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The Importance of NAWAPA For Geophysical Research

by Peter Martinson [Reprinted from EIR Vol38, No 20; May 20, 2011.]

Bert punched out and headed home from work. These days, everybody had jobs. There weren't enough people to fill them! They had been watching the Copper Reservoir fill behind the colossal 1,753-foot-high Chitina Dam for the past several months, keeping an eye on the dam for structural problems. So far, so good, so Bert headed home.

As he walked to his car, he heard some rustling nearby him, like an animal in the bushes, or someone crumpling cellophane. But, upon looking around, he saw nothing in the bushes. Then, as he looked up, he saw the source of the sound: a magnificent display of the Northern Lights! He and many other people up here near the Arctic can hear them, and the Eskimos have many legends about the sound. Just then, a meteor streaked across the sky, which Bert also heard as a crackle.

Bert got into his car and drove home. When he pulled up, he saw that his dog Katyusha was already waiting at the window for him, as she always does—even though Bert works odd hours. He walked in, greeted Katyusha and his two cats, Ivan and Sascha, and began fixing dinner. Just as he finished cooking, he heard some commotion in the living room, and went in to scold his pets. Katyusha was running in very tight circles, while the two cats bolted out of sight. Then the dog took off up the stairs. Bert had seen this behavior before, and immediately dove under his heavy oak desk, and held on tight. Within moments, the ground began to shake. Up and down, books flying off shelves, cookware hitting the wall. As Bert would find out later, Chitina was now being hit by a magnitude 4.5 earthquake, whose epicenter was about 2 km beneath the huge Copper Reservoir. Within seconds, which seemed like minutes to Bert, the shaking stopped.

When he thought it was safe, Bert scrambled from under his desk, and dug out his phone to call the base. "Come on, Bert!" said the voice on the other end, "this dam has handled worse than that in the past few months! It was built to withstand an atomic bomb blast!" Bert hung up, let out his breath, and said to his cats, who had come out of hiding, "So, have you come back to your senses?"[1]

April 23—Accepted geology today is about as objective as modern climatology. All phenomena are assumed to be derivable from a few accepted doctrines, and all observations that cannot be explained with these doctrines as the primitive causes must be ruled out as "superstition." Several of the doctrines are attributed to valid, even perhaps heroic, hypotheses of past scientists, such as Alfred Wegener and Tuzo Wilson, but they have been turned into the chains that bind scientists to a limited universe. Real hypotheses are never the end points from which scientists are relegated to deriving implications; instead, they are always transition points to higher discoveries that improve Man's mastery over his universe, while posing more profound questions. The relationship between earthquakes and NAWAPA can help us break these chains (see www. larouchepac.com/infrastructure).

It has been known for some time that the impoundment of water into man-made reservoirs causes seismic activity. Tremors can occur immediately upon initiation of impoundment, or appear after several seasons of filling cycles, or both. The seismic activity is typically related not to the actual level of water, but appears to change of the water level. When the water level becomes stabilized, the tremors usually die down. The theory is that the added weight, and possibly the entrance of water into fault cracks, can cause an already stressed fault to snap. Scientists such as Pradeep Talwani,[2] director of the South Carolina Seismic Network, try to use these reservoir-induced-seismic (RIS) tremors as models to understand how natural earthquakes occur, but, as we will see, there is almost certainly a sharp distinction between the two phenomena.

