STATION 1

These two pictures show the same span of coastline but were taken approximately two weeks apart. Both pictures have the same scale.

Question #1: What event affected this coastline between the taking of these two images? Be specific. (2 pts)

Question #2: FROM which direction is the longshore current flowing in the bottom image? (1 pt)

Question #3: Give the best reason for the color of the features at Points A and B. (2 pts)

STATION 2

The southern tip of Greenland and the nearby ocean are the subjects of this image. North is toward the top.

Question #4: The long, linear features at Points A and B are known as _____. (1 pt)

Question #5: The whitish-gray features indicated at Points C and D are _____. (1 pt)

Question #6: Which direction is the ground-level wind blowing FROM in this image? (1 pt)

Question #7: Are the clouds in this image 'high clouds like cirrus, 'middle clouds' like altcumulus, or 'low clouds' like stratus? Explain. (2 pts)

STATION 3

This is a Spaceborne Imaging Radar-C/X Band Synthetic Aperture Radar image of parts of central Pennsylvania. North is toward the upper right.

Question #8: This type of radar uses what part of the electromagnetic spectrum to acquire its imagery? (2 pts)

Question #9: (From your answer in #8)..These wavelengths allow the radar to: (1 pt)

A. distinguish between urban and forested areas.
B. detect variations in topography.
C. Collect data at any time regardless of weather or sunlight conditions.
D. All of these
E. None of these

Question #10: The feature labeled by Point A is known as a(n): _____ (2 pts)

Question #11: Toward which direction is the large river flowing? (1 pt)

STATION 4

Image A was taken in July 1988 and image B was taken in August 1993. Both are of the area near St. Louis, Missouri. North is at the top of the image.

Question #12: Identify one of the major rivers in these images. (1 pt)

Question #13: Toward which direction(s) is water flowing off of the maps? (1 pt)

Question #14: Between points C and D on the 1993 map, the river's width is much smaller than in other areas. Give the reason for this narrow segment of this river and also find the width of the river along this span. (3 pts)

Question #15: Explain the brown features shown at point E on the 1993 map. (2 pts)

STATION 5

This natural color image shows a section of the Mexico coast along the Gulf of California in December 2010. North is at the top of the image.

Question #16: Identify the features labeled at point A. (1 pt)

Question #17: Identify the features labeled at point B. (2 pts)

Question #18: There are no features from question 16 that are very close to those features from question 17. Why would it be quite unlikely to find these two features side by side in this area? (2 pts)

Question #19: Which of the features (at A or B) would be most identifiable with infrared sensors during a typical December night in this part of the world? Briefly explain. (2 pts)

STATION 6

This is an AVHRR Water Surface Temperature image of the Atlantic Ocean near the east coast of the U.S. North is toward the top of the image.

Question #20: This image was taken in which of the following months: (1 pt)

A. February
B. April
C. September
D. November

Question #21: The curved pattern along points A, B, and C is known as a(n): (1 pt)

Question #22: The feature labeled at point D is known as a(n): (2 pts)

Question #23: The abbreviation "AVHRR" is short for: (2 pts)

Question #24: How would one of the features in questions 21 or 22 change if this area was measured several days after this image was taken? Be brief but specific. (2 pts)

STATION 7

This image depicts the global sea surface temperature anomalies as of early January 2012.

Question #25: The data suggest the Pacific Ocean is currently in: (1 pt)

A. a strengthening La Nina
B. a weakening La Nina
C. a strong, stable El Nino
D. neither La Nina nor El Nino

Question #26: How would the present SSTs affect the growth/development of low pressure systems just off the U.S. northeastern coast? Be brief but specific. (2 pts)

Question #27: What is the resolution of this map data? (1 pt)

Question #28: According to this data where would pack ice formation be delayed this winter? (2 pts)

Question #29: Maps like this would be LEAST helpful in determining: (1 pt)

A. locations of abundant plankton.
B. surface wind speeds.
C. areas of increased tropical storm development.
D. None of these could be determined by this map.

STATION 8

This image shows percentages of impervious surfaces in a city.

