

# Langmuir's Claim of a Seven-Day Periodicity Caused by Cloud Seeding

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## Introduction

In November/December 2002, while reading meteorology journals from the early 1950s on cloud seeding, I came across an apparently fantastic claim by Irving Langmuir that cloud seeding during 1949-51 had modified the weather *more than 1000 kilometers* downwind.

The specific project was conducted by Dr. Irving Langmuir's research group (including Dr. Bernard Vonnegut) at the General Electric Company, under contract to the U.S. Military. As part of this project, Dr. Vonnegut released AgI from a generator on the ground at Socorro, NM on Tuesday, Wednesday, and Thursday of each week during 6 Nov 1949 to 27 April 1950. (Langmuir's *Collected Works*, Vol. 11, p. 217)

Langmuir claimed that this release of AgI modified the weather, not only in the state of New Mexico, but also more than 1000 kilometers downwind. Langmuir's evidence was a seven-day periodicity found in meteorological records in the Ohio River Valley, the Wabash River Valley, as well as in New England.

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## Annotated Bibliography

Langmuir made a few public presentations of his claims at meetings of various scientific societies, and brief versions of his claims were published at:

- Irving Langmuir, "Control of Precipitation from Cumulus Clouds by Various Seeding Techniques," *Science*, Vol. 112 pp. 35-41, 14 July 1950. (Focuses on rainfall in New Mexico, but tersely mentions rain in Kansas "may" have been caused by AgI seeding in New Mexico.)
- Irving Langmuir, "Widespread Modification of Synoptic Weather Conditions by Localized Silver Iodide Seeding," *Science*, Vol. 112 p. 456, 20 October 1950. (Expands claim to Kansas, and says: "significantly high correlations between times of rainfall and the times of

the systematic seedings up to 2000 miles [3000 km] downwind from the point of seeding.")

- Irving Langmuir, "A Seven-Day Periodicity in Weather in United States During April, 1950," *Bulletin of the American Meteorological Society*, Vol. 31, pp. 386-387, December 1950. (Claims that periodic AgI release in New Mexico caused a corresponding periodicity in "pressure, humidities, cloudiness, and temperature over much of the United States", including Chicago and Buffalo, NY.)

### Criticism of Langmuir's Claims

Langmuir's claims were rejected by the meteorological community, because Langmuir's published evidence was *inadequate*. The following is a partial list of publications that disagree with Langmuir's claims:

- Ferguson Hall, Comments and Communications: "Dr. Langmuir's Article on Precipitation Control," *Science*, Vol. 113 pp. 189-191, 16 February 1951. (Refutes Langmuir's July 1950 paper, principally because Langmuir incorrectly assumed that precipitation in adjacent grids on a map are independent events, and because the wind could *not* have carried the AgI smoke to all of the areas where Langmuir claimed rain had fallen as a result of the cloud seeding.)
- G. Emmons, B. Haurwitz, G.P. Wadsworth, and H.C. Willett, Comments and Communications: "Dr. Langmuir's Article on Precipitation Control," *Science*, Vol. 113 pp. 191-192, 16 February 1951. (Calls Langmuir's October 1950 claim of modified rainfall in the Mississippi Valley "fantastic", and says that Langmuir's published statements are inadequate to allow verification of his claim.)
- William Lewis, "On a Seven-Day Periodicity," *Bulletin of the American Meteorological Society*, Vol. 32, p. 192, May 1951. (Finds seven-day periodicity in weather in two out of five years during 1938-42; such periodicities not caused by cloud seeding.)
- Eberhard Wahl, "Seven-Day Periodicity in Weather in the United States During April, 1950," *Bulletin of the American Meteorological Society*, Vol. 32, p. 193, May 1951. (Finds seven-day periodicity in weather at Boston in April 1879 and also in Mitchel Field, NY in April 1947; such periodicities not caused by cloud seeding.)
- H.F. Hawkins, Jr., "The Weather and Circulation of May 1952," *Monthly Weather Review*, Vol. 80, pp. 82-87, May 1952. (Finds seven-day periodicity in weather in May 1952, after Vonnegut's AgI release has been discontinued.)
- G.W. Brier, "7-Day Periodicities in May, 1952," *Bulletin of the American Meteorological Society*, Vol. 35, pp. 118-121, March 1954. (Confirms Hawkins' seven-day periodicity in weather in May 1952, after Vonnegut's AgI release has been discontinued, but notes that Langmuir claims that commercial cloud seeders on the West Coast of the USA were then releasing AgI with a weekly periodicity. Brier suggests that naturally occurring seven-day periodicity of the weather was influencing commercial cloud seeders choice of when to release AgI.)
- G.W. Brier, "Seven-Day Periodicities in Certain Meteorological Parameters During the Period 1899-1951," *Bulletin of the American Meteorological Society*, Vol. 36, pp. 265-277, June 1955. (This article "was prepared in late 1952" but publication was delayed for three years for unspecified reasons. Also strangely, the article explicitly declares its scope as only to "report the facts" and neither to

