

January 3, 2022

News and Views



New Year Fireworks

Credit: [Ondrej](#), [public domain](#)

Happy New year everyone! Before going on to look at the [Ordovician Period](#), here are some news items that I thought were interesting:

Earthquakes and Seismology

- Discovered by analysis of seismic waves: [Possible chemical leftovers from early Earth sit near the core.](#)
- This could be useful: [Using sparse data to predict lab earthquakes.](#)
- [Earthquake depth impacts potential tsunami threat.](#)
- [‘Hell of a way to wake up’: Darwin shaken by earthquake off Indonesian coast;](#) Darwin, Australia shaken by 7.3 M earthquake beneath in the Banda Sea.
- Related, earthquake swarm in Indonesia: [BMKG records 27 earthquakes in Aceh-North Sumatra on December 17-23](#) and [7.4 earthquake rattles Indonesia, Australia.](#)
- Earthquake swarm in South Carolina, USA: [7 earthquakes detected near Columbia this week, highest magnitude was 3.3.](#)
- Earthquake in Texas, from the United States Geological Survey (USGS): [M 4.5 - 18 km N of Stanton, Texas.](#)
- [Magnitude 6.2 earthquake strikes off North California coast.](#)
- Also from the USGS: [Earthquake hazard model for the Hawaiian Islands.](#)
- [Latest earthquakes](#) from the USGS.

Mining

- [Top 20 mining stories of 2021.](#)
- [2021 was the year clean energy finally faced its mining problem.](#)
- Related: [All the mines Tesla needs to build 20 million cars a year.](#)
- [Surge Battery Metals Announces Preliminary Results from its Lithium Exploration Programs in Northern Nevada.](#)
- [Base metals shine in 2021 on robust China demand, supply concerns.](#)
- [Top gold stories of the year and what to expect in 2022.](#)
- Not new, but still interesting: Mines around the world [Part 1](#), [Part 2](#), and [Part 3](#).

Energy

- From the U.S. Energy Information Administration(USEIA): [Energy prices rose more than other commodities in 2021.](#)
- This is interesting also from the USEIA: [Hourly Electric Grid Monitor.](#)
- From Oilprice.com: [What's In Store For Energy Prices In 2022?](#)

Paleontology

- CT scanning of fossils: [Medical scan reveals the secrets of New Zealand's extinct marine reptiles.](#)
- [10 extraordinary dinosaur discoveries from 2021.](#)
- [Seven New Things We Learned About Human Evolution in 2021.](#)
- [Fossil discovery of 5 mammoths along with Neanderthal tools reveals life in ice age.](#)
- Giant ichthyosaur: [Earth's first known giant creature.](#)
- [Sauropod dinosaurs were restricted to warmer regions of Earth.](#)
- [World's Largest Flying Animal – With a Wingspan Nearing 40 Feet – Leaped Aloft To Fly.](#)
- [Extinct shark named after LSU museum official as she retires.](#)

Other Rants

Some entertaining observations on the world:

- One of the best writers around, J. H. Kunstler: [Forecast 2022 — Dumpster Fire Blazing on the Frontier of a Dark Age.](#)
 - Dave Collum, distinguished Professor of Chemistry at Cornell University, [2021 Year in Review: Crisis of Authority and the Age of Narratives.](#)
 - The Z Man: 2021 [Year In Review](#) and [2022 Predictions](#)
-

January 3, 2022

Ordovician Period - Part 1

Overview

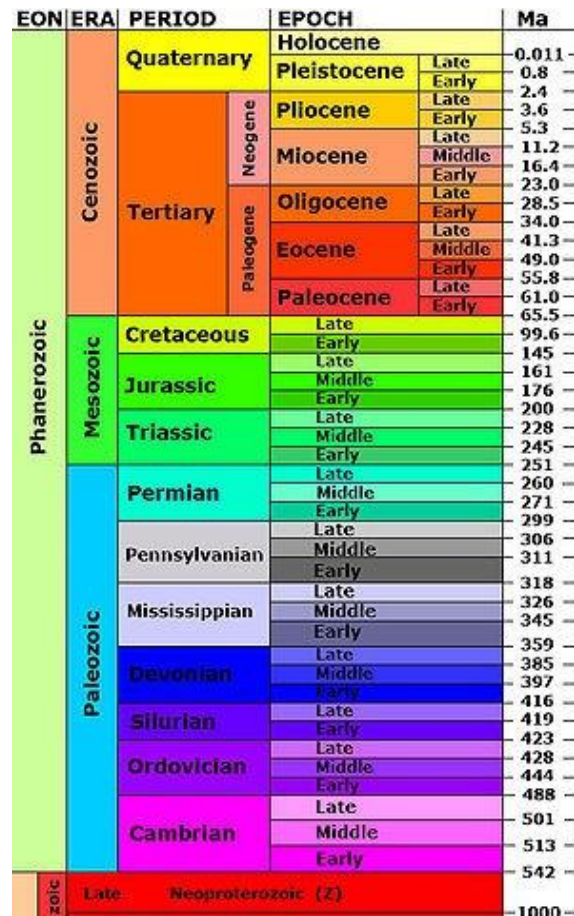


Figure 1 - Phanerozoic Time Scale

Credit: Modified from File: [Geologic time scale.jpg](#),
[United States Geological Survey](#), public domain

In this week's posting, we'll take an overview of the Ordovician Period and look at the layout of the continents (paleogeography) during that time together with a discussion of the major events of the Period. Next week, we'll examine the history of life during the Ordovician, including the [Great Ordovician Biodiversification Event](#) and the mass extinctions that mark the beginning and end of the Period.

