

BROOKTRAILS TOWNSHIP

COMMUNITY SERVICES DISTRICT

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AGENDA ITEM K-7

TO: Board of Directors
FROM: Denise Rose
DATE: January 23, 2015

SUBJECT: 'Rain- on- Demand' Project

Staff recently met with Ken Davlin, P.E. of Oscar Larson & Associates who serves as the District's consulting engineer to discuss capital improvements, particularly in the area of water.

Davlin discussed a group that he has worked with in the past that is currently working to set up rain-fall-by-ionization, a pilot plant program in northern California.

The group would be responsible for all permitting, installation and operational costs. The apparatus for the project would be temporary and easily dismantled with minimal land disturbance.

I have attached a power point presentation concerning the pilot project, as well as two articles concerning the technology that the project has adapted for the pilot for your consideration.

If you are interested in pursuing this program, I will contact the project director to discuss the next steps.

From: Ken Davlin [<mailto:kdavlin@olarson.com>]
Sent: Wednesday, December 10, 2014 10:27 AM
To: Denise Rose
Subject: Rain On Demand Pilot Plan Program

Denise:

Here is the info on the rain-fall-by-ionization pilot plant Program.

Remember this is not a proven technology in the USA, but there are papers and claims that it has worked well in other international countries.

I would want to let Bernd know if you are interested. Then you could work thru us or directly with his group.

The trials will be completely paid for the 12 months or so. They will pay for permits. They will pay a small rent if appropriate.

They have reached agreement with UC Cal Poly at San Luis Obispo, to handle the large scale permit issues / processes, documentation, and reporting.

My concern is whether BCSD has the better location, topo, and some other land control factors for the type of trial they are thinking of.

Call to discuss if you wish.

Kenneth G. Davlin, P.E.
kdavlin@olarson.com



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BKS ENERGY LLC presents:

"RAIN ON DEMAND"

TM

A Showcase for California



Contact:

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California's reality: catastrophic draught and severe water shortage. "Drought worsens in California since last week; 33% of the state facing exceptional drought conditions", the National Weather Service said Thursday.

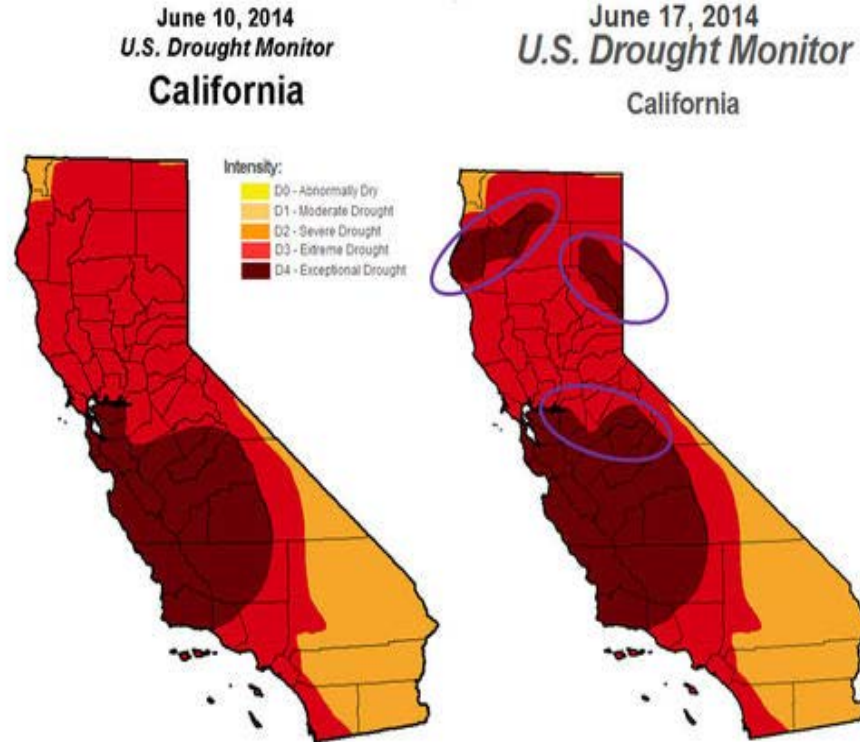
Los Angeles Times, June 19, 2014:

<http://www.latimes.com/local/lanow/la-me-ln-drought-worsens-across-california-20140619-story.html>



Given the level of crisis, all available scientific capabilities should be applied to the defense of the water, food, and livelihood of the people of North America West, including systems to influence and control the weather.

("Expanding NAWAPA XI: Weather Modification To Stop Starvation", Executive Intelligence Review, Aug 9, 2013) <http://larouchepac.com/node/30858>



Weather modification, especially cloud seeding, has been practiced in the U.S. for many years, but mostly limited to using existing clouds during the winter months and averaging between 5% and 15 % increase of seasonal rain or snow.

