



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.



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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)



Learn more at
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 ²	72.3 km ²	+78%
Precipitation Flux	281.3 m ³ /s	524.2 m ³ /s	+86%
Cloud Volume	129.6 km ³	267.2 km ³	+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]



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Ready to Apply These Results?

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

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