

Universität Potsdam

REMOTE SENSING OF THE ENVIRONMENT

WINTERSEMESTER 2024-2025

LAB 2

Prof. Dr. Bodo Bookhagen

Hanna Kretz

Matrikelnummer: 824063

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Question 1

Figure 1 shows the map that was to be created in Question 1. The region shown includes Berlin and Potsdam.

Unfortunately, despite several checks and repetitions, my calculations did not result in such a nice map, as the maximum values of the NDVI only went up to 4.5 (see legend) instead of up to 8, as shown in the tutorial. As a result, my entire map is quite red and you can't distinguish the urban regions from nature. However, the calculation of the NDWI worked well: The water areas are easily recognisable in blue.

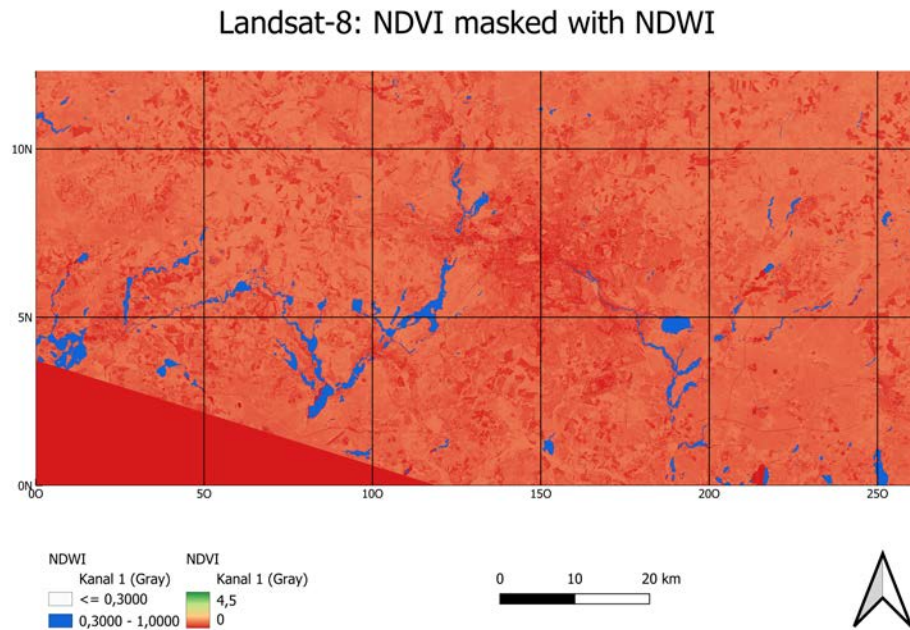


Figure 1

Question 2

Figure 2 and Figure 3 show the two maps that should be created in question 2. They show the surface temperature in Celsius in the Potsdam and Berlin areas. The maps were calculated from the datasets of Landsat-8 volumes 10 and 11.

In my opinion, the calculated temperature values are realistic. They are approximately between 20 and 35 °C, which is realistic for a measurement taken in summer. The largest temperature differences are between the water areas and forest (both comparatively cool at around 20°C) and fields (> 40°C). Urban areas also have a significantly higher surface temperature at around 30 – 35°C than the water and forest areas.

Bands 10 and 11 hardly differ from each other, the measured and calculated surface temperature seems to be slightly lower for band 11, as the map is slightly brighter.

