

July 12, 2021

Opening Notes and Comments

I've upgraded my website with a new tab containing the archive of previous blog entries. From now on, the *Blog* tab will hold the current posting and the *Previous Blog Entries* hold the archive of previous entries. I have some future plans for this blog, and these include:

- Compiling and editing the entries on geoscience into a primer or textbook for people wanting an introduction to geology. I think that I should have enough material for this sometimes in 2022.
- A library of open source material on geology - I've collected a wide range of geology books and papers over the years so I will publish these publicly available to a page on this blog.

News and Views

Here are a few items from the news and the web that I thought were interesting:

Longest known continuous record of the Paleozoic discovered in Yukon wilderness

Uninterrupted deposition of sediments over a long periods of time are rare. Here is a good discussion on a sedimentary sequence recently studied in the Yukon; published in [Phys.org](#) and in [Science Advances](#).

California Shaking

A tectonically active place, California often experiences earthquakes. Recently, there have been a [swarm of earthquakes](#) in the vicinity of Yosemite National Park and a [magnitude 6.0 earthquake](#).

Iceland Volcanoes

Here is an interesting [YouTube video](#) on one of the recent volcanic eruptions in Iceland. The geologists had planned to study volcanic geology in Iceland and when they arrived, the volcanoes began erupting.

Clues to Ancient Climate Patterns

Recently formed chert has preserved a [record of changing vegetation](#) in East Africa by preserving pollen in the chert. The changing vegetation reflects changing climate, in this case a progressive desiccation of East Africa over the past million years.

Thoughts on the Future of Industrial Society

John Michael Greer is an unconventional thinker, to put it mildly. All the more reason to listen to him, as far as I'm concerned. In his July 7, 2021 blog posting he muses on the [future of our industrial society](#). Long story short - we are in for a rough ride.

GAC-MAC London 2021 Joint Annual Meeting

The Geological Association of Canada and the Mineralogical Association of Canada will be holding their annual joint meeting in London Ontario this coming November. Some of the meeting will be online and some will be a hybrid online/in person meeting. If it interests you, check out the [website of the meeting](#).

July 12, 2021

Depositional Environments for Sedimentary Rocks - Part 1

In this week's blog all be moving on from igneous rocks to sedimentary rocks and we'll look into the depositional environments for sedimentary rocks.

Sedimentary Basins

We looked at weathering previously in my posting on [May 17, 2021](#). Once rock is weathered and the minerals become broken up and / or altered into new minerals, they can be transported and deposited elsewhere. These methods of transport include water, wind, glaciers and combinations of these three.

Once carried away by wind, water and/or glaciers, the material is deposited in *sedimentary basins*, that is, a depression in the crust of the Earth, often formed by plate tectonic activity in which sediments can accumulate. Over time, the accumulation of deposits can cause further depression or subsidence. Figure 1 illustrates the plate tectonic activity that creates sedimentary basins.

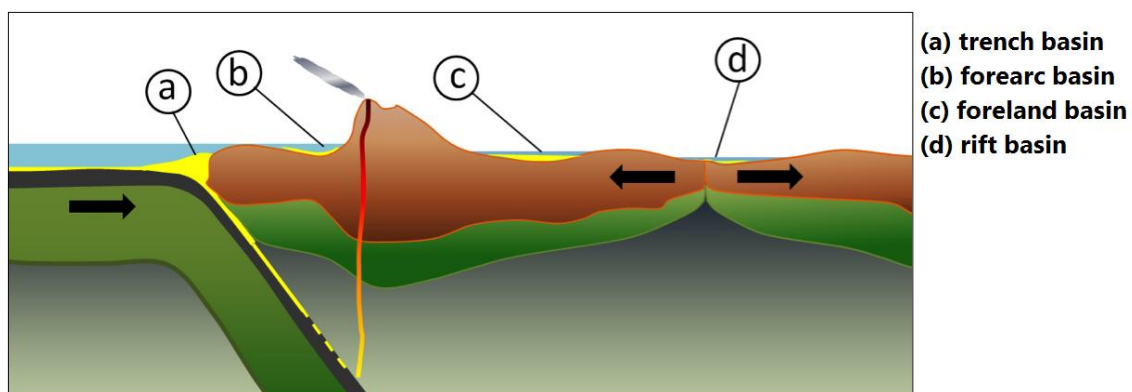


Figure 1 - Tectonically Produced Basins

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Four sedimentary basins are shown Figure 1:

1. A **Trench Basin** is formed over a subduction zone where one tectonic plate is moving under another one. An example of this is the [Cascadia Subduction Zone](#) on the west coast of North America
2. A **Forearc Basin** lies between the subduction zone and the volcanic arc created by the subduction zone further inland. Examples of this include the [Cascadia Forearc basin](#) and the [Central Myanmar Forearc Basin](#).
3. A **Foreland Basin** is found on the far side of the volcanic arc. One of the best large scale examples of this are the late Mesozoic and Cenozoic deposits of the [Western Canada Sedimentary Basin](#).
4. A **Rift Basin** is created where two tectonic plates are moving apart. Examples of these are the [Suez Rift Basin](#) and the nearby [Dead Sea Rift Basin](#).

