

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

DEPARTMENT OF GEOGRAPHY

SCHOOL OF PHYSICAL SCIENCES

REM315P: Digital Image Processing First Semester 2015/2016

INSTRUCTIONS: Answer questions One (1) and any other three(3) questions. Credit will be given for the use of specific examples and illustrations with relevant diagram.

- 1a. Explain Radiometric Normalization and its usefulness
- b. Define the mathematical model for achieving simple Radiometric Normalization
- c. Using the attached Image support data, calculate the at sensor radiance for Images. Seirra 1, Seirra2, Seirra 7 and pass your comment on the outputs .Note that the three (3) digital images are 8 bits sensor image

80	77	77	81
82	81	82	86
84	87	90	87
77	81	78	79
79	78	80	80

Seirra1

37	36	36	37
39	38	39	42
40	43	43	39
36	36	37	37
34	36	44	45

Seirra2

53	58	61	61
58	64	65	64
63	62	64	64
63	59	70	66
59	62	72	70

Seirra 7

2. Discuss the link between the science of digital image processing (DIP) and the study of Geography.
3. Explain in detail the function (s) and the information carried by the following in Idrisielva.
 - a) The project plane
 - b) Idrisi explorer
 - c) Idrisi auto scaling
 - d) Project folder
 - e) Idrisi status bar
4. Differentiatebetween the following digital image processing operations.
 - a) Radiometric correction and radiometric enhancement
 - b) A kernel and a kernel default
 - c) Smoothing filters and sharp filters
 - d) A true colour composite and false colour composite
 - e) Physically-baseddark object subtraction(DOS) and Image based dark object subtraction (DOS)
5. Describe the sources of errors in remote sensing image
6. Discuss the importance isof the color spaceproperty in spectra enhancement and transformation.

GROUP = L1_METADATA_FILE
GROUP = METADATA_FILE_INFO
ORIGIN = "Image courtesy of the U.S. Geological Survey"
REQUEST_ID = "9991201310001_00421"
PRODUCT_CREATION_TIME = 2012-02-01T01:20:54Z
STATION_ID = "EDC"
LANDSAT7_XBAND = "1"
GROUND_STATION = "ASN"
LPS_PROCESSOR_NUMBER = 1
DATEHOURLY_CONTACT_PERIOD = "0933513"
SUBINTERVAL_NUMBER = "01"
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PRODUCT_TYPE = "L1T"
ELEVATION_SOURCE = "GLS2000"
PROCESSING_SOFTWARE = "LPGS_11.6.0"
EPHEMERIS_TYPE = "DEFINITIVE"
SPACECRAFT_ID = "Landsat7"
SENSOR_ID = "ETM+"
SENSOR_MODE = "BUMPER"
ACQUISITION_DATE = 2009-12-01
SCENE_CENTER_SCAN_TIME = 09:40:34.9147477Z
GAP_FILL_ACQ_DATE = (2010-01-18)
GAP_FILL = 99.1
WRS_PATH = 189
STARTING_ROW = 53
ENDING_ROW = 53
BAND_COMBINATION = "123456678"
PRODUCT_UL_CORNER_LAT = 11.0685888
PRODUCT_UL_CORNER_LON = 6.0109295
PRODUCT_UR_CORNER_LAT = 11.0823632
PRODUCT_UR_CORNER_LON = 8.2125740
PRODUCT_LL_CORNER_LAT = 9.1718283
PRODUCT_LL_CORNER_LON = 6.0284433
PRODUCT_LR_CORNER_LAT = 9.1831989
PRODUCT_LR_CORNER_LON = 8.2171954
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PRODUCT_UL_CORNER_MAPY = 1225200.000
PRODUCT_UR_CORNER_MAPX = 414000.000
PRODUCT_UR_CORNER_MAPY = 1225200.000
PRODUCT_LL_CORNER_MAPX = 173400.000
PRODUCT_LL_CORNER_MAPY = 1015200.000
PRODUCT_LR_CORNER_MAPX = 414000.000
PRODUCT_LR_CORNER_MAPY = 1015200.000
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PRODUCT_LINES_PAN = 14001
PRODUCT_SAMPLES_REF = 8021
PRODUCT_LINES_REF = 7001
PRODUCT_SAMPLES_THM = 4011
PRODUCT_LINES_THM = 3501
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BAND3_FILE_NAME = "L71189053_05320091201_B30.TIF"
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BAND61_FILE_NAME = "L71189053_05320091201_B61.TIF"
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BAND7_FILE_NAME = "L72189053_05320091201_B70.TIF"
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METADATA_L1_FILE_NAME = "L71189053_05320091201_MTL.txt"
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LMIN_BAND1 = -6.200
LMAX_BAND2 = 300.900
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LMAX_BAND3 = 234.400
LMIN_BAND3 = -5.000
LMAX_BAND4 = 241.100
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LMAX_BAND5 = 47.570
LMIN_BAND5 = -1.000
LMAX_BAND61 = 17.040
LMIN_BAND61 = 0.000
LMAX_BAND62 = 12.650
LMIN_BAND62 = 3.200
LMAX_BAND7 = 16.540
LMIN_BAND7 = -0.350
LMAX_BAND8 = 243.100
LMIN_BAND8 = -4.700
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QCALMAX_BAND7 = 255.0
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GROUP = PRODUCT_PARAMETERS

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CORRECTION_METHOD_GAIN_BAND8 = "CPF"
CORRECTION_METHOD_BIAS = "IC"
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BAND5_GAIN = "L"
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BAND7_GAIN = "L"
BAND8_GAIN = "L"
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BAND7_GAIN_CHANGE = "0"
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BAND4_SL_GAIN_CHANGE = 0
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BAND6_SL_GAIN_CHANGE1 = 0
BAND6_SL_GAIN_CHANGE2 = 0
BAND7_SL_GAIN_CHANGE = 0
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SUN_AZIMUTH = 142.6506355
SUN_ELEVATION = 49.7010220
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STRIPING_BAND5 = "NONE"
STRIPING_BAND61 = "NONE"
STRIPING_BAND62 = "NONE"
STRIPING_BAND7 = "NONE"
STRIPING_BAND8 = "NONE"
BANDING = "N"
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COHERENT_NOISE = "Y"  
MEMORY_EFFECT = "N"  
SCAN_CORRELATED_SHIFT = "N"  
INOPERABLE_DETECTORS = "N"  
DROPPED_LINES = "N"  
END_GROUP = CORRECTIONS_APPLIED  
GROUP = PROJECTION_PARAMETERS  
REFERENCE_DATUM = "WGS84"  
REFERENCE_ELLIPSOID = "WGS84"  
GRID_CELL_SIZE_PAN = 15.000  
GRID_CELL_SIZE_THM = 60.000  
GRID_CELL_SIZE_REF = 30.000  
ORIENTATION = "NUP"  
RESAMPLING_OPTION = "CC"  
SCAN_GAP_INTERPOLATION = 2  
MAP_PROJECTION = "UTM"  
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GROUP = UTM_PARAMETERS  
ZONE_NUMBER = 32  
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END_GROUP = L1_METADATA_FILE  
END
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