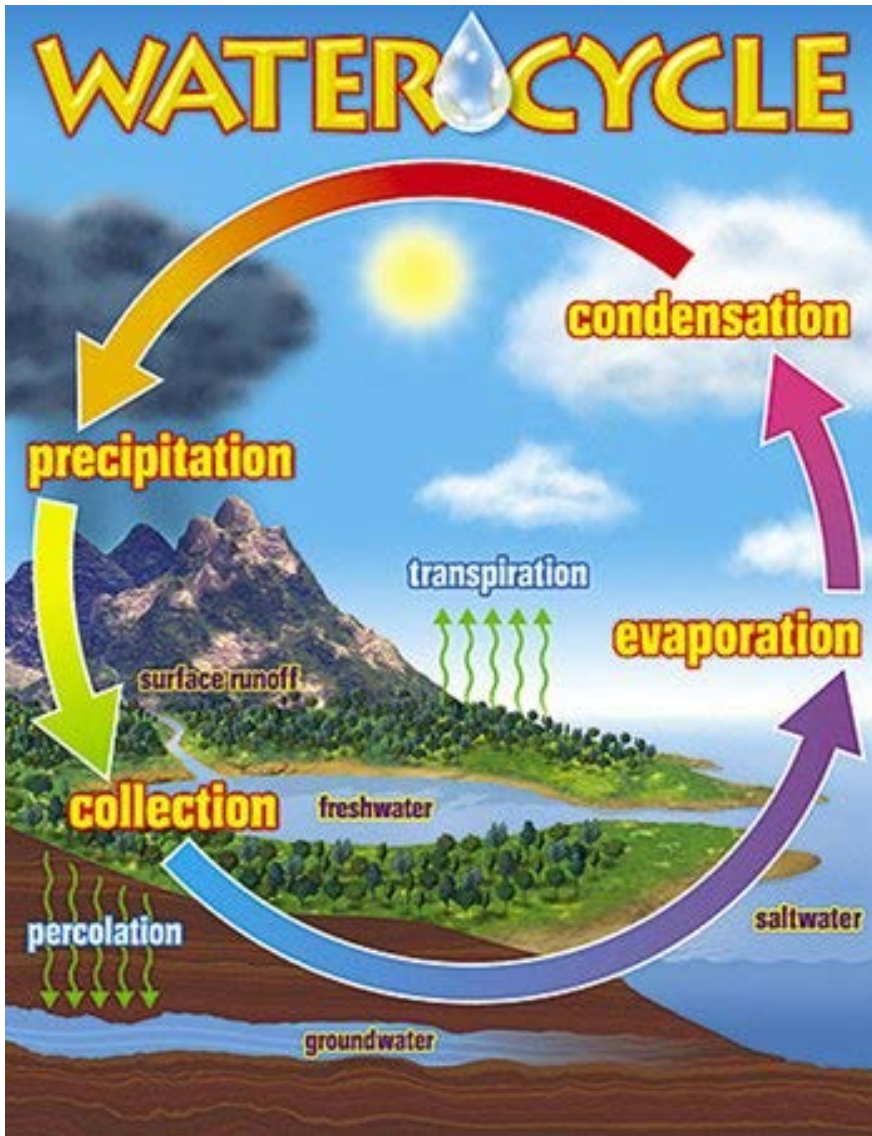
A demonstration facility in Mexico produced an increase in rain from the annual average of 11 inches to 47-51 inches.

(Executive Intelligence Review, Aug 9, 2013)



| | <u>Cloud seeding</u> | vs. | <u>ROD Ionization</u> |
|-------------------------|----------------------|-----|-----------------------|
| Use of Chemicals | YES | | NO |
| Exhaust Emmissions | YES | | NO |
| Harmful Radiation | NO | | NO |
| Temperature Limitations | YES | | NO |
| Precipitation Increase | 8-15% | | 25-200% |

Rain-on-Demand™ copies Mother Nature



Natural Cloud Creation and Rainfall:

The sun's heat evaporates the water from the planet's water bodies and fluxes of galactic cosmic rays ionize the water vapor, most of it over the oceans, creating the global cloud coverage.

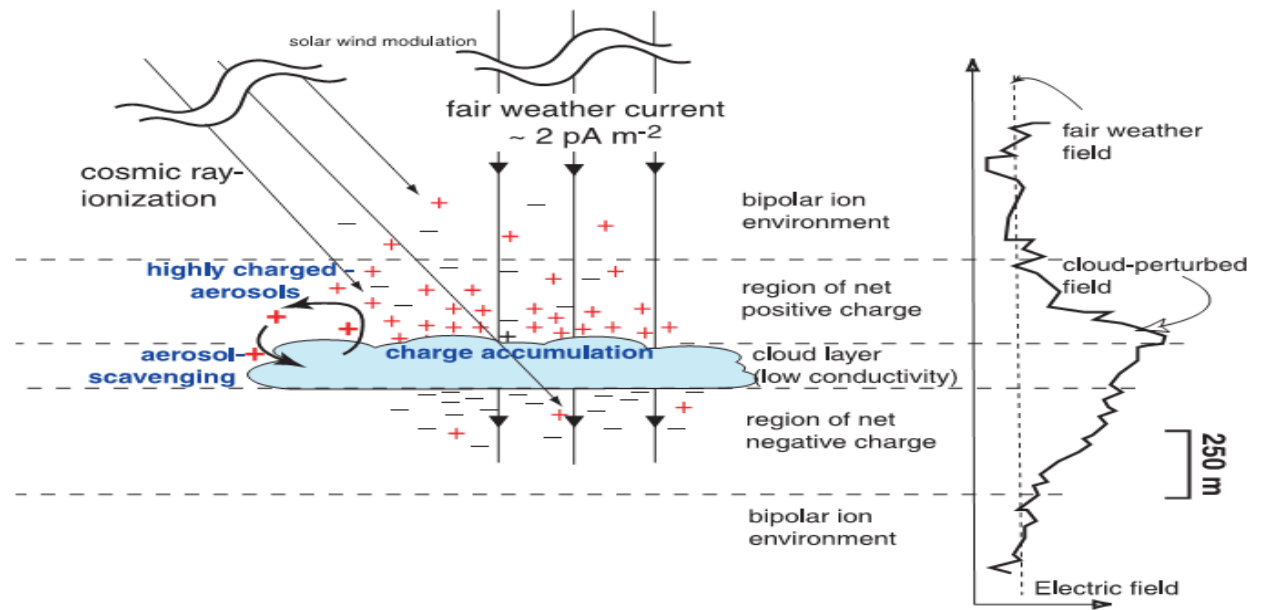
Rain-on-Demand™ (ROD™) follows the Natural Water Cycle:

