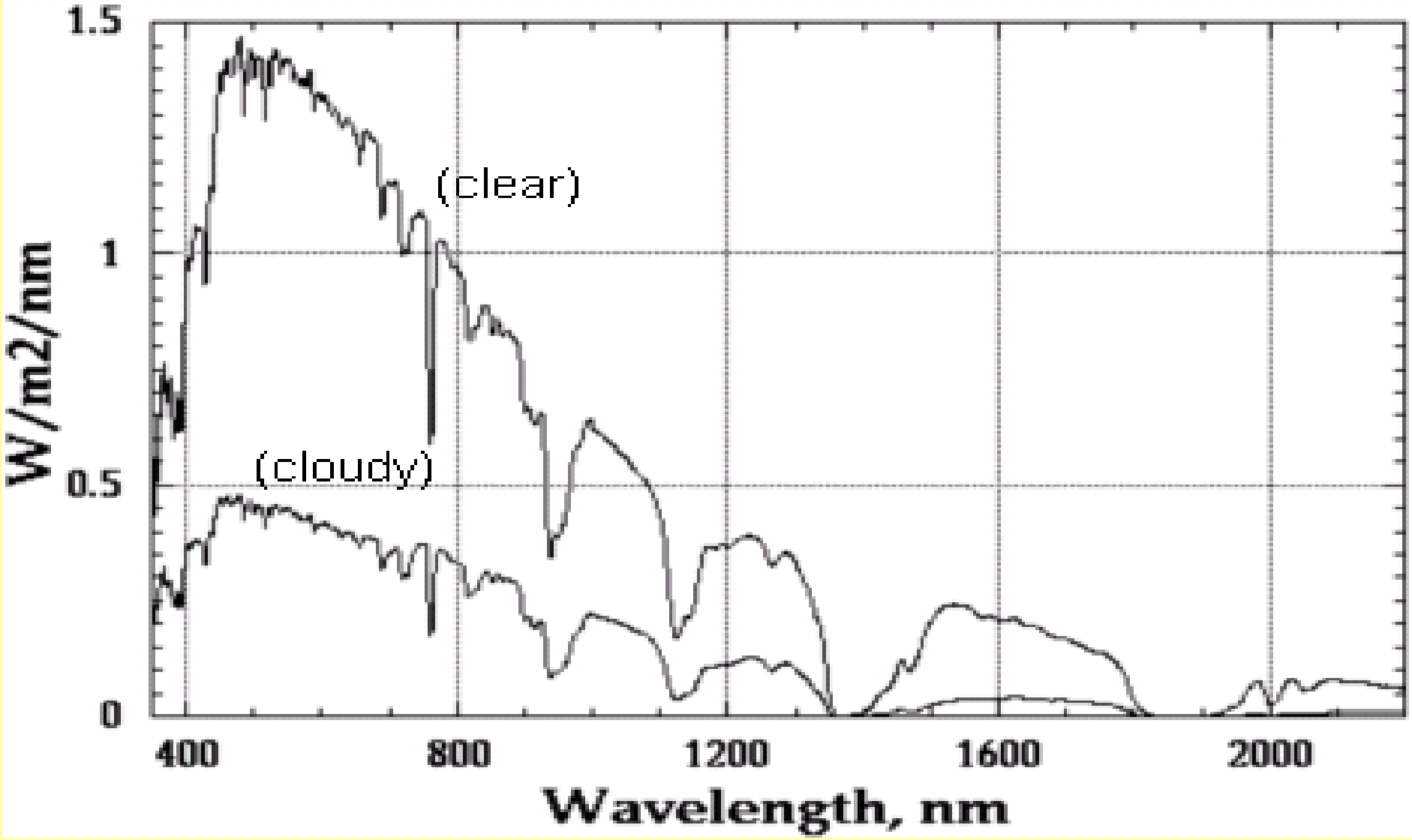
- **Remote Sensing:** using electromagnetic spectrum to image the land, ocean, and atmosphere.

- **In this class,** we will mostly focus on the
  - principles and techniques for data collection and the interaction of electromagnetic energy with the Earth's surface
  - some application examples
  - also you will get familiar with ENVI, an image processing software.

What we measure in remote sensing?



