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The Leaching of Sub-Florescent Soils as Used in the Ancient Qanat Karez Technology to Produce a Modern Cheap Solution for Controlling and Adjusting Marginal World Albedo

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ABSTRACT

Huge desert endorheic basins with very substantial areas of flat evaporation pans were once in operation specifically for the precipitation of white crystalline sodium chloride. The Qanat Karez water distribution systems are thought to have been invented some 3000 years ago. Thousands of kilometers of tunnels and boreholes were designed and built with very heavy human investment, primarily to leach, dissolve and recrystallize salts - predominantly sodium chloride. They were only limited in capacity by the Qanat volumetric capacity watershed surge flow into the endorheic basins needed to extract these salts. Today we know that in addition nature has continuously supplied these basins with these rich minerals and rare earth materials, which in many cases lurk only a few meters in the water table below the basin surface. In the Tarim basin a Potash salt production unit is now pumping these brines to produce industrial Potassium fertilizer, using the Qanat Karez technology. Maintaining an industrial thin white crust layer of salt during critical hot seasons of the year over these huge desert areas and salar flats would it is calculated, increase the world albedo and enable cheap precise control of the total short/long wave reflection, in addition to the existing high albedo of the Polar Regions.

The surface crust of an inland Sabkha basin typically is made up of layers of salts that have re-crystallized and settled or precipitated during the evaporation process of controlled Qanat system floodwaters. Leached Salts dissolve quickly in a desert endorheic basin, and over a short intensely hot period, the process of re-crystallizing the salts can produce purer and more concentrated layered playa cakes. The dissolved salts leached out of the underlying sub fluorescent layers in the vast desert basin flats are intermittently precipitated back onto the basin surface, to form a typical salt mirror, possibly the most ancient industrial process devised by mankind for use in two critical modern solutions.

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Introduction

A modern solution to negative effects - of climate change, is directly derived from QANAT KAREZ technology, developed nearly 3500 years ago. The possible control of a massive desert pristine white canopy of salt, to incrementally influence the world albedo.

The type of snow and ice crystal and its pristine cleanliness, found at the polar regions critically influences the Albedo of the world. A form of crystal and with similar radiative qualities can be found in the centuries-old technology of salt evaporation pans. These vast areas may easily and cheaply be also made available to provide almost identical reflective or absorptive radiation. Such solar pan areas would have a far greater influence than the polar albedo since they are within the 30th parallel latitude.

The precipitation of thin layers of white evaporite salt has been a key technology of mankind comparable to the discovery of fire. With modern tools, this ancient technology can be employed to incrementally move the mean global Albedo both positively or negatively, in the event of either a solar minimum or a solar maximum or any similar climate-changing event. By industrially creating a pristine white canopy of a salt precipitate, it would be possible to reflect more energy and increase the albedo index, Alternatively by shallow flooding the same white precipitate with a dark energy-absorbing fluid Green pigment used with salt pans brine the reverse effect would decrease the albedo by more than an order of magnitude.

Ancient Sabkha salt technology with the use of the Qanat Karez irrigation system has produced such a white canopy in vast expanses of existing uninhabitable endorheic basins. Existing natural Salar plateaus also could be cheaply brought under the control of the salt industry. Combined to the Polar snow high indexed albedo regions these basins within the 'hot" equatorial latitudes would offer an extremely efficient "Dash-Pot" control of the total albedo index.

