**Environmental Data**

**Week 1 Revision Questions**

1. Why is an image algebraic operation also called a multi-image point operation? Write down the mathematical definition of the multi-image point operation.
2. Why does image addition improve image SNR? Using a stationary camera to take 9 pictures of the same scene under identical illumination conditions and then summing them to then generate an average image, by how many times is the SNR is improved in comparison with any an individual picture?
3. Describe image difference (subtraction) and ratio (division) operations and compare the two techniques in terms of change detection, selective enhancement and processing efficiency.
4. What is the importance of the weights in image subtraction? Suggest the most desirable pre-processing step for image differencing…
5. Why does image differencing decrease the SNR?
6. Describe image multiplication and its major application.
7. Explain the characteristics of the value range of a ratio image. Do you think that two reciprocal ratio images contain the same information when displayed after a linear stretch, and explain why?
8. Using a diagram to describe ratio image as a coordinate transformation from a Cartesian coordinates system to a polar coordinates system.
9. Explain the principle of topographic suppression using image ratio technique. selected.
10. What is the NDVI and how is it designed? Explain the different functionalities of differencing and ratio operations.
11. Describe the design and functionality of TM or ETM+ iron oxide and hydrated mineral (inc. clay & gypsum) indices.
12. Using a diagram of RGB colour cube to explain the mathematic definition and physical meaning of intensity, hue and saturation.
13. What are the value ranges of intensity, hue and saturation according to the RGB colour cube model of RGB-HSI transformation?
14. Why RGB-HSI is a useful image processing technique?
15. Describe the principle of decorrelation stretch (DS) with the aid of diagrams.
16. Describe the major steps of HSI DS and explain how the image inter-band correlation is reduced and why.
17. What is the drawback of stretching the hue component in the HSI decorrelation stretch? How can we expand the value range of the hue component without stretching the hue component directly?
18. Using a diagram to explain the principle of DDS. In what senses are DDS and HSI DS are similar, and different?
19. How to improve the spatial resolution of a 30m resolution TM colour composite with a 10m resolution SPOT panchromatic image using RGB-HSI transformation and Brovey transform?
20. Explain the major problem of image fusion using RGB-HSI transformation and Brovey transform.
21. How does SFIM achieve pan-sharpening which preserves spectral properties?