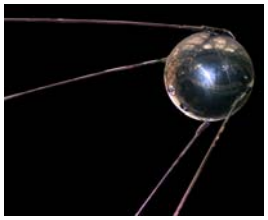
~ Satellite Data ~

What is a satellite ?

Sputnik 1954

We've come a long way in the last 50 years !!



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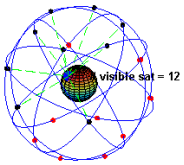
Modern satellites

More than 500 currently in orbit !!

- Astronomy
- Navigation
- Military
- Communications
- Broadcast (TV)
- Meteorology
- Earth observation



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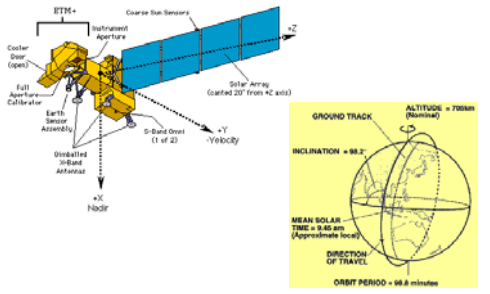
Example: Landsat



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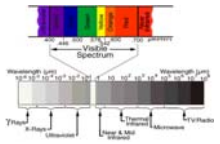
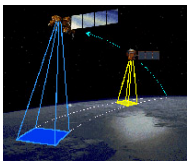
The data: what do satellites record ?

Electromagnetic Spectrum





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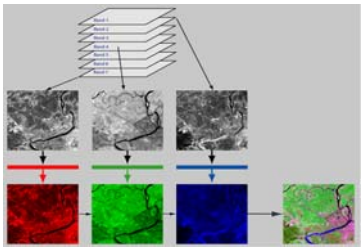
Spectral bands

Different bands used individually or in combination to 'see' different things



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Mixing bands

Landsat ETM bands 4+5+3
Land-water boundary, vegetation type and condition, soil moisture

Landsat ETM bands 7+4+2
Moisture in vegetation and soils, vegetation mapping

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Processing at source

Raw data are evaluated and 'corrected' prior to distribution

- Angle
- Illumination
- Water vapour
- Projection

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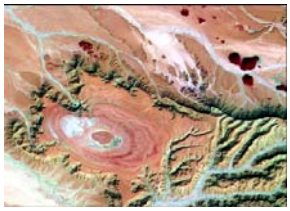
Data considerations: which satellite/sensor ?

- Temporal resolution: years & within years
- Radiometric resolution
- Geographic range & resolution
- Seasonality
- Sensor characteristics
- Processing



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What's available ?

Earth observation satellites and sensors

http://www.satimagingcorp.com/satellite-sensors/aster.html

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Satellite data and GIS

All usual GIS functions

- Map
- Measure
- Quantify change
- Derive new variables

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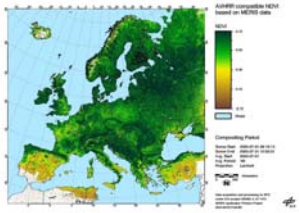
Example : Landcover

Frequently used satellite & GIS data for conservation

Type 1: classification of land cover or use

Type 2: index of a 'quality' e.g. NDVI, leaf area index, water stress



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Land cover: why use satellite data ?

Assessing land cover

- Map habitats & land type/use
- Quantify change
- Determine phenology
- Others…..

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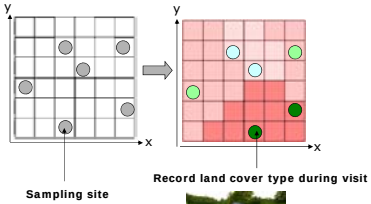
Land cover: process of satellite image classification

1. Design stratified field sampling
2. Collect data from sampling sites (ground-truthing)



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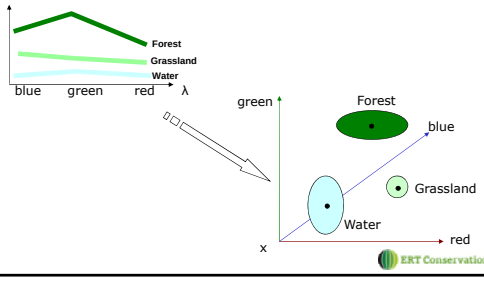
Land cover: process of satellite image classification

3. Use ground-truthed data to make spectral signatures for cover classes in 'band hyperspace'



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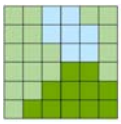
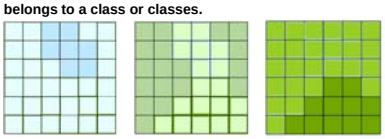
Land cover: process of satellite image classification

4. Classify the image

Hard classification
Pixels are allocated unambiguously to a single class



Soft classification
Express the probability that a pixels belongs to a class or classes.



75% **85%** **95%**

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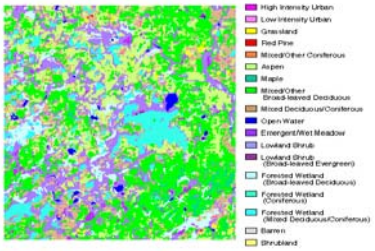
Land cover: process of satellite image classification

5. Perform accuracy test (cells correctly allocated e.g. Kappa statistic)

6. Create final habitat map:



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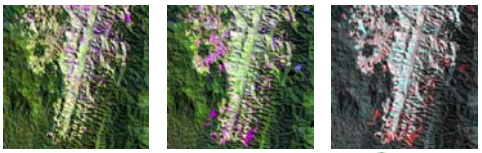
Change over time

Rapid and easy method for illustrating change:

- **Red = Band 5 most recent image**
- **Green = Band 5 older image**
- **Blue = Band 5 older image**

***BUT*... interpretation requires familiarity of the landscape and no quantitative/classified product is produced**



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Not just QGIS: other GIS software for satellite data

IDRISI http://www.clarklabs.org/

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Pricing

How long is a piece of string ?

A *lot* of this is now free…. YOU WILL SOON BE USING SOME !!!

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