The use of Qanat Karez Aflaj water streams is still for domestic

irrigation purposes however the human engineering motivation required for building these ancient systems was for a far more important purpose. The surface crust of an inland Sabkha basin typically is made up of layers of different salts that have re-crystalized and settled or precipitated during the evaporation process of controlled QANAT system floodwaters. Leached Salts dissolve quickly in a desert endorheic basin, and the process can produce purer and more concentrated layered playa salt cakes. These various dissolved salts leached and crystalized out of the underlying porous subsoil layers were the original ancient purpose engineered design of the Qanat to control basin flooding without destroying the basin salt mirror playa or causing erosion. They were built and operated under extreme hardship during certain periods when coastal "Sebkha" salt evaporation pans were globally inundated due to climate change, and salt was catastrophically in short supply. The salt "winners" of this ancient saltern industry have for thousands of years relied upon the tides of the sea to fill evaporation pans. This salt industry is probably the only credible witness of historical fluctuations of the eustatic sea level and past climate change. Between the years 100 BCE and 300 AD the Mediterranean sea level is estimated to have risen 1.8 meters. This is a sea-level rise indicating historic global warming similar to present estimated rates of rising. It also is evidence of catastrophic inundation and lack of salt supplies resulting in the development of the Silk Road as a source of the traded commodity salt, and the means of exchange which was silk.

Albedo global control science appears in many plans and ideas such as seeding clouds, spreading reflective materials on the sea surface, or even launching giant sun umbrellas into space to reflect light away before it can reach the planet.

None of these engineering projects has the potential of a simple canopy of white salt which can be spread quickly and cheaply in a short time period with the added ability to reverse the effect of albedo reflection to absorbing solar radiation.

The mean albedo [optical reflective brightness] on a scale of zero to 1, of planet earth is considered to be approximately 0.30 (30%) It is estimated that at albedo 0.42 (42%) planet earth's climate would be in a status similar to that of the last ice age. Albedo for this paper's purpose refers to energy reflected back in the visible spectrum where Kirchoff's Law refers to white crystalline SODIUM CHLORIDE salt's capacity to absorb and emit radiation at a specific wavelength.

If we are to assume that mankind is presently experiencing the upper limit of temperature comfort with the climate and that any further warming would be unacceptable, the following practical use of vacant endorheic deserts is offered as a viable and available possibility of controlling earth's albedo to a safe and comfortable margin of value between these two extremes. Acting as a "dash-pot" to stabilize almost every man-made or natural eventual tipping point in earth's energy budget leading to climate change, could be controllable.

Estimates have indicated that the recent [10 year] decrease of a calculated 0.007 albedo has resulted in a global temperature increase of 0.16 degrees Celsius. Whether this is true or not, one might assume that if it were possible to precisely control the earth's albedo all our troubles would "seem so far away". So one can "imagine" that by Increasing or decreasing the world albedo increment by only one or 2 points quickly and significantly, it would suffice to react to the future feedback from advanced measuring systems, of man-induced or natural climate changes. For example - A recent discovery was made in the Arctic. Dirty snow, scientists found was responsible for much polar and Arctic warming previously blamed on greenhouse gases. Dark soot and ash lightly soiling the pristine snow absorbs about 95 percent of the incoming solar radiation, while pristine snow reflects more than 15 times that amount. While spreading a light layer of new snow [ie coloring the Poles a whiter shade], or alternatively spreading a light layer of soot, or increasing cloud reflection could all be a possible means of control, they are hardly practical. Neither is spreading an absorbing or reflecting aerosol in the stratosphere to create blocks. All these varied possibilities while perhaps contributing to increasing the albedo to prevent warming, will not contribute to the alternative possibility, a projected glacial cooling of the earth.

Like the albedo of the white Polar regions, the albedo of the Salar de Uyuni is a typical example of salt flats in Bolivia estimated to have an average albedo of 0.69 measured over the total area of 10,000 sq/km including ultraviolet light. As with fresh snow, freshly precipitated salt albedo would be over 0.90. It is even used as the target of satellite calibration due to its flatness and continuity. Thus if one was able to create a number of controlled white surface areas similar to the Salar, with a similar or improved albedo, it would make possible controlling the earth's climate instead of speculating about the causes of climate change.

A confidential pilot project code "SALBEDO" with minimal investment is tentatively in progress, in spite of the fact that existing salt production evaporation pans have been in operation for thousands of years demonstrating the ease of replicating pristine white salt precipitation over vast expanses of potentially high albedo surfaces. The world albedo could be increased or decreased, artificially from an index average presently equal to 0.32 to 0.35 resulting in the controlled decrease of global warming by at least 2-3 C degrees. The albedo could also be reversed since the salt industry today employs accelerators such as 2-Naphthol green dye, to absorb energy and induce faster evaporation. No other available system can presently influence both global warming and global cooling of the earth's energy balance at short notice.

