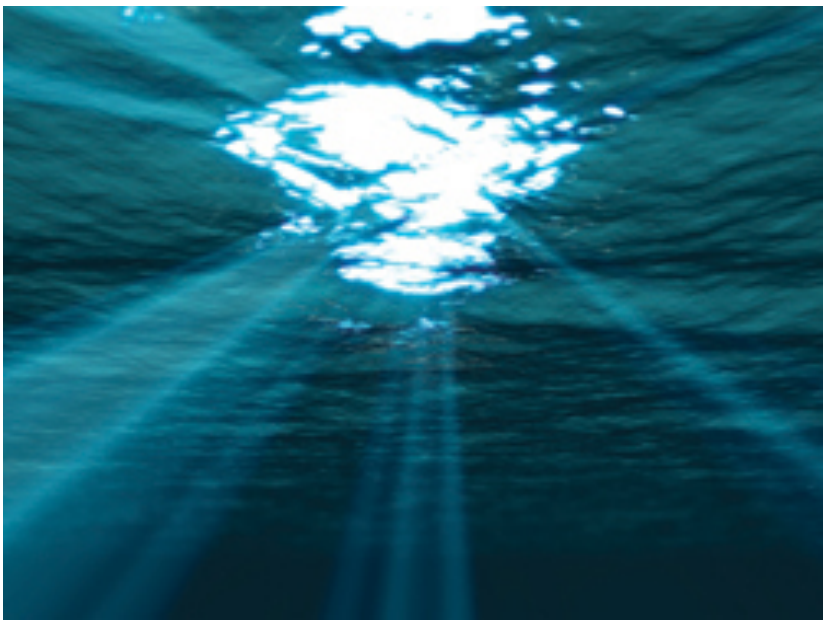
Global Warming Oceans

By Clark M. Thomas



Much has been said about global warming as it affects our atmosphere, our agriculture, our cities, and so forth. It is easy to minimize how profoundly the biospherical Earth is a water planet, and the degree to which every place on the land surface is heavily influenced by what's on top and below the global ocean.

This essay will discuss (1) water in our solar system, (2) water in contemporary and historical oceans, (3) our water world after the ice caps have melted and hot oceans have become alien to what we know of them today, and (4) some ideas for trying to deal with the threat.

WATER IN OUR SOLAR SYSTEM

Humans live on land, but inside a surface water world. Almost 7/10th of the globe's surface is saltwater oceans. It was once thought that Earth may be unique in having abundant water on its surface, but new astronomical science has revealed otherwise.

It was hypothesized that comets brought the birthing Earth's water, which may be partially right. If so, then how did the very ancient comets get their own water in the first place?

Water is seemingly *everywhere*, in solid, liquid, or gas form. It is in so-called empty space, and is very abundant in places within our own solar system that we wouldn't ordinarily imagine. A more accurate paradigm sees the early gas cloud from which our entire solar system condensed some 4.6 billion "Earth years" ago as having abundant water molecules, which means water was here from the very beginning in comets and forming planets.

Jupiter's moon *Europa*[1] has deep ice on its full surface, with plumes, and below an ocean that may average 62 miles deep. That average compares to the deepest trench in the Pacific which is 6.8 miles deep. Earth's average ocean depths are about 2.4 miles. Thus, even though Europa is much smaller than Earth, it may have twice the liquid water as Earth. Saturn's smaller moon *Enceladus*[2] has both water and water geysers from under its ice, thanks to the gravity pull of Saturn.

Jupiter gravitationally deforms its innermost moon *Io*, yielding many volcanoes, but no surface water. Europa and Enceladus experience less gravitational distortion, but enough to sufficiently heat their cores, yielding liquid oceans.

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[1] http://listverse.com/2018/10/04/10-out-of-this-world-facts-about-jupiters-moon-europa/

[2] https://www.nbcnews.com/mach/science/saturn-s-moon-enceladus-now-likeliest-place-find-alien-life-ncna887921

Mars looks reddish bronze, due to oxidation from long-lost atmospheric oxygen. Nevertheless, water does persist in many areas of Mars, but generally below its hostile surface. Asteroids and Oort-cloud comets have water. Both Europa and Enceladus are considered more likely to have active macroscopic life than Mars, thanks to their oceans. [I own a very tiny piece of bronze Martian basalt, delivered to Earth by a documented meteorite.]