evaluate Langmuir's evidence nor interpret the facts. Reading between the lines, it is possible that the U.S. Weather Bureau, who employed Brier, had censored Brier.)

### Langmuir's Reaction

Instead of publish adequate evidence, Langmuir appears to have ceased publishing in journals of professional scientific societies. I can think of two reasons for this sudden cessation of publications by Langmuir:

1. Perhaps Langmuir was annoyed by the harsh criticism by meteorologists.
2. Perhaps Langmuir was censored by managers and attorneys for General Electric Company who were trying to avoid tort liability for flooding near Kansas City in July 1951. Langmuir had earlier said that AgI release by Vonnegut in New Mexico had caused rain in Kansas, and General Electric was releasing AgI in New Mexico during June and July 1951.

Of these two reasons, the second appears more likely to me. Vonnegut, who was a prolific author of scientific papers, apparently never published any discussion of *why* he chose a weekly periodic release of AgI, and apparently never published any discussion of the results of his periodic release. Given General Electric's careful assignment of *all* cloud seeding from *airplanes* to the U.S. Military (i.e., with General Electric's employees only as observers), Vonnegut's release of AgI smoke from the ground seems to me to have violated General Electric's policy of having only the U.S. Military make decisions when and where to release AgI.

Langmuir's detailed evidence was given in a tediously long technical report issued by General Electric company as part of the research project sponsored by the U.S. Military. (*Final Report of Project Cirrus, Part II*, General Electric Research Laboratory Report RL-785, May 1953.) This report was initially classified by the U.S. Military, but later declassified and published in 1961 in *The Collected Works of Irving Langmuir*, volume 11. The important thing to note here is that Langmuir's critics (with the possible exception of Brier) probably had *not* seen the then classified report.

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## Conclusion

My opinion is that there was a naturally occurring seven-day periodicity in the weather in the central and eastern USA at that time, and it is purely coincidence that Vonnegut operated his AgI generator on a weekly cycle. Further, Langmuir never publicly published adequate evidence for his conclusions that (1) AgI release *caused* rainfall far from the point of release or (2) periodic AgI release *caused* periodicities in meteorological variables.

Langmuir's controversial and fantastic claims are now only a small detail in the history of science and technology, which is why I have written about them in a separate essay from my other essays on the [law](#) and [technology](#) of weather modification. If one were interested in evaluating the long-range effects of AgI release, it would be better to do a new experiment than to re-examine Langmuir's old data. A new experiment could take advantage of modern technology, including use of tracers (e.g., SF<sub>6</sub>) to follow the AgI in the atmosphere.

Prof. Byers made the following tantalizing remark:

One has only to ask that someone in the Southwest [USA] repeat this ridiculously simple experiment to see what vindication can be found for Langmuir.

Horace R. Byers, foreword to *The Collected Works of Irving Langmuir*, volume 11, p. xx, 1961.

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