

**I Only Wanted to Be a Weather Forecaster:
A Cloud and Weather-Centric, “C” and “D” Student’s
Improbable Journey through Science¹**

By Art Rangno¹

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Dedications

My life would not have happened the way it did without a mom who encouraged me so much as a little kid. I got interested in the odd subject of clouds and weather when I was just six years old. She took me to a nautical instruments store, Pan American Navigation, in North Hollywood, CA, and bought me books on weather, a rain gauge, and even an aneroid barometer from my parents' meager salaries. Mom also had a strong sense of what was right and wrong. If the car wasn't fixed right, *she* was the one that took it back and got it fixed right. Thanks, Mom, for all you did, and who you were! You really helped make me into who I turned out to be. (My dad was only interested in my baseball achievements...)

I had two elementary school teachers, Mr. Borders in the 4th grade, and Mr. de la Gega in the 5th, at Bertrand Elementary School in Reseda that also had interests in weather who were critical in sustaining my interest.

I also want to mention the Cub Scouts and their Merit Badge series because my troop had one with excerpts from the 1941 George Ripley Stewart book, "Storm", one that ends a drought in California. That helped cement my weather interest, too.

Selected quotes from a career steeped in controversy and "disparate impact:"

The source for each of these quotes follows.

1. *"I think you should give up the idea of becoming a meteorologist and write about weather instead."*
2. *"You seem to have a genius for finding surprising and perhaps unwelcome discoveries."*
3. *"Art, your name kept coming up as I spoke with many qualified scientists around the country. I hope you can shed light on this subject (cloud seeding) for me. I have gained great respect for you based off what many of your peers have to say about you."*
4. *"I may say that your (journal) comments had a tremendous impact on the cloud seeding activities in Israel."*
5. *"The reviewers are still unconvinced by these controversial claims."*
6. *"(Your discovery) ...was an embarrassment to the airborne research community."*
7. *"I think you're arrogant for thinking that you know more about the clouds of Israel than those who study them in their backyard."*
8. *"Who do you think you are, the Messiah, come to expose the liars? Did Hobbs send you?" followed by, "Leave my office, do your own thing, and don't come back."*
9. *"We don't hate you, Art, but we don't love you either."*
10. *"There is a widespread perception of a personal vendetta out there."*
11. *"I think they (your peers) see you as a kind of gadfly."*
(Merriam-Webster gadfly definition: **"a cattle-biting fly,"** or an **"irritating harassing person"**).

12. *"You WILL die of most malignant and fast-growing tumor. In 11 month (sic) sharp. Just wait, you fucking rascal²."*
13. *"I hate to tell you Art but you are thought of on the Wx (weather) street as a whacko sceptic (sic). I was told that by several scientists that we both know personally. So, you are not called upon to be a reviewer because they expect a biased review. In fact, many journals ask who you don't want to review the paper and guess who is first on the list?"*
14. *"You've become (along with Peter Hobbs) the most criticized author (in print) in the history of the American Meteorological Society".*
15. *"This certificate of Honorary Resident Sceptic (within the Bureau of Reclamation's seeding division) is hereby conferred upon Arthur Rangno who has shown himself to be worthy of being a respected member of the Loyal Order of Resident Sceptics (of cloud seeding claims) ."*
16. *"(Your experiment) is the way to prove cloud seeding."*
17. *"As one of the supporting letters said, 'Peter Hobbs and Arthur Rangno's research on weather modification set some much-needed higher standards in the science of weather modification that persist today. Their research in cloud physics and cloud dynamics were the pioneering works that many of us adopted in our research work in attempting to assess impacts of cloud seeding on precipitation reaching the ground.'"*
18. *"I really admired your careful analysis of the evidence."*
19. *"Do you have any more (journal) blockbusters coming? Those guys have gotta be stopped."*
20. *"Peter (Hobbs) stole that paper."*
21. In Hawaii: *"You're Art Rangno?!!"*

Oh, well, you can't please everybody.