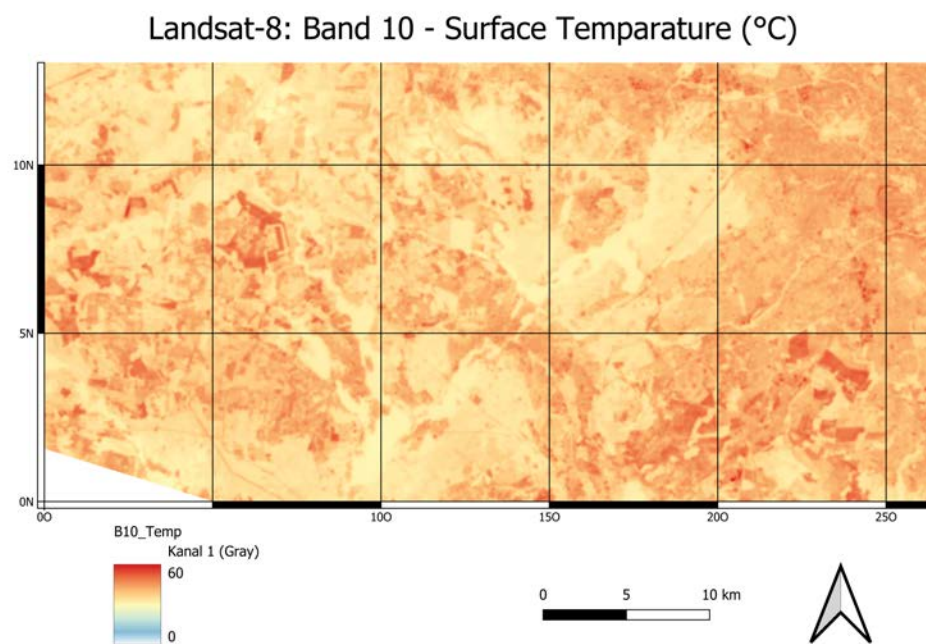


Figure 2

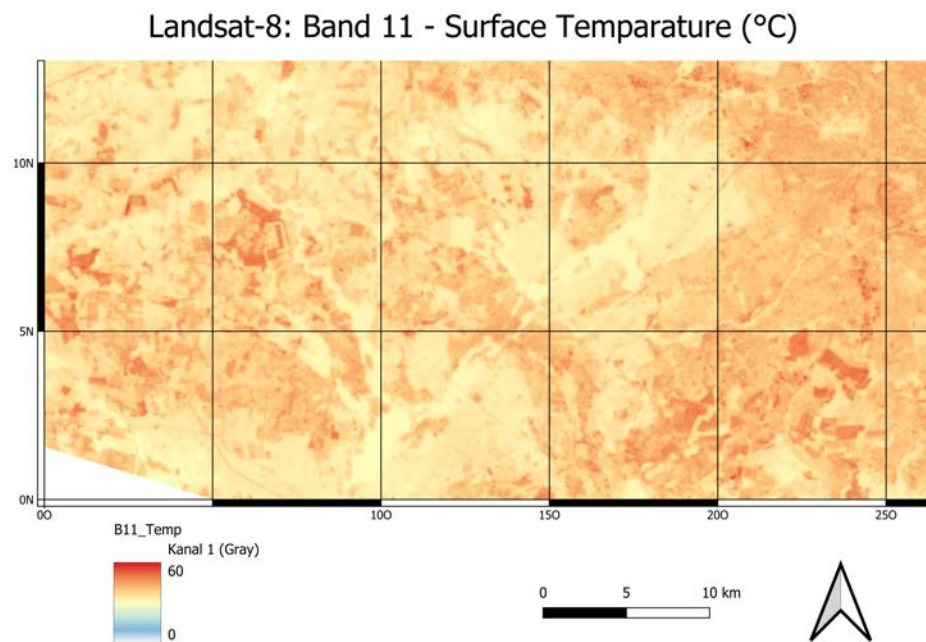


Figure 3

Question 3

In Figure 4 and Figure 5 you can see the two maps that were to be created in question 3. They show two different false-colour representations in different Landsat-8 band combinations.

In Figure 4, the NIR (5), red (4), green (3) band combination is shown. Here the different vegetation areas and the urban areas can be easily distinguished from each other.

In Figure 5, the shortwave infrared band combination SWIR-2 (7), SWIR-1 (6), red (4) was selected. According to <https://gisgeography.com/landsat-8-bands-combinations/>: 'This composite displays vegetation in shades of green. While darker shades of green indicate denser vegetation, sparse vegetation has lighter shades. Urban areas are blue and soils have various shades of brown.'

Both band combinations characterise the vegetation, while the first uses the near-infrared band to distinguish the vegetation types, the second version uses the shortwave infrared band. The colour representations also differ: the NIR band combination is more reddish, the SWIR band combination is green.

