HOW NOAH'S FLOOD CAUSED A SINGLE ICE AGE

By Mike Oard

This remarkable book by Michael Oard covers a crucial period of earth history—the post-Flood Ice Age. It deals with the multitude of questions that arise, a feat that requires knowledge and expertise in many scientific disciplines. A foremost expert on geology, Michael Oard is eminently qualified for this and clearly sets out the evidence for much greater glacial ice cover in the past. He shows how secular scientists with their uniformitarian worldview (which denies that Noah's Flood ever occurred) have been mystified by this evidence and unable to reach a satisfactory solution.

How Noah's Flood Caused a Single Ice Age delves into the many fundamental questions about the Ice Age, providing clear and comprehensive answers. From its timing and geographical extent to the ice cover's thickness, the water's origin, the assumed number of ice ages, and its effects on global sea levels, Oard leaves no stone unturned. He also tackles the even bigger issue that has stumped uniformitarian thinking: what caused the Ice Age, and why did it end? Biblical answers are woven through the pages and show that, yes, the Bible can be a trusted resource for the complexities of the Ice Age.

Tasman Walker, Geology (BSc), Engineering (BEng, PhD),
Scientist, Writer, and Speaker, CMI-Australia.

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How Noahs Flood Caused a Single Ice Age

by Michael J. Oard

MICHAEL OARD M.S. did his masters in atmospheric science and is a retired meteorologist from the US National Weather Service. He has authored numerous books and articles, is a fellow of the Creation Research Society, and is widely regarded as an expert on Ice Age creation topics.
For more: creation.com/oard.

First edition: January 2025

ISBN: 978-1-954198-13-5

Design and layout: Tim Kneipp

Cover image: © Magryt | Dreamstime.com

Published by

CREATION BOOK PUBLISHERS

Creation Book Publishers
P.O. Box 350
Powder Springs, GA 30127
Phone: 1-800-616-1264
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FOREWORD

FOR YEARS, I have wanted a single source that summarizes the biblical creationist views on the Ice Age. We have many arguments, but they were never in one place, until now. *How Noah's Flood Caused a Single Ice Age* is the book I have been waiting for.

Yet, one wonders why something that is not even mentioned in the Bible can be so important that it warrants a full-length book. The reason is that we need an explanation for any major climactic or geological event that happened in world history. The Ice Age had world-changing consequences, but until now had only been described in terms of naturalism, gradualism, materialism, and uniformitarianism. These "-isms" are belief systems. The Christian, therefore, needs a way to explain the Ice Age using a different belief system, one based on the Bible.

Ice Ages are an intrinsic part of the deep-time, establishment thought pattern. *If* the earth has gone through many glaciation cycles, each being tens of thousands of years long, and each cycle being tens to hundreds of thousands of years apart, *then* the earth cannot be as young as the Bible claims. But what if there is a better answer? In fact, the multiple supposed Ice Ages can be collapsed into a single Ice Age, one caused by a worldwide Flood. Only the biblical Flood provides the necessary conditions for an Ice Age. It explains why it happened, and the mathematics tells us how long it would have lasted. In fact, the physics and the timing of the Ice Age fit beautifully into the post-Flood world.

If we can claim this major world event as evidence for the Bible, people will have less excuse to reject the historicity of the Bible. If the Bible is reliable in its history, the theology of the Bible cannot be so easily rejected. Snow and ice are often used in the Bible to represent struggle and hardship, but snow can also represent purity. Thus, this passage from Isaiah represents this book quite well:

> Come now, let us reason together, says the Lord: though your sins are like scarlet, they shall be as white as snow; though they are red like crimson, they shall become like wool (Isaiah 1:18).

Let us now turn our attention to the Ice Age. If you are struggling to believe the Bible, I trust the following pages will answer many of your questions. As those questions are answered, I encourage you to turn to Jesus, who alone can make you whiter than snow.