Our proprietary technology enhances the natural air ionization process and increases the formation of nuclei in moist air to form water drops and, subsequently, the rainfall.

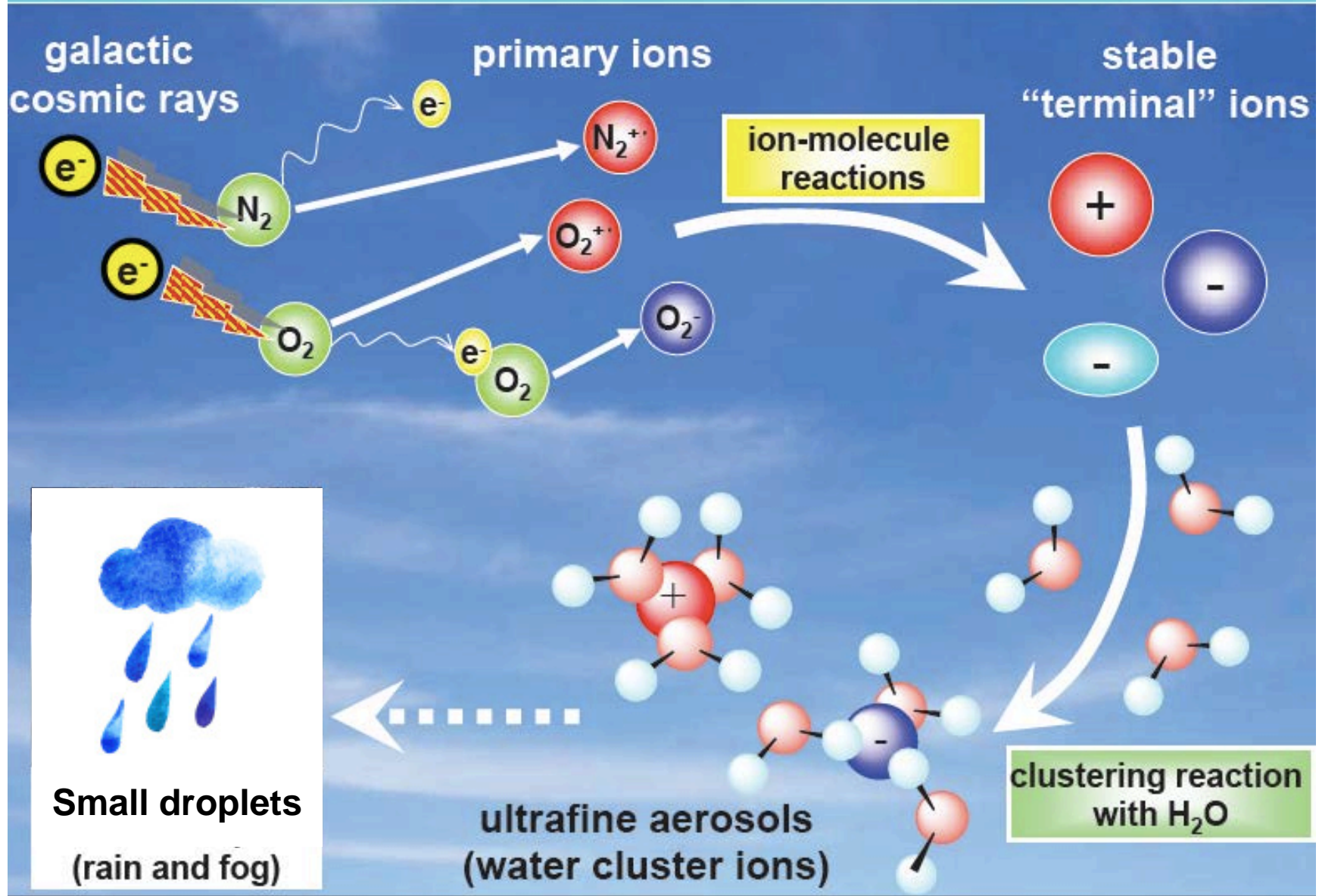


