

University of Anbar

College of Science – Applied Geology Department

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Assis. Professor

2nd Stage

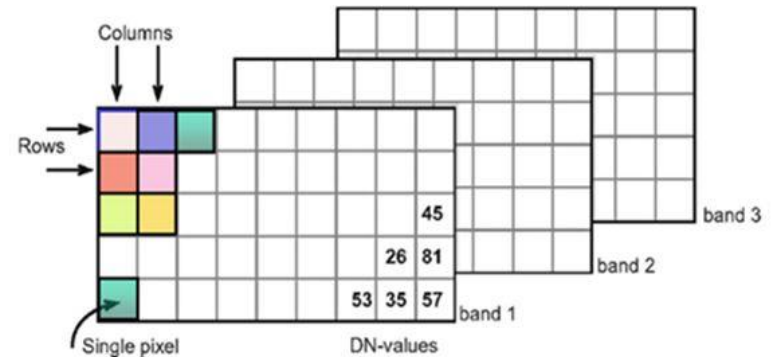
Remote Sensing

Lecture 7 : Digital Images

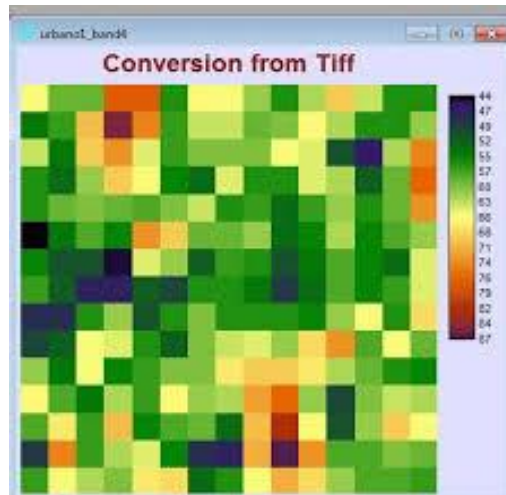


Digital Images

The last step in satellite digital recording is the saving the reflectance as digital range between 0 – 255 level of intensity, these digital numbers save in image as a matrix (net cells of rows and column), each cell represent area on ground with special resolutions have a value of its reflectance amount .