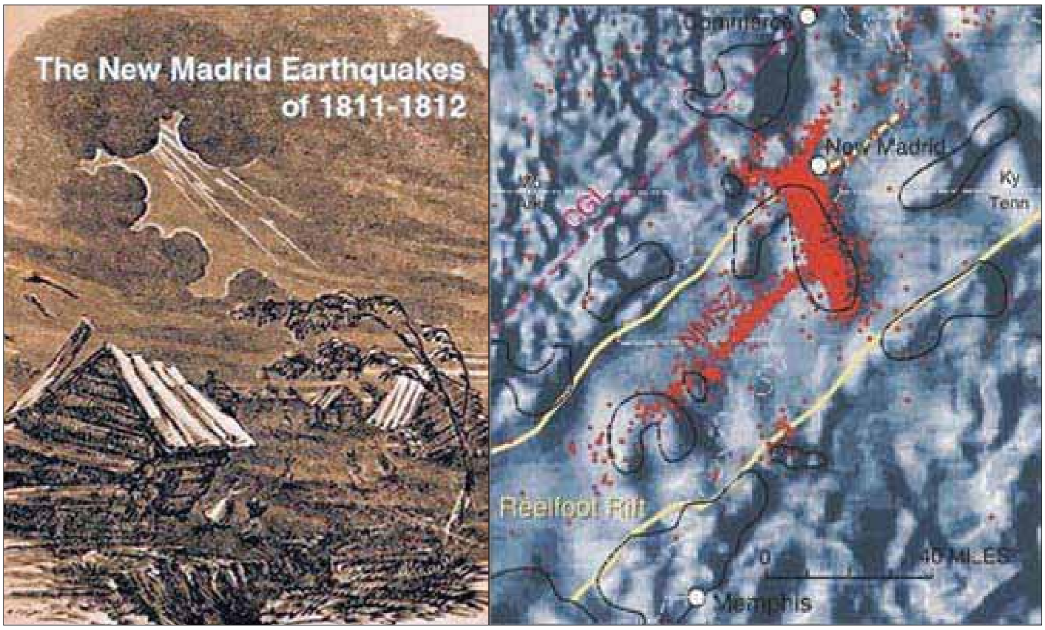
The proposal for a North American Water and Power Alliance (NAWAPA) includes the impoundment of hundreds of millions of acre-feet (MAF) of water along areas that are quite close to the North American section of the Pacific Rim of Fire, from Alaska down through the Rocky Mountain Trench fault line, to the Rocky Mountains and Cascadia. The largest measured earthquake in American history occurred about 100 miles west of the proposed largest dam in the NAWAPA system, the 1,700-foot Chitina Dam in Alaska, which will hold back a reservoir of more than 1,000 MAF of water. The construction of such a dam, with the capability of withstanding an M10 or 11 earthquake, will present large engineering challenges, but nothing that is beyond the future ability of Man.

Will the impounded water cause a huge earthquake? It is not clear. There are some who claim a causal relationship, such as the so-called scientists at the *Wall Street Journal*,[3] who claim that a reservoir impounded by the Zipingpu Dam in Sichuan, China caused a devastating M7.9 earthquake in 2008. What is clear, is that there has been an ongoing effort by the British Empire to stop the advancement of Man's control over both the biosphere and the lithosphere, and also an effort to retard the understanding of how the Earth works.

In this short report, I will show that the tremors generated by human impoundment of water are a different species of phenomenon from real earthquakes.

Is there a connection between such phenomena as the majestic Northern Lights (as seen here over Malmesjaur Lake in Lappland, Sweden, April 5, 2010) and earthquakes and volcanoes? Research is ongoing. The pseudo-scientists at the Wall Street Journal claim that a reservoir impounded by the Zipingpu Dam in Sichuan, China (shown here) caused a devastating M7.9 earthquake in 2008. But the engineering challenges are not beyond man's powers to overcome them.

Real Earthquakes



Between 1811 and 1812, several M8-plus quakes took place in the New Madrid Seismic Zone, tearing open huge chasms, burning trees to cinders, and shaking the land. Parts of the Mississippi River reversed direction for a while; lakes disappeared; new lakes emerged and filled up with hot, stinky water. The "aftershocks" continued for 200 years. ***Yet, there is no observed plate boundary or fault line around the New Madrid Zone!*** *Shown: a poster of the time; a satellite image of the Reelfoot Rift, within the New Madrid Seismic Zone.*

The field of geology is dominated by the theory of tectonic plates and subduction. In summary, underneath the crust of the Earth is a deposit of hot, plastic rock which undergoes convection. This rock emerges from the depths at mid-ocean ridges and forms new, basaltic plate material. The surface of the Earth is composed of several of these large basaltic plates, whose creation at mid-ocean ridges is compensated for by destruction at subduction zones, almost like a conveyor belt.