Mechanism of the global cloud formation

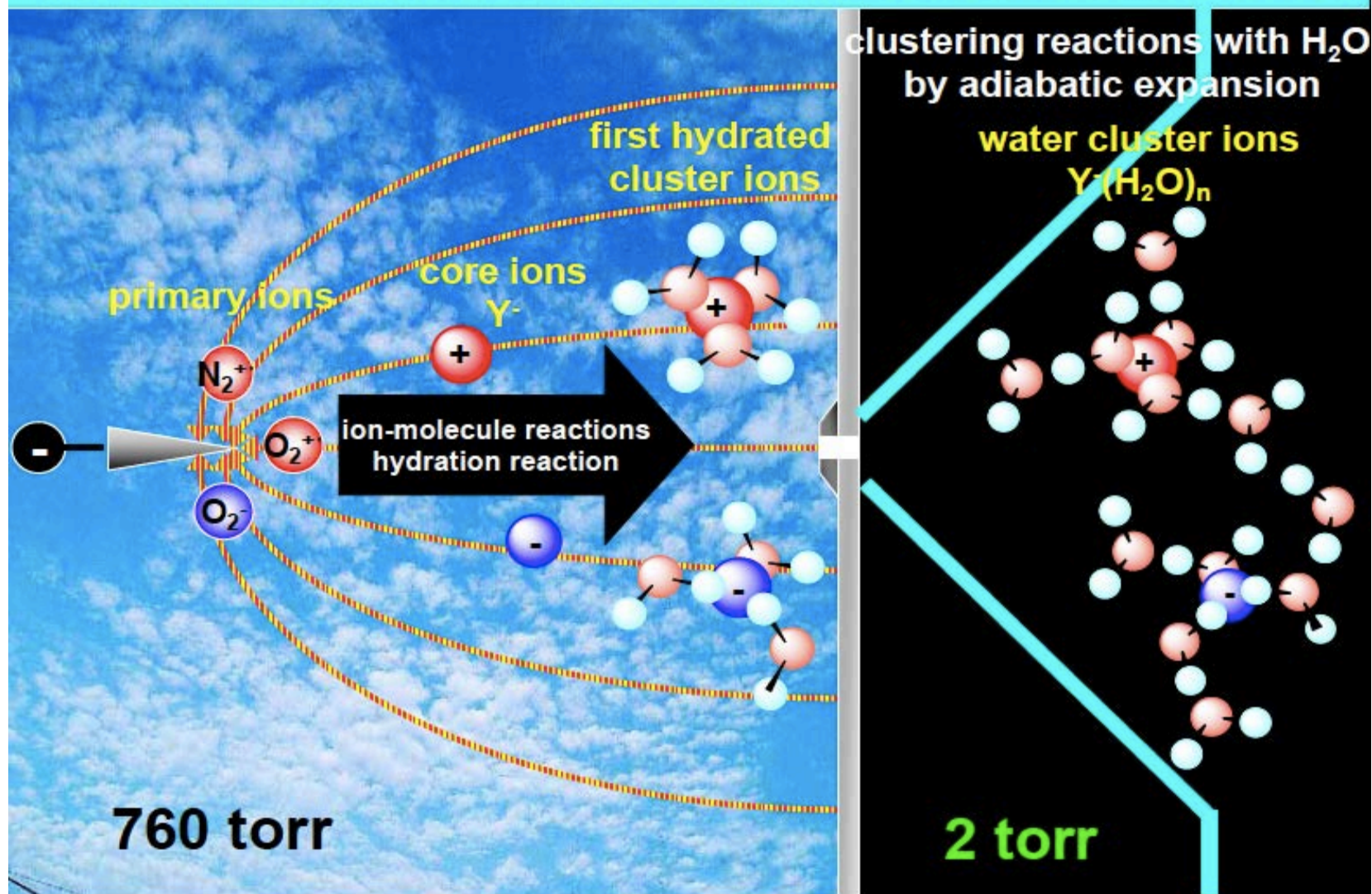
- **High energy rays ionize the air molecules**
- **Ions are good centers of water vapor condensation, growing embryos create clouds**