Together with the Qanat Karez water distribution systems thought to have been invented some 3000 years ago, the technology could control the planet albedo within the narrow index band between past glacial periods and the present temperatures.

Thousands of kilometers of tunnels and boreholes were designed and built with very heavy human investment, primarily to leach, dissolve and recrystallize salts - predominantly sodium chloride. They were only limited in capacity by the Qanat volumetric capacity watershed flow into the endorheic basins needed to extract these salts. Today we know that in addition nature has continuously supplied these basins with these rich mineral waters, which in many cases lurks only a few meters in the water table below the basin surface. In the Tarim basin, a Potash salt production unit is now pumping these brines to produce industrial Potassium fertilizer, using the Qanat Karez technology. Similar Qanat technology is used in the Atacama and in Bonneville.

The ancient Qanat water distribution design to leach salt is thought to have operated by controlled flooding of "fields" in endorheic basin flat alluvial expanses. The Qanat tunnel volume was seasonally flooded including in huge cisterns to provide volumetric surge capacity. At the appropriate moment, the volume of water stored in these cisterns and the tunnels were manually released to "well" and to gush up through multiple bore-holes in the flat basin surface, dissolving the sub-florescent capillary salts to create a rich brine "irrigating' the surrounding evaporation

fields. As the brine became concentrated, the salts re-crystallized and precipitated at their designated point of supersaturation. The resulting crust of pure layered salts depended upon the flood timing controls of the Qanats using leather water bag valves to open and close the Qanat conduits. Thus a controlled shallow brine level in surrounding flat fields optimally dissolved subsoil salt without eroding the flat basin surface to allow brine evaporation and eventually precipitation of a layer of white pristine salt.

Conclusion

By quickly crystallizing a reflecting thin pristine white salt crust canopy from a brine over vast desert areas estimated at 1 million square kilometers, it is expected that the world albedo could be raised by 3 incremental points to maintain a lower global mean temperature. However, This flooding technique and leaching method still primitively employed to produce consumer salt crust slabs in many desert basins is the only foreseeable system which could be also used to prevent global cooling in the event of a predicted glacial period, using the same brine, darkened in color to absorb instead of reflecting energy.

Just as the new Lop Nor potash plant in the Taklamakan depression, is today producing industrial salts by evaporation so too, could this ancient technology produce a much thinner temporary precipitation of controlled white salt crystallization to cover much larger vast flat alluvial expanses of the many existing endorheic basins. Such a vast area specifically to produce an increased albedo [or alternatively a decreased albedo by shallow flooding the same area with brine colored by 2- Naphthol green dye] would effectively be controllable. By switching seasonally to obtain a reflective white pristine condition at the critical periods of the hot desert climate, an incremental controlling DASH POT influence to the existing global albedo is possible. Implementation of an albedo increased by exposing the new white crust or decreasing the albedo by flooding would depend upon achieving a stable, reliable real-time feedback measuring system perhaps similar to the CERES or the new Sentinel data system in order to create albedo forcing during relevant seasons of the year. Management of the arid deserts would require the cooperation of the Shi'a Jafari, the modern owners of the ancient Qanat systems still working and situated in the vast existing endorheic basins in the Kavir and Tarim depressions of the Silk Road, to extend some of the needed one million square kilometers for modern flooding plant by an international organization. The remaining existing vast areas could also easily be made a "whiter shade of pale" created by revamping the endorheic Salar deserts of Australia, the Kalahari desert, Bolivia and of course Bonneville, Utah. Not only would such a small investment in Central Asia prevent prevailing conflict but it would also solve hydrologically drought problems [1-7].