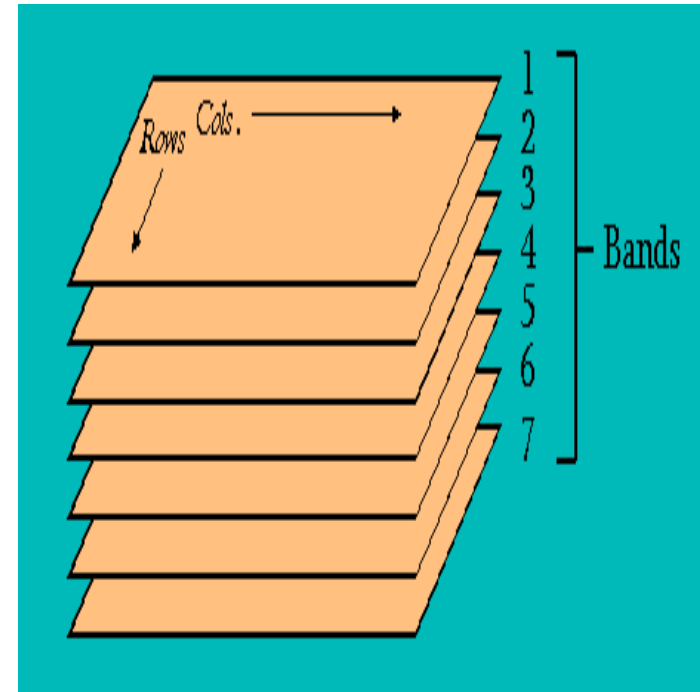
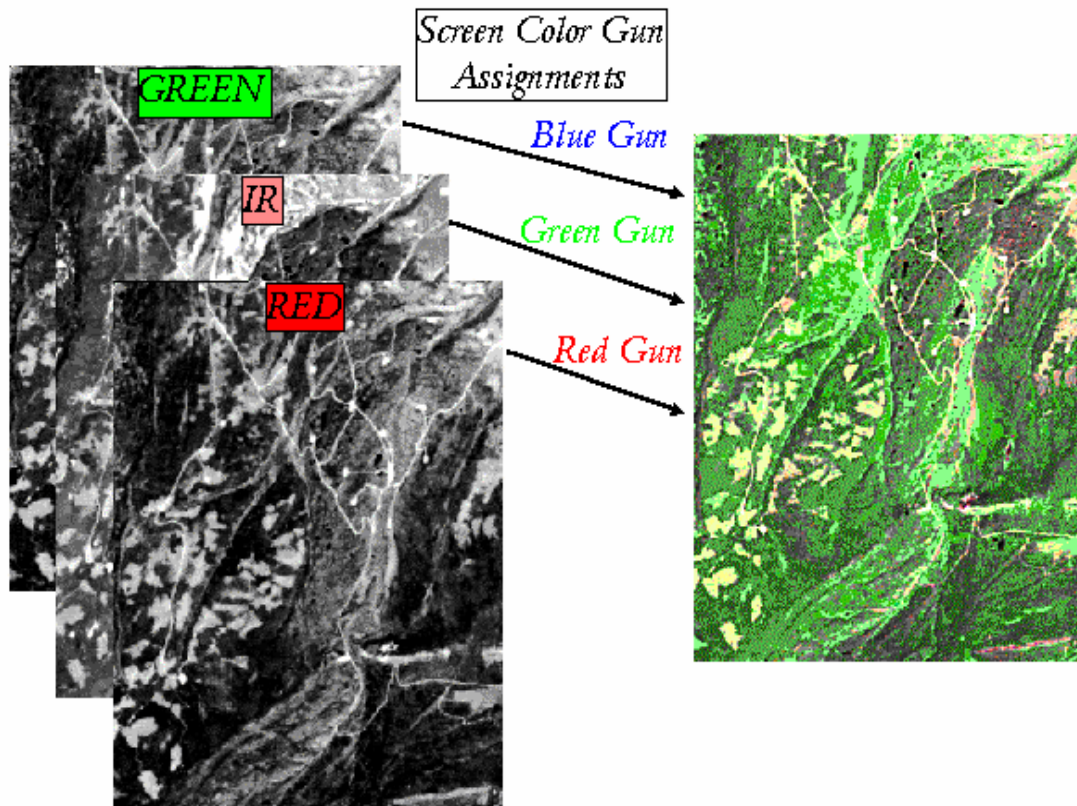
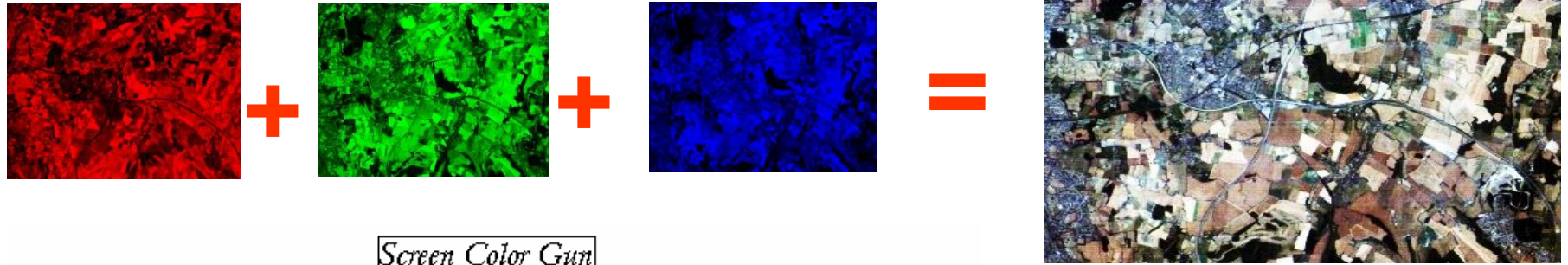


Each band have a single net of numbers and the next band with another net so on , the Landsat satellite have now 8 layers of digital nets as a 8 bands .



