

Learning Material

Westafrica - crossing the Earth's biggest desert

Grade 7-9

Sample Solutions

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The exercises of the learning unit are embedded in a superordinated work order. The pupils should use the online- tool for Westafrica to work on the exercises given in the additional material. Besides questions on the ISS emphasis is on exploring the region shown in the ISS-panorama, as well as creating a map, based on minimum distance classification.

Exercise Sheet 1: Earth observation

Question 1: The ISS (International Space Station) is the largest artificial object in the orbit. How many cameras are installed at the ISS which record images of the earth 24 hours a day.

Answer: 4 cameras

Question 2: The ISS rotates the earth several times a day.

a) How many rotations is it accomplishing each day?

Answer: 16 rotations per day

b): How long does it take for one rotation?

Answer: 90 minutes

Question 3: You can see the ISS from the earth but it is far away from here. Even though pictures can give a good image of what is happening on our blue planet. But if you zoom in you can also see the single pixels.

a): What is the flight altitude of the ISS?

Answer: 400km/~250miles

b): What is the size of one pixel within the ISS-Panorama?

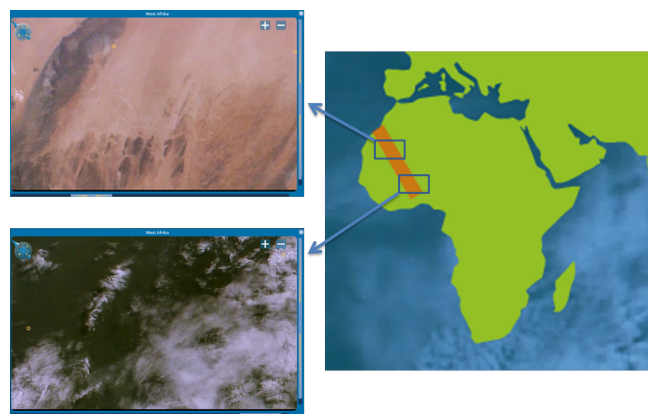
Answer: 500m x 500m

Exercise Sheet 2: Landoberfläche und Klimazonen

Question 1: Which land cover can you spot in the image? Go from coast to the interior and list at least four different land covers which you will spot along.

Possible Answers: Water, Desert, Clouds, Forest

Question 2: The two images on the left show two extracts of the flyover. The overview map on the right identifies the location of both images.



Overflight Westafrica (right), Screenshots climate zones (left)

a) To which climatic zones are the pictures assigned to?

Answer:

Top: Subtropics; Bottom: Tropics

The geospatial location itself helps to assign both pictures to the right climate zones. The bottom picture shows a heavy cloud cover as well as dark greenish vegetation which describes the evergreen

rainforest in the tropics. This information can also be taken from the information points. The image at the top shows the Sahara, the biggest desert of the earth.

Here, besides a vast bare land no cloud cover can be detected.

b) What do you recognize when you look at the cloud cover of both images on the left. Why are there more clouds on the picture at the bottom than on the one on top?

Answer: Again the answer to this question can be made by reflecting on climate zones. Due to the tropical climate at the equator more moisture is available in soil and vegetation. Because of high temperature in these latitudes water evaporates resulting in high cloud coverage. Deserts on the other hand are very dry ecosystems. Here, evaporation rates are not as high which result in low to no cloud cover as seen in the image.

Exercise Sheet 3: The African Savanna

1. The information points give further information on different regions and phenomenon which are depicted in the ISS-Panorama. Look at the location of the points and read through the information of the African savanna. Use this information and the one you get in class and describe the savanna ecosystem and how you can see it in the image.

Answer: Savanna ecosystems are located in the subtropics. Mostly they are situated in the transition zones from an arid to a very humid region. On the ISS-panorama these savanna regions can be identified by green vegetations which are characterizing grasslands. More humid regions are characterized by a higher cloud cover. This is also depicted in the ISS-panorama.

If you open the information box on the African savanna you can even get more information about this special and important ecosystem. This includes

the occurrence of fire on a large scale which lead to the recovering and revitalizing of the vegetation. Moreover, high temperatures and rainfall are common throughout the year.

2. List of Savanna types:

Answer: Tropical and subtropical savannas; Temperate savannas, Mediterranean savannas (Flooded savannas, Montane savannas)

Precipitation rates and vegetation density build the baseline for the distinction of different savanna types. Based on the given types pupils can also do some homework getting more information on the characteristics of each types as well as there are further distinctions as well.

Exercise Sheet 4: The Classification

Question 1. Use the tool and make a classification. Choose the area which is depicted right at the beginning when you open the tool (place the slider to the very left). Create at least three surfaces: water, clouds and desert. Also check the instructions below the tool. You can display or hide them to get the instructions on how to make your map.

Answer/Work Order a)-c): The conduction of the classification is described in the accompanying commentary as well as within the Online-Tool itself. Below the Tool map instructions can be faded in and out. All steps how to make the classification with the ISS-Panorama are described. Moreover, symbols with different applications can be faded in and out.

Question 2. Test the classification with different training areas and compare them. Again, choose the same areas as for Exercise 1 (place slider to the very left).

a) Check the area of the Sahara/desert.

Answer: 89.000 to 98.000 km²

b) For which surfaces you can spot the most mistakes?

Answer: Partly some cloud cover is classified as desert which occurs due to similar color values. The classifier incorrectly assigns those colors to cloud cover. This problem could be solved by creating more training samples. Different surfaces representing the desert could e.g. be marked with „desert 1“ and „desert 2“.