NAWAPA, from The Standpoint of Biospheric Development

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The current crisis is not a financial one, or even a physical one, in the simplest sense. We are not facing a lack of finances, or a lack of resources. We are facing a crisis of human culture, of which the current U.S. President and his predecessor are merely exemplary. It is time that we analysed more deeply the roots of the erroneous thinking which have led us into this current disaster, in order that we might avert it in the only way possible: by turning our sights once again towards humanity's future, and returning to the cultural-philosophical roots of a true science of physical economy.

When man "builds infrastructure," he is not simply placing some object called infrastructure into an empty box. He is actually reorganizing the physical space-time of the Biosphere, as a system, by transforming and redirecting the biogenic flows through the Biosphere, allowing it to attain higher and higher levels of energy flux density. The simplest example of this, is the introduction of farming and animal husbandry: The apples, corn, and livestock of today are far different, and far more efficient, in terms of energy density, than their wild counterparts which reflect the state in which man first encountered them.

Photosynthesis, which converts the diffuse energy of incident sunlight into the concentrated form of chemical bonds, creates both the difficult-to digest cellulose of plant stems, as well as the easily accessible energy stores of carbohydrates and other organic molecules. This process is a part of what Russian-Ukrainian biogeochemist V.I. Vernadsky called the biogenic migration of atoms—the continuous flow of matter through the Biosphere as the result of living processes, creating higher and higher levels of organization in the secreted fossil materials. Man's action on apples, corn, and livestock, for example, increases the ratio of usable carbohydrates, lipids, and proteins to the expensive (in terms of energy), but relatively useless (for consumption) cellulose of the plant's structural components.

Ultimately, the survival of the human species will depend on man's ability to not only organize these flows and increase their efficiency, but also, to create, from scratch, the environment of biogenic flows which he requires in order to live outside of Earth's atmosphere, and to colonize our Solar System and beyond.

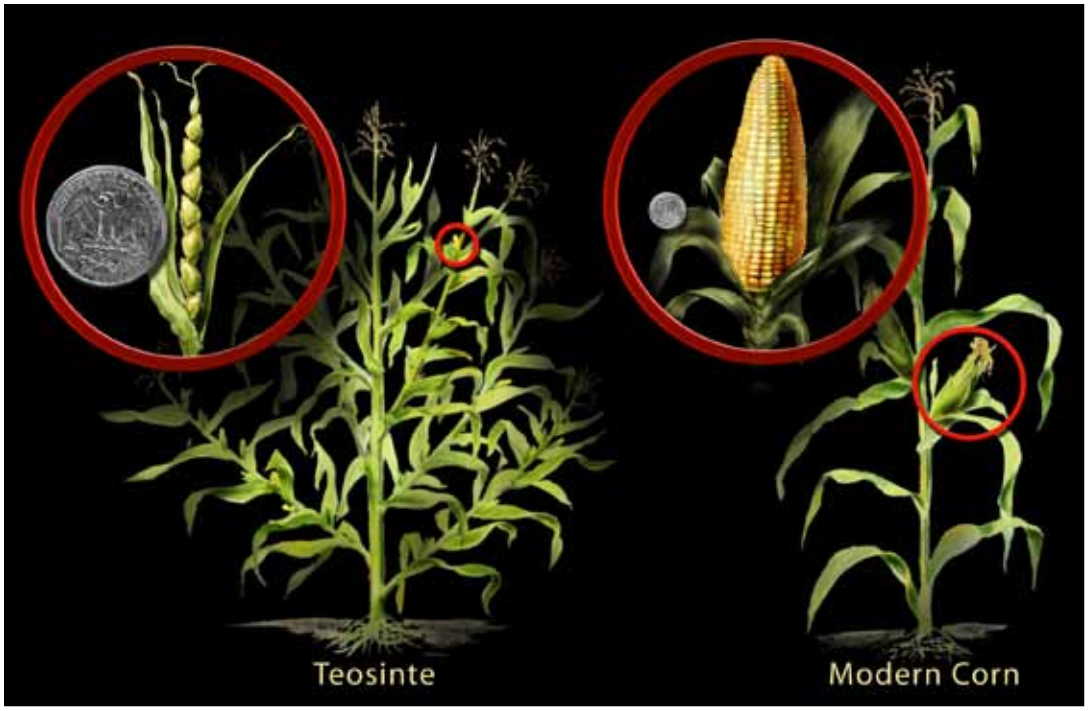
The North American Water and Power Alliance (NAWAPA)[1] program will be among the first of man's projects to willfully redirect those larger processes determining the further evolution of the Biosphere, as a whole, serving as the reference point for such challenges as establishing permanent settlements on other planets, such as Mars. Again, this will be achieved through further understanding and redirecting these biogenic flows, but now, on a much grander and more fundamental scale.

