Chapter 5

Met Techs, the Environment, and Science at the Joint Arctic Weather Stations, 1947–1972

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STEPHEN BOCKING'S "LANDSCAPES OF SCIENCE" OUTLINES several themes that "deserve more attention in the environmental history of Canadian science." His exciting suggestions include examining how different environments impact scientific practices and material cultures, as well as how the use of science in the Canadian North after the Second World War shaped the state's ability to "administer and exploit the region."

The Canadian High Arctic provides unique opportunities to examine such questions and pose new ones. I am currently completing a history of the Joint Arctic Weather Stations (JAWS) with P. Whitney Lackenbauer. The stations were constructed between 1947 and 1950 largely at the behest and design of the American government. Canada and the US collaboratively operated a hub station at Resolute on Cornwallis Island and smaller eight-man satellite stations at Mould Bay on Prince Patrick Island, Isachsen on Ellef Ringnes Island, and Eureka and Alert on Ellesmere Island until 1972. Each of these civilian-run stations collected synoptic weather data by making surface observations and by flying weather balloons twice a day carrying radiosondes (which could be manually tracked) or rawinsondes (which could be tracked via radio-direction finding equipment) to measure temperature, barometric pressure, humidity, and wind direction. In station vernacular, both of these devices were commonly referred to as "radiosondes." The data these flights generated were crucial to military planning, civilian meteorology, and transatlantic commercial

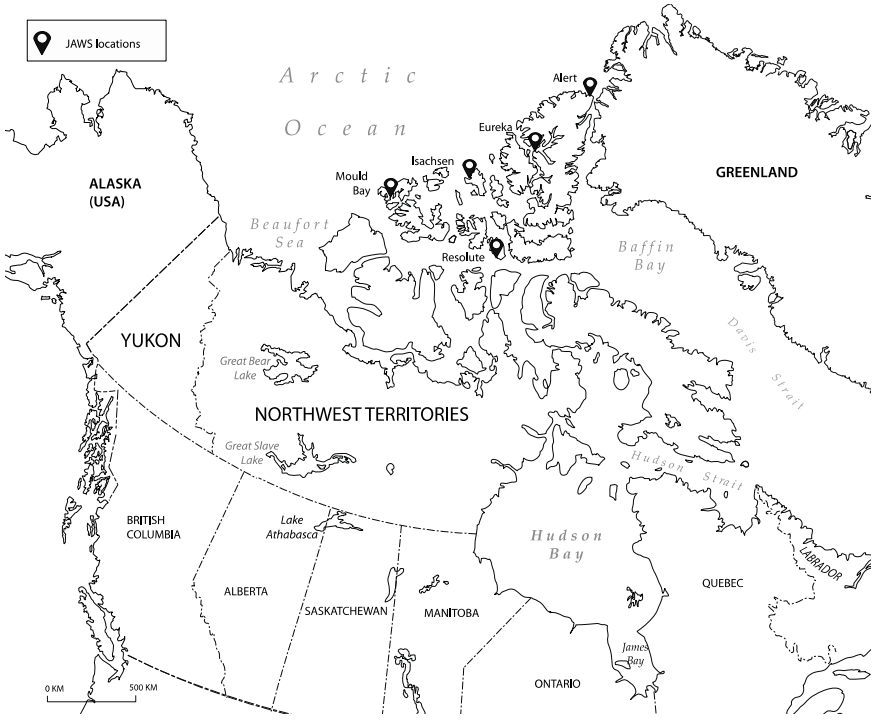

Figure 1. The Joint Arctic Weather Stations. Map courtesy of True North Consulting.

aviation, as well as North America's agricultural and forestry economies. Apart from the resupply season, these stations had little contact with the South. In fact, aside from a few hair-raising flights during the initial years of operations, aircraft did not land at the satellite stations during the dark period of the year until the 1960s.

My contributions to the book include analyzing how the High Arctic environment affected the stations' scientific cultures. The JAWS program suggests the need for historians of science and environmental historians to follow the lead of Steven Shapin and pay more attention to technicians.[1] Most scholarly research focuses on the ideas, activities, and impacts of scientists or engineers with undergraduate or advanced degrees. Other academics have begun to explore how "amateurs" (such as hobbyists)

complicated scientists' authority and contributed to environmental knowledge.[2] Meteorological technicians, not scientists, conducted and encoded the JAWS programs' synoptic meteorological observations. "Met techs," as they were known, generally lacked undergraduate (let alone graduate) degrees. They were, however, professionally trained. Canadian Met Techs had to pass two courses offered by the federal Department of Transport. In the first three-month course, students learned how to conduct surface observations. The top students from this class were eligible to enroll in a rigorous four-month course in upper air observations. Neither course included Arctic curriculum. Instead, graduates received this additional operational knowledge via on-the job training at the Joint Arctic Weather Stations from outgoing Met Techs.

JAWS personnel lived in a scientific culture. They valued the powers of observation as well as accuracy, consistency, and repetition. Yet they could not analyze the data they gathered, and they were not indoctrinated to desire the placeless ideal of laboratory cultures.[3] Moreover, Met Techs resided at the stations for a year or more at a time. Scientists, by comparison, typically worked at the stations for a few weeks or months. These differences led JAWS personnel to more readily accept and adapt to local conditions. The JAWS program thus offers the opportunity to compare and contrast the scientific cultures constructed by scientists and technicians in an extreme environment.

