

Canada and the Weatherships

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The story of the weatherships is of particular interest to CMOS members because it is an example of a system used for meteorological and oceanographic observations and in which Canada participated from its early beginnings.

The concept of stationing ships along oceanic air routes dates back nearly 80 years when a number of ships were deployed along the route of the British airship R34's crossing of the Atlantic in 1919. After a number of years of planning, which included the use of merchant ships for surface observations, the French Meteorological Service put in operation one weathership that remained in service from July 1937 to September 1939. The program came to an end with the advent of the Second World War.

Weather intelligence emerged as a strategic commodity for both sides during the war but as the Allies gained an upper hand in the Atlantic, weathership observations grew and expanded, and by 1945 up to 21 weatherships were stationed in the Atlantic alone. However, as soon as the war ended this military-driven effort decreased rapidly.

After the war, commercial civilian flights across the North Atlantic (and to a lesser extent, across the North Pacific) began to develop and expand rapidly from year to year. It soon became clear that weather observations could only be reliably furnished by a system of ships stationed across the Atlantic. The Provisional International Civil Aviation Organization organized a meeting of various countries bordering on the North Atlantic Ocean to study the problem of developing a program for weather observations.

The number of stations, the services to be provided, division of responsibility and financing amongst the participating countries were laid out. Canada agreed to operate weather station "Baker" jointly with the United States. A naval frigate, "HMCS St. Stephen", was modified and equipped for weather duty. She was manned by naval personnel and carried a staff of experienced meteorological observers and commenced her duties on station "Baker" in 1947.

The International Agreement on North Atlantic Weather Stations specified the services that had to be performed by the ships. Each vessel had to be capable of providing weather observations, search and rescue services, navigational aids and communications, and miscellaneous oceanographic and scientific observations.

In 1947 thirteen weatherships were deployed under the auspices of the International Civil Aviation Organization (ICAO) headquartered in Montreal. Administration of the

system led to regular meetings of Member States participating in the scheme - those with aircraft flying over the ocean serviced by the ships, including States as far from the oceanic areas in question as Israel, Switzerland and Venezuela. At these meetings, agreements were worked out and modified as to the services to be performed by the ships, and the payments to be made by States for these services, depending on the number of flights per country. In the case of countries providing the ships, the costs were deducted from the amount they were required to pay for the upkeep of weathership operations.

The North Atlantic weathership system was eventually set at nine stations, located as shown in Fig. 1. Of those, Canada shared responsibility for Station "B" (for "Baker"), off Labrador, with the United States. The other stations being manned were by France, the Netherlands, Norway, Sweden, United Kingdom, and the United States. In 1950 it was agreed by Canada and the United States that the USA would man Station "B" alone, and Canada would take over and man Station "P" (for "Papa") in the North Pacific at 50° N 145° W on its own (Fig.2).

The aircraft engaged in transatlantic flight in those days were slow and only capable of flying at relatively low levels. The fact the flights were scheduled made the need for prevailing wind and weather conditions more imperative than their earlier military counterparts when flights were scheduled for favourable flying conditions only.

Weather information, actual and forecast, still used Morse code communications, and relays of messages were often needed. Navigational aids were also provided by the ships with DF (direction finding) bearings and radar fixes.

While on station the weatherships were the sea-going platforms providing meteorological, communications and navigational services to ocean-transiting aircraft. Their marine program included:

- Meteorological Services;
- Surface observations eight times daily, with special observations in between if specified changes occurred;
- Upper wind observations four times daily to at least 55,000 feet;
- Radiosonde observations (upper air temperature, pressure and humidity) at least twice daily, but preferably four times.

These observations were to be transmitted to appropriate shore stations, as well as, on request, to aircraft. Special weather data were expected to be supplied to aircraft in

the event of ditching at sea including the following:

Communication Services:

- Receipt of safety, distress or emergency calls; continuous listening watch on international distress frequencies;
- Communication with aircraft or vessels for distress, emergency or safety purposes;
- Provision of normal ship-air communications, including receipt and relay of aircraft weather observations and ship observations;
- Communication with land stations.

Navigational Services:

- As required, direction finding, radio beacon and microwave search radar services.

Search and Rescue Services:

- Ships were to be equipped with the necessary equipment for search and rescue operations and the crews trained to support these functions.