This biogenic migration of atoms is more than a mere flow of material "within" the Biosphere. It constitutes the very structure of the Biosphere, and governs the nature of Earth's interaction with phenomena outside of the Earth's atmosphere, such as solar and cosmic radiation.

The Creation of Earth's Atmosphere

To take a useful example: The creation of Earth's oxygen atmosphere by life not only caused a massive change in species on the face of the planet—rendering the vast majority of then-existing life forms extinct, while paving the way for more complex, oxygen breathing life forms—it also changed the Biosphere's interaction with the Sun's electromagnetic radiation (specifically in the "ultraviolet wave range"), creating a higher degree of structure within the Biosphere—the ozone layer—which, in turn, further moderates which frequencies of electromagnetic radiation would be allowed to enter Earth's developing Biosphere to affect planetary evolution.

This biogenic migration of atoms also caused the development of the ionosphere, the highly energetic zone which, by its interaction with the solar wind and Earth's magnetic field, is responsible for the creation of the aurorae, and which can at times act as a massive particle accelerator, determining what types of cosmic radiation will be fed down onto the Earth's surface. Some of this radiation would be involved in producing the cloud cover which moderates the Earth's temperature and

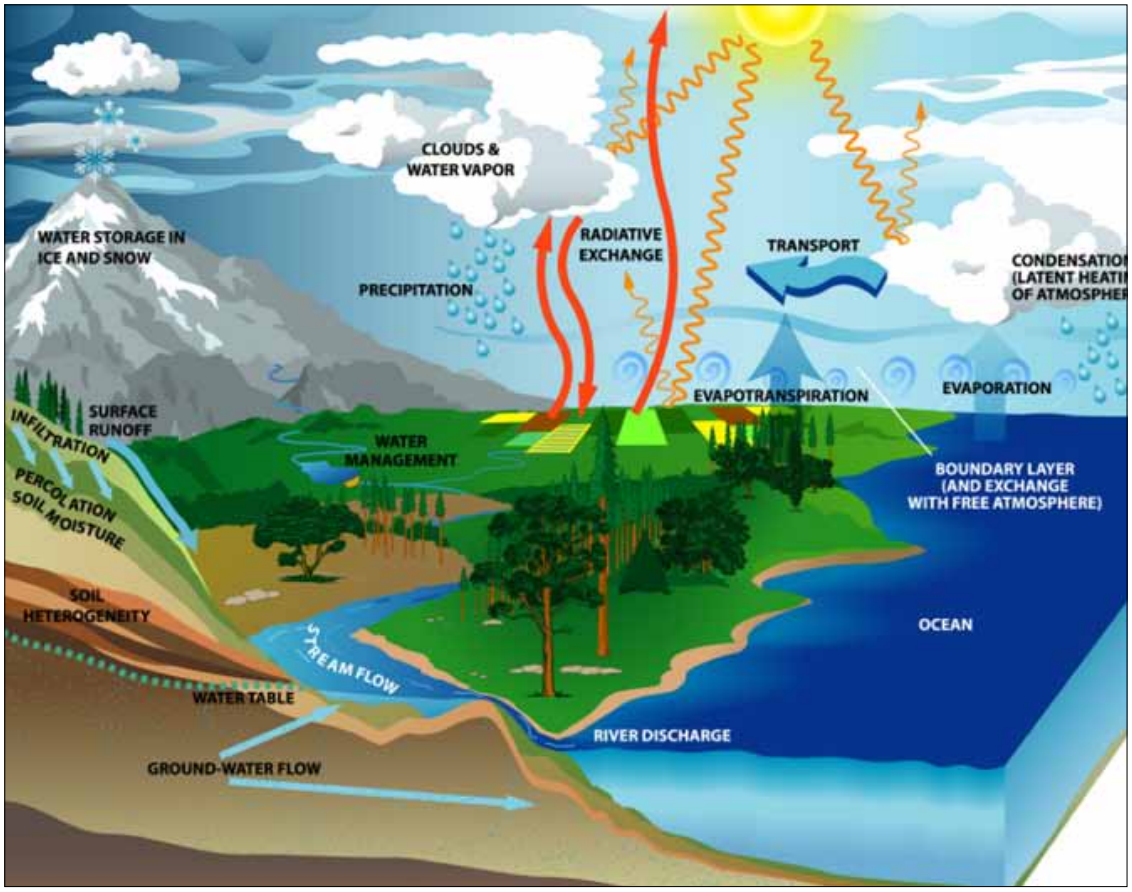


Teosinte represents the state of corn at the time man first encountered it in the wild. Only a very small portion of the bushy plant contained the nutrients and digestible material that make corn the staple it is today. The highly nutritious, and energy-efficient food that we now call corn is entirely a creation of early man's projects in biological engineering and, like the similarly human-engineered modern cow, will not survive outside of human care.

1. See "The Tennessee Valley Authority of the 21st Century," by The LPAC Basement Team, EIR, Aug. 6, 2010.

produces precipitation.[2]

Certain aspects of this process of biogenic migration of atoms are popularly broken down, for ease of understanding, into several oversimplified cycles: the "water cycle," "nitrogen cycle," "carbon cycle," etc. At low resolution, these do, in fact, appear as simple cycles, but when viewed more closely, they form an interconnected network, a system, whose causal interrelations are impossible to represent linearly. Changes in the nitrogen concentration of soils, caused by perturbations in the nitrogen cycle, change the rate of carbon fixation in plant life, perturbing the carbon cycle, which in turn changes the rate of photosynthesis, perturbing the oxygen and water cycles, which in turn perturb the nitrogen cycle, and other biogenic flows of atoms, etc., etc.