DR ROBERT CARTER
Ph.D. in Marine Biology,
Senior Scientist/speaker, CMI–US

ENDORSEMENTS

Michael Oard thoroughly documents the geologic evidence for the post-flood Ice Age. Conventional-thinking geologists have argued there were multiple ice ages; however, the geologic evidence confirms there was only one—the Biblical Ice Age. I highly recommend this as a resource to Christians who are fascinated by the mysteries of the Ice Age, to Christian educators interested in diving deeper into creation science apologetics, and to scientists and skeptics who advocate for deep-time interpretations of the geologic record.

CHRISTOPHER RUPE
Biology (BA), Geology (PhD),
President and Founder of Back2Genesis

In this book, Michael Oard illustrates how the Bible opens new insights and solves the seemingly unsolvable problems arising from the secular worldview. He shows that the fears of climate catastrophe swirling in our culture today are by and large generated by a wrong understanding of the Ice Age.

Understanding the Ice Age involves many different research disciplines and has many far-reaching implications. Michael Oard has done a great job in addressing these. I endorse this book, which is immaculately researched, comprehensive, soundly based, authoritative, and easy to read.

TASMAN WALKER
B.Sc.(Hons.), B.Eng.(Hons.), Ph.D.

DEDICATION

I DEDICATE THIS BOOK on the Ice Age to my good friend and colleague in Atmospheric Science, Dr Larry Vardiman, and to his supportive wife of nearly 60 years, Jeannette. Larry received his PhD degree in Atmospheric Science at Colorado State University. After a stint in cloud physics research, he joined Christian Heritage College and the Institute for Creation Research (ICR) in 1982. Larry retired from ICR in 2012 after 30 years of research. During that time, he had the privilege of managing the RATE (Radioisotopes and the Age of The Earth) project on dating methods with eight esteemed creation scientists.

Larry especially researched the Ice Age. His special expertise was modelling aspects of the Ice Age, especially the amount of precipitation that resulted on various areas of the continents caused by the warm post-Flood ocean. With his help and encouragement, I was able to write an ICR monograph on ice cores.

After his retirement from ICR, Dr Vardiman taught for a while at Shasta Bible College. He has since moved to Coeur d'Alene, Idaho, where he has written 27 murder mystery novels featuring the great detective Maurice Bordeau, which can be found on Amazon.com. I greatly appreciate the work we have done on the Ice Age—Larry from a computer modeling perspective and me from a broad-scale view of the Ice Age.

DR LARRY VARDIMAN, and his wife JEANNETTE VARDIMAN

PREFACE

THE ICE AGE has a curious place in the biblical framework. It is not directly mentioned in Scripture. (Perhaps Job 38:22–30 suggests an Ice Age climate, but we cannot be sure.) Nonetheless, there is abundant evidence for Ice Age conditions in the past.

For many skeptics, this poses a problem for the Bible. How can the Bible be silent about something so powerfully evident in geology? However, the problems posed go deeper. Many skeptics say that the evidence for Ice Age conditions contradicts the timescale of Scripture based on the genealogies of Genesis 5 and 11, as well as statements by Jesus and Paul.[1,2]

Secular scientists claim each ice age takes tens to hundreds of thousands of years. Furthermore, they claim there were 50 ice ages, which would take millions of years. However, they have yet to explain how one ice age developed, let alone 50. There are also many mysteries about the ice age conditions which the long-age framework has not been able to solve for over 200 years.

However, the Bible provides the proper framework in which to understand the evidence for Ice Age conditions. A single, intense Ice Age would have been caused by the conditions at the end of Noah's Flood in Genesis 6–9. Moreover, meteorology, climatology, geology, glaciology, and paleontology applied to the climatic consequences of the Genesis Flood can readily explain the Ice Age.

The biblical Ice Age also solves many other mysteries that secular science has not been able to solve for over 200 years. For example, a *single* Ice Age *caused by the Genesis Flood* answers why:

- Millions of woolly mammoths lived near the Arctic Ocean, died, and were entombed in permafrost.
- Many non-glaciated areas near the ice sheets were like the Serengeti of Africa. In those areas, cold- and warm-adapted animals lived together and were buried together.
- At the end of the Ice Age, 66% of large mammals disappeared from the earth.
- Areas that today are semi-arid or deserts were wet during the Ice Age.
- Only the mountains of Siberia and Alaska were glaciated.