Question #30: Why are city planners interested in maps like these? (2 pts)

Question #31: How might city planners try to balance out increases in impervious surfaces? (2 pts)

Question #32: To provide the best drainage of the city, which areas should be highest in elevation and which areas should be lowest. Give a brief reason for your answer. (2 pts)

STATION 9

These are images of a coastal Japanese town before and after the March 11, 2011 earthquake and tsunami.

Question #33: After natural disasters there is usually a rush to capture and develop before and after images such as these. While these images can be useful to indicate areas affected by the disaster, list 2 potential problems with these types of images (e.g. how might someone misinterpret information from the before and after images?) (3 pts)

Question #34: Identify the feature at point A on the 'after' image. (2 pts)

Question #35: Would the shape of the coastlines at the city likely reduce or enhance the damage from the tsunami? Briefly explain. (3 pts)

STATION 10

This image shows IR channel 4 from NOAA 18 to measure surface water temperature in the Chesapeake Bay and coastal Atlantic Ocean. North is toward the ip

Question #36: This NOAA satellite is different from the GOES satellites in that this NOAA satellite: (1 pt)

A. orbits the earth at a higher altitude.
B. never 'sees' the Eastern hemisphere of the Earth.
C. remains fixed over the same position of the Earth.
D. travels in a polar orbit.
E. NOAA satellites are different in all of the above ways.

Question #37: Identify the source of the deep red color in the southeastern corner of the image. (2 pts)

Question #38: Why are the coldest waters in the places that are closest to the mainland? (2 pts)

Question #39: At which of the points (A, B, or C) is the water most likely to freeze? Briefly explain. (2 pts)

STATION 11

This image shows a segment of the Tocantins River in central Brazil. North is at the top of the image.

Question #40: Toward what direction is the Tocantins River flowing? (1 pt)

Question #41: What type of drainage pattern exists in this area? (2 pts)

Question #42: What percentage of Brazil's 8.5 million km^2 is shown on this image if the bridge crossing the narrow part of the reservoir at point A is 1 km in length? Show work. (4 pts)

STATION 12

These are 2 Water Vapor images of strong Hurricane Wilma from 2005. North is at the top of each image. The unenhanced image contains grayscale shading while the enhanced image contains color.

Question #43: How is an unenhanced water vapor image different than a routine IR image? (3 pts)

Question #44: If the hurricane is moving steadily northward, what is its likelihood of maintaining its current strength? Briefly explain. (2 pts)

Question #45: Briefly explain the advantage of an enhanced WV image over an unenhanced image. (2 pts)

Question #46: Which direction is this hurricane rotating? (1 pt)

STATION 13

Remote sensing technology is loaded with acronyms. Decode the acronyms below.

Question #47: (12 pts)

GOES

HRPT

TOMS

UTC

IR

NOAA

POES

HIRS

UHF

LIDAR

GPS

AMSU

STATION 14

This image is of the southern part of Hudson Bay in Canada. North is toward the top of the image.

Question #48: This image was most likely taken in which month? (1 pt)

A. January
B. March
C. May
D. August
E. October

Question #49: From an ecological position – why is it ecologically important that the Hudson Bay freeze completely (or nearly completely) each winter? (2 pts)

Question #50: Why is the ice so much more textured in some areas and very smooth in others? (2 pts)

Question #51: On a large scale, which side of Hudson Bay typically becomes frozen first? The eastern shore OR western shore? Give a brief reason for your answer. (2 pts)

STATION 15

This image was taken on a cloudless day over eastern North Carolina and southeastern Virginia.

Question #52: What is likely the reason for the change in color pattern near point A? (2 pts)

Question #53: The bodies of water at points B and C are wide and tidal. What kind of body of water are these? (1 pt)

Question #54: The long, thin stretches of land marked by point D are known as: (1 pt)

Question #55: The long bridge at point E is 8 kilometers in length. Given that information, find the length of the nearby canal between points F and G. (1 pt)

Question #56: What is the benefit of this canal in this location? (2 pts)

REMOTE SENSING
ATHENS INVITATIONAL 2012
ANSWERS

STATION 1

1. (2 pts) the 2004 Indian Ocean tsunami
2. (1 pt) from the southeast
3. (2 pts) silt runoff from deforestation or local mining

STATION 2

4. (1 pt) fjords
5. (1 pt) low clouds/fog
6. (1 pt) from the west or southwest
7. (2 pts) low clouds – cloud features extend into some of the fjords.

