oceans using all these calculations.

However, it's important to stress that this is not the actual age of the oceans, but only a maximum age based on the assumption that there was no salt originally dissolved in the oceans. On the other hand, in the biblical model of earth history, there can be no doubt that God created the oceans initially containing some saltiness, in order that saltwater fish could live within them. Furthermore, during the Flood cataclysm much more salt would have found its way into the oceans due to all the erosion, sedimentation, and volcanism. During this time, the sodium input would have been an order of magnitude or more higher than current input rates. Furthermore, there would have been a much higher input rate of salts as the Flood waters retreated and eroded the current land surface. Thus, the true age of the oceans, using realistic assumptions governed by the biblical framework of earth history, would more likely be only thousands of years.

**Erosion of Continents**

The earth's land surfaces are constantly being weathered and eroded by the water falling on them as rain and flowing over them. Soil, rock, and mineral grains are washed into rivers that transport these as sediments out to the oceans. The rate at which sediments have been transported to, and deposited in, the ocean basins can easily be estimated by measuring the volume of sediments rivers carry at their mouths. River sediment measurements can also be used to calculate the rate at which rivers are eroding the land surfaces they drain. Such measurements show that some rivers are eroding their basins at a rate of 35 inches (900 mm) or more in height per thousand years, while others erode only 0.04 inches (1 mm) per thousand years.[8] Thus, the average height reduction for all the continents across the earth's surface is estimated to be about 2.4 inches (61 mm) per thousand years.

This average rate of land erosion might seem quite slow, but it needs to be seen from the perspective of the uniformitarian geologic timescale, and the current thinking that there has been exposed land surfaces available for erosion for 3.5 billion years.[9] As has already been pointed out, using an estimated average erosion rate of 61 mm per thousand years, the North American continent would be eroded flat to sea level in "a mere 10 million years."[10] Even if the slowest erosion rate of

8 J. N. Holleman, 1968, The sediment yield of major rivers of the world, *Water Resources Research*, 4: 737-747; E. W. Sparks, 1986, Geomorphology, in *Geographies for Advanced Study*, S. H. Beaver, ed., London and New York: Longman Group, 509-510; J. D. Milliman and J. P. M. Syvitski, 1992, Geomorphic/tectonic control of sediment discharge to the ocean: The importance of small mountainous rivers, *Journal of Geology*, 100: 525-544; A. Roth, 1998, *Origins: Linking Science and Scripture*, Hagerstown, MD: Review and Herald Publishing, 264.

9 R. Buick, J. R. Thornett, N. J. McNaughton, J. B. Smith, M. E. Barley and M. Savage, 1995, Record of emergent continental crust ≈3.5 billion years ago in the Pilbara Craton of Australia, *Nature*, 375: 574-577.

10 S. Judson and D. F. Ritter, 1964, Rates of regional denudation in the United States, *Journal of*

only 1 mm per thousand years is used, based on an average of 623 meters above sea level for the continents, the continents would have eroded to sea level in only 623 million years. This, of course, begs the question to why the earth's continents are still above sea level if they are up to 3.5 billion years old. This question is even more acute when one considers mountains ranges such as the Caledonides of western Europe and the Appalachians of eastern North America, which geologists assume are several hundred million years old. Why are these ranges still here today if they are so old? After all, rates of erosion are fast in mountainous regions, with erosion rates as high as 1,000 mm per thousand years in the Himalayas.[11]

However, another way of highlighting this glaring discrepancy is to again consider the erosion rates based on quantities of sediments delivered by rivers to the ocean basins from the continents. Calculations have varied from 8,000 million to 58,000 million metric tons per year.[12] These estimates are probably low, because normal measuring procedures do not account for the rare catastrophic events (such as local floods), during which the transport of sediments increases considerably. They also do not consider the sediments that are rolled or pushed along the beds of rivers. Nevertheless, the average rate from a dozen studies is 24,108 million metric tons per year. At this rate, the average height of the world's continents (623 meters) above sea level would erode away in about 9.6 million years, a figure close to the already published 10 million year figure for North America.

Geologists often maintain that mountains still exist because uplift is constantly renewing them from below.[13] However, even though mountains are still rising, the process of uplift and erosion could not continue long without eradicating ancient sedimentary layers contained in the mountains. Yet sedimentary strata that are supposedly very ancient are still well represented in the earth's mountain ranges, as well as elsewhere. Even taking into account that human agricultural practices have increased erosion rates, such an explanation does little to resolve the discrepancy. Proposing a dry climate in the past, and thus slower erosion rates, also will not resolve the discrepancy, because estimates of global precipitation suggest variable but average, or even slightly wetter, conditions over the past three billion years.[14]

Another problematic discrepancy for the supposed long geologic ages is allegedly ancient planar land surfaces, which stretch over large areas and yet show little or no evidence of erosion. For example, Kangaroo Island off the southern Australian

*Geophysical Research*, 69: 3395-3401; R. H. Dott, Jr. and R. L. Batten, 1988, *Evolution of the Earth*, fourth edition, New York, St. Louis, and San Francisco: McGraw-Hill Book Company, 155.

