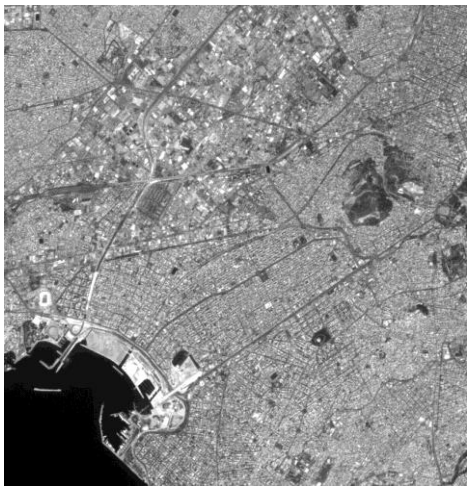
Lab Session: Friday 8am Name: Aaron Marks

GEOG 362: Introduction to Remote Sensing
Problem Set 4, Fall 2011

1. Look at the detail apparent in each of these two images of Athens, Greece. Which of the two images is of a smaller scale? What clues did you use to determine this? Which sensor has higher spatial resolution?

SPOT KOMPSAT



A B

Image A is a smaller scale image when compared to image B which appears to cover a smaller surface area in its extent. The major clue to determining the scale difference is being able to distinguish small details such as a roads and some building outlines in image B. Image A includes some mountainous areas which also gives a perspective on the scale of the image. A higher spatial resolution means each pixel represents a smaller area of the ground than a lower resolution. Image B would therefore have a higher spatial resolution with each pixel representing a smaller block of land than those found in image A.

2. The radiometric resolution of an imaging system describes its ability to discriminate very slight differences in energy. Please compare the following two remotely sensed images and describe which one has higher radiometric resolution.


(CCRS/CCT)

A B

Image B has a higher radiometric resolution, or a higher bit rate than image A. This is apparent by the increased number of shades of grey reducing the 'blocky-ness' found in image A with its inability to distinguish different intensities as well as the higher resolution system that produced image B.

3. Suppose you have a digital image which has a radiometric resolution of 6 bits. What is the maximum value of the digital number (DN) which could be represented in that image?

The maximum value of the DN that can be represented is based on the number of bits of a system. The equation is DN = 2^(bits) , therefore a 6 bit system would have a DN of 2^6 = 64.

