Harvesting the Clouds; Weather Modification on Stamps

Bob Kochtubajda, Garry Toth and Don Hillger

American writer Mark Twain is rumored to have said that everyone talks about the weather but no one does anything about it. Weather modification is an effort to prove him wrong. In its most general sense, weather modification is the deliberate effort to influence atmospheric conditions for the benefit of people and society. This article will look at weather modification, past and present, as depicted in philatelic materials.

Traditional attempts to modify the weather

The manipulation of weather to man's advantage has been a dream since earliest times. One common activity was attempting to bring rain. For example, sorcerers or medicine men would perform rain dances. During times of drought, some people would offer invocations to hasten the return of the rains. Sierra Leone Scott 2459 (Figure 1, released in 2001) depicts the ninth-century Japanese poet Ono no Komachi in a scene that shows her "Praying for Rain." Legend has it that during an exceptionally severe drought, only her prayers were able to bring back the rains. Komachi is also found on Japan Scott 2934 (Figure 2, issued in 2005). Some North American native peoples are also known to have

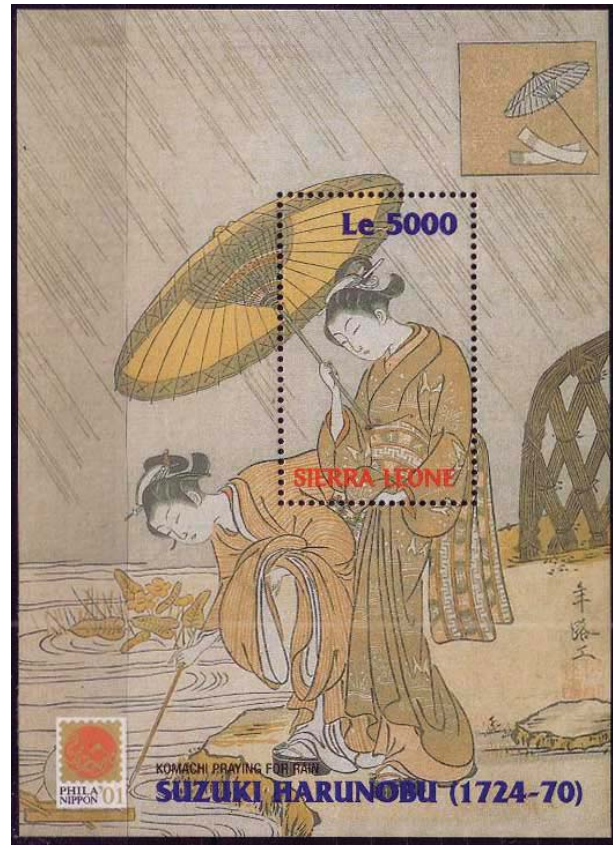

Figure 1 (above). Japanese poet Ono no Komachi prays for rain, as depicted on Sierra Leone 2459.

Figure 2 (left). Komachi is also depicted on Japan Scott 2934.

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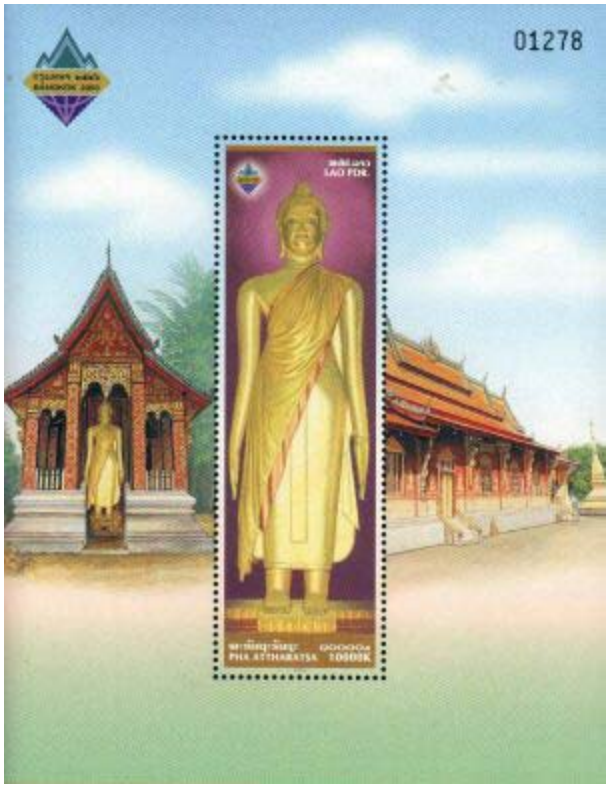
Figure 3 (above). The Laos rocket festival is depicted here, on Scott 1227.

Figure 4 (right). the Calling For Rain Buddha is found on Laos 1602.

performed rain dances. This was common in the dry southwestern regions.