I have worked together with other scientists on the Ice Age for over 45 years. This book is an updated summary of most of what we have published in books and articles during that time. Part I deals with the abundant evidence for an ice age. Part II shows how the climatic consequences of Noah's Flood can explain the Ice Age. Part III delves into how the earth was repopulated during the Ice Age. Part IV shows how the biblical Ice Age can explain the other mysteries of earth science during the time of the Ice Age.

The book is geared for those who are seeking a more complete explanation of the science behind the biblical Ice Age. Material that goes into greater detail will be either placed in in-depth sections or appendixes. A glossary is provided. Numerous references are listed as footnotes for further research.

Scientific and dating terms and common abbreviations

- Standard SI unit symbols are used throughout, usually with conversion to US customary units. For example, 1 metre (m) ≅ 3.28 feet, 1 joule (J) ≅ 0.24 calories (cal), 1 km ≅ 0.62 miles. For mammoth masses, the most common unit is the tonne (t) = 10^3 kg with 1 kg ≅ 2.2 lb. *Micron* is a common term for micrometre = a millionth of a metre = 1 μm = 10^{-6} m.
- To convert Celsius *temperature* to Fahrenheit temperature, multiply by $^9/_5$ then add 32. But to convert a temperature *change* (i.e. something is hotter or cooler) from Celsius degrees to Fahrenheit degrees, just multiply by $^9/_5$. E.g. water boils at 100°C: multiply by $^9/_5$ then add 32 to give 212°F. This is 100 Celsius degrees hotter

than freezing point. It is also 180 Fahrenheit degrees hotter (212–32), or $^{9}/_{5} \times 100$.

- For most conversions, the same number of significant figures is used. E.g. if ice thickness was known to be 100 m *to the nearest metre*, the conversion would be 328 ft. But if 100 m was just a round figure, the conversion would also be to the round figure of 300 ft.
- Note that mass is different from weight. Weight is the strength of gravity on an object. So, the mammoths would have possessed the same mass on the moon but ⅙ the weight. However, many people, including scientists, sometimes slip into the language of mammoths 'weighing' so many tonnes.
- The unit of weight must be a force unit, the newton (N). 1 kg on earth weighs ~9.81 N, and 1 lb weighs ~4.45 N.
- We also use the standard evolutionary names for rock strata, so communication is possible. But we make it clear that we deny the claimed millions of years age of these rock layers. We also use the objective stratigraphic terms such as "upper Cretaceous" and "lower Jurassic", rather than the evolutionary terms "late Cretaceous" and "early Jurassic", since these layers were all laid down during the Flood year of Noah's time.
- Ga = giga-annum or a billion (10^9) years ago; Ma = mega-annum or a million years ago; ka = kilo-annum or a thousand years ago—these are (alleged) *dates*. For *duration*, it is Gyr, Myr, kyr, e.g., evolutionists believe that the Mesozoic Era was 252–65 Ma; thus, it lasted 187 Myr.
- ARJ = *Answers Research Journal.*
- CAB = Batten, D. (Ed.), Catchpoole, D., Sarfati, J., and Wieland, C., *The Creation Answers Book*, 9th Edn, Creation Book Publishers, Atlanta, GA, 2018; creation.com/cab.
- CBP = Creation Book Publishers, Creation Book Publishers, Powder Springs, Georgia, USA, 2019.
- CRS = Creation Research Society, Glendale, Arizona, USA.
- CRSQ = *Creation Research Society Quarterly.*
- ICC = International Conference on Creationism, Creation Science Fellowship, Pittsburgh, Pennsylvania (as of 2023, Cedarville, Ohio), USA.
- ICR = Institute for Creation Research, Dallas, Texas, USA.
- MB = Master Books, Green Forest, Arkansas, USA.
- PNAS = *Proceedings of the National Academy of Sciences.*
- Throughout the book, we will highlight terms (in **bold blue**) that are further explained in the Glossary at the back of the book.

References and notes

1. Oard, M.J. and Reed, J.K., *How Noah's Flood Shaped Our Earth*, CBP, 2017.
2. Oard, M.J., *The Deep Time Deception: Examining the Case for Millions of Years*, CBP, 2019.