The idea of the so-called "water cycle" is a useful abstraction, showing the general flow of water between ocean and land. In reality, this cycle contains numerous sub-cycles, and is inextricably connected with other "cycles" of carbon, nitrogen, etc. Together, the complex system forms what V. I. Vernadsky called the "biogenic migration of atoms."

Even within a single one of these so-called cycles, the amount of complexity quickly reaches a point where the description requires a systems approach—a tensor description— particularly when we wish to discuss the conscious manipulation of such a system.

Taking water as an example: In first approximation, at the lowest resolution, we can describe the water cycle as a simple process, beginning with sunlight's effect on the ocean surface, causing evaporation. This evaporated water rises into the atmosphere; some of it migrates over land and falls as precipitation.

This precipitated water then makes its way, over time, back into the ocean, by way of streams and rivers.

Upon closer examination, this process really consists of many interconnected subcycles, where water plays its most important role, in facilitating the growth of plants. In this process, there is no clear beginning, nor are there any simple linear or cyclical relationships. Plants consume both water and sunlight, using them to produce oxygen, and to fix CO_2 into energy-dense organic molecules. The moisture which these plants release in transpiration then rises up to become cloud cover, feeding and enhancing the precipitation which had permitted their growth originally.

If the vegetation becomes dense enough, this additional atmospheric moisture is enough to change weather patterns, alter the landscape, and reshape the course of rivers. At various stages of this process, large amounts of water enter the soil, to either be evaporated again into rainfall, or to be sucked deep down into the groundwater stores which form a continuous system of exchange with the above ground lakes and rivers.

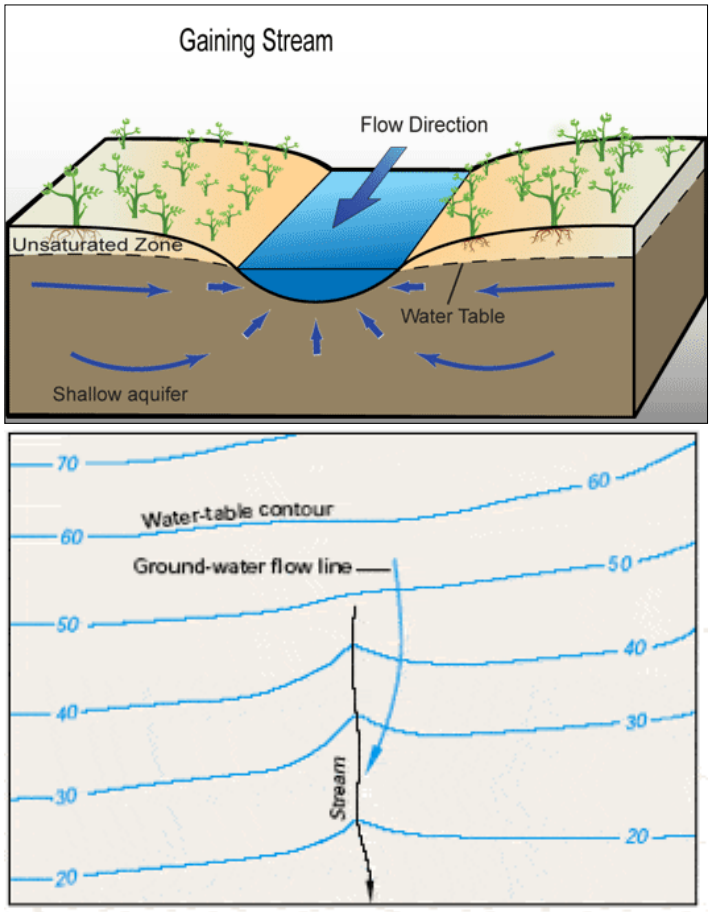
The result of this is that, globally, the same water falls an average of 2.7 times on land before returning to the sea, and the rate is obviously higher in areas of dense vegetation.[3] Further, as the ground cover and soil moisture change, so does the reflectivity of certain parts of the Earth's surface, which, in turn, transforms how sunlight is absorbed and changes its effects on temperature and evaporation.