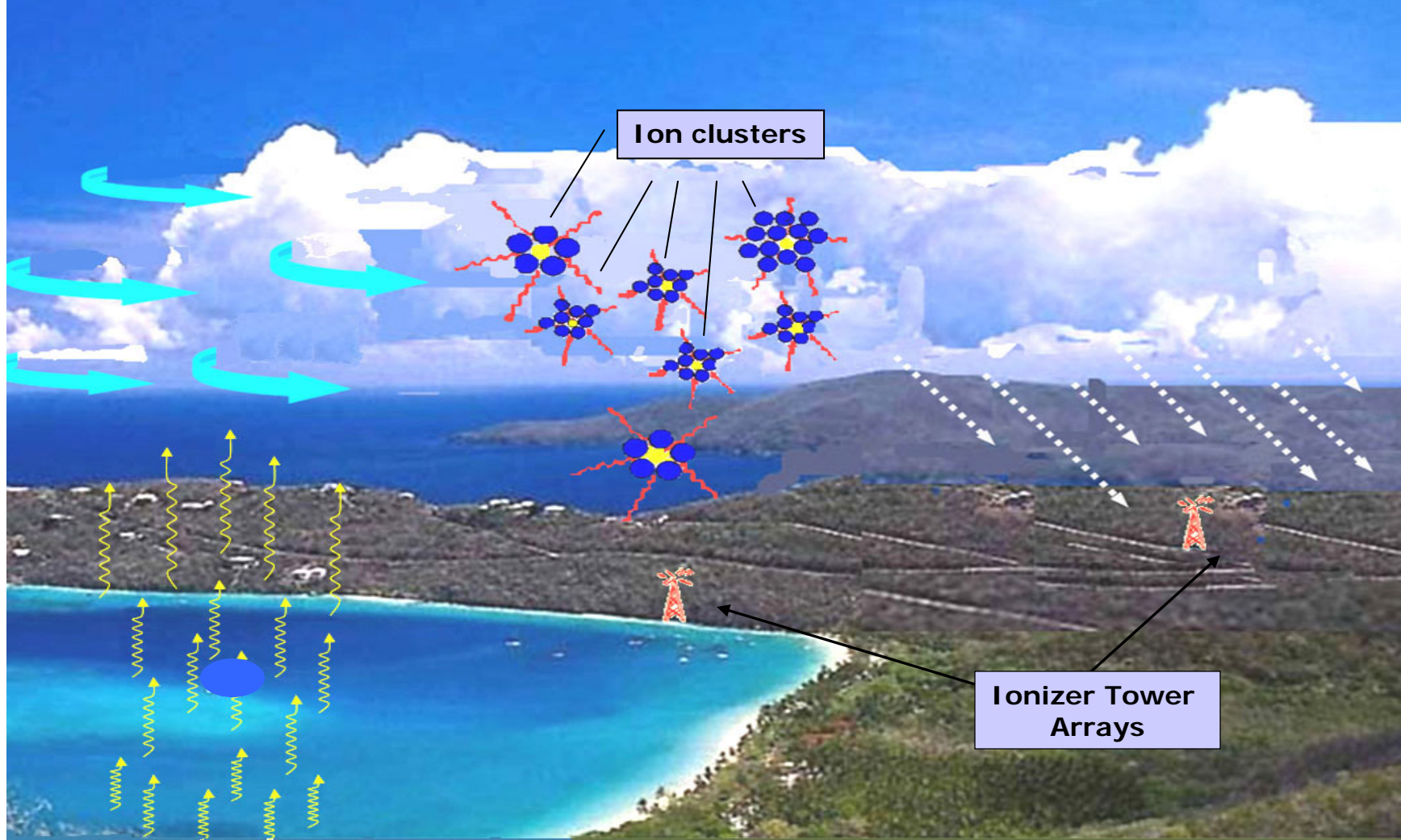


The aerosol formation mechanism in the lower troposphere



The formation of water cluster ions in APCDI MS





First, we initiate rainfall in designated coastal areas, where there is enough moisture in the atmosphere (min. humidity is 30%).

Then, through a chain of ionizer tower arrays, we pull moisture and clouds further inland and induce the rain for up to 100 miles from the coast.

The Task: Identify and lease a site of about 10 acres, preferably with access roads and electricity, with statistical certainty of moisture of a minimum of 30% in the atmosphere over certain periods of time during the year, preferably within 5 miles from the ocean. Identify the expected boundaries of the increased rainfall, communicate with local private and public stakeholders

The Challenge: Inform and work with government agencies to support expeditious permitting

Basic Information: The project is funded for equipment installation and one year of operations with data collection for proof of efficiency and environmental benefits

Step 1: Identify and lease a site, apply for and obtain permits

Step 2: Installation of electrical equipment for the ionization of atmospheric moisture to induce cloud creation and rainfall; Voltage: up to 100,000 Volt, 5 kW power supply

Land area needed: 10 acres, flat to some sloping

Actual footprint of equipment: central tower (100 ft height) 20 sq ft, central tower guy wires 80 , 10 satellite anchors for high voltage wires with 20 sq. ft each, total actual footprint 300 sq ft.