Earthquakes and volcanoes typically occur at areas designated as subduction zones, where the plates are bent dramatically downwards and pushed underneath, usually, granitic continental crust. That subducted plate sucks water down with it, melts when it reaches the asthenosphere, and the melted material rises and pops out at volcanoes. As the plate gets pushed downwards, the continental crust on top gets buckled back and upwards, the strain growing until the crust gives way and collapses back down in an earthquake.

Ignoring for now the fact that bending down at a sharp angle, a several-kilometer-thick section of very dense rock, and then pushing it down hundreds of kilometers, would require enormous stresses that are simply not observed, a large body of evidence is now piling up that indicates that these merely kinetic and thermodynamic mechanisms are not the real story. There is something else going on down there.

According to the kinetic model of seismic waves, the epicenters of large earthquakes are usually quite deep in the crust. For example, the seismic waves sent out by the main March 11, 2011 Japanese earthquake lead back to a spot about 32 km beneath the floor of the ocean. After this event, the many aftershocks, several of which were over M7, and continue to this day, have ranged from near the surface to about 200 km deep.

For comparison, the deepest hole ever dug by man, the Kola Superdeep Borehole project in Russia, is a little over 12 km deep. Based on seismic data, conjured by British statistician and opponent of Wegener's continental drift theory Harold Jeffreys, they expected to reach a boundary between 3 and 6 km down, where the granite continental rock would transition into basaltic basement rock, which carries seismic waves much faster. Instead, they ran into a quite different species of rock, gneiss (a metamorphosed granite), which was saturated with water that could not have trickled down from the surface. They never reached basalt. Eventually, they had to give up the project due to lack of funding, but also because the rock was much hotter (~200°F) than they had expected (~100°F), and had entered into a new, plastic phase that kept destroying drill bits and closing up.

The foundations of geophysics had thus been demonstrated as wrong, a mere 3-6 km down, while most earthquakes originate at depths several times this. Can it really be assumed that we know what causes earthquakes?

Let's look at an example of a real earthquake, here in the United States. Quakes are generally relegated to the so-called plate boundaries—until one occurs in the middle of a plate. For example, take northern Arkansas, in the New Madrid Seismic Zone, where, between 1811 and 1812, three or four quakes, estimated to be larger than M8, took place within about three months. Descriptions of this event are rife with imagery that is absolutely inconsistent with simple, or even complex, rock kinetics. The series of quakes tore open huge chasms that belched forth noxious fumes, created round mounds that apparently burnt trees to cinders, and shook the land like waves on the ocean. Parts of the Mississippi River reversed direction for a while, lakes disappeared, new lakes emerged and filled up with hot, stinky water. This area then suffered "aftershocks" for the next 200 years.

There is no observed plate boundary or fault line around the New Madrid Seismic Zone, although seismologists have mapped out where one could be, based on the seismic data. They call this the "Reelfoot Rift," which was created when the North American continent threatened to break into two parts, but then stopped. There is now a developing situation in Nevada, far from any known fault line, where there have been well over 1,000 earthquakes, reaching up toM4, just in the past two weeks. Seismologists are now scrambling to describe the existence of a "previously unknown fault" underneath this area. Perhaps earthquakes actually create the faults, rather than vice versa!

Now, look at the observations and measurements both leading up to earthquakes and during them. Since antiquity, people have described various precursor phenomena, such as anomalous animal activity, the smell of "noxious gases," and strange weather before an earthquake strikes. Recently, with the advent of satellite technology, other phenomena have been observed days to weeks before an earthquake, such as changes in the ionosphere, ultralow- frequency magnetic variations, infrared anomalies, increased air conductivity, and other electromagnetic and chemical phenomena. During the earthquake, people have described seeing strange lights and fires near rifting areas.

The processes deep in the Earth's crust responsible for building up this potential are currently unknown. Thomas Gold[4] has proposed, based on these and other anomalies, that earthquakes and other tectonic events are caused in large part by the exhalation of gases from deep below the Earth's crust. This gaseous discharge then results in many of the precursors seen by people (and animals). Russian Academician Sergey Pulinets[5] suggests that radon from radioactive decay of uranium is released near the time and location of earthquakes, which then causes a cascade of events generating the various precursors. NASA scientist Friedemann Freund[6] has demonstrated that compression of rock will generate various electric currents that could cause several of the observed phenomena. All of these hypotheses are testable, and may play a role, but everything adds up to a picture that leaves the usual geophysics dogmas in the dust.