The number and types of interrelations are vast, but perfectly comprehensible to the human mind, when aided by the proper conceptual tools. In fact, their thorough comprehension is the destiny of the human species, since the mastery—and replication, in an improved form—of their complex interrelations will be necessary in order for man to achieve his destiny of colonizing interplanetary and interstellar space. Already today, spacecraft designers must attempt to recreate portions of the oxygen, carbon, and water cycles in miniature, in order to maintain crews on their trips.[4] The same process, at much higher levels of complexity and efficiency, and combined with a deeper understanding of the role of cosmic radiation and other electromagnetic and gravitational phenomena, in the maintenance and evolution of life on Earth, will be required for the establishment of permanent settlements on the Moon, Mars, and beyond. Projects like NAWAPA will bring such goals—necessary for the continued survival of the human species—out of the realm of science fiction, and within reach of humankind.

The introduction of irrigation, and the consequent agri-

2. One might, in fact, consider this entire process to be the creation of a sort of biospheric infrastructure, where biological fossils continually provide the conditions for more advanced creative processes.

3.Lev S. Kuchment, "The Hydrological Cycle and Human Impact On It," in "Water Resources Management," Encyclopedia of Life Support Systems, 2004.



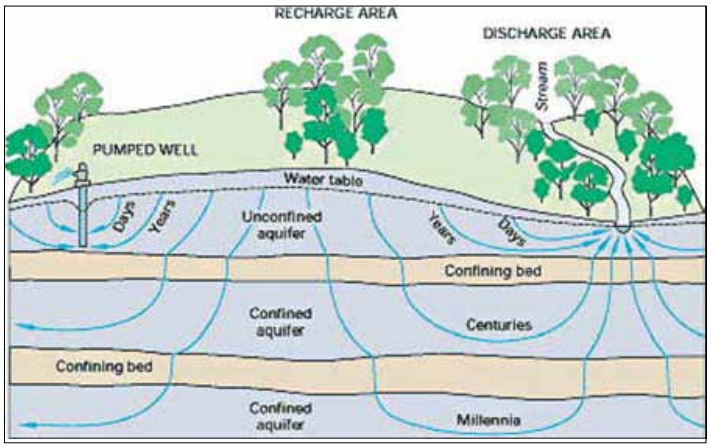
Surface water and ground water are not two distinct phenomena. Rather, they form a single, complex flow of water and associated minerals, characterized by abrupt discontinuities which delineate sharp changes in flow intensity and direction. A. A flowing body of water, gaining volume all along its length from a connected aquifer. B. The gradient associated with an aquifer's flow lines, compared to the direction of the flowing surface water, shows whether the stream is replenishing the aquifer or vice versa.

cultural development, increases the amount of transpiration in a given area, creating more sustained subcycles of rainfall, and generating rainfall which previously may not have existed.

What Does This Mean for NAWAPA?

In this case, we are taking a portion of the hydrological cycle involving the western region of North America, which currently includes relatively few subcycles, and connecting it into a Noöspheric system of much greater complexity. Water that evaporates off the surface of the Pacific Ocean tends preferentially to travel up the coastline as cloud cover, and deposit itself in northern regions as solid ice and rivers.