Color Composites spectral images

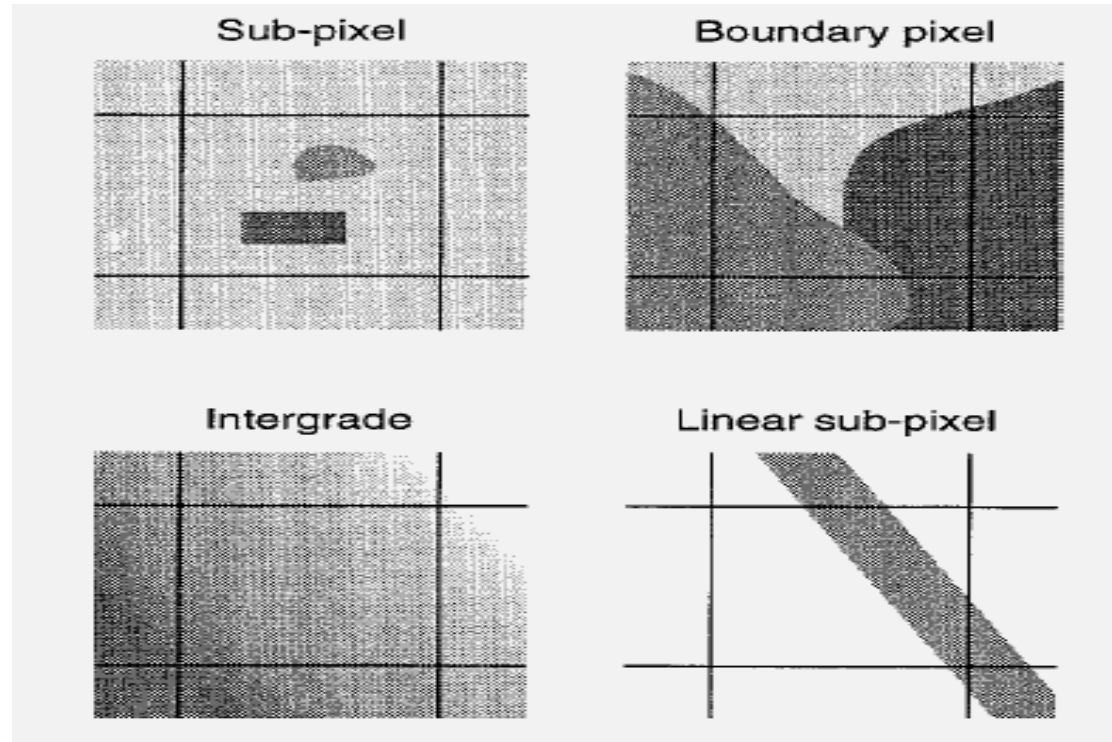
Any color image formed from 3 bands merged together to produce color images



Resolution

Ability to separate closely spaced objects on an image or photograph. Resolution is commonly expressed as the most closely spaced line-pairs per unit distance that can be distinguished. Also called spatial resolution.