ACKNOWLEDGMENTS

A BOOK IS A group project that includes artists, reviewers, layout designers, and administrators who oversee the details from the first draft to the published book. I thank all of them, and in particular CMI for publishing the book. I especially thank my wife, Beverly, for doing the initial review to make the English more presentable. Special thanks go to Shaun Doyle of CMI New Zealand who did the heavy editing at the beginning. I also thank Jonathan Sarfati and Russell Grigg, as always providing insightful reviews later in the process. I also thank my artist, Mrs Melanie Richard for drawing many diagrams. Others supplied photos, including Mats Molén, Tas Walker, my oldest son David Oard, Rick Thompson, Peter Klevberg, Keaton Halley, and CMI artists, and I thank them all. I appreciate Jim Dick for giving permission to use one of his paintings. And last of all I thank enumerable people for providing ideas, disagreeing with me on certain aspects so that I do more research, and encouraging me through 50 years of research. Besides these many people, fellow atmospheric scientists, Larry Vardiman, has provided much inspiration and to whom the book is dedicated.

Part I

IS THERE EVIDENCE OF AN ICE AGE?

WHAT IS AN 'ICE AGE'? Is there evidence for any ice age? A few Christians believe there never was an ice age, and some are not sure. Why? Secular scientists claim an ice age takes hundreds of thousands of years, and there have been dozens of them. This does not fit with the Bible! But there is abundant evidence for an ice age. In fact, the history surrounding the discovery of an ice age is quite surprising. But most importantly, the secular story is not the only way to look at the evidence. There is a biblical view of the Ice Age. In fact, instead of challenging the Bible, an ice age affirms the Bible but remains an unsolved mystery for secular earth science.

Chapter 1

Ice sheets past and present

CLIMATE CHANGE is a constant refrain in the media. The message is that it is serious, and that humans are at fault. Schools go to great lengths in educating children about how it is a threat to their future. Yet, global warming so far has only been about 1°C (1.8°F) since measurements began in 1850. Climate change has been a part of earth history since the Fall of man.[1,2,3] This includes the biblical Ice Age, which was followed by drought, and much later the Little Ice Age. This book is an account of the last major climate event in history, the Great Ice Age when temperatures plummeted about 20°C (36°F) below normal at high latitudes.

What is an ice age?

The Cambridge Dictionary defines an '**ice age**' as "a time in the past when the temperature was very cold and **glaciers** covered large parts of the earth".[4] **Ice sheets** are of very large size such as the Greenland and Antarctic Ice Sheets, while a glacier covers a smaller area. Currently, snow and ice in the form of glaciers and ice sheets cover about 10% of the earth's land surface, the vast majority of which are in Greenland and Antarctica.[5] During the Great Ice Age,[6] ice and snow covered about 30% of the land, mostly in the mid and high latitudes. Tropical mountains also had glaciers around 1,000 m (3,300 ft) lower than the present-day **snowline**, which currently stands at about 4,500 m (14,800 ft) above sea level (asl).

The work of glaciers

To learn how much of the land was glaciated during the Ice Age, scientists explore areas that are glaciated today and study the clues they left

behind. Since most glaciers in the world are receding due to global warming,[7] it is easy to study how glaciers moved earth, and to study the characteristics of the debris they left behind. Through years of studying the surface of the earth, scientists found tell-tale signs of widespread glaciation. From this they could estimate the extent of Ice Age ice sheets and mountain **ice caps**.

The Athabasca Glacier in the Canadian Rocky Mountains is an excellent modern example of glaciation. It has been receding since about 1890, after advancing through the **Little Ice Age** (figure 1.1). We can see today that nearly 130 years of recession has left a trail of a random mixture of rocks of every size, even down to fine-grained particles. This mixture is called glacial **till** or **ground moraine**. An old term for glacial debris is '**drift**' or **diluvium**. It was so named because scientists once thought that the debris was deposited by Noah's Flood, but when the Ice Age was discovered, the debris was easily associated with the Ice Age. Since this debris was thought to be the extent of the deposits from the Genesis Flood, this reassignment caused the Genesis Flood to disappear entirely from the secular geological mindset.