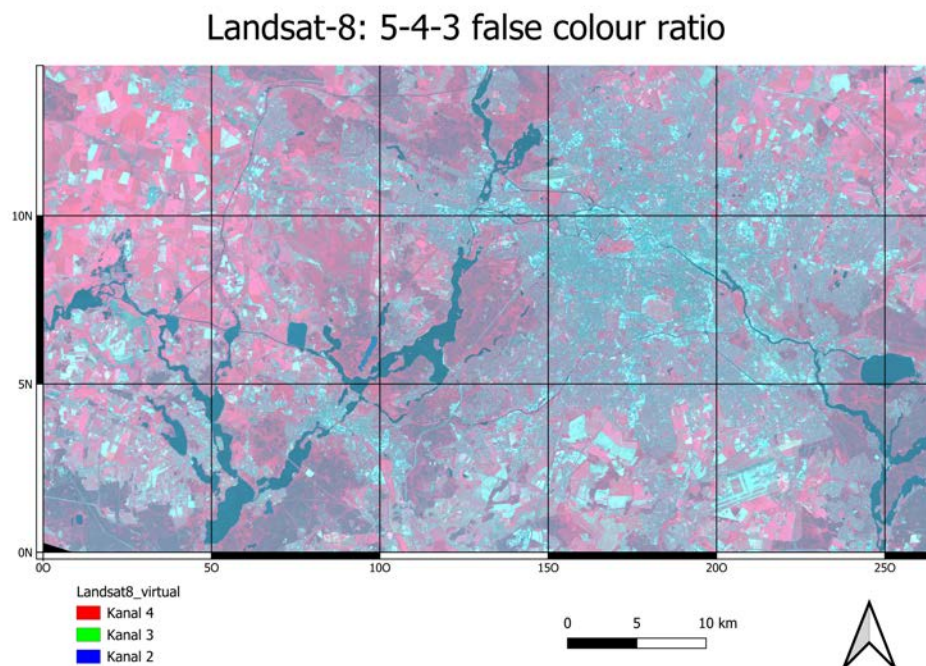


Figure 4

Question 4

In Figure 6 and Figure 7 you can see the two maps that were to be created in question 4. They show a part of north-west Germany: you can see a part of Lower Saxony and Hamburg. The Jade Bay, which can be recognised as a teardrop shape on the North Sea coast, is also clearly visible. The two maps are from two different dates: Figure 6 is from 21.04.2023 and Figure 7 is from 13.08.2024. The shortwave infrared band combination SWIR-2 (7), SWIR-1 (6), red (4) was chosen for both types of map.

I chose this area because I lived there for a while and am therefore very familiar with it. I also find it interesting that (although Figure 7 is partly covered by clouds) you can see the tidal differences. Especially at the Jade Bay, which is hardly covered by water at low tide, you can see the big differences: In Figure 6

Landsat-8: 7-6-4 false colour ratio

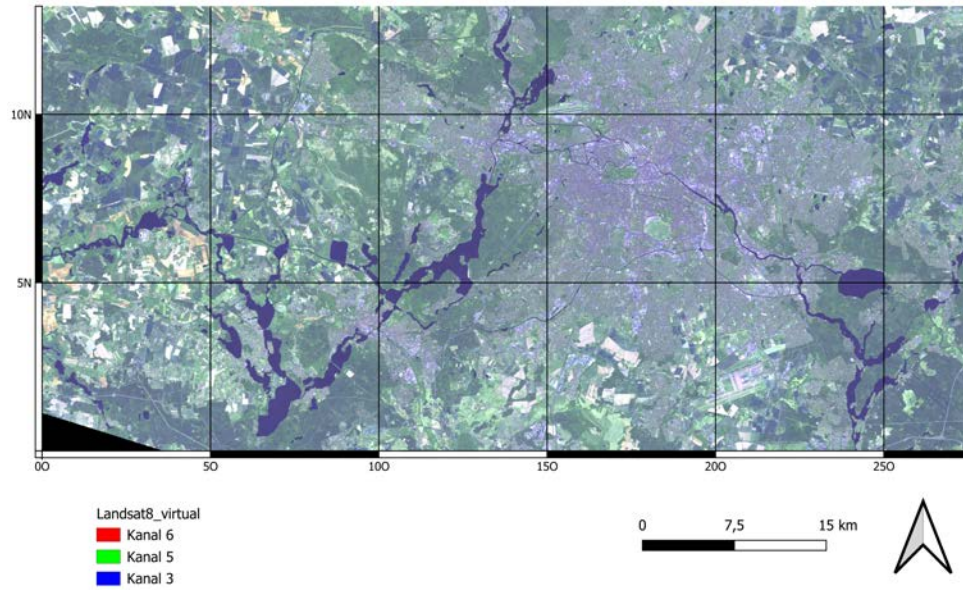


Figure 5

(2023) it is high tide and in Figure 7 (2024) it is partly low tide.