The Ordovician Period lasted from between 485.4 and 443.8 million years ago (Mya). and is divided into the Early, Middle and Late Ordovician Epochs. Figure 2 shows the organization of its subdivisions, as approved by the [International Commission on Stratigraphy](#):



ORDOVICIAN CHRONOSTRATIGRAPHIC CHART

International Subcommission on Ordovician Stratigraphy



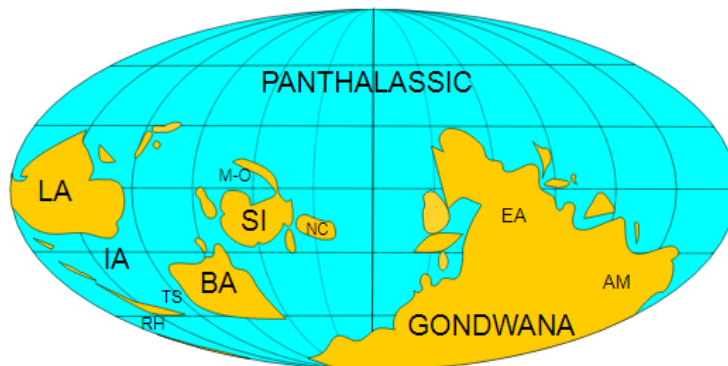
GLOBAL		UNITED KINGDOM		NORTH AMERICA		BALTOSCANDIA		AUSTRALIA		CHINA		SIBERIA		MEDITERRANEAN & N.GONDWANA		Stage Slices (SS)
SYSTEM	SERIES	STAGE	SERIES	STAGE	SERIES	STAGE	SERIES	STAGE	SERIES	STAGE	SERIES	STAGE	SERIES	STAGE	STAGE	
ORDOVICIAN	UPPER ORDOVICIAN	HIRNANTIAN	ASHGILL	HIRNANTIAN	CINCINNATIAN	GAMACHIAN	HARJU	PORKUNI	BOLINDIAN	HIRNANTIAN	GSSP	CHENTANGKIANGIAN	UPPER	Not distinguished	HIRNANTIAN (=KOSOVIAN)	H2
			RAWTHEYAN CAUTLEYAN PUSGILLIAN	RICHMONDIAN MAYSVILLIAN EDENIAN		PIRGU YORMISI NARJIA		UPPER								NEICHIASHA-NIAN
		STREFFORDIAN CHENEYAN	CHATFIELDIAN	HALJALA KUKRUSE	UPPER	CHERTOVSKIAN	BEROUNIAN		Ka4 Ka3 Ka2							
		BURRELLIAN	TURINIAN	GISBOR-NIAN				UPPER	DOBROTVIAN	Sa2						
		AURELUCIAN	CHAZYAN	UJAKU LASHNAMAGI ASERI KUNDA	UPPER	ORETANIAN	Sa1									
	LLANDEILIAN	Not distinguished	GSSP	MIDDLE				DARRIWILIAN	KIMAIAIAN	Dw3						
	ABEREIDDIAN				VOLKHOV	YAPEENIAN	MIDDLE			DAPINGIAN	ARENIGIAN	Dw2 Dw1 Dp3 Dp2				
	WHITLANDIAN	RANGERIAN	BILLINGEN	MIDDLE	GSSP	UGORIAN		Dp1								
	MORIDUNIAN	BLACK HILLSIAN	HUNNEBERG GSSP VARANGU				LOWER		FLOIAN	NYAIAIAN	F3 F2 F1					
	MIGNEINTIAN	IBEXIAN	TULEAN	LOWER	TREMADOCIAN	TREMADOCIAN		Tr3 Tr2 Tr1								
GRESSAGIAN	STAIRSIAN SKULLROCKIAN GSSP	PAKERORT	LOWER													

Fig. 1. Chart showing proposed correlation between the new global series and stages and regional chronostratigraphic units recognized in major outcrop areas of Ordovician rocks. Also shown are the stratigraphic positions of the stage slices (SS) defined in the present study. The Siberian and Iberian columns were compiled by Andrei Dronov and Juan Carlos Gutiérrez-Marco, respectively. The Global Boundary Stratotype Section and Point (GSSP) boxes in the North American column refer to the base of the Ordovician System and the base of the Katian Stage, respectively; those in the Baltoscandian column to the bases of the Floian and Sandbian Stages, respectively; and those in the Chinese column to the bases of the Dapingian, Darriwilian, and Hirnantian Stages, respectively.