	Columns →			
Rows ↓	10	15	17	20
	15	16	18	21
	17	18	20	22
	18	20	22	24





0.5 x 0.5 m



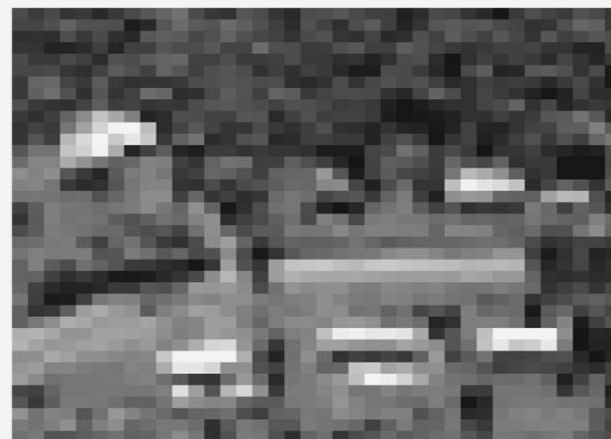
1 x 1 m



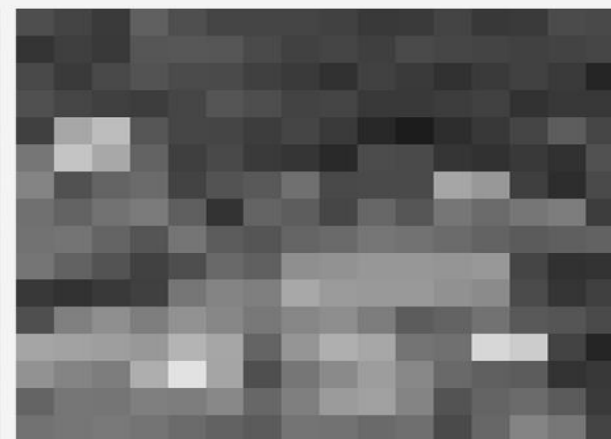
2 x 2 m



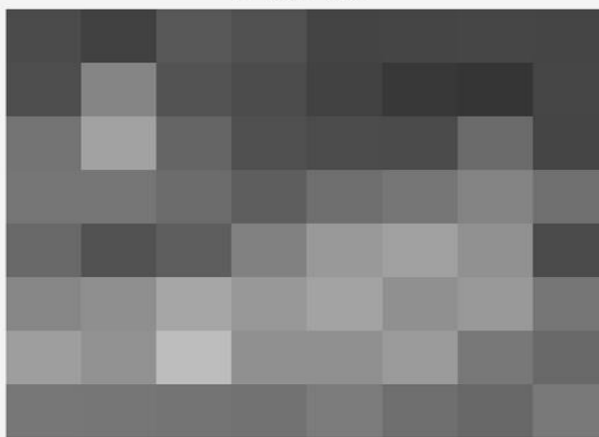
5 x 5 m



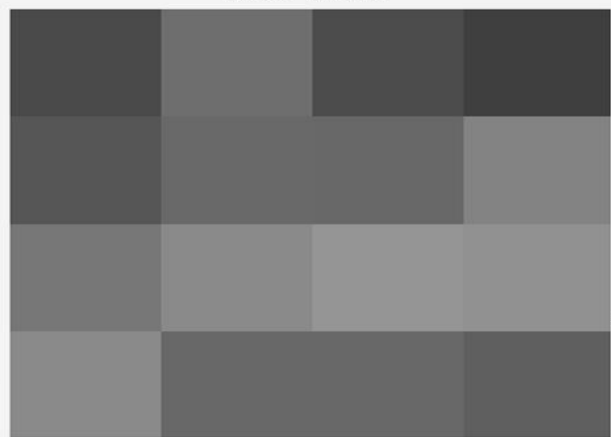
10 x 10 m



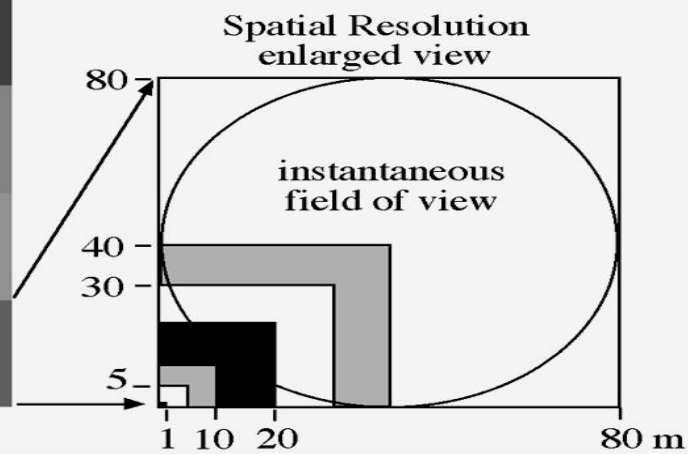
20 x 20 m



40 x 40 m



80 x 80 m



Errors of digital satellite images

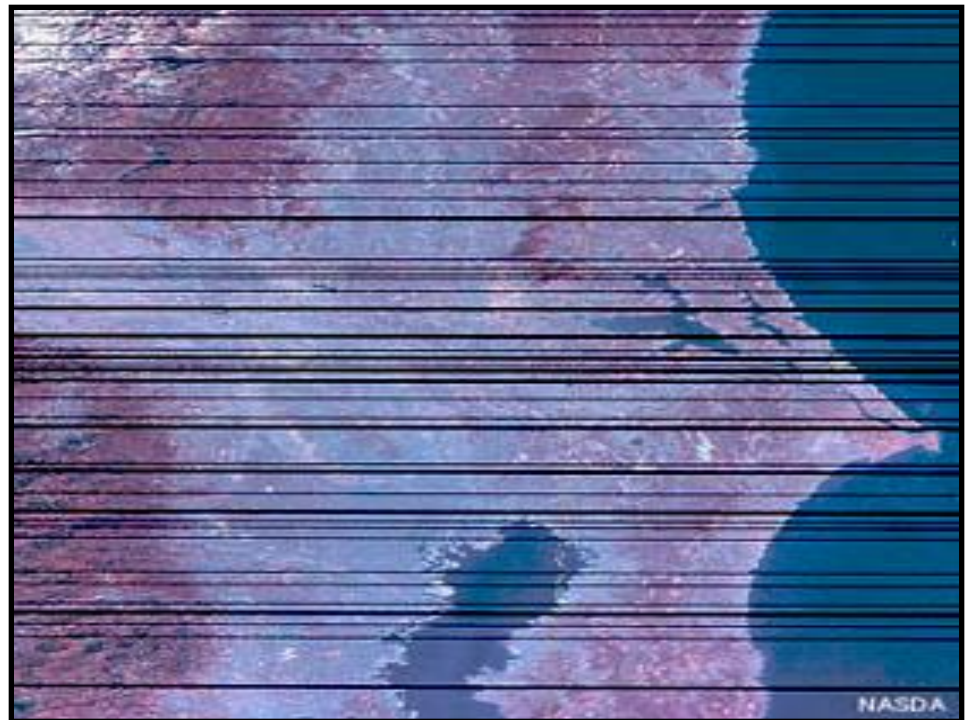
Because of high level of technology and many recording complexes some of errors may happened according that operation . And must correct them to get best results :

1. The zero values of one detectors : some times one of detectors stopped suddenly that produce black lines appear on image and effect badly on image .

12 45 17 22

0 0 0 0

18 31 49 70



To solve this problem we can either omit the bad zero line or calculate the average between the above and below lines to create new values

2 . The double value of detector

Some times one of detectors give wrong values 2 to 3 times larger that the real values . That produce light lines .