4. Answer the following:

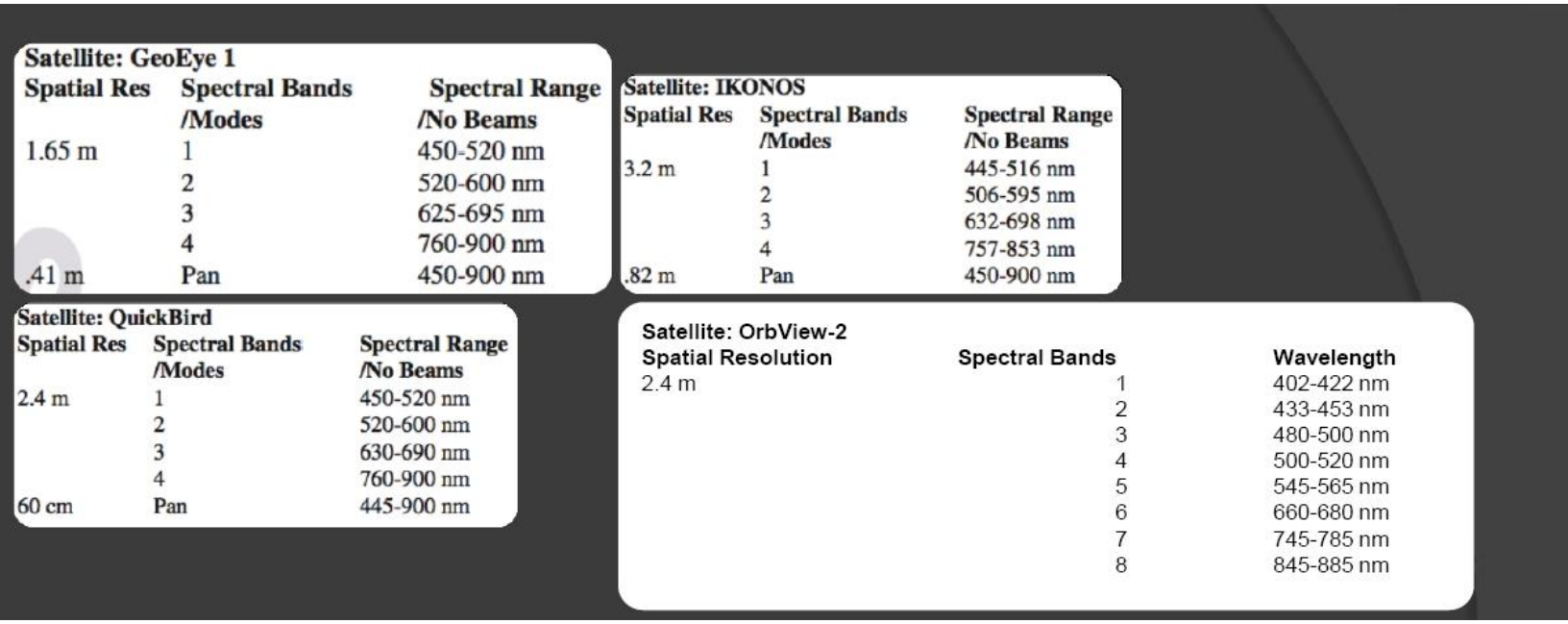
A- Select the sensor and bands that has the BEST SPECTRAL resolution to in the visible part of the EM spectrum.

OrbView-2 has the best spectral resolution in the visible spectrum based on having the greatest number of bands within the spectrum, which is ~400-700nm, which would include **bands 1-6**. The other sensors only have up to 4, with only 3 falling the visibile spectrum range.

B- Which instrument and band has the highest spatial resolution?

QuickBird has the highest spatial resolution in Pan mode at 60cm, and GeoEye 1 has the highest spatial resolution per single band at 1.65m.

Lab Session: Friday 8am Name: Aaron Marks



Satellite: GeoEye 1

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams
1.65 m	1	450-520 nm
	2	520-600 nm
	3	625-695 nm
	4	760-900 nm
.41 m	Pan	450-900 nm

Satellite: IKONOS

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams
3.2 m	1	445-516 nm
	2	506-595 nm
	3	632-698 nm
	4	757-853 nm
.82 m	Pan	450-900 nm

Satellite: QuickBird

Spatial Res	Spectral Bands /Modes	Spectral Range /No Beams
2.4 m	1	450-520 nm
	2	520-600 nm
	3	630-690 nm
	4	760-900 nm
60 cm	Pan	445-900 nm

Satellite: OrbView-2

Spatial Resolution	Spectral Bands	Wavelength
2.4 m	1	402-422 nm
	2	433-453 nm
	3	480-500 nm
	4	500-520 nm
	5	545-565 nm
	6	660-680 nm
	7	745-785 nm
	8	845-885 nm

5. Use this link to answer the following questions:
(http://landsat.gsfc.nasa.gov/about/L7_td.html)
Would Landsat-7 be a good sensor to monitor an intermittent stream known to fill up and dry out every 7-days? Why or why not?
No, the temporal resolution associated with this satellite is 16 days meaning it wouldn't be able to monitor the changes that occur between days 1 and 16, where a cycle is taking place on a 7 day scale.

6a.Which satellite system will have greater scene contrast an 8-bit system or 10-bit system?
A 10 bit system will have a greater contrast with its greater spatial detail

6b.What would be the Range of DN values for these two systems?
An 8 bit system would have a DN of 2^8 = 256 . Range would be 0-255
The 10 bit system would have a DN of 2^10 = 1024. Range would be 0-1023