At certain times of the year, other societies engage in activities designed to end the dry season. In Laos, the rocket festival held in May or June is a ceremony with the goal of bringing back the rains so that rice planting can begin. Rockets are shot into the sky to inform the rain god Phaya Thaen that it is time for the rains to return. This activity is illustrated in a series of stamps found in Laos Scott 1227-1230 (issued in 1995). In one of these, Scott 1227 (Figure 3), we see two such rockets on a firing frame. Of course, we now know from the climatology of Laos that the monsoon rains generally return in May-June. Laos also has a special Buddha known as the Calling for Rain Buddha which can be used in ceremonies at the end of the dry season to invite the rains back. Such a Buddha can be found in Scott 1602 (Figure 4), a souvenir sheet of one stamp issued in 2003.



The traditions of some peoples involve other methods that attempt to influence the weather. The traditional medicine set of

Figure 5. Botswana Scott 394 and 395 depict rain-related activities, including lightning prevention and rain-making.

Botswana (Scott 394-397) illustrates such activities. In Scott 394 a medicine man is conducting a lightning prevention ritual, while in Scott 395 we find another medicine man performing a rain-making ceremony. These stamps are shown in Figure 5.

Scientific attempts to modify the weather

Scientific work has focused on dissipating fog, increasing precipitation (rain or snow) or suppressing hail. In all cases the physical structure of the fog or clouds must be modified, so the early studies of cloud structure are fundamental to the science of weather modification.

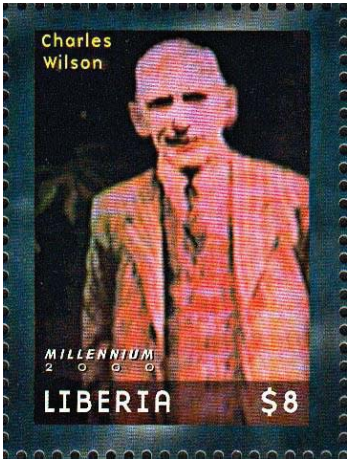


Figure 6. Liberia, Michel 2905.

The English physicist Charles Wilson (Liberia, Michel 2905, Figure 6) conducted some of the first studies of cloud structure. He built a cloud chamber (Liberia, Michel 2903, Figure 7) in the 1890s. In his experiments with this chamber, he showed that ice crystals in clouds can form only in the presence of small particles (such as dust) known as ice nuclei. Most mid-latitude clouds are composed of both liquid water droplets and ice crystals. In such clouds, much of the precipitation originates with the ice crystals, so Wilson's work hinted that manipulating ice crystals in clouds might change the precipitation falling from them. Early work based on this idea was carried out in the United States and in the Netherlands in the 1920s and '30s, but no significant results emerged. However, further work in the United States in the late 1940s showed that the addition of ice nuclei in real clouds could have a significant effect on them.

Figure 7. Liberia, Michel 2903.

The year 1946 can be considered as the beginning of the modern era of scientific weather modification. In

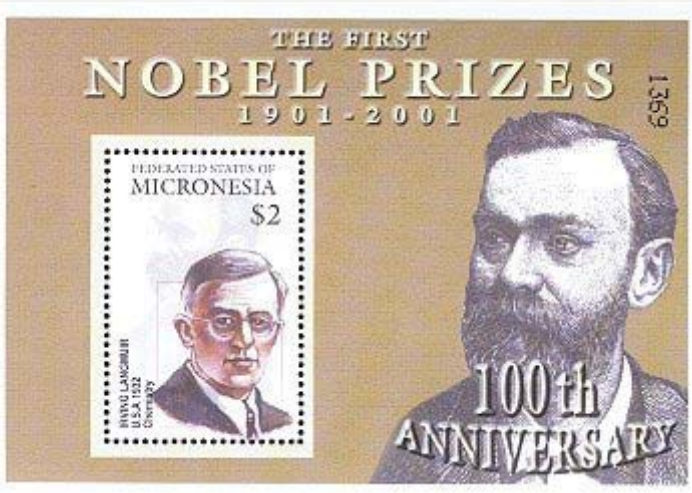


Figure 8. Micronesia, Scott 471.

that year, Vincent Schaefer (a research chemist working at the General Electric Laboratory under the direction of Nobel laureate Irving Langmuir – Micronesia, Scott 471, Figure 8) serendipitously used dry ice (solid CO2) to cool a cold box in which experiments were being undertaken to study supercooled clouds (clouds with liquid water droplets at temperatures below 0°C). Schaefer discovered, to his surprise, that dry ice could convert supercooled cloud droplets in the cold box to ice crystals. Bernard Vonnegut, a meteorologist and physical chemist in their working group, found that silver iodide (AgI), which exhibited a similar crystalline structure to that of ice, also acted as ice nuclei and so allowed ice crystals to grow in the clouds at the expense of the liquid water in them. This was a key early conclusion in scientific weather modification. Schaefer realized that the dry ice must have been acting as a source of ice nuclei in his experiment. The group then performed a test in the real atmosphere with dry ice and were able to make changes to clouds. They also experimented with AgI and found that it was a very efficient source of ice nuclei. The delivery of dry ice or AgI into clouds is referred to as cloud seeding.