A large percentage of this freshwater then runs directly into the ocean off the coast of Alaska and North America, never



An image of an interconnected system of ground water and surface water.

taking part in any biospheric sub-cycles on land. Meanwhile, the southern desert area of the west—the Great American Desert—remains dry and barren (see NASA animation of clouds circulating up the coast at: http://svs.gsfc.nasa.gov/vis/a000000/ a003600/a003645/index.html).

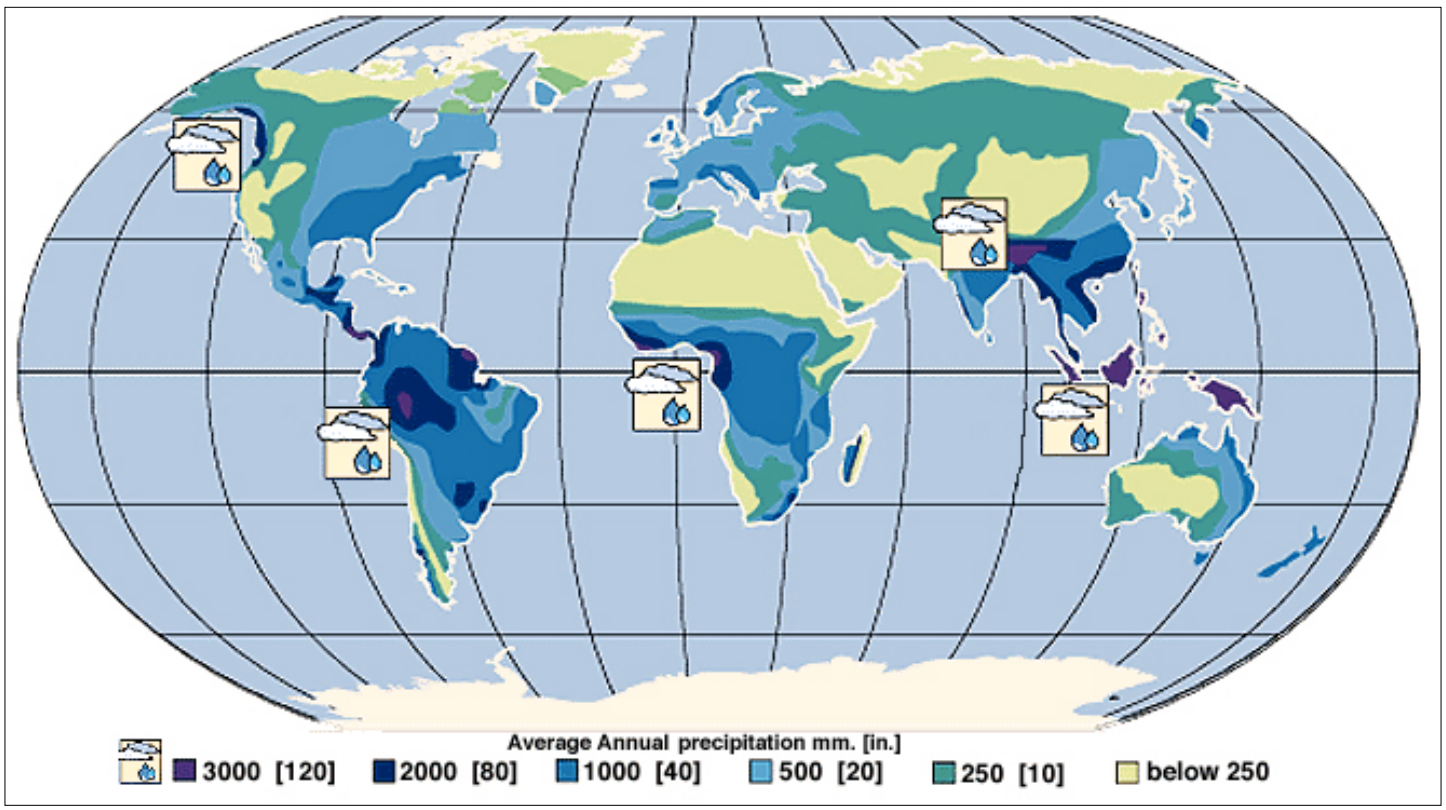
To get an idea of this quantitatively:

The total amount of water evapotranspired from land and ocean amounts to 71,000 km^3/yr and 434,000 km^3/yr million acre feet per year, respectively, for a total of 505,000 km^3/yr. 25 percent of that, or 107,000 km^3/yr, falls back onto the land as rain or snowfall, while the rest is rained directly back into the ocean. At any given moment, there are 15,500 km^3 of water in the atmosphere, 4,400 of which is over land. Approximately 3,450 km^3/yr fall within just the Alaskan and Canadian catchment basin to be utilized by NAWAPA, an amount equivalent to more than half the total precipitation of the entire continental United States! This produces 990-1110 km^3/yr of runoff into the Pacific and Arctic Oceans. This quantity is lost to the productive processes of the Biosphere, never taking part in photosynthesis, or any other biospheric process during its time on land. This is a continuous cycle, constantly replenished, although, in parts, it is terribly inefficient.

