

Effect of Altitude and Mountains on Climate

Dana Desonie, Ph.D.

Say Thanks to the Authors

Click <http://www.ck12.org/saythanks>

(No sign in required)



To access a customizable version of this book, as well as other interactive content, visit www.ck12.org

CK-12 Foundation is a non-profit organization with a mission to reduce the cost of textbook materials for the K-12 market both in the U.S. and worldwide. Using an open-source, collaborative, and web-based compilation model, CK-12 pioneers and promotes the creation and distribution of high-quality, adaptive online textbooks that can be mixed, modified and printed (i.e., the FlexBook® textbooks).

Copyright © 2016 CK-12 Foundation, www.ck12.org

The names “CK-12” and “CK12” and associated logos and the terms “**FlexBook®**” and “**FlexBook Platform®**” (collectively “CK-12 Marks”) are trademarks and service marks of CK-12 Foundation and are protected by federal, state, and international laws.

Any form of reproduction of this book in any format or medium, in whole or in sections must include the referral attribution link <http://www.ck12.org/saythanks> (placed in a visible location) in addition to the following terms.

Except as otherwise noted, all CK-12 Content (including CK-12 Curriculum Material) is made available to Users in accordance with the Creative Commons Attribution-Non-Commercial 3.0 Unported (CC BY-NC 3.0) License (<http://creativecommons.org/licenses/by-nc/3.0/>), as amended and updated by Creative Commons from time to time (the “CC License”), which is incorporated herein by this reference.

Complete terms can be found at <http://www.ck12.org/about/terms-of-use>.

Printed: August 26, 2016

flexbook
next generation textbooks



AUTHOR

Dana Desonie, Ph.D.

CHAPTER 1

Effect of Altitude and Mountains on Climate

- Explain how altitude and mountain ranges affect climate.
- Define rainshadow effect.

Altitude and Mountain Ranges

Air pressure and air temperature decrease with altitude. The closer molecules are packed together, the more likely they are to collide. Collisions between molecules give off heat, which warms the air. At higher altitudes, the air is less dense and air molecules are more spread out and less likely to collide. A location in the mountains has lower average temperatures than one at the base of the mountains. In Colorado, for example, Lakewood's (5,640 feet) average annual temperature is 62°F (17°C), while Climax Lake's (11,300 feet) is 42°F (5.4°C).

Mountain ranges have two effects on the climate of the surrounding region:

- rainshadow effect, which brings warm, dry climate to the leeward side of a mountain range (**Figure 1.1**).
- separation in the coastal region from the rest of the continent. Since a maritime air mass may have trouble rising over a mountain range, the coastal area will have a maritime climate but the inland area on the leeward side will have a continental climate.



FIGURE 1.1

The Bonneville Salt Flats are part of the very dry Great Basin of the Sierra Nevada of California. The region receives little rainfall.

Five factors that Affect Climate takes a very thorough look at what creates the climate zones. The climate of a region allows certain plants to grow, creating an ecological biome.



MEDIA

Click image to the left or use the URL below.

URL: <https://www.ck12.org/flx/render/embeddedobject/1588>

Summary

- Collisions between molecules increase temperature: where air is denser, the air temperature is higher.
- Rainshadow effect occurs on the leeward side of a mountain range.
- Maritime air may become stuck on the windward side of a mountain range and so is unable to bring cooler air further inland.

Review

1. Why does an increase in altitude cause a change in temperature?
2. What is rainshadow effect?
3. Besides rainshadow effect, how else do mountains affect weather downwind?

Explore More

Use this resource to answer the questions that follow.



MEDIA

Click image to the left or use the URL below.

URL: <https://www.ck12.org/flx/render/embeddedobject/1589>

1. What happens when wind crashes into a mountain range?
2. What weather occurs on the windward side of a mountain?
3. What is the climate on the windward side of the mountain relative to the leeward side of the mountain?
4. What are rain shadow deserts?
5. Describe the characteristics seen on the windward side of the Sierra Nevada Mountains.
6. Describe the characteristics seen on the leeward side of the Sierra Nevada Mountains.

References

1. Flickr:KellyB.. [Image of the Bonneville Salt Flats](#) . CC BY 2.0