When JAWS personnel understood the importance of their activities, only the most extreme situations frustrated their perseverance. At some stations, such as Alert, balloon releases were eased by consistently low wind speeds. At other stations such as Isachsen, however, high winds regularly endangered launches by pushing released balloons sideways, dragging and pulverizing the instrument package across the station grounds. Over time, JAWS personnel used different techniques to ensure successful launches in high winds, but the most common solution was the two-person launch.

Figure 2. Preparing to launch a balloon with radiosonde after preparing them in the inflation shed at Resolute, 1949. Alan Faller personal collection.

After filling the weather balloon in the shelter and checking its attached instrument package, one person walked upwind with the radiosonde and waited until his partner released the balloon. He then ran with the radiosonde until the balloon carried its cargo aloft. According to Howard Wessbecher, who served as both a supply clerk at Resolute and then an Executive Officer at Alert in the mid-1950s, "sometimes we tried two, three releases and I'd say… less than 5% of the time we didn't make it" and would have to concede that "hey, we can't get her up."[4] In one extreme case, personnel at Isachsen launched five balloons, because the first four "burst upon hitting the sides of the door on the way out" under heavy winds.[5]

Radiosondes, however, were not the only types of balloons used at the stations to make meteorological observations. Smaller pilot balloons

Figure 3. Lowell DeMond about to release a pilot balloon at Mould Bay, 1956. Lowell DeMond personal collection.

(pibals) were not as revealing, data-wise, as radiosondes, but they were less expensive, simpler to prepare, and useful for measuring cloud ceilings. They could also be used to determine the wind's direction and speed. Tracking the pibal flights forced observers to sit in a sheltered open-air dome and manipulate a metal theodolite with their bare hands at 30 or even 40 degrees Fahrenheit below zero. During the dark period, observers hung a candle or battery-powered light below the pibal to enhance its visibility at altitude. From time to time, the observer would note three or four identical azimuth and elevation readings and realize that he had lost the pibal and was instead fixed on a star. "This always brought about a few curses!!" former Mould Bay and Eureka Met Tech Lowell DeMond subsequently recalled. This was because a second release was necessary if the balloon had not attained the required minimum altitude.[6]

By the mid-1950s, station personnel began using excuses such as high winds or snow to avoid conducting pibals. Southern departmental cries

Figure 4. Isachsen's pibal dome, 1953. If you zoom in, you can see the theodolite inside the dome. Bill Nemeth personal collection.

that the flights were essential led to their strict resumption. By the 1960s, however, the regularity of these flights wavered once again. According to Larry Petznick, who was Isachsen's OIC from 1964–1965, station personnel continued "to question the value of pibal observations" and wondered "if the useage [sic] and end results from pibals are worth the amount of time and work put into them." Nevertheless, Petznick assured Canadian and American authorities that "the Pibal program continues to slog on."[7] This seems to have been the last cry. Personnel who served at the

JAWS stations in the late 1960s or early 1970s do not recall launching pilot balloons as part of a synoptic program.

JAWS Met Techs participated in High Arctic scientific culture, innovated operating procedures that better suited their environments, and contributed to data sets. This culture led them to persevere with a host of environmental observations, including upper air flights, despite often harsh conditions. On rare occasions, however, different understandings about the utility of their activities led them to deviate from the wishes of southern scientists. Met Techs are, of course, not unique to the JAWS program. Canada and the United States employed them at weather stations across both countries. Technicians in other professions and programs also require attention. Studying the contributions that these men (and later women) made to their varied disciplines will help social scientists to better comprehend the extent and nature of scientific culture, to understand how the practical feasibility of government programs are assessed, and to discern how non-scientists contributed to the expansion of the state in remote locations.

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[1] Steven Shapin, "The invisible technician," *American Scientist* 77, no. 6 (1989): 554–63.

[2] See, for example, W. Patrick McCray, "Amateur Scientists, the International Geophysical Year, and the Ambitions of Fred Whipple," *Isis* 97, no. 4 (2006), 634–58, https://doi.org/10.1086/509947; and Thomas R. Williams, "Getting Organized: A History of Amateur Astronomy in the United States" (PhD diss., Rice University, 2000).

[3] For further discussion on "placing" laboratory cultures, see David N. Livingstone, *Putting Science in Its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003), https://doi.org/10.7208/chicago/9780226487243.001.0001.

[4] Howard Wessbecher interviewed by Brian Shoemaker, April 20, 2000, Polar Oral History Project, The Ohio State University,

https://kb.osu.edu/dspace/bitstream/handle/1811/32171/1/WessbecherTranscript.pdf.

[5] John Llewellyn, "Monthly Station Activity Report – December, 1965," January 15, 1966, Library and Archives Canada (LAC), RG 93, box 821, file 6754-1291, pt. 19.

[6] Lowell DeMond, email message to author, May 23, 2013.

[7] "Monthly Station Activity Report, Isachsen, NWT," May 2, 1965, LAC, RG 93, box 821, file 6754-1291, pt. 19.