Thus, it becomes clear that, contrary to popular misconceptions and outright lies, the water to be used by NAWAPA is not some stash, which will be run down over time, nor is it water which otherwise would be used for other purposes. NAWAPA is the harnessing and improvement of this natural, global cycle and, because of this, will be capable of not only providing freshwater to the western U.S. and northern Mexico for perpetuity; experience has shown that it will also permanently transform the climate in these areas as a result, lowering the temperature and increasing rainfall.

NAWAPA will transform this cycle, drawing a portion (200 km^3/yr, or 20%) of what would otherwise immediately

4. As an example, take the limited example of water, oxygen, carbon, etc., recycling on the International Space Station.



Rainfall map of the world. Note the disparity in the amount of rainfall along the Pacific Coast of the United States.

become run-off water, into a system of already existing rivers and newly made canals. As it travels, the water will replenish groundwater stores and take part in greening large swaths of the Great American Desert. This will extend the time this water spends on land by orders of magnitude, as well as increasing the frequency of its circulation during that stay.

Now, what will be the effect of the increased plant transpiration in the 21-50 million acres of new farmland and forests created as a result of the NAWAPA project? This will be up to double the current irrigable acreage west of the Mississippi. For the United States, this amounts to a strip of newly irrigable land 1,800 miles long and 35 miles wide—nearly four times the size of California's Central Valley.

Again, the careful selection of regions of farmland, but also areas of new, highly organized and maintained forests, where once there was desert, will increase the overall soil moisture, as well as increasing the amount of overall evapotranspiration over land. This will lead to increased rainfall, and, if carefully structured, new and beneficial downwind rain and weather patterns. The water introduced by NAWAPA will be used not once, but multiple times, as it makes its way through innumerable smaller sub-cycles, falling multiple times as rainfall over land, before finally making its way back to the sea, to someday, eventually, make its way back to Alaska to begin the entire cycle once again. Only now, among its activities, will be included a plethora of industrial and other uses. This same water might someday be the freshwater used to hydrate the first manned crew traveling to Mars!

Earth's Atmosphere

Our planet is sometimes unimaginatively pictured as a rocky sphere to which a thin layer of gas tenuously clings amidst the vacuum of space. Far from that bleak prospect, the Earth's surface represents a particularly intense region of transformation of the cosmic radiation which permeates all of space. In our neighborhood, the vast majority of this radiation is emitted by the Sun, which pro- duces a large spectrum of electromagnetic frequencies, as well as a constant stream of electrically charged plasma called the Solar wind. The Solar wind, guided by the Sun's magnetic field, is involved in a constant interaction with the plasma that constitutes the upper regions of the Earth's atmosphere and Earth's own, constantly changing, magnetic field. This complex interaction produces highly structured phenomena such as the Van Allen radiation belts and the aurorae, while the ionosphere itself produces electromagnetic radiation in the low frequency range.

The relative strength of the Sun and Earth's magnetic fields also modulates the influx of galactic cosmic rays, which change the climate through cloud formation, and acts directly on the evolution of living organisms over longer periods of time. It has also been documented that subtle fluctuations in the Earth's magnetic field, in part induced by its interactions with the Sun, directly influence the behavior and vital activity of living organisms and is likely a factor in their evolution. But, it is life itself which produced the ionosphere, through its creation of the atmosphere.

Several recent studies also point to the possibility of life's direct role in the creation of the geomagnetic field, possibly through the movement of ocean currents, and through the influence of water on plate tectonics, which could affect heat convection of the hypothesized dynamo beneath Earth's crust. Whether this is the actual mechanism or not, it is in fact the case that the peculiar character of Earth's magnetic field is associated with its uniqueness as a bearer of living matter in the Solar System.

Thus, in sum, it is safe to say that weather, in space and on Earth, is a product of living processes.