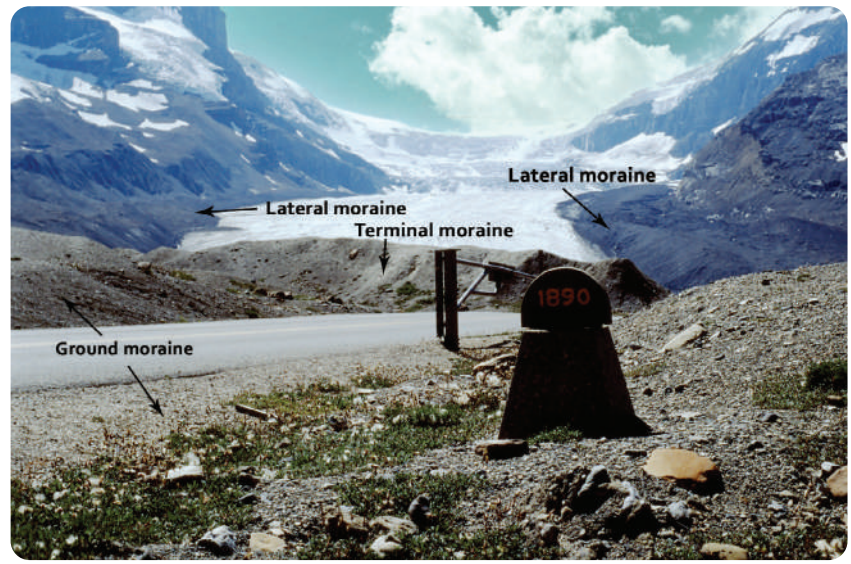


Figure 1.1. The Athabasca glacier in the Canadian Rocky Mountains showing ground moraine, a terminal moraine, and two lateral moraines (arrows).

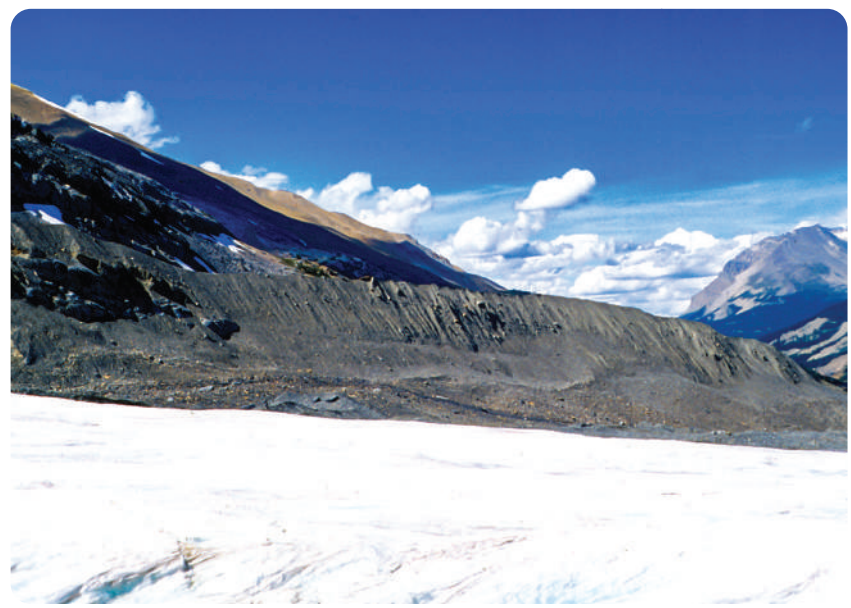


Figure 1.2. Close up of one of the lateral moraines on the Athabasca glacier. Notice rocks of all sizes in the ridge.

Notice in the figure the lateral and end **moraines** (arrows) associated with the Athabasca Glacier. A moraine is a ridge, mound, or other marked build-up of glacial till. **Lateral moraines** form along the sides of glaciers as ice pushes debris toward the edge. Figure 1.2 shows a close-up of one of the lateral moraines. Debris is also pushed ahead of the advancing front, forming a **terminal moraine**, also called an **end moraine**. Terminal moraines mark where the glacier stopped growing. The lateral moraines, terminal moraines, and hummocky ground moraines are all composed of a distinctive mix of larger stones of all sizes within a fine-grained matrix.

