



SC

GEOG2100 Télédéttection de l'environnement

[30h+30h exercises] 5 credits

Teacher(s): Eric Lambin
Language: french
Level: 2nd cycle course

Aims

Knowledge : The students will acquire a good knowledge of the different applications of remote sensing, and a capacity to decide which sensors and which image processing and interpretation methods are most appropriate for a given application.

Skills : The students will gain understanding of the bases of remote sensing and will be able to process and interpret satellite data on a given region, using a image processing software on PC. Emphasis is put on optical remote sensing for terrestrial ecosystem applications.

Main themes

Prerequisites : Notions of statistics, general physics course.

The course has three components:

- 1: The presentation during lectures of the theoretical and methodological bases of remote sensing;
- 2: The application of image processing and interpretation methods to Landsat data on a region of Belgium, using image processing software on PC;
- 3: The exploration of a large range of remote sensing applications and of the methods used in each application, on the basis of CD-ROMs demonstrating case studies.

Physical bases of remote sensing:

- Definitions: radiant energy, radiant flux, radiant flux density, radiance;
- Interactions between energy and the surface of the earth: laws of Stefan-Boltzmann and Wien.
- Spectral reflectance curves ;
- Atmospheric effects;
- Physical interactions with thermal infra-red energy.

The sensors used in remote sensing:

- Landsat MSS and TM, SPOT;
- AVHRR, Vegetation, MODIS;
- the new high spatial resolution sensors.

Image processing:

- Corrections for non-systematic and systematic geometric distortions
- Radiometric corrections
- Extraction of statistics from images
- Contrast enhancement
- Spatial filtering
- Supervised classification
- Unsupervised classification
- Classification errors estimation
- Change detection methods
- Multispectral transformations: Tasseled cap transformation; principal components analysis;
- Notions of microwave remote sensing.

Practical work:

Processing of a Landsat TM image of Belgium:

- 1st session Introduction to image processing software
- 2nd session Color composites and contrast enhancement
- 3rd session Design of a scientific project
- 4th and 5th sessions Geometric correction
- 6th session Unsupervised classification
- 7th session Supervised classification
- 8th session Accuracy assessment of classification

Other credits in programs

CART3DS	Diplôme d'études spécialisées en cartographie et télédétection		Mandatory
GEOG21	Première licence en sciences géographiques	(5 credits)	Mandatory