Water (H_2O, or HOH) is both ordinary and exceptional. It is ordinary in its apparent ubiquity – and exceptional in some of its qualities. Finding water in its liquid form is unusual, because naturally liquid water is only found on celestial bodies between zero and 100 degrees Celsius. Water molecules can be cooled to far below 32 degrees F (zero C), but they do not ordinarily stay liquid at freezing temperatures, except under supercooling pressure. Above 100 degrees C in Earth's air water is a gas.

In so-called empty space dispersed water molecules are gas or plasma, even when very cold. Liquid surface water is also found on some alien planets, but not all, as with solar system planets. There are cases, even on the surface of Earth, where water can phase shift in both directions from solid to gas. When going from solid to gas the process is *sublimation*. When going from gas to solid the reverse process is *deposition*. Liquid bath-water range temperatures in our solar system and beyond are the exception.

EARTH'S OCEANS TODAY

Earth's one global ocean with several names is almost as old as our second-generation Earth. There are trillions of stable water molecules inside individual human bodies that are each billions of years old. Imagine where they all have been!

Many everyday people think of oceans as just generic bodies of saltwater. However, each body of water and/or ice is composed of untold trillions of molecular water units, plus inhabitants. Water is also known as the universal solvent. Many things such as salt mix easily with water; and mountains are dissolved by

flowing water as part of the ongoing hydrologic cycle. Advanced life as we know it on Earth, and in other water worlds, would not exist without humble H_20 molecules. Hydrogen atoms are the most common in our known universe, and oxygen atoms are rather common too, which opens the door to creating many water-related molecules in space and on land.

Liquid water is water between freezing and gas. However, the *key issue* for our planet's water-world surface is where on the temperature spectrum are these water molecules. Brownian motion vibrations of molecules are associated with kinetic energy. The more kinetic energy directly and indirectly received from the sun and other sources of energy, the more water heats. Because the oceans are deep, there are mixing mechanisms among heat layers. Things that heat up can also cool down, but not always in the same ways. All of these simple-but-complex mechanisms are well known to oceanographers and to other climate scientists.

A liquid ocean at 70 degrees F is chemically very similar to a potential liquid ocean at 100 degrees F. The real difference is that *hot water expands, and critically can absorb much less oxygen than cooler water.* Many precious life forms in the ocean will suffocate at much higher temperatures. In other words, there is a narrow heat band required for most macroscopic aquatic life forms, many of which would be endangered or extinguished by serious oceanic warming in the not distant future.[3]

HUMAN TIME AND GEOLOGICAL TIME

Things that seem very good for humans can become very bad for us when conditions qualitatively change. Rising average air and water temperatures can sneak up on us, just like slowly rising temperatures in a pot of water can trap and *boil frogs*

[3] https://www.scientificamerican.com/article/the-ocean-is-running-out-of-breath-scientists-warn/

sitting therein.[4] Some people who should know better still cling to climate denial as long as average temperatures don't change too much too soon.[5] We should be more aware than frogs in a pan of slowly heating water, but are we?

Recently, 2017 and 2018 brought some dramatic water-related weather phenomena that gave millions more people worldwide a new perspective. The question now is do we globally "get it"; or do we feel it's all a passing scare, being comforted by historical climate averages apparently oscillating around acceptable norms?

Human time is NOT at all like geological time. We easily blend routine weather cycles within our felt ideas of time and climate. Humans experience years and decades, sometimes centuries. In contrast, geological periods can persist over tens or hundreds of million years – but they also occasionally exhibit *punctuated equilibrium* that humans can detect. We are now within such a punctuated, dialectical, geological transition – where some of us "get it," and most of us don't yet fully perceive.

The cosmic history of our mother Milky Way is almost equal to the 13.8 billion "Earth years" of our visible universe. Beyond the galactic billions of years may be trillions of years within the actual total universe, the multiverse. Therefore, what can one brief human lifetime viscerally and conceptually know about the grand scheme of geological and cosmic time?