11 H. W. Menard, 1961, Some rates of regional erosion, *Journal of Geology*, 69: 154-161.

12 A. Roth, 1998, 265, Table 15.2, based on sources indicated therein.

13 H. Blatt, G. Middleton and R. Murray, 1980, *Origin of Sedimentary Rocks*, second edition, Englewood Cliffs, NJ: Prentice-Hall, 18.

14 L. A. Frakes, 1979, *Climates Throughout Geologic Time*, Figure 9-1, Amsterdam, Oxford, and New York: Elsevier, 261.

coast covers an area of about 87 miles (140 km long) by 37 miles (60 km wide) and is extremely flat. However, the surface is estimated to be at least 160 million years old, based on both fossil and potassium-argon "dating."[15] How could such a surface exist for 160 million years without rainfall and surface water flow resulting in some pattern of channelized erosion, when there is very little evidence of such?

The alleged antiquity of erosion surfaces compared with the overall rate of erosion of land surfaces is indeed an insurmountable problem for uniformitarian dating methods. Nevertheless, evolutionary geologists still cling to the dates in the face of "common sense," as has been admitted:

> If some facets of the contemporary landscape are indeed as old as is suggested by the field evidence they not only constitute denial of commonsense and everyday observations but they also carry considerable implications for general theory.[16]

Quite clearly, the earth's continental land surfaces aren't all that old, and thus neither is the earth itself.

**Sea Floor Sediments**

The sediments eroded from the continental land surfaces are carried by rivers to ultimately be deposited on the floors and margins of the ocean basins. As noted above, the average rate of delivery to the oceans of sediments eroded from the continental land surfaces transported by rivers, calculated from twelve studies, is more than 24 billion metric tons per year. Yet this estimate is probably somewhat lower than the actual volume of sediments delivered by rivers to the ocean basins, because the studies from which this average figure was derived did not include the rock material that rolls along river beds. All this sediment and rock eventually accumulates on the basaltic ocean crust that makes up the ocean floor. It has been estimated that the average depth of all the sediments on the ocean floors worldwide is less than 400 meters.[17]

There is only one known mechanism by which sediments are removed from the ocean floor and that is during subduction of the ocean floor at trenches. As the sea floor slides slowly (a few cm per year) beneath the continents at the trenches, it is estimated that about 1 billion tons of sediment per year is subducted into

15 E. Daily, C. R. Twidale and A. R. Milnes, 1974, The age of the laterized summit surface on Kangaroo Island and adjacent areas of South Australia, *Journal of the Geological Society of Australia*, 21 (4): 387-392.

16 C. R. Twidale, 1998, Antiquity of landforms: An "extremely unlikely" concept vindicated, *Australian Journal of Earth Sciences*, 45: 657-668.

17 W. W. Hay et al, 1988, Mass/age distribution and composition of sediments on the ocean floor and the global rate of sediment subduction, *Journal of Geophysical Research*, 93 (B12): 14,933-940.

the mantle with the sea floor.[18] As far as is known, the other 23 billion tons of sediment per year simply accumulate on the ocean floors. At that rate the sediments accumulating on the ocean floor as a result of erosion of the continents would have accumulated in approximately 12 million years.

Yet according to the uniformitarian timescale of the evolution and development of the earth, erosion and tectonic plate subduction have been occurring as long as the oceans have existed, at least 3 billion years. Furthermore, even just considering the latest and present cycle of plate tectonics, the present ocean basins have been in existence for at least 200 million years. If that were so, then according to the present rate of accumulation of sediments on the ocean floors, the ocean basins should now be massively choked with sediments many kilometers deep. Since they aren't, the measurements of sediments carried to the ocean basins, and the rate of accumulation on the ocean floors, don't support the claim that the earth and its ocean basins are millions of years old.

On the other hand, because the present ocean basins were only formed in the biblical framework for earth history toward the end of the Flood cataclysm some 4,500 or so years ago, the present amount of sediments on the ocean floors had to be deposited in a short time. This was largely accomplished, not at present rates of accumulation, but as a result of the Flood waters catastrophically draining off the emerging continental land surfaces at the end of the Flood. These erosion rates would have been orders of magnitude greater than the presently measured erosion rates. It is thus the biblical model of earth history that is consistent with the evidence.

18 Hay et al, 1988.