Depositional Environments

Figure 2 illustrates the main sedimentary depositional environments

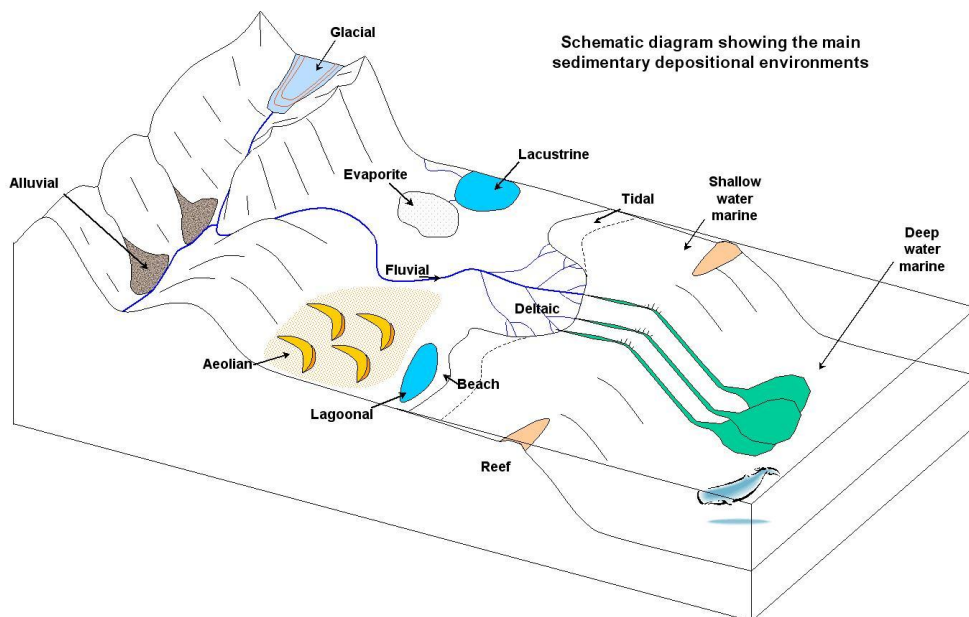


Figure 2 - Sedimentary Depositional Environments

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Sedimentary depositional environments can be divided into two main kinds: terrestrial environments and marine environments. Tables 1 and 2 summarise the kinds of sediments deposited in these two environments.

Table 1 - Terrestrial Depositional Environments			
Environment	Key Transport Processes	Depositional Settings	Typical Sediments
Glacial	Gravity, moving ice, moving water	Valleys, plains, streams, lakes	Glacial till, gravel, sand, silt, clay
Alluvial	Gravity, moving water	Where steep-sided valleys meet plains	Coarse angular fragments
Fluvial	Moving water	Streams	Gravel, sand, silt, organic matter
Aeolian	Wind	Deserts and coastal regions	Sand, silt
Lacustrine	Moving Water	Lakes	Sand, silt, clay, organic matter
Evaporite	Still water	Lakes in arid regions	Salts, clay

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Table 2 - Marine Depositional Environments			
Environment	Key Transport Processes	Depositional Settings	Typical Sediments
Deltaic	Moving water	Deltas	Sand, silt, clay, organic matter
Beach	Waves, long-shore currents	Beaches, spits, sand bars	Gravel, sand
Tidal	Tidal currents	Tidal flats	Fine-grained sand, silt, clay
Reef	Waves, tidal currents	Reefs and adjacent basins	Carbonates
Shallow marine	Waves, tidal currents	Shelves, slopes, lagoons	Carbonates in tropical climates; sand/silt/clay elsewhere.
Lagoonal	Little transportation	Lagoon bottom	Carbonates in tropical climates, silt, clay
Submarine fan	Underwater gravity flows	Continental slopes, abyssal plains	Gravel, sand, silt, clay
Deep water	Ocean currents	Deep-ocean abyssal plains	Clay, carbonate mud, silica mud

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In the next two blog entries, we'll take a look at terrestrial depositional environments and marine depositional environments.

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.