Scientists have ways to clearly and directly inspect remnants of different climates. Documented earth sciences are behind the urgencies of impending climate change. Science lives both in human time and geological time. To deny climate change data from geological history is to deny geological time itself. Despite anthropocentric desires,[6] the Earth is not just 6,000 years old.

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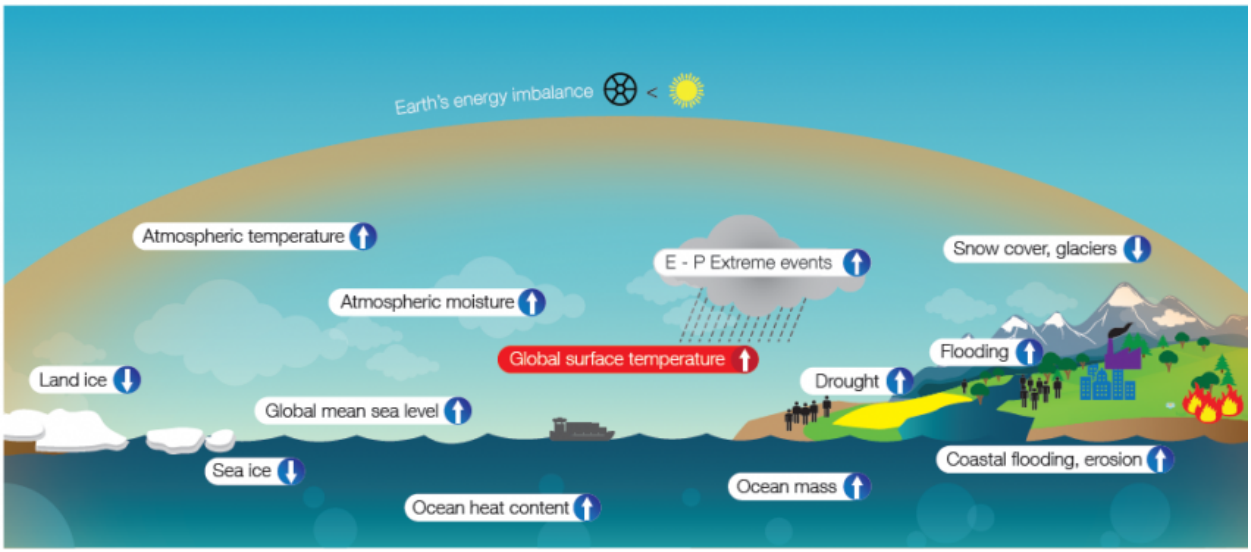
4 http://astronomy-links.net/Boiling.Frogs.pdf

5 http://astronomy-links.net/Butterfly.effect.climatology.pdf

6 https://www.christiancourier.com/articles/7-how-old-is-the-earth

OCEANS IN THE NOT DISTANT FUTURE



Most of this essay's readers already have a good sense of what may come without timely corrective actions. Therefore, I will only mention a few of the transformations that will accompany our oceanic world under increasingly radical climate change.[7]

Some changes will be abrupt, like the death of critical nursery coral reefs; and some will take much more time. Reversing all the damage will take up to millions of years for future oceans to resemble the species diversity we have today. By that distant future time humans will no longer exist, and millions of today's beautiful and sensitive species will have forever vanished.[8]

Seemingly "alien" life of some sort will always persist – but will those future life forms mirror today's "peak humanity"? Will our Garden-of-Eden biosphere take tens of millions of years (if ever) to recreate sophisticated civilizations similar to ours?

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[7] https://insideclimatenews.org/news/10032017/global-warming-oceans-climate-change-noaa

[8] https://www.huffpost.com/entry/deadly-ocean-heat-waves-study_n_5c7dd6c0e4b069b2129efb79

Near-term changes are already rushing at us. Because we have become so efficient at trashing our civilizations – with wars, introduced plagues, and miscellaneous genocides – what could be a very long-term process is rushing at us in accelerating real time. Our "suicidal efficiency" is a dark synergistic union of unchecked population growth and greedy profits-from-pollution.

The oceans are absolutely connected with what goes on over land. A strong argument could be made that Earth's oceans mostly determine events over land. For this reason, what is emerging from our oceans today will largely shape what happens to the thin veneer of civilization in today's "peak humanity."