Although the result of the earthquake is the movement of a large mass of rock, the movement of rock cannot be held to be the cause of the earthquake. Whatever moves the rock, must be built up as potential, which then begins to "burn" for some time leading up to the actual explosion. It appears that some change in the environment around the quake zone causes the fuse to be lit, which will then be followed some time soon by the actual quake. It is likely, since large quakes also coincide closely with solar flare events, that there is an interaction with the environment far off the surface of the Earth, that forms the trigger.

The moral of this story is that this immense transformation of energy is not caused by the weight on top of the rock, and certainly not by man-made reservoirs. The shakes created by these reservoirs are surface shakes. The idea that the pressure of the water will generate large earthquakes is rooted in the typical geophysics dogma, that rubbing rocks together will give you a quake. It is reminiscent of the old trick of squeezing water out of a buffalo nickel. Constructing reservoirs along NAWAPA may help us sound out existing stresses built up in the crust, and may indeed be useful in relieving some of those stresses, but, as we will see in the next section of this report, there is another factor involved with large quakes that that cannot, at this moment, be touched by Man.

Paleotectonics

Scientists from all over the world (such as Gerald Duma and Laurence Hecht) have demonstrated that there is a close correspondence between large earthquakes and solar cycles. For example, Duma[7] has taken the catalog of all earthquakes, in four parts of the planet, over the course of the entire 20th Century, and categorized them, based on time of occurrence. In all four places, he found a clear increase of quake activity during the local night, versus the local day. He also found that increases in seismic energy release tend to follow increases of solar activity, in an 11-year cycle. A similar correspondence was found by Hecht, who showed that if you take all the earthquakes of M7.9 or higher over the past century, and combine them with volcanic eruptions, there is a clear correspondence with solar activity. (See the video report by Natalie Lovegren summarizing this.[8])

Our planet is an integral part of the Solar System. As such, it shows clear resonances with processes in the Sun, and with other planets. The whole system is also part of a galactic system, along with the Crab Nebula, which itself is part of a greater local group of intergalactic space-time, which includes over 30 galaxies, and beyond that, supergroups and superclusters. What is emerging from the research into earthquake precursors, and correspondences with other phenomena of our galaxy, is a scientific revolution.

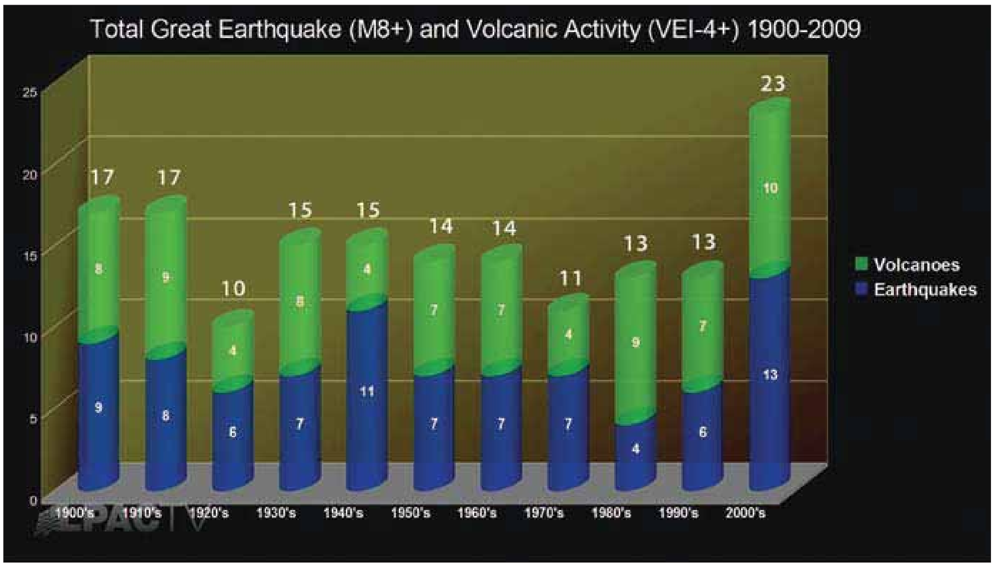
Study of the last 550 million years of our planet's fossil record reveals a cyclic change over a period of about 62 million years, give or take a few million. This cycle appears as a growing and shrinking of the number of distinct types of organisms, which grows and shrinks in an apparently regular tempo. Some of the most severe dips in the numbers are what we call "mass extinctions," but those statistical variations ignore the overall anti-entropic development of the biosphere. After each so-called dip, there is a resurgence of life on the planet, always including advances that can be measured in energy-flux density. Hence, there is an overall growth of both number, and intensity, of life in the biosphere, which is punctuated by something that reduces, sometimes catastrophically, the number, in a rather regular rhythm.