Images

The minimal band between Ice age Albedo and present Albedo to anthropologically control the global albedo and temperature:

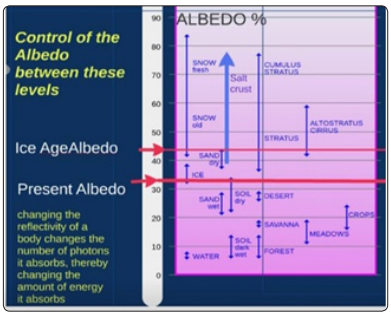

Figure 1: The Ancient QANAT was designed to supply sweet watershed streams to Sabkha endorheic basins, in order to dissolve – re-crystallize, and precipitate fresh white salt crust with full process system control by surge flooding

Figure 2: Slabs of salt crust cut and shaped for distribution-Ethiopia

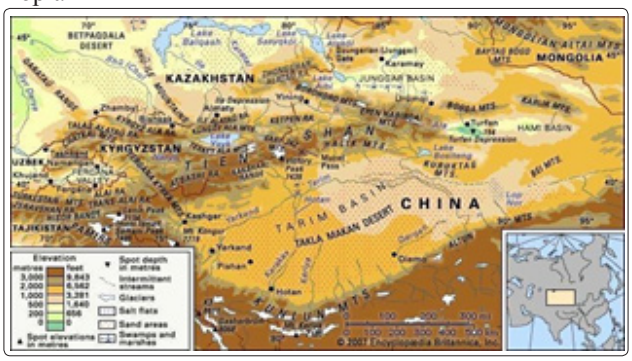

Figure 3: Taklamakan desert - typical of endorheic salt basins-Where Qanat systems once produced Salt crust for the SILK ROAD trade

Figure 4: QANAT borehole lines and sinkholes between the lines of boreholes where salt has dissolved

Figure 5: Qanat design to stream watershed irrigation to distant endorheic basins and salt evaporation arid zone flats

Figure 6: Airphoto of Qanat flood boreholes with weirs and holding dykes in a Kavir basin and white salt precipitates in Iran

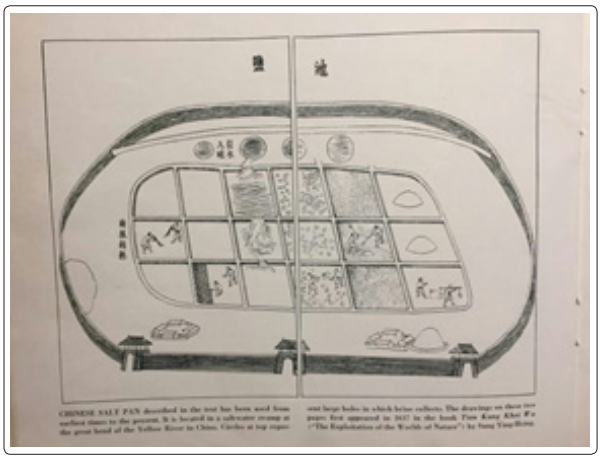

Figure 7: China 14th century scheme showing line of multiple boreholes supplying brine to salt production pans

