

Educational material on the subject of

# Deserts and their Formation

Grades 7-9

Teachers' material

## Project Information

These educational materials were created in the scope of the project “Columbus Eye – Live Images from the ISS in School Lessons”. The project Columbus Eye is promoted by the Space Agency of the German Aerospace Center with resources of the Federal Ministry for Economic Affairs and Energy due to a decision of the German Bundestag, and has the funding code 50JR1307.

The preparation of a comprehensive offer of digital learning materials for the use in school classes is the overriding project goal. This offer includes interactive tools and worksheets, which will be provided via a learning portal.

<http://www.columbuseye.uni-bonn.de>



## Overview

Grades

7-9

Level



Time requirement

2 hours

Authors

Johannes Schultz,  
Andreas Rienow,  
Floreana Miesen

### Educational objectives

The pupils should...

- Interpret satellite images and allocate them geographically,
- learn how to link geographical information wisely with each other,
- learn to distinguish differently sized deserts according to their characteristics
- learn how to interpret climate diagrams independently,
- understand the genesis of different desert types,
- enlarge their knowledge of regional geography

### Themes

Classification of deserts

Desertification

Climate

Climate diagrams

Detection of transformations

### Media & Material

Video „Deserts of the Earth“

## Didactical notations

### Course of the lesson

**Phase 1:** The ISS-Video “Deserts of the Earth” showing the space station’s flyover above different desert regions should be presented after the pupils have been given a general introduction and work sheets have been handed out. The deserts in the video show up in the same order as in material 1 (see work sheet). An HD version (higher resolution) of the video can be found at <http://columbuseye.uni-bonn.de/highlights/eine-reise-durch-die-wusten-der-erde/>

**Phase 2:** The pupils have to work on task 1 to 3 after phase 1. Thereby they start to familiarize themselves with the climatic and later on with the morphological classifications of deserts. Task 1 shows climate diagrams which should be connected to desert regions. By describing the curves’ progressions, the pupils should be able to work out differences and similarities of climates as well as to detect potential desert types. Then, the climatic specialties are associated with the geographical locations in task 2. The pupils should highlight the desert regions on the given world map and describe their location regarding their latitude and proximity to mountain ranges. In the subsequent task (task 3), desert regions should be explicitly climatically classified with the help of material 3. The morphological classification of the deserts follows in task 4 in respect of material 4. Watching the video for a second time or having a closer look at the satellite images shown in material 1 might help.

**Phase 3:** The issue of desertification is introduced. Initially, the definition in material 5 should be read together and be discussed in the class by the basis of the example of Africa (map of Africa in material 5). Afterwards, the detected impacts are debated by way of example of the Aral Sea afterwards. For this purpose, atlases or the access to other topographic

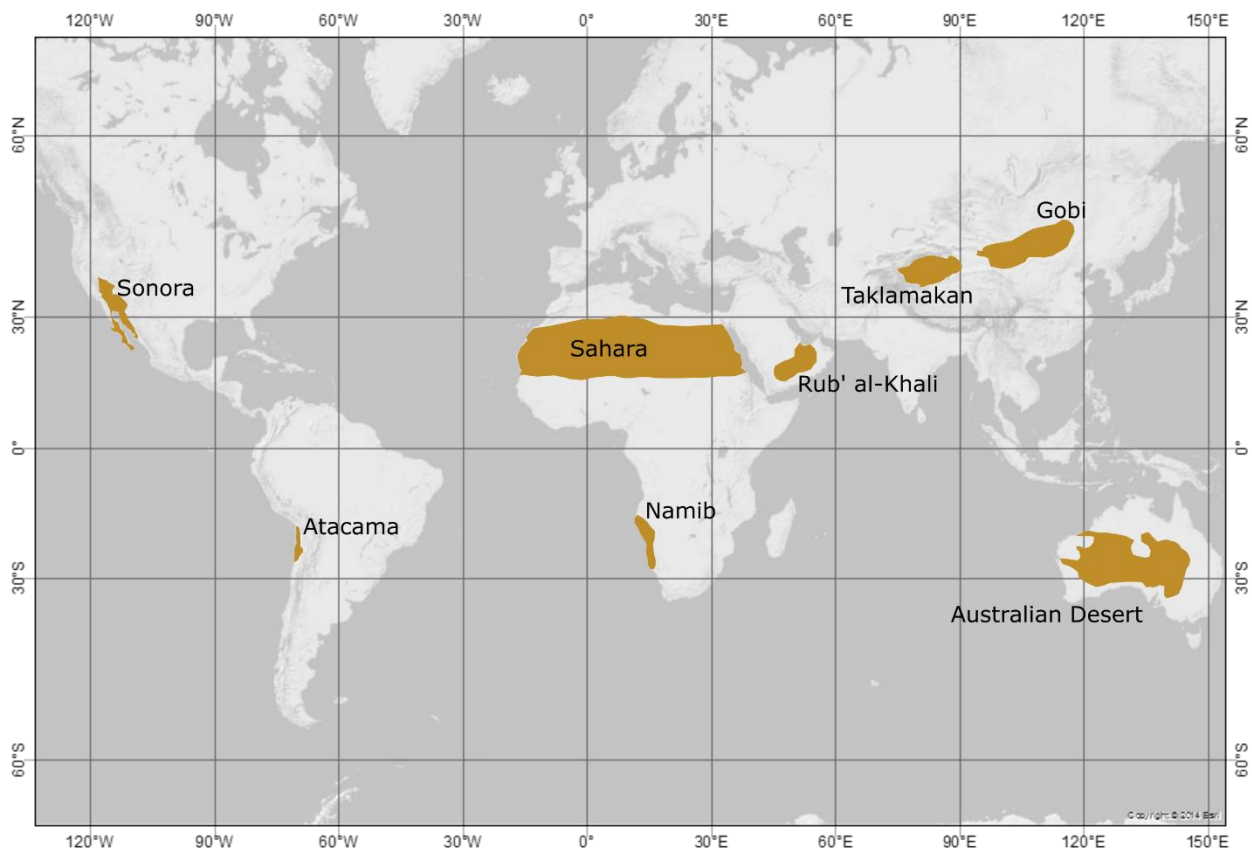
maps like Google Earth must be provided for the pupils. The extent of landscape changes / desertification between 1991 and 2015 has to be estimated with the help of material 6a and 6b in task 5. The pupils should recognize surrounding settlement structures and put the concept of desertification in a socio-economical context (task 5).

