AEROSPACE INFORMATION TECHNOLOGY

Julius-Maximilians-
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Remote Sensing
Summer Semester 2023
Prof. Dr. Marco Schmidt

Exercise 1

25.04.2023

Cheating is prohibited. Each group has to submit their own solution. Give your answers in the units provided in the parenthesis. Include your name and matrikel nr. on your solution sheets!

Submission: — upload on WueCampus2

Task 1.1: *PPI vs RHI*

2 Points

Aside from analyzing RADAR scans from a Plan Position Indicator (PPI) scope, another scope called Range-Height Indicator (RHI) is often used. Describe the principle of measurement used for obtaining the RHI scope as compared to a PPI scope. What additional information does the RHI scope provide that the PPI scope normally does not?

Task 1.2: *CW vs Pulsed*

2 Points

How are the two following properties of a target - *Range* and *Speed*- measured by a RADAR system? Which of the above two properties, can one detect with a Continuous Wave (CW) waveform and Pulsed waveform RADAR? Justify your answer.

Task 1.3: *Mono-static vs Bi-static*

2 Points

Is a *mono-static* or a *bi-static* radar more susceptible to pick up scatter from a stealth target? Why?

Task 1.4: *Python programming: Split satellite image into tiles*

4 Points

Earth observation satellites generate large images of varying resolutions and shapes. For many applications, these images have to be split into smaller tiles.

1. Write a program in python that reads a single band sentinel-2 image in the JPEG2000-format (.jp2) and splits it into multiple smaller, rectangular tiles that are saved in the .TIF-format in a separate folder. To read the .jp2-image you can use the rasterio-library and to save the images in .TIF-format you can use OpenCV/cv2. An exemplary .jp2-file is provided with this task.

Total: 10 Points