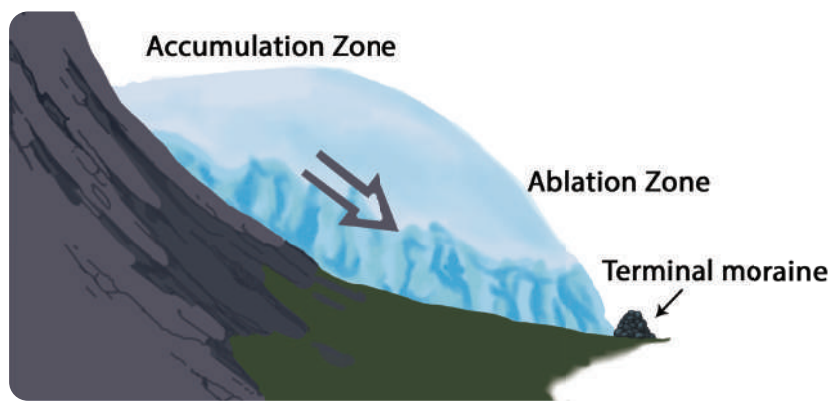
In addition to moraines and till, glaciers leave rocks that became incorporated into the base of the ice. These became scratched or **striated**, and they also striate the bedrock (figure 1.3). Striations on bedrock indicate the direction of glacial movement. But rocks in the ice at the bottom of the glacier can shift, causing the rocks themselves to be striated in different directions (figure 1.4). A glacier primarily moves because of its surface and bottom slope. Storms deposit snow in the **accumulation zone**. Down glacier from the accumulation zone is the **ablation zone**, where the glacier melts during the summer (figure 1.5).

Evidence of an ice age in currently non-glacial areas

Scientists search for glacial features in currently non-glaciated areas. Lateral and terminal moraines are unique to glaciation, so they mark an area that was once glaciated. It is very common to find striated boulders and bedrock in these areas. However, scientists must be cautious because till-like debris, striated rocks and bedrock, and a few other features created by glaciers can also be produced by landslides.[8] They differ in that landslide features are mainly found within cemented sedimentary rocks, while real Ice Age features are on the surface and are rarely cemented together.

Figure 1.3. Scratched bedrock from movement of the Athabasca glacier, Canadian Rocky Mountains.

Figure 1.4. Scratched boulder from the Athabasca glacier. Note that there are scratches in different directions because the boulder shifted at the base of the glacier during movement.



Drawn by Mrs Melanie Richard

Figure 1.5. The upper accumulation zone and the lower ablation (melting) zone of a valley glacier.

Glacial features are common over much of the mid and high latitudes of the earth. Figure 1.6 shows a rounded end moraine about 30 km (19 mi) east of the Rocky Mountain Front in north-central Montana, USA. A close-up of the debris in this moraine shows it is composed of rocks of all sizes within a finer-grained matrix (figure 1.7), similar to modern glacial moraines. Some of the rocks are scratched in different directions (figure 1.8). Going west, the first clifftop of the Rocky Mountains displays scratched bedrock (figure 1.9). These features show the northern Rocky Mountains were once glaciated and the ice spread about 30 km (19 mi) east onto the High Plains. Today, winter snow easily melts in the spring and does not return until the next fall or winter, making glacier accumulation impossible (see chapter 5).

Distinctive sharp-crested moraines are found at the edges of many mountain ranges in the western United States, including the San Francisco Mountains of northern Arizona, USA. They are also found around and within the Cascade Mountains of Oregon and Washington, USA, and the Sierra Nevada Mountains of California, USA. We find Ice Age features in the northern United

Figure 1.6. Subdued end moraine from an ice cap in the northern Rockies of Montana, USA (view southwest from top of the moraine and over a moraine breach by probably a dammed lake during deglaciation).

Figure 1.7. Close up of moraine in figure 1.6 showing rocks of all sizes in a finer-grained matrix.

