# Plate Tectonic Supercycle - annotated resource list

This document is a teacher and student resource providing additional information on the plate tectonic supercycle. These resources may be used as background information or to frame and shape a secondary sourced investigation, or task, about scientific models. [The Earth and Environmental Science Module 5 guide](https://education.nsw.gov.au/teaching-and-learning/curriculum/key-learning-areas/science/stage-6/earth-and-environment#Module2), available on the NSW Department of Education website is a teacher guide which may complement this resource.

## Scientific Journal Articles:

● Merdith, A., Williams, S., Brune, S., Collins, A., Muller, R., (2019) [Rift and plate boundary evolution across two supercontinent cycles](https://www.researchgate.net/publication/329160226_Rift_and_plate_boundary_evolution_across_two_supercontinent_cycles). Global and Planetary Change 173 (2019) 1–14

Students can use this article on rift and plate boundaries to employ the Working Scientifically Skills to analyse how models can be used and updated to make further predictions about the effect of the plate tectonic supercycle on evolution.

● Murphy, J., Nance, R. (2013) [Speculations on the mechanisms for the formation and breakup of supercontinents.](https://core.ac.uk/reader/81953078) Geoscience Frontiers 4 (2013) 185e194

Students can deepen their understanding of the mechanisms of the plate tectonic supercycle when they formulate their model of the cycle.

● Nance, R., Murphy, J. (2013). [Origins of the Supercontinent Cycle](https://www.researchgate.net/publication/239938661_Origins_of_the_supercontinent_cycle). Geoscience Frontiers 4 (2013) 439e448

Students can deepen their understanding of the mechanisms of the plate tectonic supercycle when they formulate their model of the cycle. This study on the origins of the supercontinent cycle also has very useful graphics that can link to the effects of the cycle on climate and evolution and on mass extinctions.

● Nance, R., Worsley, T., Moody, J. (1988) [The Supercontinent Cycle](https://www.researchgate.net/publication/250803012_The_Supercontinent_Cycle). Scientific American, July 1988. P. 72-79

An older study on the cycle summarising the effects of the plate tectonic supercycle on climate change and evolution. This can also provide students opportunities to observe advances in the understanding of the cycle between 1988 and the more recent studies.

● Oriolo, S., Oyhantcabal, P., Wemmer, K., Siegesmund (2017). [Contemporaneous assembly of Western Gondwana and final Rodinia break-up: Implications for the supercontinent cycle.](https://e-docs.geo-leo.de/bitstream/handle/11858/7064/1-s2.0-S1674987117300294-main.pdf?sequence=4&isAllowed=y) Geoscience Frontiers 8 (2017) 1431e1445.

This article on supercycle models provides another look at remodelling in science and the revised hypothesis of the history of the plate tectonic supercycle.

● Trabucho-Alexandre, J. & Hay, William & De Boer, Poppe. (2011). [Phanerozoic black shales and the Wilson Cycle](https://www.researchgate.net/publication/252497501_Phanerozoic_black_shales_and_the_Wilson_Cycle). Solid Earth Discussions. 3. 29-42. 10.5194/sed-3-743-2011.

This article on modelling cycle discusses the limitations with previous models and provides a new model to represent the Wilson cycle, the dynamic sequence of events and stages that characterise the evolution of an ocean basin, from the opening continental rift to the closing orogeny. This article also has some useful graphics to use as a stimulus for examination-style questions.

● Young, G., (2013) [Precambrian supercontinents, glaciations, atmospheric oxygenation, metazoan evolution and an impact that may have changed the second half of Earth history.](https://www.geosociety.org/gsatoday/archive/23/10/pdf/i1052-5173-23-10-4.pdf) Geoscience Frontiers 4 (2013) 247e261

This article on continents and the atmosphere delves deep into the history of the Earth for the last 2.5 billion years, including atmospheric CO2 levels. This also links stages of Precambrian Wilson Cycle to C-13 levels in strata, and evolution of life in these times.

## Videos:

● [The Whole Saga of the Supercontinents](https://www.youtube.com/watch?v=KfYn9KVya-Q) (duration 9:17)

A good overall introductory video from [PBS Eons YouTube channel](https://www.youtube.com/c/eons/featured) covering the links between the plate tectonic supercycle and climate and evolution.

● [History of the Earth](https://www.youtube.com/watch?v=Q1OreyX0-fw&feature=youtu.be) (duration 11:35)

This animation of the changes of the Earth’s continents over the planet’s history provides extra information, such as day length, atmospheric composition and evolutionary events.

● [Animation: Geology Wilson cycle](https://www.youtube.com/watch?v=p3mNomwar6U) (duration 5:09)

Annotated video from [FTCC-Geology Online YouTube Channel](https://www.youtube.com/channel/UCW2APXswCVKyngdZ32DjX3Q/about) with description of the Wilson cycle to introduce the plate tectonic supercycle.

● [1.5 billion years of Plate Tectonics](https://www.youtube.com/watch?v=IlnwyAbczog) (duration 4:19)

Animation by [C.R. Scotese](https://www.youtube.com/user/cscotese/videos) showing the known movements of continents over the course of Earth’s history. This video is unique to the history of the Earth videos as it shows the known plate boundaries, as well as sea floor spreading since the Mesozoic. There is also a link to a labelled version of the animation.

● [Continental Drift - Scotese Animation](https://www.youtube.com/watch?v=grMwSU8ZZis) (duration 0:47)

This animation also by [C.R. Scotese](https://www.youtube.com/user/cscotese/videos), despite the unscientific name, shows the movement of continents in reverse, starting with today’s layout. It also shows known mountain ranges.

● COSMOS: A Spacetime Odyssey, Season 1 Ep. 9 “The Lost Worlds of Planet Earth” (hosted by Neil DeGrasse Tyson), released on Blu-ray and DVD on June 10, 2014 by 20th Century Fox Home Entertainment. Video available by purchase as DVD or episode 9 is available on clickview or on streaming platforms.

Episode 9, Series 1 of [COSMOS: A Spacetime Odyssey](https://video.nationalgeographic.com/video/cosmos-a-spacetime-odyssey), explores stages of the environment through the Earth’s history and the application of the scientific method as the theory plate tectonics was devised. This episode also links to other inquiry questions in Module 5, such as the end-Cretaceous extinction, and cross-modular links to Module 6 (volcanic effects on the atmosphere) and Module 7 (natural causes of climate change and flow-on effects of anthropogenic climate change).

## Websites:

● [The ocean is sinking into Earth’s mantle, and a dead supercontinent is partly to blame](https://www.livescience.com/65678-deep-water-cycle-sinking-ocean.html)

This resource on [livescience.com](https://www.livescience.com/planet-earth) explores the flow-on effects on the Earth’s mantle from the breakup of Pangea.

● [Ancient Earth Globe](https://dinosaurpictures.org/ancient-earth#340):

This interactive globe at [dinosaurpictures.org](https://dinosaurpictures.org/) allows you plug in your address to see how it’s changed over the past 750 million years. This resource engages students by allowing them to plug in any address or location of interest and follow the point along the course of the plate tectonic supercycle. It also allows students to observe the cycle and continents at various points in Earth’s history as chosen by time or by evolutionary breakthroughs.