1. Professor Joanne Malkus, January 1963 at UCLA's Department of Meteorology. Her sage advice came after I told her about my grades in calculus and physics in junior college. Joanne had just been named Los Angeles Times "Woman of the Year." I had hoped that I could get into their meteorology program due to extreme interest in weather rather than grades.
2. Dr. S. C. Mossop, cloud physicist, co-discoverer of the Hallett-Mossop riming-splintering ice particle mechanism, Commonwealth Scientific and Industrial Research Organization, Sydney, Australia, February 10, 1986, personal communication to me in Israel.
3. Billy Tiller, a west Texas farmer in emails, September 5, and September 14, 2002, respectively. His farm was in a county that was considering cloud seeding to alleviate drought. He wrote that he had gotten responses to his cloud seeding question from 130 out of 160 universities he had contacted. He did not

² Perhaps when you comment publicly on an issue and receive a death threat it's a measure that you are perceived to have great impact?

mention how many times my name came up, only “often.” He asked me to write an editorial about cloud seeding in his local paper, the Lubbock Avalanche Herald.

4. Professor Yair Goldreich, Professor (Emeritus), Department of Geography and Environment, Bar-Ilan University, Ramat-Gan, Israel; author of “*The Climate of Israel*,” in a June 11, 2018, email. Goldreich was referring to the Rangno and Hobbs (1995, *J. Appl. Meteor.*) reanalyzing the first two Israeli cloud seeding experiments and the many journal-published “Comments” and the “Replies” to those comments by me and Prof. Hobbs in 1997.

5. Dr. Bernard A. Silverman, Editor, of the *J. Appl. Meteor.*, in his 1982 letter informing Professor Peter Hobbs that our revised paper had been rejected by reviewers for a 2nd time. The manuscript, Rangno and Hobbs, concluded that the Douglas B-23 aircraft used by Peter Hobbs’ group had produced ice while flying in droplet clouds at -10°C. A third version was accepted in 1982 and the effect confirmed by independent researchers eight years later after a considerable period of denial.

6. Professor John Hallett, Desert Research Institute, University of Nevada, Reno, co-discoverer of the Hallett-Mossop riming-splintering ice particle process with S. C. Mossop, stated at the January 2008 New Orleans Peter Hobbs Symposium Day concerning the Rangno and Hobbs finding that an aircraft can produce ice in clouds at temperatures as high as -10°C, a finding that was independently confirmed in later studies and cast a shadow on all prior airborne studies when the cloud was sampled more than once.

7. Professor Peter V. Hobbs, Director, Cloud and Aerosol Research Group, Atmospheric Sciences Department, University of Washington, in a verbal appraisal in his office before I boarded a plane going to Israel for my self-funded cloud investigation of the reported super “ripe for cloud seeding” clouds which I believed were mythical, as described by Hebrew University of Jerusalem (HUJ) cloud seeding experimenters.

8. Professor Avraham “Abe” Gaglin, leader of the benchmark Israeli cloud seeding experiments, in his HUJ satellite office, January 15, 1986. Professor Gaglin asked me what I had discovered about the clouds of Israel after the first week of storms during my visit. What I told him contradicted *everything* he had published about them. His response was understandable. And, no, Hobbs did **NOT** send me!

9. Professor Lewis O. Grant, Department of Atmospheric Sciences, Colorado State University (CSU), and leader of the benchmark Climax, CO, cloud seeding experiments, June 1984, at the Park City weather modification conference. I had asked for an investigation of the reporting of the Climax experiments in October 1983 by CSU, National Academy of Sciences, and the American Meteorological Society. Then, at Park City in 1984, I was in “the kitchen.”