18 20 18

36 36 44

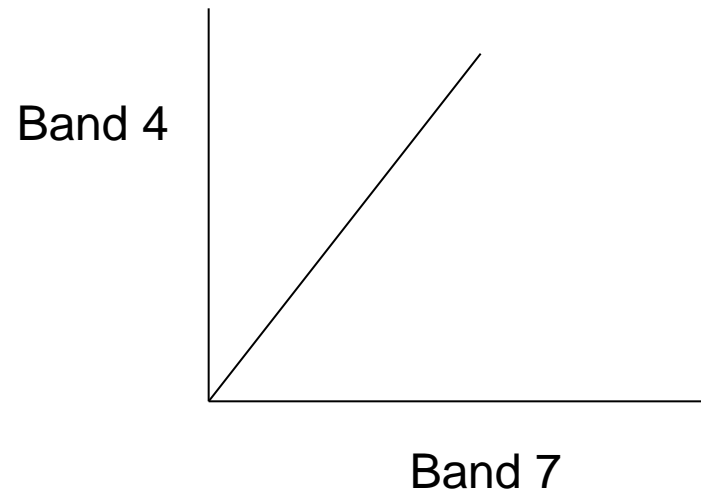
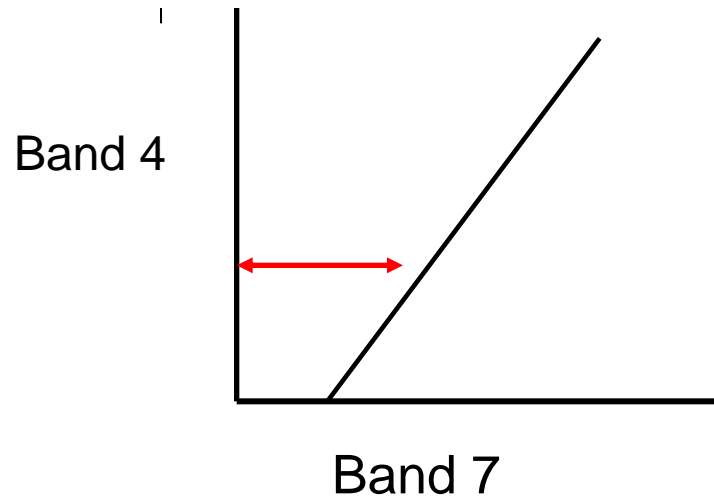
18 18 20