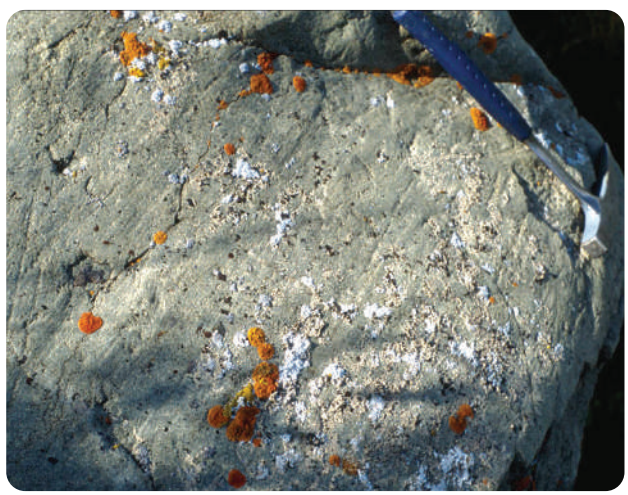


Figure 1.8. A scratched boulder with scratches in different direction from the end moraine seen in figure 1.6.

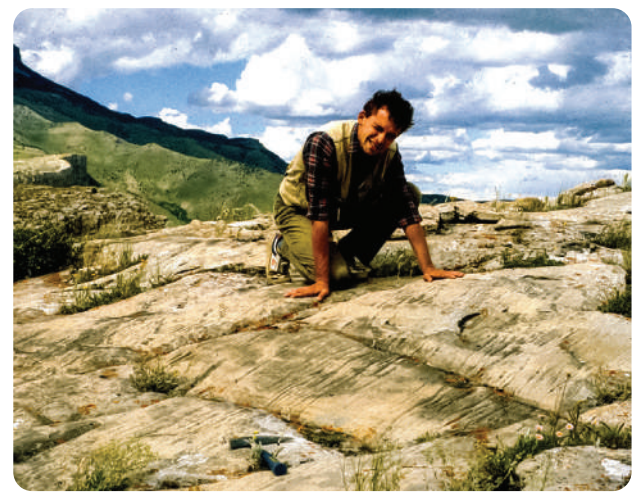


Figure 1.9. Scratched bedrock on top of first cliff of the Rocky Mountain front west of end moraine shown in figure 1.6.

States and most of Canada. Figure 1.10 shows striated granite from the ice sheet in Acadia National Park, Maine, USA. This striated surface even has special ice friction features, such as **lunate fractures** and **chattermarks** that formed when a rock was pushed down with great force by the ice (figure 1.11).

Distinct lateral and end moraines can form a horseshoe-shaped ridge of debris at the mouth of mountain valleys. One of the best examples of these is found in the northern Wallowa Mountains of northeast Oregon, USA, at Wallowa Lake (figure 1.12). The lateral moraine rises about 180 m (600 ft) above the lake, as seen by the trees at the far end (figure 1.13). Road cuts through it show typical glacial till (figure 1.14). These **landforms** provide evidence that there was an ice cap over the Wallowa Mountains, and a valley glacier about 600 m (2,000 ft) high extending out onto the plain. Today, this area warms to an average high of about 32°C (90°F) during summer. The average summer temperature would need to drop below 0°C (32°F) to sustain a glacier or ice cap in these mountains (see chapter 5)

Figure 1.10. Striated pavement on granite from Acadia National Park, Maine, USA.

Figure 1.11. Lunate fractures on granite from Acadia National Park, Maine, USA. Glacial flow was from bottom right to top left.

Figure 1.12. The horseshoe-shaped end and lateral moraines around Wallowa Lake in the Northeast Wallowa Mountains, Oregon, USA.

Figure 1.13. Lateral moraine on east side of Wallowa Lake (view south). Moraine is 180 m (600 ft) high (notice trees for scale).

There are thousands of such glacial features across the planet. Together they provide clear evidence that there once was an Ice Age.

