

# Ocean-Ocean Convergent Plate Boundaries

---

Dana Desonie, Ph.D.

**Say Thanks to the Authors**

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

*(No sign in required)*



## AUTHOR

Dana Desonie, Ph.D.

To access a customizable version of this book, as well as other interactive content, visit [www.ck12.org](http://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-content, web-based collaborative model termed the **FlexBook®**, CK-12 intends to pioneer the generation and distribution of high-quality educational content that will serve both as core text as well as provide an adaptive environment for learning, powered through the **FlexBook Platform®**.

Copyright © 2015 CK-12 Foundation, [www.ck12.org](http://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/terms>.

Printed: January 6, 2015

**flexbook**  
next generation textbooks



## CHAPTER

## 1

# Ocean-Ocean Convergent Plate Boundaries

- Learn the activity and features of convergent plate boundaries where one oceanic plate subducts beneath another oceanic plate.



## What do you see in this satellite photo?

We continue our trip up western North America to find a convergent plate boundary where oceanic crust subducts beneath oceanic crust. North of the contiguous U.S. lies Canada, and north of Canada lies Alaska. A line of volcanoes, known as the Aleutian Islands, is the result of ocean-ocean convergence. In this satellite image is an erupting volcano, topped by snow or ice, and surrounded by seawater - a member of the Aleutian chain. Let's take a look at this boundary and the volcanic arc.

## Convergent Plate Boundaries

When two plates converge, what happens depends on the types of lithosphere that meet. We explored what happens when oceanic crust meets continental crust. Another type of convergent plate boundary is found where two oceanic plates meet. In this case the older, denser slab of oceanic crust will plunge beneath the less dense one.

### Ocean-Ocean

The features of a subduction zone where an oceanic plate subducts beneath another oceanic plate are the same as a continent-ocean subduction zone. An ocean trench marks the location where the plate is pushed down into the mantle. In this case, the line of volcanoes that grows on the upper oceanic plate is an **island arc**. Do you think earthquakes are common in these regions ( **Figure 1.1**)?

In the north Pacific, the Pacific Plate is subducting beneath the North American Plate just as it was off of the coast of the Pacific Northwest. The difference is that here the North American plate is covered with oceanic crust. Remember

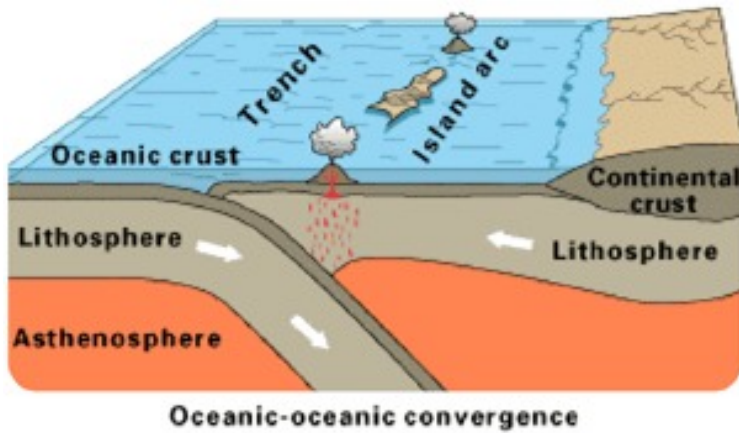


FIGURE 1.1

Subduction of an ocean plate beneath other oceanic crust results in a volcanic island arc, an ocean trench, and many earthquakes

that most plates are made of different types of crust. This subduction creates the Aleutian Islands, many of which are currently active (see **Figure 1.2**). Airplanes sometimes must avoid flying over these volcanoes for fear of being caught in an eruption.

### Summary

- If the two plates that meet at a convergent plate boundary both are of oceanic crust, the older, denser plate will subduct beneath the less dense plate.
- The features of an ocean-ocean subduction zone are the same as those of an ocean-continent subduction zone, except that the volcanic arc will be a set of islands known as an island arc.
- The older plate subducts into a trench, resulting in earthquakes. Melting of mantle material creates volcanoes at the subduction zone.

### Explore More

Use the resources below to answer the questions that follow.

- **Subduction Zones** at

<http://www.nature.nps.gov/geology/usgsnps/pltec/converge.html>

1. Describe a subduction zone.
2. What forms this subduction zone?
3. Where and why does melting occur?
4. What is formed on the continental plate?
5. Where can an example of this plate boundary be found?

- **Volcanic Arcs** at

[http://earthguide.ucsd.edu/eoc/teachers/t\\_tectonics/p\\_subduction.html](http://earthguide.ucsd.edu/eoc/teachers/t_tectonics/p_subduction.html)

6. Why do arc volcanoes appear in a line?
7. Why are there volcanoes near subduction zones?



These North Pacific air routes carry more than 20,000 people and millions of dollars in cargo every day.

**FIGURE 1.2**

The arc of the island arc that is the Aleutian Islands is easily seen in this map of North Pacific air routes over the region.

### Review

1. Compare and contrast the features of an ocean-ocean convergent plate boundary with the features of an ocean-continent convergent plate boundary.
2. How do the Aleutian volcanoes differ from the Cascades volcanoes?
3. How do island arcs get their name?

---

## References

1. Courtesy of US Geological Survey. [Diagram of a convergent plate boundary between two ocean plates](#) . Public Domain
2. Courtesy of the US Geological Survey. [Map of a Aleutian Islands](#) . Public Domain