Solar radiation



Applications of National Priority

Carbon Management

Public Health

Energy Management

Aviation

Water Management

Homeland Security

Coastal Management

Disaster Management

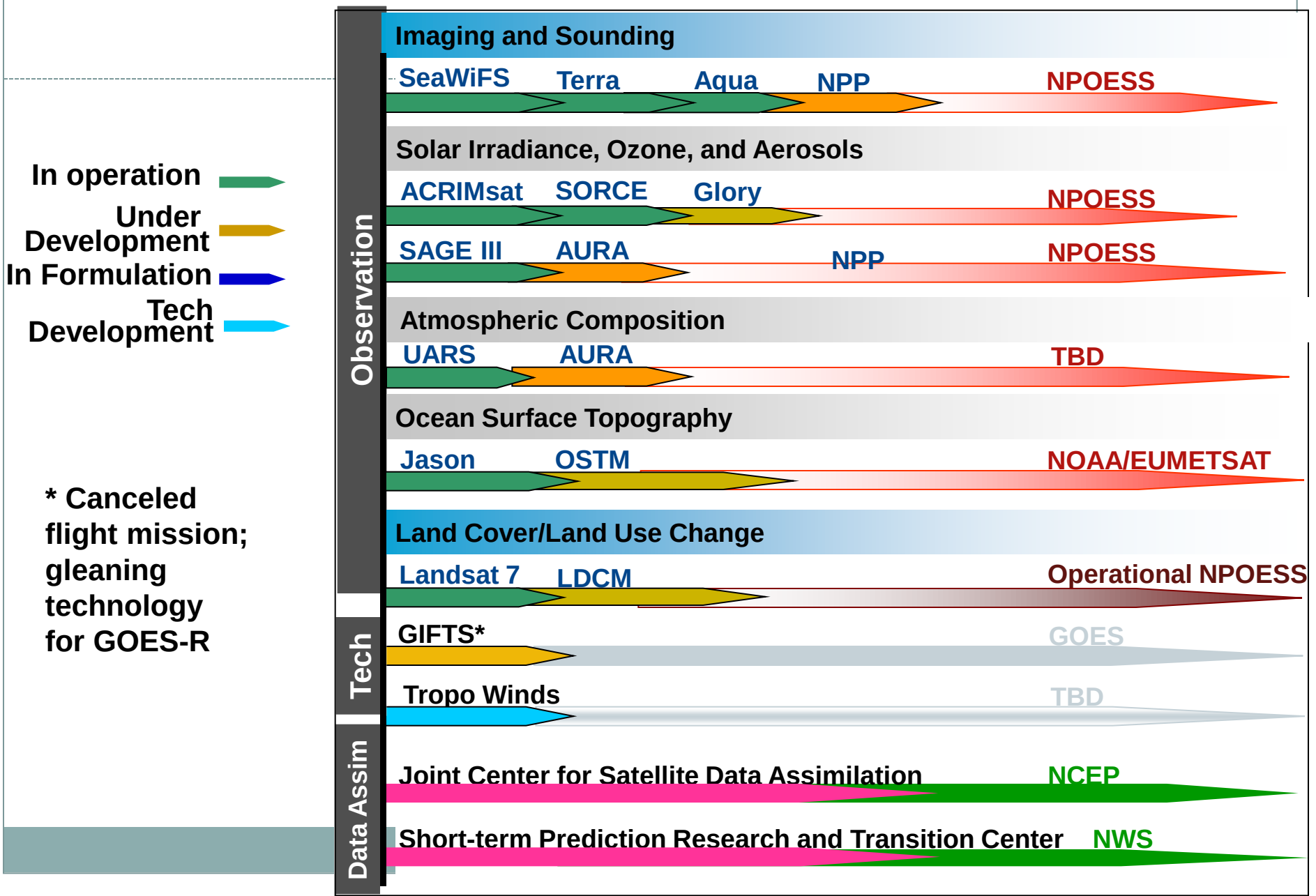
Agricultural Efficiency

Invasive Species

Ecological Forecasting

Air Quality

Research Systems to Operational Systems



Trend and Future of Remote Sensing

- Globe coverage, high repeatability (or improved temporal resolution)
  - AVHRR, 1100m, morning or afternoon
  - MODIS, 250-1000m, morning or afternoon
  - NPOESS (will be launched in 2013), 370-740m, 4 hours
- Real-time or near real-time availability
  - MODIS available online in the second day ?
  - NEXRAD available online in 6 minutes
  - NPOESS available online in 15 minutes
- Cost free or affordable
  - Most of the federal collected images are free available or lower cost, while commercial high resolution images are affordable.
- Integrated remote sensing and GIS
  - Remote sensing applications with the support of GIS
  - Remote sensing data as a major GIS data source

Hydrology: Current Research
Related Conferences

4th International Conference on
Hydrology & Meteorology-USA

Hydrology: Current Research Related Journals

- **Journal of Geology & Geosciences**
- **Journal of Geophysics & remote Sensing**

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