Locations of past ice sheets

When all the information on glaciation is pieced together, we know the extent of the ice sheets and mountain ice caps. In North America, they covered most of Canada, the mountains of Alaska, and the northern United States (figure 1.15). The lowlands of Alaska and the northwest Yukon Territory remained unglaciated. The unglaciated areas are a problem for secular Earth science because their computer models cannot explain why they were never glaciated (see chapter 17). The Laurentide Ice Sheet covered central and eastern Canada, dipping south into the northern United States. It was the largest ice sheet. The Cordilleran Ice Sheet covered British Columbia and the adjacent northern United States, and the Innuitian Ice Sheet covered northeast Canada.

Northern Europe and northwest Asia were home to the Scandinavian Ice Sheet (figure 1.16). Its European southern boundary is well known, but the northwest Asian boundary is still debated. Scientists once thought the northern edge of the ice was in northern Norway, but they now believe it extended into the shallow Barents Sea north of Norway, as far as the Svalbard (Spitzbergen) Archipelago at about 80°N (see chapter 7). This became obvious when they discovered numerous spectacular glacial features on the ocean-bottom of the Barents Sea. Like the lowlands of Alaska and the Yukon Territory, the lowlands of Siberia were unexpectedly never glaciated.

The lowland areas of the far north are where millions of woolly mammoths and numerous other mammals lived during the Ice Age. We even find complete carcasses of the woolly mammoth in the **permafrost** (see chapter 21). *Permafrost* is permanently frozen ground where only the top half metre (1–2 ft) melts during the summer.

Figure 1.14. Road cut through the lateral moraine in figure 1.13 showing the typical texture of glacial debris with rocks of all sizes within a finer-grained matrix.

Figure 1.15. General ice cover over North America at the peak of the Ice Age (from *Life in the Great Ice Age*).

Figure 1.16. General ice cover over Europe and Asia at the peak of the Ice Age (from *Life in the Great Ice Age*).

Figure 1.17. Mount Kosciuszko in southeast Australia—the only location glaciated during the Great Ice Age.

In addition to the large ice sheets, glaciers and ice caps covered many mountainous areas of the world. In the Northern Hemisphere, these include many of the mountains of the western United States, Europe, and Asia. In the Southern Hemisphere, with the exception of Antarctica, the snow and ice were mainly confined to the Andes Mountains of South America, the Alps of New Zealand, and Tasmania. Only Mount Kosciuszko in southeast Australia was glaciated (figure 1.17). At 2,228 m (7,310 ft) high, it is the highest mountain in Australia and has a sky lift.

Evidence for the Ice Age is found all over the world. However, the biblical Ice Age is not the

only explanation offered for this evidence. Secular scientists have their own version of 'ice ages'. How does this differ from the biblical Ice Age?

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2. Hebert, J., *The Climate Change Conflict: Keeping Cool over Global Warming*, ICR, 2019.
3. Batten, D., Anthropogenic Global Warming (AGW)—a biblical and scientific approach to climate change, creation.com/climate-change, last update 3 Feb 2023.
4. Ice Age, dictionary.cambridge.org, accessed 1 Jul 2020.
5. Oard, M.J., *The Frozen Record: Examining the Ice Core History of the Greenland and Antarctic Ice Sheets*, ICR 2005 (print on demand copy available from Institute for Creation Research).
6. As opposed to the 'Little Ice Age' between about 1300 AD and 1900 AD in which all the glaciers in the world advanced. But the effects of the Little Ice Age were small, with the snow line lowering only about 100 m (330 ft) compared to the Great Ice Age. When referring to the Great Ice Age, I will just write the Ice Age in capital letters.
7. As of about 2022, global warming is said to be about 1.1°C (2.0°F) since 1880. Since my main field of study has been atmospheric science, examining the data shows that natural processes can account for more than 50% and man adding carbon dioxide to the atmosphere less than 50% of this global warming. See, Oard, M.J., *The Great Global Warming Debate* (DVD), Creation Ministries International, Powder Springs, GA, 2011; and Oard, M.J., *Wonders of Creation: The New Weather Book*, MB, 2015.
8. Oard, M.J., *Ancient Ice Ages or Gigantic Submarine Landslides?* CRS, 1997.