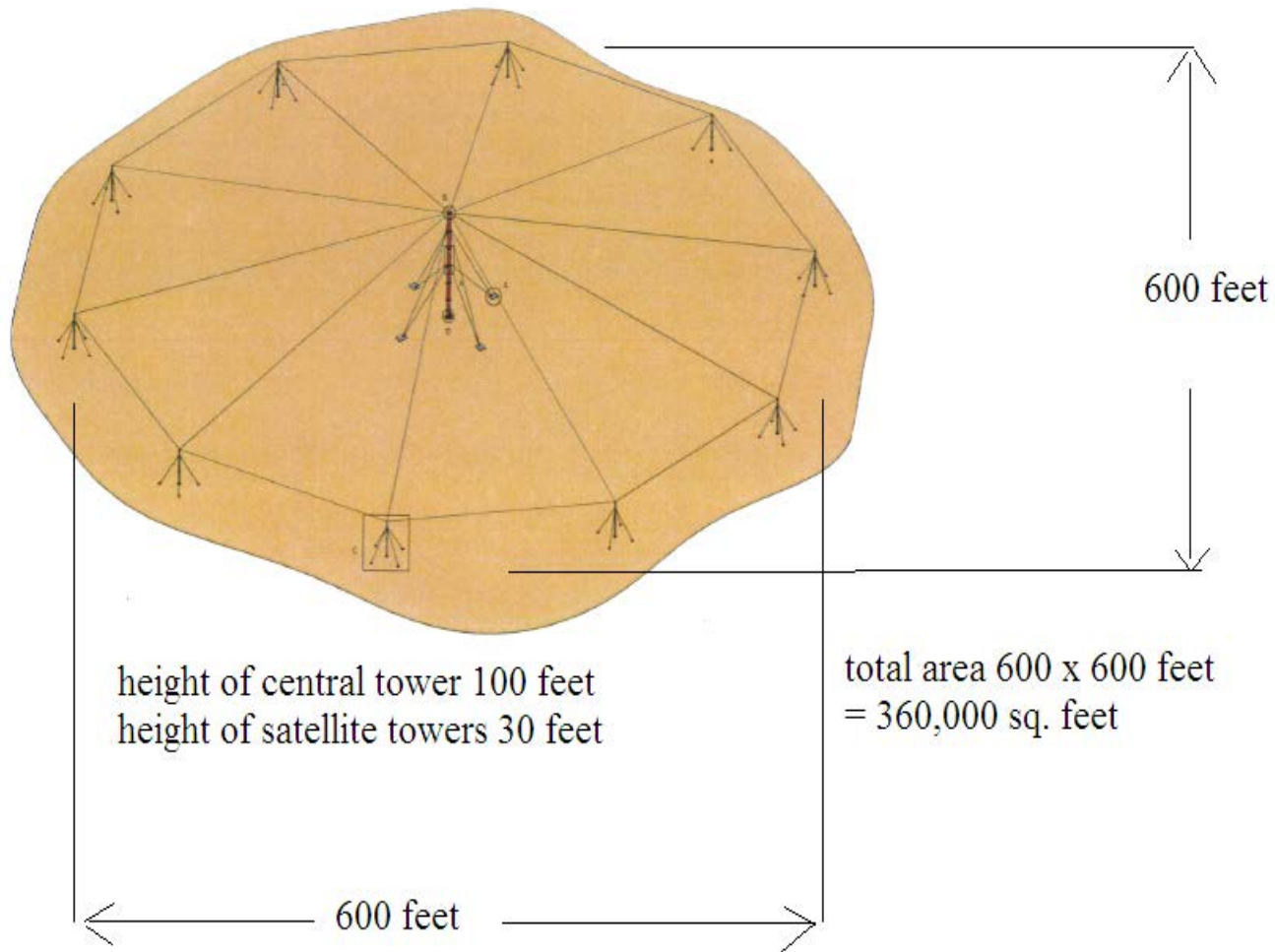
Expected area of rainfall: within a radius of 10 miles

Preferred location of first unit: within up to 10 miles from the coast for marine moisture

Step 3: Operate the facility for initially one year to collect data and calibrate equipment to atmospheric conditions

Step 4: After successful operations and further permitting, extend the rainfall area by installing a series of ionization units up to 100 miles inland

Schematic drawing of a typical ionization unit



System Components:



Ionization towers: main



peremeter

Operating Mode:

- Initiation time – about 72 hours
- Coverage – 10-15 miles radius for a single installation
- Shutdown time – rain stops approximately one hour after deactivation

Power source



Remote control unit



Operational Safety:

Ionizer Effect on Humans (See Appendix I)

Preliminary Permit Application Drawings (See Appendix 2)

EPRI Comments on the IEEE Standard for Safety Levels With Respect to Human Exposure to Electromagnetic Fields, 0 to 3 kHz (2002) ; <https://www.osha.gov/SLTC/elfradiation/epri-ieee1-03d.pdf>

Encyclopedia of Occupational Health and Safety, International Labor Organization <http://www.ilo.org/oshenc/part-vi/radiation-non-ionizing/item/659-static-electric-and-magnetic-fields>



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National Geographic News

Scientists Make Dozens of Storms in the Abu Dhabi Desert?

Claims of Manmade Rain Clouds Spark Skepticism





Camels and trucks travel on a main desert road in Abu Dhabi while rain descends in the background.

PHOTOGRAPH BY JAMES DAVIS PHOTOGRAPHY, ALAMY

By Brian Handwerk
for National Geographic News

PUBLISHED JANUARY 18, 2011

This story is part of a special *National Geographic News* series on global water issues.

In arid lands, the ability to create freshwater out of thin air would be priceless.

Now a Swiss company, Meteo Systems, is poised to earn a pretty penny in Abu Dhabi with a controversial weather modification system said to be responsible for dozens of rain showers in the desert last summer.

The claim is difficult to verify but certainly has raised a storm of skepticism among many leading weather modification experts.

“As far as I’m concerned I don’t believe these claims,” said Roelof Brientjes, who heads the National Center for Atmospheric Research’s international weather modification programs. “There’s no scientific basis for this; the physics doesn’t support it.”

(Related: “Planes Create Weird Clouds—And Snow, Rain Fall Out.”)

While typical weather modification efforts—which began in the mid-20th century and continue in nations from the United States to China—make use of natural clouds and attempt to “seed” them to produce precipitation, Meteo Systems purports to create the clouds themselves.

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Their system uses arrays of 33-foot (10-meter) electric towers that produce negatively charged ions, according to the company. These ions bind with tiny solid and liquid particles, supercharging the particles' ability to form clouds and precipitation.

Joseph Golden, a weather modification expert who once chaired the now-defunct Atmospheric Modification Program at the National Oceanic and Atmospheric Administration (NOAA), also has serious doubts that the technique could work.

"This method is inherently incapable of producing clouds out of thin air," Golden said.

(Related: "China's Rain-Free Olympics Plan Met With Skepticism.")