10. Dr. L. Randall Koenig, 1995, Editor, *J. Appl. Meteor.*, in a telecon during in the process of publishing “Comments” by Paul Mielke, Jr. and K. Ruben Gabriel on a 1993 *J. Appl. Meteor.* article by me and Hobbs pointing out for the 3rd time more faults and barriers to cloud seeding effectiveness and improper conduct of the Climax, CO, cloud seeding experiments; the experimenters had not drawn random decisions when they said they would.

11. Dr. William A. “Al” Cooper, Atmospheric Scientist, and cloud seeding specialist, National Center for Atmospheric Research, 1992, after I asked him on how he thought I was seen by the weather modification community.

12. Foretold by a Texas resident named “Portnoy,” in an email, September 4, 2002, the evening before my editorial on cloud seeding appeared in the Lubbock Avalanche Journal newspaper. What he predicted happened 11 months later in August 2003 except for the death part. The editorial had been requested by a Texas farmer, Billy Tiller who questioned cloud seeding for his county.
13. Professor William R. Cotton, Emeritus, Department of Atmospheric Sciences, Colorado State University, October 30th, 2024, in an email following his attendance at an American Meteorological Society conference. Prof. Cotton and those he spoke to apparently do not understand the purpose of peer-review of journal manuscripts. They must pass muster with the most knowledgeable in the field.
14. K. Wilson, Technical Editor, Amer. Meteor. Soc., 1996, in a telecon prior to publication in 1997 of a record number of pages of comments/criticisms of my 1995 paper with Prof. Hobbs reanalyzing the first two Israeli randomized cloud seeding experiments.
15. Dr. Archie M. Kahan, Chief, Division of Atmospheric Water Resources Management of the Bureau of Reclamation, spring 1974, in an award “ceremony” hosted by Mr. Bill Douglas, Project Monitor for the Colorado River Basin Pilot Project after I questioned ludicrous claims about the effect of left over silver iodide on a following randomly selected control day and stated that the BuRec needed a “resident skeptic” in my letter critique to the authors of those claims.
16. Dr. Vincent Schaefer, Professor Emeritus, Albany University, NY, and discoverer of the modern method of cloud seeding, in a hand-written note to Peter Hobbs, October 1981. His letter followed the *Science* magazine published experiment (Hobbs et al. 1981) that yours truly suggested to Prof. Hobbs and Prof. Radke, to use our vertically pointed Ka-band radar as a seeding target. (However, Peter Hobbs did not credit me with that idea in the article. I was the flight director in all those experiments, but was not asked to analyze the results.
17. An excerpt from the World Meteorological Organization (WMO) certificate awarded to Prof. Hobbs and me in 2005. A monetary prize of \$20,000 was also awarded to us. However, that was the least of those sums awarded to prize winners and was, thus, somewhat of a consolation prize despite all the work that Hobbs’ group and myself had done. The prize money was funded by the United Arab Emirates and the awards adjudicated by the WMO.
18. Professor Roddy Rogers, Professor of Atmospheric Science, McGill University, Toronto, Canada, June 22, 1979, regarding the publication of, “A Reanalysis of the Wolf Creek Pass Cloud Seeding Experiment,” in the *J. Appl. Meteor.* Rogers is a co-author of the book, “A Short Course in Cloud Microphysics.”
19. Prof. Richard Reed, Professor of Atmospheric Sciences, University of Washington, and former President of the American Meteorological Society, in a stairwell encounter at the University of Washington after my “Reanalysis of the Wolf Creek Pass Experiment” appeared as the lead article in the May 1979 issue of the *J. Appl. Meteor.*
20. Prof. Larry Radke, 1978, when the “Reanalysis of the Skagit Project” was published in the *J. Appl. Meteor.* as “Hobbs and Rangno 1978.” It was my first journal publication. It had been submitted AFTER the “Reanalysis of the Wolf Creek Pass Experiment” manuscript, however. I had done what lead authors do on that paper; initiated the study, analyzed the data, wrote up the results. Hence, Larry Radke’s comment about the author sequence.

