



Applied Remote Sensing Training (ARSET) Program

Disaster Assessment Using Synthetic Aperture Radar

Homework Questions

Question 1

Which band is better suited for detecting inundated vegetation in densely forested areas?

Answers: (bold correct)

- a. X-band
- b. C-band
- c. S-band
- d. **L-band**

Feedback:

L-band has a longer wavelength than S, C or X bands and therefore has greater penetration through the vegetation canopy.

Question 2

Which backscattering mechanism dominates in areas of open water?

Answers: (bold correct)

- a. Double-bounce
- b. Rainbow scattering
- c. **Specular scattering**
- d. Volume scattering

Feedback

Open water surfaces are generally smooth, which is why they are specular scatterers and appear very dark in the radar images.

Question 3

Double-bounce is the dominant backscattering mechanism where there is inundated vegetation.

Answers: (bold correct)

- a. **True**
- b. False

Feedback:

Double-bounce is typical of inundated vegetation because of the interaction between the smooth water surface and the vertical structure of the vegetation such as the trunk. These areas appear bright in the radar images.

Question 4

Which is the best polarization for detecting open water?

Answers: (bold correct)

- a. **HH**
- b. HV
- c. VV
- d. None of the above

Feedback:

HH generally has greater penetration through vegetation than VV or HV. Hence it has a higher likelihood of reaching the surface and detecting inundation.

Question 5

The phase of the radar signal is the number of *cycles of oscillation* that the wave executes between the radar and the surface and back again.

Answers: (bold correct)

- a. **True**
- b. False

Question 6

Interferometric Synthetic Aperture Radar (InSAR) can be used for (select all that apply):

Answers: (bold correct)

- a. **Earthquake and volcano monitoring and modeling**
- b. **Landslides and ground subsidence**
- c. **Glacier and ice sheet dynamics**
- d. **Deforestation, change detection, disaster monitoring**

Question 7

When we do repeat pass interferometry and we are using a relatively short radar wavelength, there is volumetric scattering within the trees, and the leaves cause a loss of coherence.

Answers: (bold correct)

- a. **True**
- b. False

Feedback:

Longer wavelengths are less sensitive to leaves and hence their movement from one acquisition to another is less likely to cause loss of coherence.

Question 8

Low coherence or decorrelation for any reason causes:

Answers: (bold correct)

- a. A gain in information
- b. **A loss of information**
- c. It has no effect

Feedback:

Low coherence or decorrelation for any reason causes loss of information in that area.

Question 9

Some of the challenges in detecting oil spills with SAR are assessments of:

Answers: (bold correct)

- a. Thickness estimates
- b. Oil type and its properties
- c. Oil type characteristics
- d. All of the above**

Question 10

Oil slicks dampen the surface roughness and are hence detected as areas of:

Answers: (bold correct)

- a. High backscatter
- b. Low backscatter**
- c. Medium backscatter
- d. All of the above

Question 11

Which polarization is best for detecting oil spills:

Answers: (bold correct)

- a. HH
- b. HV
- c. VV**
- d. VH

Question 12

Please select the sources of confusion with oil spills.

Answers: (bold correct)

- a. **Newly formed sea ice**
- b. **Low wind regions**
- c. Internal waves
- d. **Algae blooms**

Question 13

Areas with thicker oil tend to dampen the surface even more and therefore appear brighter in radar images.

Answers: (bold correct)

- a. True
- b. **False**

Feedback:

Areas with thicker oil tend to dampen the surface even more and therefore appear darker in the radar images.

Question 14

Sensor characteristics such as incidence angle and signal-to-noise ratio affect detection and monitoring capabilities of oil spills.

Answers: (bold correct)

- a. **True**
- b. False