A Long History of Ionization

The Technical University of Munich's Peter Wilderer, winner of the 2003 Stockholm Water Prize, said people have been attempting ionization techniques for decades.

"The ionization technology was first mentioned in 1890 by [Nikola] Tesla. In 1946 General Electric executed some field trials under the leadership of [Bernard] Vonnegut [brother of novelist Kurt Vonnegut]. Later the technology was used for military purposes in the former Soviet Union."

Wilder added that reviews of radar images suggested to him that ionization could possibly have some effect, under proper meteorological conditions. Despite press reports to the contrary, he has never personally witnessed any rainfall events produced by Meteo Systems.

Show Me the Data

NOAA's Golden is interested in hearing much more from the scientists trying to make it rain in the desert.

"I put out a challenge to any of those that are involved in this project and making these claims. Show me the data," he said.

There may be little chance of such transparency in the near-term, however, as Meteo Systems is closely guarding the secrets of the potentially valuable technology the company has dubbed "WEATHERTEC."

Meteo Systems did not respond to calls and emails from *National Geographic*

The directors of the Max Planck Institute for Meteorology, who have been erroneously linked to the project via media reports, released a statement expressing “distress” that the scientific organization had been associated in any way with the work of Meteo Systems. They added that rainstorms were part of unusual weather patterns in the Middle East last summer.

“Our institute has no connection whatsoever to this work, nor have we been privy to the underlying evidence that the company is using to support its claims,” the statement said.

“We also note that many people have a financial stake in seeing these claims being credibly reported by the media, and that to the extent rain showers in the region were unusual this summer, they accompanied rather unusual weather patterns over the broader region, which certainly had nothing to do with the very localized experiments in Abu Dhabi. One only needs to be reminded of the terrible flooding over neighboring Pakistan.”

Playing God

NCAR’s Bruintjes noted that the UN-based World Meteorological Organization’s expert team on weather modification research met in Abu Dhabi in March 2010, and issued a report on the state of the science that cautioned against just this type of technology.

“The energy involved in weather systems is so large that it is impossible to create cloud systems that rain,” the WMO report read. “Weather modification technologies that claim to achieve such large-scale or dramatic effects do not have sound scientific basis (e.g. hail cannons, ionization methods) and should be treated with suspicion.”

Golden said people who are simply desperate to fool Mother Nature often pay for modification techniques that are unproven at best, including the hail cannons mentioned in the WMO report. “Farmers invest thousands of dollars in those cannons to suppress hail even though the scientific evidence is that they don’t work,” he said.

Bruintjes put his point bluntly: “The rotation of the Earth, the energy of the sun, and moisture from the oceans cause these things. None of us can change that, and it’s actually good that none of us can change that because we’d likely make a mess of it.”

Electric Rainmaking Technology Gets Mexico's Blessing

But for now, doubters prevail north of the border

By Samuel K Moore

Posted 1 Apr 2004 | 5:00 GMT

From at least the early 1940s to the end of the 20th century, it always rained more in the state of Jalisco, in central Mexico, than in its neighbor Aguascalientes. But in 2000, on a patch of parched pasture in Aguascalientes, workers from Mexico City-based Electrificación Local de la Atmósfera Terrestre SA (ELAT) erected a peculiar field of interconnected metal poles and wires somewhat resembling the skeleton of a carnival tent. Since then, about as much rain has fallen on the plains of Aguascalientes as on its more lush neighbor.

The brainchild of a fractious group of Russian émigrés, the poles and wires are in fact a network of conductors meant to ionize the air. If the technique is done properly, the thinking goes, the natural current between the earth and the ionosphere is amplified, leading--through a mechanism that is not fully understood--to rainfall. There are now 17 such installations in six states in Mexico, and in January, federal government agencies decided to back construction and operation of 19 more by 2006, potentially altering the weather in much of parched north and central Mexico. Meanwhile, by May, ELAT's competitor Earthwise Technologies Inc., of Mexico City and Dallas, could win the right to establish ionization stations in southwest Texas's water-starved Webb County, which would make it the first such installation in the United States.



STORM CLOUDS GATHER: Scientists and authorities differ over whether ionizing the air can bring on big weather changes.

But some atmospheric scientists aren't so sure the Russians aren't selling snake oil. "[Ionization] is highly unconventional and in my realm of experience, I have seen no concrete evidence published in a refereed journal, nor have I seen sufficient credible eyewitness verification that the technology works as touted," says George Bomar, the meteorologist charged by the Texas government with licensing the state's weather modification projects [see photograph, "Storm Clouds Gather"].

Ionization technology, called alternatively IOLA (ionization of the local atmosphere) by Earthwise and ELAT (electrification of the atmosphere) by the company ELAT, washed ashore in the New World with a group of Russian scientists, who left for Mexico after the Soviet Union's collapse. The scientists had already formed a company called ELAT in Moscow, but soon "a less than amicable split" occurred, according to Earthwise CEO Steven C. Howard. The last Soviet ambassador to Mexico, Oleg Darusenkov, now a businessman and adviser to Earthwise, put the contingent led by Serguei Komarov in touch with that company's executives. Meanwhile, Komarov's former colleague Lev Pokhmelnikh formed ELAT by joining with another Darusenkov associate, the Mexican astronomer and scientific establishment insider Gianfranco Bissiacchi. Each company believes it holds key patents.

