



CASE STUDY | 6-YEAR USDA RESEARCH TRIAL

## 208% MORE WATER

### The Texas Breakthrough That Changes Everything

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In an era of unprecedented drought, depleting aquifers, and growing water demand, water resource managers face an impossible equation: how do you create more supply when nature provides less? Traditional conservation measures, while important, can only stretch existing resources so far. The game-changing solution may come from an unexpected source—the precise control of atmospheric electrical forces that govern how raindrops form.

For six years (2017-2022), researchers working with the United States Department of Agriculture conducted the most rigorous study ever undertaken of electrostatic weather modification technology. Their findings don't just suggest incremental improvement—they demonstrate a fundamental breakthrough that could transform how we approach water resource management in drought-prone regions.

#### The results speak for themselves

Clouds treated with electrostatically charged water droplets produced 208% more precipitation than untreated control clouds. This isn't a laboratory curiosity—it's a potential game-changer for water-stressed regions worldwide. Consider what this means: if a region typically receives 20 inches of annual rainfall, ionization technology could help deliver an additional 40+ inches. That's the difference between drought conditions and agricultural abundance, between water restrictions and reservoir security.

#### The Future is Ground-Based

While this research used aircraft delivery to prove the ionization principle, the same electrostatic technology can be deployed from ground-based systems—offering greater cost-effectiveness, continuous operation, and broader coverage areas for practical water resource enhancement. Rain Enhancement Technologies specializes in ground-based ionization systems that deliver the proven science from this USDA research to water-stressed regions worldwide.



RAIN ENHANCEMENT  
TECHNOLOGIES

208%

Precipitation Increase  
vs. Traditional Methods

6

Years of Rigorous  
Scientific Research  
(2017-2022)

18

Controlled Trial  
Comparisons

USDA

Patent Approved (US  
11,116,150)



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[rainenhancement.com](http://rainenhancement.com)



## Proven Results

Six Years of Data Show Consistent Enhancement Across Multiple Metrics

Metric	Traditional Result	Electrostatic Result	Percentage Increase
Precipitation Mass	699.8 kilotons	2,078.9 kilotons	+208%
Cloud Lifetime	40 minutes	55 minutes	+38%
Cloud Area	40.7 km <sup>2</sup>	72.3 km <sup>2</sup>	+78%
Precipitation Flux	281.3 m <sup>3</sup> /s	524.2 m <sup>3</sup> /s	+86%
Cloud Volume	129.6 km <sup>3</sup>	267.2 km <sup>3</sup>	+106%

## GOLD STANDARD METHODOLOGY

- 6-Year Duration:** Extended research period from 2017-2022 eliminates weather variability concerns and establishes consistent performance patterns
- TITAN Radar Analysis:** Same protocols used for Texas's 25+ year operational weather modification programs, providing scientific rigor and institutional credibility
- Controlled Comparisons:** 18 treated clouds matched with similar untreated clouds using advanced software, ensuring robust statistical analysis
- USDA Partnership:** Conducted with United States Department of Agriculture Agricultural Research Service, demonstrating federal confidence in the research
- Multiple Aircraft Types:** Technology tested across Air Tractor 402B, Piper Comanche, and 502B platforms, proving versatility and reliability
- Patent Approval:** Results led to USDA patent application and approval (US 11,116,150), providing regulatory pathway for deployment
- Advanced Physics:** Based on collision-coalescence enhancement—40-micron charged droplets with 50 picocoulombs create optimal conditions for rapid precipitation formation

## Dr. Arquimedes Ruiz-Columbié

Lead Research Scientist & Rain Enhancement Technologies Advisor



Dr. Ruiz-Columbié brings decades of atmospheric science expertise to this groundbreaking research. As a former Research Scientist with the Texas Weather Modification Association and current Senior Lecturer at Texas Tech University, he has dedicated his career to advancing weather modification science. His co-invention of the patented Aerial Electrostatic System with USDA ARS represents a quantum leap in precipitation enhancement technology.

**The RET Connection:** Dr. Ruiz-Columbié now serves as a key scientific advisor to Rain Enhancement Technologies, bringing his proven research methodology and deep understanding of ionization physics to help deploy this breakthrough technology for real-world water resource challenges.

\*Source: Ruiz-Columbié, A., Jennings, J., Funke, C., Martin, D.E., & Bomar, G. (2017-2022). Texas Cloud Seeding Experiments using Electrically Charged Droplets. [Also reference the USDA patent: US 11,116,150]



### Ready to Apply These Results?

Six years of USDA research prove ionization technology delivers transformational results.

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