Here are six examples of oceans determining changes:

(1) Warmer surface temperatures in places like the Gulf of Mexico and the Caribbean, among many other zones of the seas, distort old weather patters and extreme events. Hurricanes, nor'easters, and tornadoes are supercharged by heat and rising humidity. Meteorologists may have to upgrade their scales to include Category 6 hurricanes, and F6 tornadoes.

(2) Rising ocean and sea temperatures are already causing population crises, leading in some cases to social conflicts.[9] For example, one of the causes of the recent bloody unrest in Syria is sharp competition among communities for water rights.

Many other areas of the Middle East are becoming unstable and dangerous for the most vulnerable populations: The south of Iraq had many marsh Arabs who today are leaving after destruction their former wetlands. Portions of northern Africa are becoming radically dry, leading to expanding desertification and fuel for radicalization. Part of southern Australia is becoming very hot and dry, as 2018 was their hottest year ever – which makes it less likely that South Asian climate refugees will be welcome.

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[9] https://www.cnn.com/2019/03/06/world/climate-change-terrorism-extremism-africa-middle-east-intl/index.html

(3) Some areas feature emerging climate crises synergized with nuclear weapons. South Asia has nuclear India and nuclear Pakistan both becoming too hot and dry for internal civility, along with excessive populations. Local religious fascists on either side may conclude that they can seize land with a first-strike nuclear attack. This insane "option" is there now, and will become increasingly likely over the next century as impoverished hungry populations panic and perish, pressing their "leaders" to "do something."

(4) Watch any TV weather forecast, and you will notice that weather events are often highly influenced by nearby oceans and other heating bodies of water, such as the Gulf of Mexico. Polar vortexes in winter are, contrary to common-sense expectations, associated with warming Arctic water. El Niño events should grow stronger and last longer.

(5) The eastern third of North America has stayed fairly cool and wet, even including the nearby Atlantic waters, thanks to melting ice from the Arctic and Greenland. However, this one exceptional region is also changing as more massive hurricanes from the south, fueled by hot Gulf and Caribbean waters, slam into areas already threatened by rising ocean levels. In time the northern cooling effects will vanish, but the southern heating effects will persist.

(6) As soon as the Arctic Ocean warms even more, and the Greenland ice cap melts, there will no longer be the reliable global oceanic river, of which the Gulf Stream is just one part. When the warm Gulf Stream no longer visits Great Britain and the Viking lands, there will be a sharp temperature drop in their local climates for a few decades until global warming catches up in the Arctic. In our biosphere nothing is forever isolated from changes elsewhere.

SLOWING OCEANIC CLIMATE CHANGES, AND MANAGING LIFE ON LAND AS BEST WE CAN

Selfish stupidity will surely result in a future dog-eats-dog world. In contrast, given a "critical mass" of energized ethical globalists there is hope for more humane human action. Will this ideal metamorphosis in consciousness be timely and sufficient? Better a positive something than nothing.

I fondly remember living with my wife in a very old Santa Fe, NM neighborhood with real adobe houses. It was bulldozed by greedy Texas developers who expelled us all, then replaced our dispersed historic homes with high-density fake-adobe condos. Real adobe dwellings have mud-brick walls two feet thick. Fake adobe consists of concrete blocks smeared with fake mud.

When the season turned hot, our old homes with their large thermal mass stayed cool for a while. However, after the mud bricks were heated for several days by the sun their thick walls' thermal mass kept things hot thereafter, even on cool nights. In general, some better things can still yield future problems:

The massive deep oceans are like real adobe dwellings. For many decades their depths have been silently absorbing solar energy, and we on land have been able to ignore the growing threat. We are beginning to notice the switch flip from deep cooling oceans to deep heating oceans. Reversing that vast thermal mass trend would take a very long time in human terms.

Melting the Greenland ice cap alone will raise global water levels about ten feet. There is now a gigantic chunk of ice in Antarctica that is close to breaking off from the continent and joining the ocean to quickly melt. It much sooner will quickly raise global water levels about another ten feet.[10] After all of Antarctica and Greenland melt over the next two or three

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[10] https://thinkprogress.org/new-study-antarctic-ice-loss-10-foot-sea-level-rise-49c7c8614848/

centuries the global sea surface will be about 215 feet higher than today, inundating today's tidewater urban areas. Places like Florida and tidewater Virginia will simply vanish.