IOLA and ELAT compete with conventional cloud seeding, which--though it also remains scientifically unproven--is used in more than 24 countries and 10 U.S. states. Cloud seeding usually involves dispersing a chemical agent such as silver iodide into cloud formations, which helps ice crystals form, leading, it is thought, to bigger clouds and more precipitation than without seeding. The ionization approach, according to Bissiacchi, now ELAT's vice president of R and D and operations, does a similar job but twice over. Ions attract water in the atmosphere, creating the aerosol that produces clouds, and they also charge the dust already in the air, making particles become more attractive nuclei for water droplets, which coalesce and fall to the ground as rain.

The ion technology's backers think their idea beats cloud seeding for a number of reasons. It produces more rainfall, and it doesn't need clouds to be in the area to work. Also, it should be less expensive, because it doesn't require aircraft to spread chemicals, the usual method. Further, they believe that changing the polarity and quantity of the ions could reduce rainfall where it's too plentiful, prevent hail, and even break up fog at airports. To these claims, Earthwise adds that its technology reduced air pollution in trials in Mexico City and Salamanca, because the condensation it caused warmed the air, creating an updraft that carried away pollution.

Earthwise's installations are structures about 7 meters high, shaped like short open-topped air-traffic control towers, that house proprietary ion generators and blowers to lift the ions. Separate antennas amplify the ionization by manipulating the local electric and electromagnetic fields. ELAT's installations work in the same manner but are more primitive in appearance, consisting of a 37-meter high central tower surrounded by 8-meter posts arranged hexagonally at a distance of 150 meters. The tower and posts are interconnected by wires, which when set to a high dc voltage by a 2-kilowatt generator, ionize air molecules such as nitrogen and oxygen. According to Bissiacchi, as the ions waft upward, they produce about 1 milliampere of current. This current swamps the Earth's natural current--about 1 picoampere--and can affect the weather up to 200 kilometers from the station, he says.

Summing up all its tests from 2000 to 2002, ELAT and its U.S. and Canadian counterpart Ionogenics, in Marblehead, Mass., claim that ionization led to about double the average historical precipitation--stimulating, among other things, a 61 percent increase in bean production in Mexico's central basin in the last three years. Cloud seeding, in comparison, typically claims only a 10-15 percent improvement in rainfall.

Despite the claimed successes, ionization has its critics. Atmospheric scientists contacted for this article noted that even the four years of testing was too brief a period to prove that the effects seen were not due to some sort of extraordinary variability in the local weather. Bissiacchi claims that the criticism goes to a deeper prejudice. "Meteorologists are not used to thinking that electrical phenomena could be important to the normal hydrodynamic model," he says.

Weather modification technology has always had a hard time standing up to rigorous scientific scrutiny. Ross N. Hoffman, a vice president at Atmospheric and Environmental Research Inc. in Lexington, Mass., helped complete a scientific review of cloud seeding, which was released by the U.S. National Research Council, Washington, D.C., in November 2003. It found that even after more than 50 years of use, cloud seeding remained unproven from a scientific standpoint. "[Ionization] faces the same problems cloud seeding does," he says. Among those are uncertainty about the natural variability of precipitation, the inability to accurately measure rainfall, and the need to randomize and replicate experiments. The last is particularly troublesome, since weather modification companies are typically hired to induce rain whenever they can. Randomly turning

on or off the system to prove a point is not in the customer's interest, Hoffman notes.

Ionization also suffers doubts about its basic plausibility. Brian A. Tinsley, a physicist at the University of Texas, Dallas, and an expert on the effects of ions and current in the atmosphere, points out that the ionosphere is about 250 000 volts positive compared with the ground. But the effect of the resulting current, and changes to it from cosmic rays and other phenomena, on droplet formation and precipitation is "relatively small" and restricted to certain types of clouds in specific locations, he says. Considering the size of the natural voltage and the modesty of its impact on rainfall, effective weather modification using ionization, he believes, would require enormous power input and hundreds of square kilometers of antenna arrays.

But some atmospheric scientists are enthusiastic. Arquimedes Ruiz, a meteorologist who evaluates cloud seeding for the West Texas Weather Modification Association in San Angelo, says he is optimistic about ionization's chances. "In Texas, there are small droplets, so clouds tend to coagulate slowly and dissipate," he notes. He thinks ionization could at least help form the clouds that conventional seeding could then manipulate.

Although ELAT and Ionogenics have the advantage in terms of the amount of data they have collected, it is Earthwise that may end up penetrating the U.S. market first. In November the company signed a US \$1.2 million contract to build up to six ionization stations in the region around Webb County and boost rainfall there by 50 percent over the average for the prior 20 years.

However, county commissioners quickly suspended the project following an uproar in the local press, critical of the terms of the contract and the unorthodox technology. Earthwise's Howard is confident that the deal will move forward again in May if he can secure grant money for the project from the Mexican government, which would also be in the affected zone.

"We know how controversial this is," says Howard. "But we've done five projects to date. All were successful. All were outside the United States. We've got to get it here so [U.S.] scientists will evaluate the efficacy of the technology before it can really begin to become commercialized." Howard thinks it could take more than 10 more years of data accumulation to satisfy the technology's critics. But success, he says, is "a question of when, not if."

Photo: MacDuff Everton/Corbis