According to best current estimates and models, Medvedev and Melott (2007)[9] have noted that the 62-million-year cycle of biodiversity coincides with the path of our Solar System up and down through the plane of the Milky Way galaxy. Later, Melott and Bambach (2009)[10] also note another cycle, which is more intriguing, and bears on our study of earthquakes and other Earth-shaking processes. The picture that emerges, is that our planet pulses, in continental uplift and collapse. This pulse produces massive volcanic outflows and earthquakes, and coincides with the periodic wipeouts of living species on the planet. There are several pieces of this puzzle, which assembles into a strange new phenomenon touching upon our discussion of earthquakes.

The record of life on the Earth is preserved in sedimentary rocks. It is well known that sedimentary rock rarely forms on continents, but rather underwater. The vast majority of animal fossils are thus of ocean creatures. The rock layers which contain dinosaur or other land-animal bones typically represent an area that used to be downriver, or some kind of sinkhole that the animals fell into as they were dying, or perhaps an area that was catastrophically flooded at some point. In fact, much of the vast sedimentary rock beds found in the central United States were laid down during several episodes of "epeiric" seas, which divided North America into two separate continents, East and West.

Imagine an area of land that is under a few hundred feet of water. This area will be undergoing sedimentation, and thus will be represented some day as sedimentary rock. Now, imagine that some unknown process makes the ocean depth shrink to nothing. This could happen either by lowering the ocean levels as a whole (as when water gets locked up in polar icecaps), or by raising the level of the land, so-called continental uplift. If this area remains dry for a few million years, and then gets resubmerged, sediments will resume piling up on the floor, and there will thus be a gap in the sedimentary record, called a discontinuity.

The problem for us is that, as one follows the layers of rock upwards in a rock face, there may be a point where one layer of sedimentary rock is followed immediately by another layer of sedimentary rock that was put down millions of years later. In other words, there may have been a gap of several million years in which no sediments were laid down, followed by a period of renewed sedimentation. Some scientists, such as Shanan Peters,[11] have found that it is possible to recognize when sedimentation rates are slowing down, as a gap is approached, and that these periods



This image is from the LPAC-TV video, "The Shocking Rise in Great Quakes" (www.larouchepac.com/node/17916), which indicates that there is a correspondence between the increase in solar activity and that of great quakes and volcanoes.

of slowing sedimentation recur on an approximately 60-million-year cycle. Indeed, Melott and Bambach note that it is during these periods, when rates of sedimentation begin to slow, that low points of biodiversity are reached (including the mass extinctions).

Another piece of the puzzle is shown by ancient ocean composition. Aspects of this record are preserved in the sedimentary rocks. Geochemists can look at the weights of various elements in the rock, and based on how these weights vary, can get some sense of what must have been in the ocean water. One particular element observed to vary is strontium, element 38. Strontium found in ocean sediment is typically lighter than that found in continental rock. If ocean sediments are found to contain somewhat heavier strontium than usual, it is a sign that either the production of ocean water at hydrothermal vents went down at that time, or that heavier strontium was being delivered to those sediments by increased erosion of continental rock by rivers. More rapid delivery of heavier strontium would then mean that the river water was more rapidly eroding the continental rock, either because there were just more rivers, or because the rivers were originating at higher altitudes, and thus the water moved much faster.