A quickie solution to global insolation and ocean heating is to partially shade the oceans and lands with chemicals sprayed by planes.[11] It could have some near term benefits, but this easy airplane "solution" likely will thereafter result in something much worse.[12] The danger here is that any success in temporarily lowering insolation will only encourage greenhouse gas polluters to delay acting for the good of the planet. In other words, we could inspire the absurd antidote to the antidote.

Ideally, *if only this atmospheric short-term fix were applied simultaneously with serious global remediation*, including virtual cessation of most greenhouse gas emissions, then *more critical time would be bought for effective permanent results.* Politically, that simultaneous scenario may not be possible everywhere, thereby retarding or defeating the grand rescue project.

As ocean levels rise, people in relatively rich countries can first move inland, until increasing atmospheric heat and bad weather destroy their new inland habitats. As things turn very hot, many of the wealthy will next buy their way into Alaska, Canada, Siberia and other temperate latitudes.

Poor people in low-lying communities around the world will flee inland to a very uncertain Malthusian future, competing with other poor people who are already there dealing with failed agriculture and drought. This merciless climate refugee process already has begun in parts of Bangladesh, and on some Pacific islands. Consider too what horrors will happen to the native land plants and animals left behind. This downward spiral will not end well.

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[11] https://www.sciencealert.com/harvard-scientists-say-reflecting-the-sun-could-safely-halve-temperature-increases

[12] http://astronomy-links.net/Accelerating.climate.change.pdf

Much of the world's wealth and economic vibrancy is found along strips of land near the ocean. As coastal urban areas are submerged, there will be lost trillions of dollars in taxable real estate wealth. It will additionally cost the affluent host countries trillions of dollars to help relocate their coastal refugees and businesses. Precisely when the financial need greatly increases, equivalent resources for resettlement and rebuilding plunge.

Short of hallucinating our being rescued from ourselves by superhero climate warriors; or by the second coming of Jesus; or by Allah, Jehovah, or Hindu gods feeling sorry for us all – humans need to wisely act now within our limited powers for good without hesitation or fear. We are not like Disney's sorcerer's apprentice, because that fool had his sorcerer to bail him out.

Any one region of the world cannot effectively act, such as Europe and/or America – while rapidly industrializing regions of overpopulated Asia keep belching global warming gas into the skies, and dumping their floating garbage into the Pacific. Nevertheless, even if Europe and North America went now 100% into doing away with their own greenhouse gas pollution, at least the slide into suicidal global oblivion could be more gradual. Maybe not:

In addition to local revenues from real estate, North America profitably exports a lot of shale oil and other carbon gas units.[13] Within the next decade we will pass both Russia and Saudi Arabia as the world's top exporter of crude. Americans can thus look smart with our organic vegetarian diets and solar panels at home – while simultaneously accelerating the global heating crisis.

Cessation of polluting production and exports from the USA would be offset by other countries like Russia and Saudi Arabia accelerating their own profitable exports to satisfy *inelastic world demand*, yielding a net zero reduction of carbon gas emissions.

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[13] https://www.huffingtonpost.com/entry/us-fracking-boom_us_5c3e7065e4b0e0baf5422c43

Ironically, as the *ecological window of opportunity* closes over the next few decades – the *political window of opportunity* will at last appear to open later in this century, but maybe too late to effectively work.

This is not time for paranoid solutions, nor for conspiracy theories. "We have met the enemy, and he is us," said Pogo. Now is the time to set aside our imaginary differences and move forward in a practical and wise way. We humans aren't gods, but we have godlike powers to create and destroy. Let us destroy our failures and strive to create a new Eden for centuries to come.

I have found as a serious visual astronomer that looking at any object with my telescope out of focus reveals little about that object. When I simply adjust the eyepiece's focus for maximum acuity there instantly appears the real object in fascinating detail.

It's time to clarify our fuzzy view of the acute global crisis. Clarity is humanity's only hope. Seeing clearly both problems *AND* opportunities for quick, practical, and effective intervention is the key for successful action.