I chose the presented ratio because it clearly separates water from land and the parts of the vegetation are easy to distinguish.

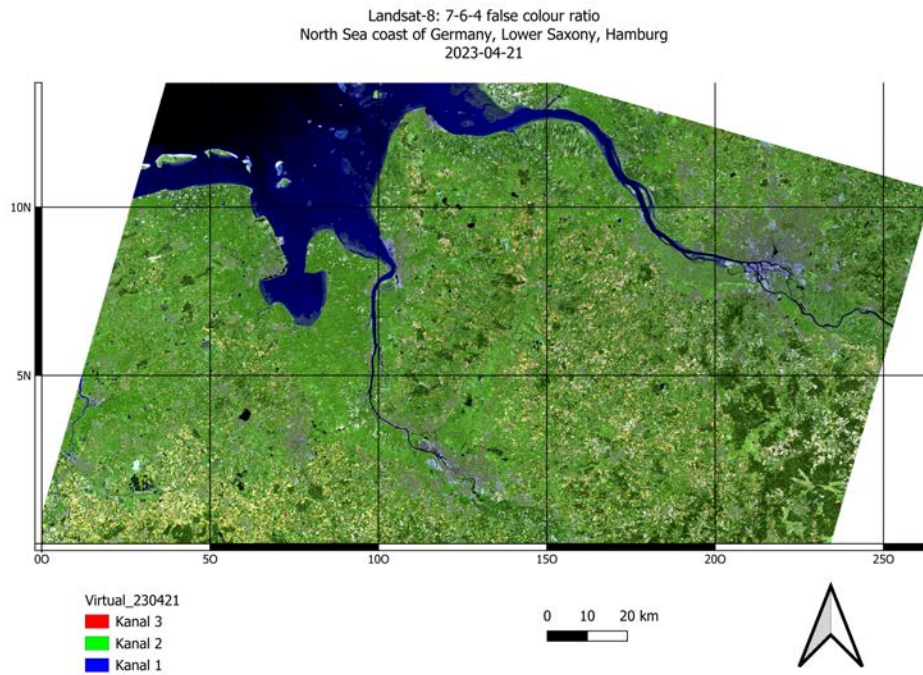


Figure 6

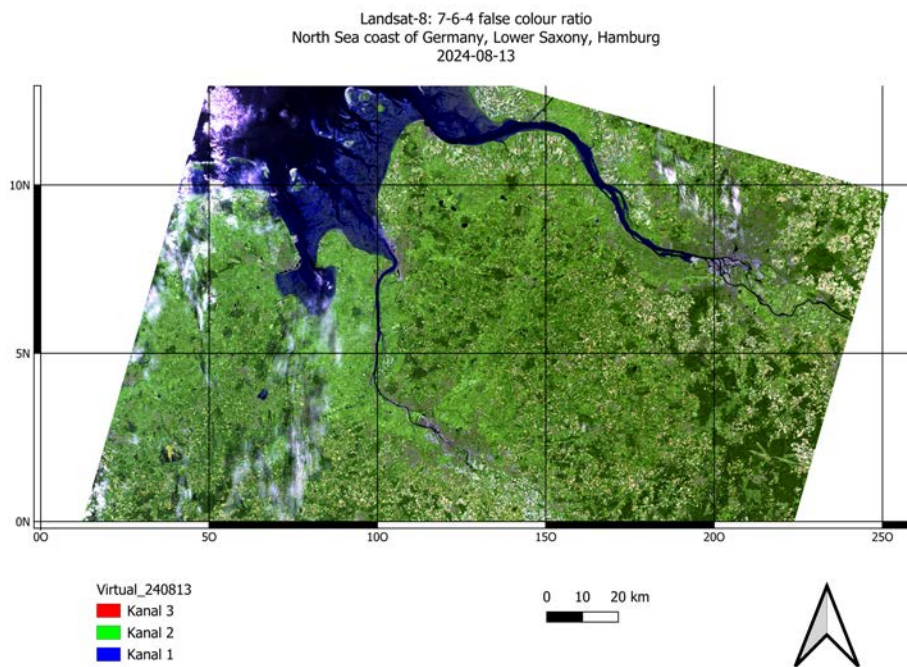


Figure 7