Figure 8: TWEET July 2019

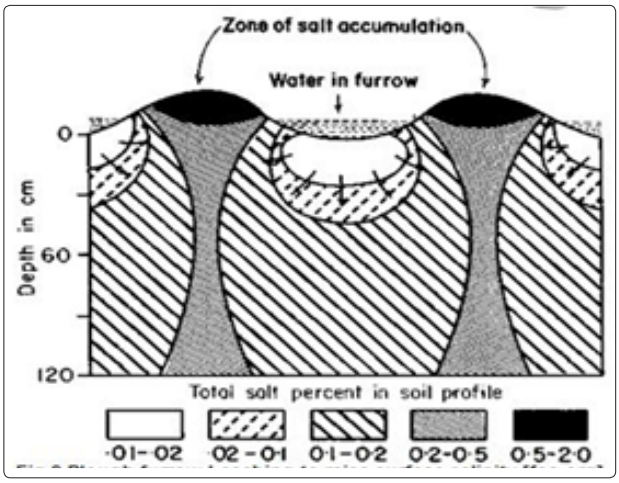

Figure 9: Typical salt concentration by water irrigation along flood furrows

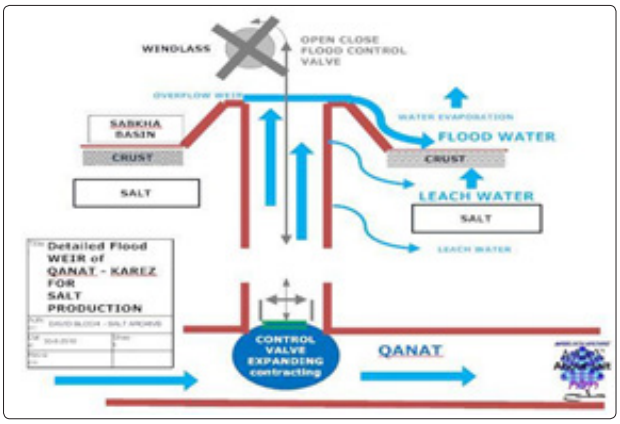

Figure 10: Scheme of Ancient Qanat flooding control valve system to leach subsoil salt, re-crystallize and precipitate new crust

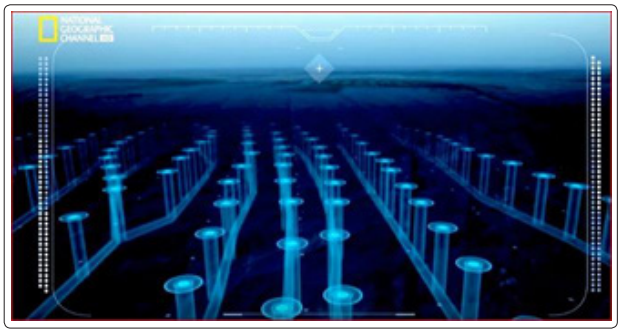

Figure 11: Flood boreholes- digital scheme of distribution system

Figure 12: Prising up slabs of salt crusts for distribution

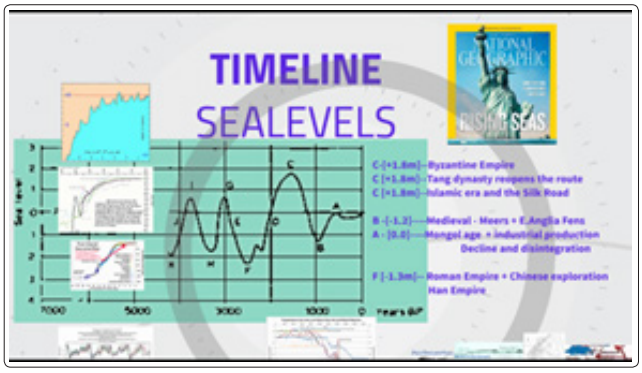

Figure 13: The Salt industry as a witness providing evidence of global eustatic sealevel rise and fall over the past two millennium

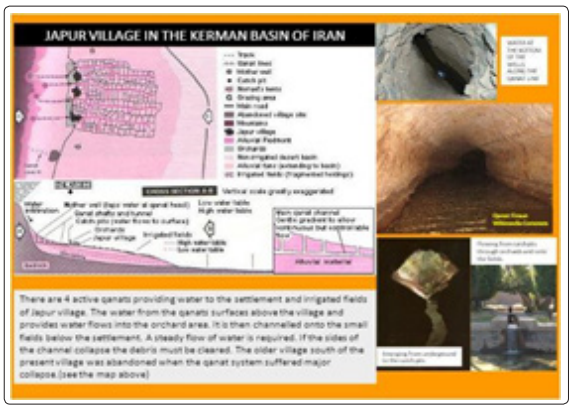

Figure 14: Every community is supplied by a Qanat system -Typical Iranian desert village. [Present trickle flow use is only for domestic needs]

Figure 15: Qanat lines of boreholes and weirs to evenly distribute brine without eroding the flat desert

Figure 16: Controlled pans and salar flats of fresh salt have albedo index of more than 0.9

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