To solve this problem We divide the Values by 2 or 3 as it record



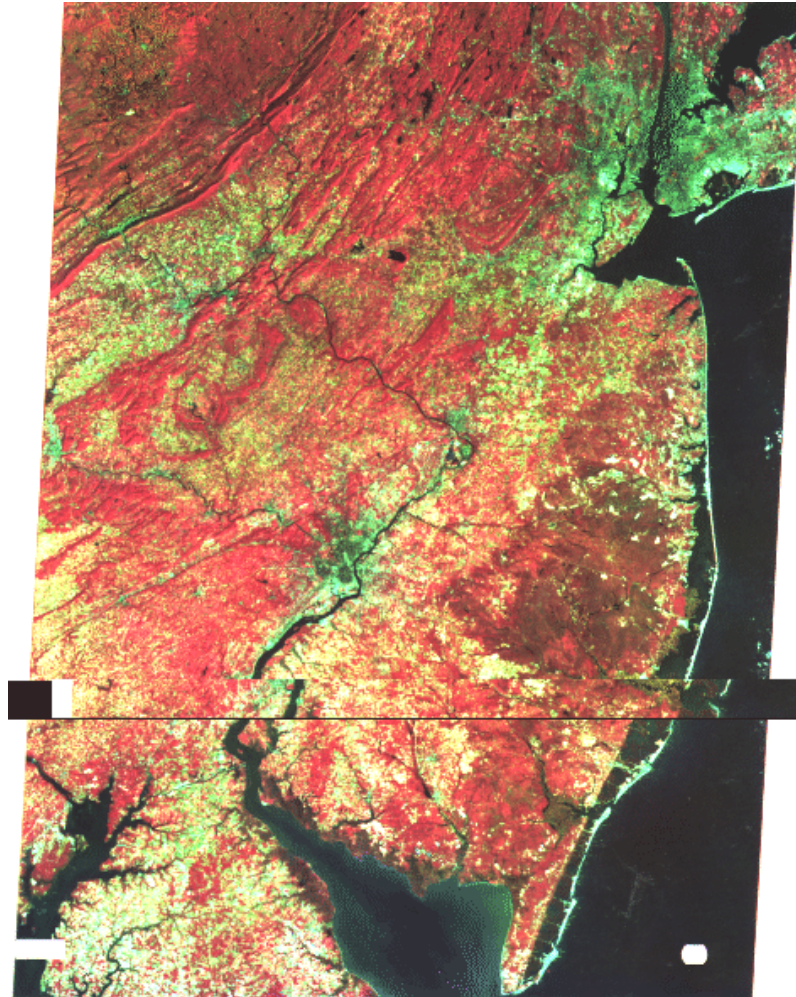
3 – The effect of atmosphere

The atmosphere effect strongly on the values record at satellite because of the long path to the ray from sun to earth and reflect again the satellite , that produce a shift on data . To solve this we must subtracts the addition values from real one .



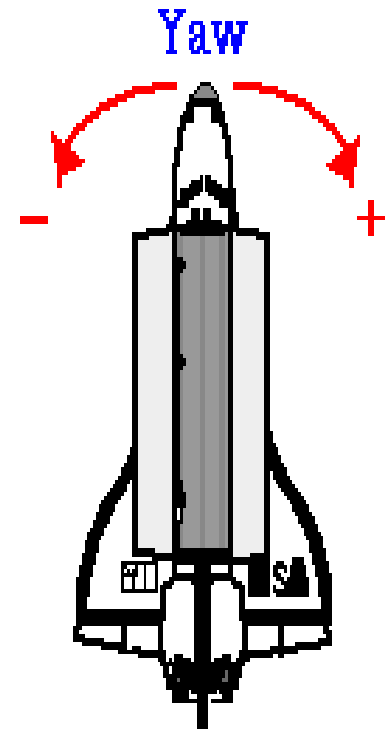
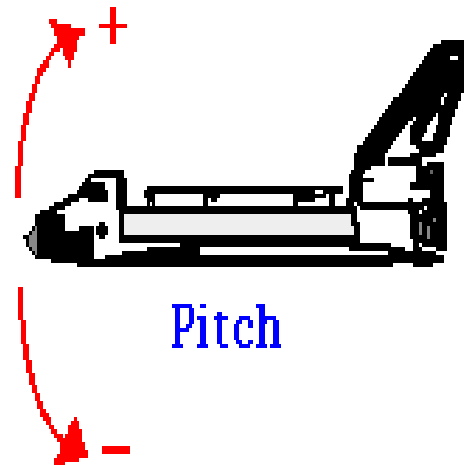
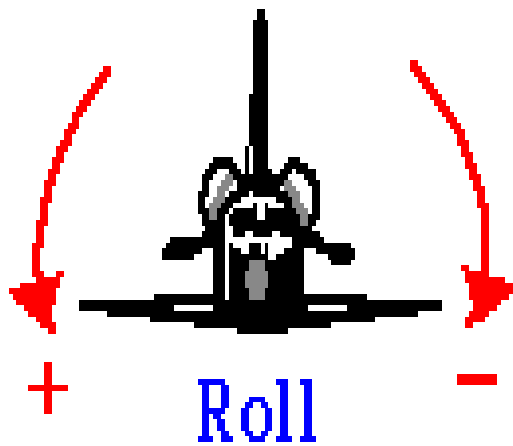
4 – shift of lines

That happened when some lines shift of its origin direction and new unusual forms show , to correct that we must subtract the distance of shifting from the lines



5 – error in navigation

Some times difficulties and errors happened when the satellite or airplane shift or tilt of the original direction that caused unusual images , some soft wear can correct that .



References

IMAGE INTERPRETATION IMAGE INTERPRETATION , Seventh Edition, Lillesand T. M., Kiefer R. W., Chipman J. W., WILEY press , USA , 2015

Earth Science Satellite Remote Sensing Vol. 1: Science and Instruments , Qu J. J., Gao W. , Kafatos M. , Murphy R. E, Salomonson V. V., Tsinghua University Press, Beijing and Springer-Verlag GmbH Berlin Heidelberg . 2006

Internet Remote Sensing Lectures sites