STATION 3

8. (2 pts) microwaves
9. (1 pt) D
10. (2 pts) water gap
11. (1 pt) toward the south

STATION 4

12. (1 pt) Mississippi or Missouri or Illinois rivers
13. (1 pt) toward the south
14. (3 pts) the water flow is confined by urban flood walls and gates/ 0.5 km
15. (2 pts) accumulated sediment from flooding.

STATION 5

16. (1 pt) shrimp or fish farms/aquaculture pens
17. (2 pts) irrigated farmland
18. (2 pts) the fish farms use salt water in the pens while the irrigated farm land use fresh water.
19. (2 pts) A (the fish farms) – they would retain their heat better than land features would.

STATION 6

20. (1 pt) A (February)
21. (1 pt) meander
22. (2 pts) cold core eddy
23. (2 pts) Advanced Very High Resolution Radiometer
24. (2 pts) The meander could amplify – the eddy would gradually lose its characteristics.

STATION 7

25. (1 pt) B
26. (2 pts) Abnormally warm SST would help provide additional moisture and instability making storms develop faster.
27. (1 pt) 50 km
28. (2 pts) in the Arctic Ocean north of Europe.
29. (1 pt) B

STATION 8

30. (2 pts) These help to determine potential problems with drainage and flooding.
31. (2 pts) Preserve existing park land and undeveloped property.
32. (3 pts) The impervious areas should be higher in elevation to allow runoff to be absorbed in less developed areas.

STATION 9

33. (3 pts) Could be different seasons (growth would be different). Could be new construction long after the disaster occurred.
34. (2 pts) deposits of silt left from the tsunami.
35. (3 pts) Enhance – the shape of the shoreline would funnel water into the city.

STATION 10

36. (1 pt) D
37. (2 pts) warm Gulf Stream temperature
38. (2 pts) shallowest water – it's able to cool faster with the least mixing.
39. (2 pts) C – it is likely the shallowest and least mixed water of these positions.

STATION 11

40. (1 pt) toward the north
41. (2 pts) dendritric
42. (4 pts) 8mm=1km Image is 21.7cm X 15.9cm 217mm/8mm/km = 27.1km
    159mm/8mm/km= 19.9km
    27.1km X 19.9km = (539 km^2 / 8.5 million km^2) X 100 = 6.3 x 10^{-3} % of Brazil's land area is shown in the picture.

STATION 12

43. (3 pts) Water vapor imagery detects vapor in the mid-levels of the atmosphere. IR senses heat energy.
44. (2 pts) Unlikely due to lots of drier air to its North.
45. (2 pts) Enhanced allows you to see distinct levels of water vapor.
46. (1 pt) counterclockwise

STATION 13

47. (12 pts)
    GOES = Geostationary Operational Environmental Satellite
    HRPT = High Resolution Picture Transmission
    TOMS = Total Ozone Mapping Spectrometer
    UTC = Coordinated Universal Time
    IR = Infrared
    NOAA = National Oceanic and Atmospheric Administration
    POES = Polar Operational Environmental Satellite
    HIRS = High Resolution Infrared Radiation Sounder
    UHF = Ultra High Frequency
    LIDAR = Light Detection and Ranging
    GPS = Global Positioning System
    AMSU = Advanced Microwave Sounding Unit

STATION 14

48. (1 pt) B – March
49. (2 pts) Frozen Hudson Bay allows for easier migration of polar bears.
50. (2 pts) Textured/rough ice may be closer to pressure ridges or has frozen and moved repeatedly.
51. (2 pts) Western shore – generally colder, more continental source region of air is on the west side of the bay usually allows that side to freeze first.

STATION 15

52. (2 pts) Boundary between swamp land and agricultural land.
53. (1 pt) Estuaries
54. (1 pt) Barrier Islands
55. (1 pt) 1.2cm = 8km canal is 4.8cm 1.2cm/8km = 4.8cm/x x = 32 km
56. (2 pts) It eliminates the need to navigate through Pamlico Sound to the east.