21. A couple in a MacDonalds restaurant near Diamond Head, Hawaii, erupted with that comment after I gave my name (for some reason) before asking them a question about the local bus schedule. Tom Wilson, our software engineer, and I were looking to see if anyone knew the local bus schedule after walking down the highway from Diamond Head toward our hotel for a couple of miles. The couple was apparently referring to my weather forecasting days on Seattle's KUOW-FM during NPR's Weekend Edition. But I had not forecasted on that program since the fall of 1992! The University of Washington's Cloud and Aerosol Group had a layover in Honolulu on our way to Kwajalein Atoll in the Marshall Islands as part of the KWAJEX scientific field study of tropical Cumulus clouds. What an incredible, unexpected moment that was!

It was a ludicrous claim. But I had become convinced in that those successes were a mirage.

This newspaper article made it all the way to the National Science Foundation, who then queried the CSU cloud seeding scientists, "What's going on?" Within two years, the CSU scientists themselves were starting to retract some of their claims of success.

But that was not to be the end of the story.

I eventually did reanalyze all their work on my own time over the 20 years that followed that newspaper article, as I had said I would, sacrificing savings, and a personal life in doing so. My activist background at San Jose State College told me I had to do something.

My experiences in Durango, where I saw false claims in a journal article describing cloud seeding successes, led to a lifetime of countering such claims. Prior to the Colorado cloud seeding project, peer-reviewed journal articles to me were like the contents of the Bible to devotees; true and infallible. I never got over the journal corruption I saw in Durango, though I did nothing about it at the time. I began to think, too, that nothing might be true about a cloud seeding success reported in a journal article, never mind that it was peer-reviewed one.

As you will read in my story, it was a fruitful perception.

I challenged the work of scientists deemed the best in the world in cloud seeding and exposed their journal errors and falsehoods in my own peer-reviewed journal publications reanalyzing their works. This would not have happened without the support of the director of the airborne research group I worked in at the University of Washington, Professor Peter V. Hobbs who organizational and editorial skills greatly improved the drafts of findings that I brought to him.

But Professor Hobbs had passed favorable judgement on the experiments I was to overturn before I arrived in his group in 1976.

I refer to the journal problems I encountered as "The Dark Side of Science³" and "The Lab Chief Syndrome," the latter label referring to some of the inappropriate authorship acts that Professor Hobbs did concerning my work. (and the work of others.)

This story will include some brief personal stuff, some sophomoric tongue-in-cheek humor, as is my want.

The order is more or less chronological and contains appendices: Appendix I, concerning technical aspects of this story with links to relevant publications, Appendix II, growing up weather and cloud manic "benchmarks;" and Appendix III, some summer, mostly baseball anecdotes, like how in 1960 I got some key hits, including one in the 10th inning that sent in the winning run and my team, having no one good enough on it for the talented but hated LA Dodger Rookies, beat them that night at Blair Field in Long Beach, CA, in front of 500 fans and baseball scouts. I still revel in that night! ☺

Yeah, I played baseball almost my whole life, even becoming a batting practice pitcher for a major league (?) team, the Seattle Mariners in the early 1980s.

Every so often I link to what I think is appropriate music for the topic, like "Nothing but Trouble" by The Lazys.

³ The name of a American Association for the Advancement of Science conference on fraud in 1989.

My Grades Are What Makes this Journey So Improbable

My “D” grades at Reseda High School were emblematic of all the ones that populated so much of my academic life from middle school through my several years at Los Angeles Pierce Junior College, 1959-1966.