Figure 2 - The Divisions of the Ordovician

Credit: The International Subcommission on Ordovician Stratigraphy

Paleogeography



Legend: AM = Amazonia, BA = Baltica, EA = East Antarctica, LA = Laurentia, IA = Iapetus Ocean, M-O = Mongol-Okhotsk Ocean, NC = North China, RH = Rheic Ocean, TS = Tornquist Ocean

Figure 3 - Paleogeography of the Ordovician

**Credit: Kent G. Budge, Creative Commons
CC0 1.0 Universal Public Domain Dedication**

During the Ordovician Period, the continents clustered around the South Pole. The [Iapetus Ocean](#) separated [Laurentia](#) (present-day North America), [Siberia](#), and [Baltica](#) (present-day northern Europe). Baltica began to move towards Laurentia later in the Ordovician, causing the Iapetus Ocean to shrink between them.

During the Ordovician, the southern continental cratons of Africa, Amazonia, Australia, East Antarctica, India, and Madagascar, were collected into [Gondwana](#), sometimes called Gondwanaland. During the Ordovician, Gondwana drifted from the equatorial latitudes toward the South Pole. The small continent [Avalonia](#) separated from Gondwana and began to head north towards Baltica and Laurentia and the [Rheic Ocean](#) between Gondwana and Avalonia was formed as a result.

The [Taconic orogeny](#), a major mountain-building episode that began during the Cambrian continued into the Ordovician. times. At the beginning of the Late Ordovician, volcanic island arcs formed along the margin of the Iapetus Ocean. These volcanic island arcs eventually collided with Laurentia and are now part of the Appalachian mountains. By the end of the Late Ordovician the volcanic activity had stopped.

Climate and Marine Transgression

The Ordovician Period was a time of major global warming; early in the Period, marine waters may have been as high as 45°C. However, by the end of the Ordovician, the climate became cooler, so that by 460 Mya the average ocean temperatures became comparable to those of present day equatorial waters.



Figure 4 - Marine Transgression Sequence, Late Ordovician - Early Silurian, Hovedøya, Norway
Credit: [Petter Bøckman](#), [Creative Commons Attribution-Share Alike 3.0 Unported](#) license

The Ordovician Period was also a time of [marine transgression](#), when the sea level rose and covered a good portion of the continental cratons such as Laurentia, Baltica and Gondwana. Many limestone formations were deposited in the shallow clear waters of these [epicontinental seas](#).

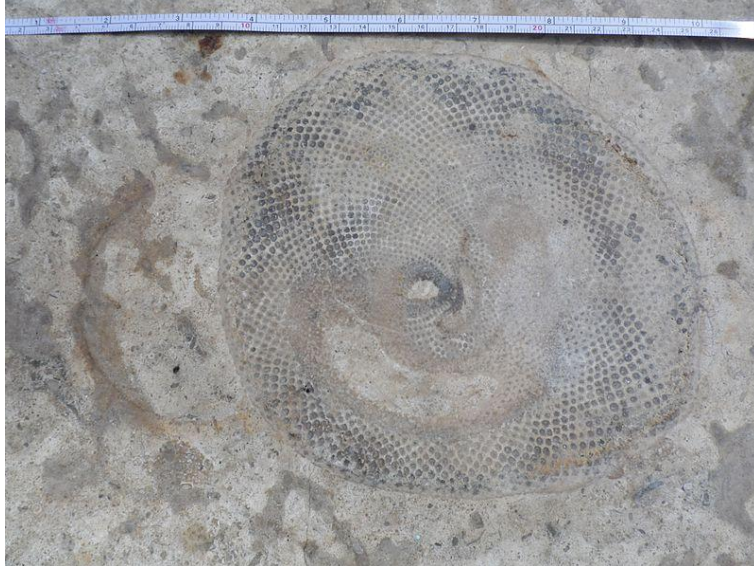


Figure 5 - Tyndall Stone with Stromatolite Fossil

Credit: [Bjorklund21](#), [Creative Commons Attribution-Share Alike 4.0 International](#) license

Among the limestones deposited during the Ordovician is the famous [Tyndall Limestone](#) quarried east of Winnipeg and used to build, among other structures, the [Canadian Parliament Buildings](#) in Ottawa, Ontario, the [Saskatchewan Legislative Building](#) in Regina, Saskatchewan, the [University of Saskatchewan](#) in Saskatoon, Saskatchewan, and the [Manitoba Legislative Building](#) in Winnipeg, Manitoba.

The Ordovician Meteor Event



Figure 6 - Impact Breccia, Hummeln Impact Structure, Sweden

Credit: [James St. John](#), [Creative Commons Attribution 2.0 Generic](#) license

Another noteworthy event of the Ordovician was a [meteor shower](#) that took place during the

Middle Ordovician. Evidence for this multiple meteor strike includes the [Hummeln Impact Structure in Sweden](#), the [Neugrund crater](#) in Estonia, the [Ames crater](#) in Oklahoma, the [Decorah crater](#) in Iowa, the [Slate Islands crater](#) in Lake Superior, and the [Rock Elm crater](#) in Wisconsin.

Some people speculate that the Great Ordovician Biodiversification Event was triggered by the Ordovician meteor event. We'll look at that event, along with the other features of life during the Ordovician, in next week's posting.

Standard Caveat

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.