Since then, AgI has come to be the standard cloud seeding material. Ice nuclei created in the atmosphere when AgI is burned can be delivered into clouds in several ways. These can include rockets, artillery shells, aircraft-mounted flares, or aircraft-mounted or ground-based generators. The stamps from Tanzania, Uganda and Kenya (Scott 264, Figure 9) and China (Scott 338, Figure 10) issued in 1973 and1978, respectively, show weather modification rockets heading into a cloud in the distance.

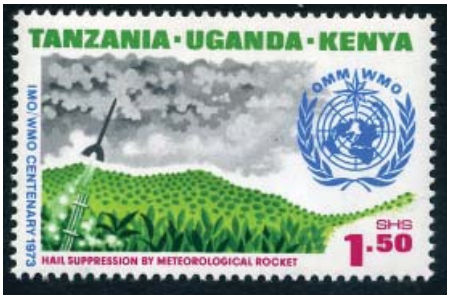


Figure 9, Tanzania, Uganda, Kenya Scott 264, cloud seeding.

Figure 10. China, Scott 1338.

More recently, an inset in a Chinese postal card issued in 2007 (Figure 11) shows a set of weather modification rockets ready to be fired.

Figure 11. The picture side of a 2007 Chinese postal card features an inset image (right) of weather modification rockets ready to be fired.

Figure 12. Thailand, Scott 1671.

The Sanming City Meteorological Bureau is shown on the left side of the postal card. The authors are not aware of any postal items depicting weather modification activities using artillery shells. Thailand Scott 1671 (Figure 12), issued in 1996, shows an aircraft using flares to release silver iodide smoke. This stamp was issued to highlight the Royal Thai Rainmaking Project, an initiative of the King. A similar aircraft carrying

Figure 13. China, Scott 3069.

Figure 14. The cachet of this 1960 FDC (enlarged at right) features a generator used in "artificial rain production."

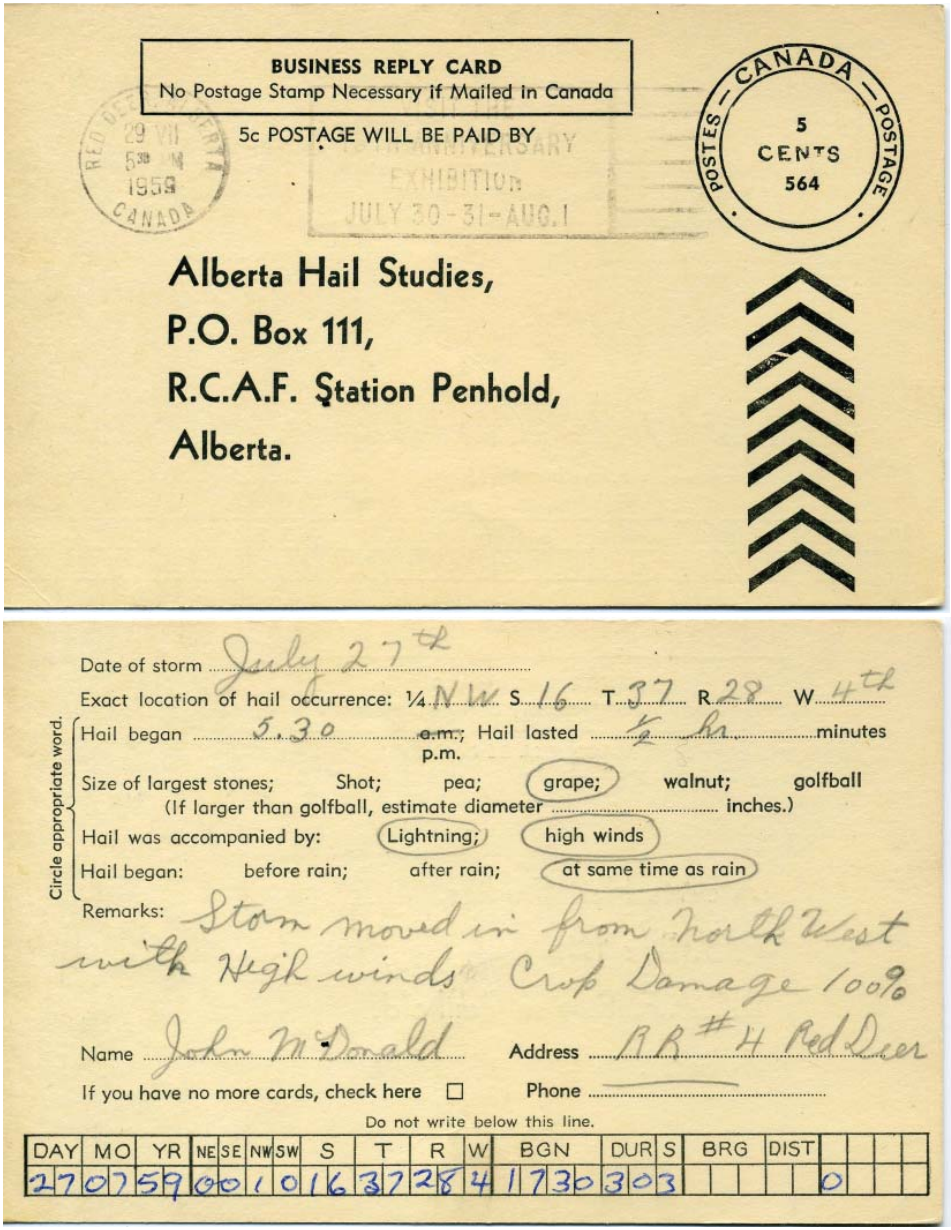
Figure 15. Robert Gentry, French Southern and Antarctic Territories Scott 332.