## Solutions

1.) In Material 2, you can find climate diagrams of places located in the listed desert regions (material 1). The diagrams illustrate the temperature and precipitation during the course of the year. Compare, describe and explain the course of the curves. Which similarities do they share? How do the diagrams differ from each other?

All Diagrams indicate an arid climate as the temperature curve exceeds the precipitation curve throughout the year (except for Dalanzadgad). The position on the northern or southern hemisphere can be deduced from the course of the temperature. If the highest temperatures are reached during the middle of the year, the climate station is located on the northern hemisphere. Dalanzadgad and Tikanlik have the highest annual temperature amplitude and temperatures below zero during the winter months (continental desert!), whereas diagrams of Calama and Walvis Bay show slight temperature amplitudes (coastal deserts).

2.) A section of an empty world map only with mountains as well as longitude and latitude specifications is shown below. Highlight (if necessary with the help of an atlas) those regions on the map where the deserts of material 1 can be located. What do you recognise?



3.) Classify the deserts according to their modes of formation regarding their geographical location. Fill in the following table. Material 3 will help you with this.

	Genetic type of desert		Genetic type of desert
<b>Sahara</b>	Trade wind desert	<b>Namib</b>	Coastal desert
<b>Australian Desert</b>	Trade wind desert	<b>Gobi</b>	Mid-latitude desert
<b>Atacama</b>	Coastal desert	<b>Taklamakan</b>	Mid-latitude desert
<b>Sonora</b>	Coastal desert	<b>Rub' al Khali</b>	Trade wind desert

4.) Which morphological types of deserts can be seen in material 1? Enter the desert's names in the following table. Material 4 will help you with this.

Stone Desert	Gravel Desert	Sand Desert	Clay Desert
<b>Sahara</b>	<b>Atacama</b>	<b>Sahara</b>	<b>Atacama</b>
<b>Atacama</b>	<b>Gobi</b>	<b>Australian Desert</b>	<b>Sonora</b>
	<b>Taklamakan</b>	<b>Namib</b>	<b>Gobi</b>
	<b>Sonora</b>	<b>Rub' al Khali</b>	

5.) In material 6, you can find images of the Aral Sea in Kazakhstan and Uzbekistan of 1991 and 2015. Compare these two satellite images. How did the landscape change? Guess the ratio between now and the past. How many times bigger was it in 1991 compared to today?

- ☐ twice as big
- ☒ ten times as big
- ☐ twenty times as big

6.) Look for settlements close to the Aral Sea with the help of an atlas. Locate towns or settlements which are threatened by desertification and a decreasing water surface level. Name the biggest towns in that region.

The town Aralsk is located northeast of the present coastline, but was situated directly on the waterfront during the 1960s. The town Mujnak, which was formally situated directly at the shore in the past as well, can nowadays be found about 80 Kilometres south of the Aral Sea. Modern maps still illustrate the town Kantubek, which is located between the two southern parts of the lake but is not inhabited anymore.