Melott and Bambach show that strontium in the sedimentary record changes weight with a roughly 60-million- year period, such that the weight goes down as sediment deposition goes up, and the weight goes up as deposition goes down. In other words, more continental erosion took place as sedimentation rates went down, and as biodiversity plummeted, but the erosion slowed while sedimentation rates went up and the biosphere recovered.

The last piece of Melott and Bambach's puzzle is volcanic. At several places on the surface of the Earth, we find what are called Large Igneous Provinces (LIPs). A LIP is a typically massive structure of mafic igneous rock (usually basalts) that was created when loads of lava poured out onto the surface of the Earth over a period as long as several million years. One of the most interesting LIPs is known as the Siberian Traps, a set of four distinct structures in Siberia which collectively contain well over 2 million cubic km of basalt. The outflow of lava began around 251 million years ago, and lasted about 2 million years. This event is widely believed to be at least part of the reason that about 98% of all types of creatures disappeared in the so-called Permian-Triassic (PT) extinction, about four 62-million-year cycles before the dinosaurs went extinct.

LIPs represent the building up of pressure under the crust, and the bursting forth of enormous quantities of liquid rock. The earliest strata of rock contain evidence of LIP events, and several scientists, such as Prokoph et al. (2004),[12] have noted that there are several frequencies of occurrence through time. If one only looks at LIPs that occurred on continental crust, one will get a clear signal of increasing and decreasing amounts of such liquid rock floods over a period of about 60 million years, which tend to coincide with increasing strontium weights and decreasing sedimentation rates.

What does all this mean? Each of these points of evidence—sedimentation rates, strontium weight, and LIP occurrence—points to the fact that the crust of the Earth, particularly that covered by continental rock, pulses in uplift and collapse, with a period of about 60 million years, and that each of those uplifts is accompanied by a corresponding decrease in the number of types of organisms on the planet. As uplift transitions into collapse, the organisms quickly rebound to higherthan- previous diversities, and higher states of organization.

Revolution in Science

Currently, there is no adequate explanation of this apparent "Heartbeat of the Earth." Most of the attempts at finding a cause revert back to the usual mechanism of mantle convection, which supposedly drives the tectonic plate conveyor belt. As we have seen, this model is not very interesting, or truthful. By combining the cycles with the earthquake precursors, we begin to see that a scientific revolution is afoot.

Perhaps changes within the Earth will find their cause in cosmic radiation. It is well known that our climate is almost completely driven by the dynamic between the Sun and galactic cosmic rays (see Svensmark 2007[13]).

It has also been recently shown that the eruptions of volcanoes could be triggered by increasing cosmic ray storms (Ebisuzaki et al., 2010[14]). We also know that the highest-energy cosmic rays, those produced in locations such as the Crab Nebula and emitted from other galaxies, are capable of passing through the core of the Earth. Perhaps the very deepest reaches of our planet are in intimate discussion with the rest of the galaxy, in real time.

What is clear, is that this picture is of an Earth which does not generate its internal activity all by its lonesome. Thus, it cannot be studied as an object unto itself, a closed system, but instead as an integral manifestation of processes of the galaxy as a whole. Understanding how the insides of the Earth function must thus be viewed as a branch of true astrophysics, and as a laboratory that we have access to, if we build the technology needed in order to plumb the depths. Hence, NAWAPA.

The reservoirs we construct with NAWAPA are really a method of tuning the region where the galaxy meets the Earth. By adjusting water levels, we may learn more about how and why the crust shakes, but we will also provide the water to agriculture, which will increase the moisture content in the air, and provide a more dynamic electric circuit between the ground and atmosphere. At the same time, the transport routes of water, through deep tunnels, indicate the advances in drilling technology that will have to be made, which might allow us to actually dream of drilling down to several hundred km, to see what is really down there. NAWAPA will not only be a boon to geophysics, but will be a laboratory for developing an experimental understanding of how the Creator's universe works.

"Understanding how the insides of the Earth function must thus be viewed as a branch of true astrophysics, and as a laboratory that we have access to, if we build the technology needed in order to plumb the depths. Hence, NAWAPA."

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