out cloud seeding is shown on China Scott 3069 (Figure 13), issued in 2000 to illustrate a rainfall enhancement project.

A first day cover issued by the United Nations in 1960 (Scott 79, Figure 14) includes in its cachet a generator capable of adding AgI to the atmosphere for what is described as "artificial rain production."

Weather Modification Projects

Numerous weather modification projects have been conducted around the world. Subsequent to the initial experiments by Langmuir's group, most weather modification projects were supported by various governments. For example, a project in the 1950s designed to produce rain to impede enemy operations in Vietnam was proposed, but never carried out. Robert Genty, shown on French Southern and Antarctic Territories Scott 332, issued in 2004 (Figure 15), a French military meteorologist, was the head of the project. In Canada, the Alberta Hail Project (1956-85) was designed to investigate the feasibility of hail suppression. Early studies were undertaken to characterize hail occurrence. As part of this project, the farming community was asked to provide information about hailfall using special postal reply cards. An example of one of these is reproduced in Figure 16.



BUSINESS REPLY CARD
No Postage Stamp Necessary if Mailed in Canada

5c POSTAGE WILL BE PAID BY

CANADA — POSTES — POSTAGE
5 CENTS
564

Alberta Hail Studies,
P.O. Box 111,
R.C.A.F. Station Penhold,
Alberta.

Date of storm July 27th

Exact location of hail occurrence: ¼ NW S. 16 T. 37 R. 28 W. 4th

Hail began 5.30 a.m.; Hail lasted ½ hr. minutes
p.m.

Circle appropriate word.

Size of largest stones; Shot; pea; grape; walnut; golfball
(If larger than golfball, estimate diameter ..... inches.)

Hail was accompanied by: Lightning; high winds

Hail began: before rain; after rain; at same time as rain

Remarks: Storm moved in from North West with High winds Crop Damage 100%

Name John McDonald Address RR #4 Red Deer

If you have no more cards, check here ☐ Phone .....

Do not write below this line.

DAY	MO	YR	NE	SE	NW	SW	S	T	R	W	BGN	DUR	S	BRG	DIST				
27	07	59	00		01		16	37	28	4	1730	303			0				

Figure 16. Alberta Hail Project postal reply card 1959 (Canada Post).

Conclusion

Despite Mark Twain's dictum, different cultures have indeed attempted to influence the weather, either through a traditional approach or the modern scientific techniques. The latter approach is complex and depends on government support that has waned in recent years. However, the private sector has taken over in some cases. As long as society believes that it could benefit from such work, it will likely continue to attempt to influence the weather in some fashion in the future.

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Additional online information

A checklist of weather modification postal items can be found on the webpage ***http://rammb.cira.colostate.edu/dev/hillger/wx-modification.htm***. Users of the website are asked to provide missing or additional information, or images that they may have. The online information will be updated whenever new details are provided to the authors.

Biographical notes

The authors have researched and written on the subjects of weather and climate on stamps and covers.

Bob Kochtubajda, MSc, is a research meteorologist with Environment Canada. Please send correspondence to **kochtubajda@shaw.ca.**

Garry Toth, MSc, now retired, worked many years at the Meteorological Service of Canada. Please send any correspondence to him at **gmt.varia@gmail.com.**

Don Hillger, PhD, is a research meteorologist with the National Oceanic and Atmospheric Administration (NOAA) and holds a cooperative position at Colorado State University. Please contact him at **don.hillger@colostate.edu.**