Last Name		First Name		Middle Name		Grade		Home Room	
RANGNO		ARTHUR		LOUIS		B 11		A 35	
Reseda High School					Date		11-15-57		
Los Angeles City High School District					Quarter Ending		Advise or Home Room Teacher		
SCHOOL		Los Angeles City High School District		Quarter Ending		Advise or Home Room Teacher			
SUBJECTS		SUBJECT GRADE LEVEL		SEMESTER PERIOD CREDITS		QUARTER MARKS		TEACHERS' SIGNATURES	
						MARKS IN SUBJECTS			
						WORK HABITS			
						COOPERATION			
						TIMES ABSENT			
						TIMES TARDY			
GEOMETRY		2				D- S E		5 -	
AMER. LIT		1		5		C S E		5 0	
CHEMISTRY		1				D U S		5 0	
SPANISH		4		5		D W S		3 -	
U.S. HISTORY		1		5		B S E		5 0	
FOOTBALL (J.V.)				5		A E E		5 0	
HOMEROOM									
EXPLANATION OF MARKS <i>Subjects</i> A Superior B Better than average C Average D Barely passing Fail Failure <i>Work Habits and Cooperation</i> E Excellent S Satisfactory U Unsatisfactory Your signature indicates that you have reviewed this progress report. <i>Mrs. Arthur Rangno</i> Signature of Parent or Guardian									

Thus, the message I want to give in my story is that you must keep trying to reach your goal even if you fail at first, as I did. From a fellow scientist, astronomer, Fusa Miyake, Nagoya University, the 2012 graduate student discoverer of immense solar storms that now bear her name, “[Miyake Events](#).” Oh, in passing, a Miyake solar storm would end civilization as we know it. Fusa Miyake wrote this:

“I was bad at physics and math when I was a high school student, but I persevered so I could study astronomy. Even if there is something you do not do particularly well, it is important to keep trying your best and to pursue your interests.”

That’s it. You can stop reading here. The rest is “blah, blah, blah” on a sometimes difficult and disillusioning journey in science; with some cry-babbling here and there. And who wants to hear about disillusionment with science?

Oh, and thanks, Fusa. I’m now afraid of the sun.

After reading the disparate quotes at the start of this piece, you’ll realize that my under-credentialed status (no advanced degree) and roiling the field I entered was a problem for many of my faculty and Ph.

D. peers. Their problem and mine was perfectly described by Douglas Adams in his late 1970s NPR sci-fi radio comedy, *"A Hitchhiker's Guide to the Galaxy"*. Adams's narrator:

"It startled him (a graduate student) even more when just after he was awarded the Galactic Institute's Prize for Extreme Cleverness, he got lynched by a rampaging mob of respectable physicists who had finally realized that the one thing they really couldn't stand was a smart-ass."

The result of being a "smart-ass" was that my peers have not cited my work when it should have been, a demonstration of the "human side" of science which we like to pretend doesn't exist.

But I wasn't a "smart-ass!"

I just did what reviewers of manuscripts should have done in the first place. And, really, what I did was pick low hanging fruit that most anyone with a modicum of skepticism and my weather and cloud experience could have done.

So how did I get into this mess as someone who just wanted to forecast weather?

It all started with the Colorado River Basin Pilot Project (CRBPP), 1970-1975, conducted in SW Colorado. It is still the nation's most expensive, best planned randomized cloud seeding experiment. Dave Schultz, Professor of Atmospheric Sciences at the University of Manchester, and I have recently (2025) [published an account](#) of that experiment to correct many of the misleading and erroneous accounts still out there. Yep, after all these years... Oh, well. Better late than never.

And none of what I did was directed by my illustrious boss, Prof. Peter V. Hobbs. Our teamwork came together *after* I brought findings and drafts to him from home when I thought they were ready concerning cloud seeding reanalyses. It was the same regarding grant work. I presented Peter with drafts and findings when I thought they were ready for his expert perusal. All the conclusions I came up with concerning cloud seeding and the problem of how high ice particle concentrations in slightly supercooled clouds developed in them countered all the prevailing scientific consensus at the time. I think that's what makes this story have a bit more interest. And Peter Hobbs supported all those controversial findings! Thank you, Peter Hobbs.

No manuscripts by his staff and faculty were allowed to be sent to journals without Hobbs' perusal (this caused problems).

A pictograph of this journey: And it could be a candid one...

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