The taking of weather observations at sea required special technical designs differing from those normally used at a land observing station. Some instruments had to be gimbal-mounted to remain horizontal and in equilibrium. Corrosion from salt spray also had to be taken into account, as well as sea-spray contamination of rain gauges. The ship's movement had to be constantly taken into account when taking upper wind observations by means of theodolites or radar. The ships were constantly under way, and even in bad weather conditions, they were required to stay within an assigned area of ten square miles. All of the above required much thought, ingenuity and determination to succeed in performing some very difficult procedures in fair and foul weather.

The ships were obligated to respond to emergencies and distress at sea and all ships were equipped for marine and aircraft emergencies with crews well-trained in handling the appropriate equipment. Fortunately, these services were seldom called upon but the rescue of some 68 persons from the Flying Boat "Bermuda Queen" which ditched near Station "C" in 1947 served to illustrate the wisdom of having such services available.

As time went on, the need for the weathership services declined; satellites began to provide much of the weather data formerly provided by the ships, as well as communication and navigational aid facilities. The need for continuing to provide low level weather information was in decline and less of a requirement for high-altitude jet aircraft. Finally, experience had shown that the ships were rarely called upon in the event of ditching or search

and rescue services.

The need for weathership-based aviation services could no longer be justified by ICAO and in 1974 the World Meteorological Organization (WMO) assumed the responsibility of a new North Atlantic Ocean Station (NAOS) system for meteorological purposes. It consisted of four stations manned only by European States as the USA had withdrawn, for the simple reason that Atlantic weather systems moved away from North America towards Europe. The withdrawal of the United States was offset by the offer of ships from the USSR. The weathership program continued until the end of 1990 when satellite observations had progressed to the point that ships taking meteorological observations were redundant.

As mentioned earlier, Canada and the United States agreed bilaterally to assume responsibilities for Station "Papa" in the Pacific and "Baker" in the Atlantic, respectively. Station "Papa" located at 50° N 145° W (Fig.2) was first manned by Canada in 1945 with a Canadian corvette, "HMCS Woodstock". It was a trying operation at the time because hostilities with Japan made it necessary for the ship to be fully armed and manned in the event of combat. Later when the bilateral agreement came into effect "St. Stephen" was transferred from the east coast to Victoria to act as standby ship for Station "Papa".

In December of 1950 the former RCN frigate "St. Catharines" made her first patrol as a weathership under the marine Branch of the Department of Transport. The frigate, "Stonetown" also saw service as a weathership.

In 1966/67 these two ships were replaced by much more up-to-date vessels "Vancouver" and "Quadra", specially designed for weathership operations by Campbell and Co. of Montreal. The ships had a displacement of 5,530 tons and measured 404 feet in overall length, with a top speed of 18 kts.

Their meteorological program was similar to the NAOS program, namely three-hourly weather observations, six-hourly upper wind measurements by radar and twelve-hourly upper air temperature and humidity measurements by radiosondes. These observations were transmitted by radio to Vancouver from where they entered the Canadian, North American and world-wide data networks.

Additionally, the ships provided navigational and communication aids to aircraft and ships, as well as search and rescue services. The position of the ships was constantly checked by means of LORAN in addition to solar and astral observations.

The international recognition of Station "Papa" was considerably enhanced by its performance as an

oceanographic vessel under the direction of Dr. J.P. Tully and staff of the Pacific Oceanographic Group of the Fisheries Research Board of Canada and much has been written on the oceanographic programs conducted by this group at Station "Papa".

The "Vancouver" and "Quadra" were state-of-the-art vessels each carrying a crew of about 96, including 15 scientific and technical staff made up of meteorologists, oceanographers and electronic technicians. The crews served at sea for six weeks, followed by six weeks off.

Station "Papa" continued in operation until 1985 when it was discontinued by the government, despite protests by many scientific organizations, including CMOS.

References:

L.J. Slobinski, 1952, *Canadian Ocean Weather Stations*, Transactions of the Royal Society of Canada, Vol XLVI, Series III, Canadian Committee on Oceanography.

The author is indebted to Mr. T. Fox, ICAO; Mr. K.J. McLeod, WMO; and Mr. F. Barber, DFO retired, for source material provided in the preparation of this article.

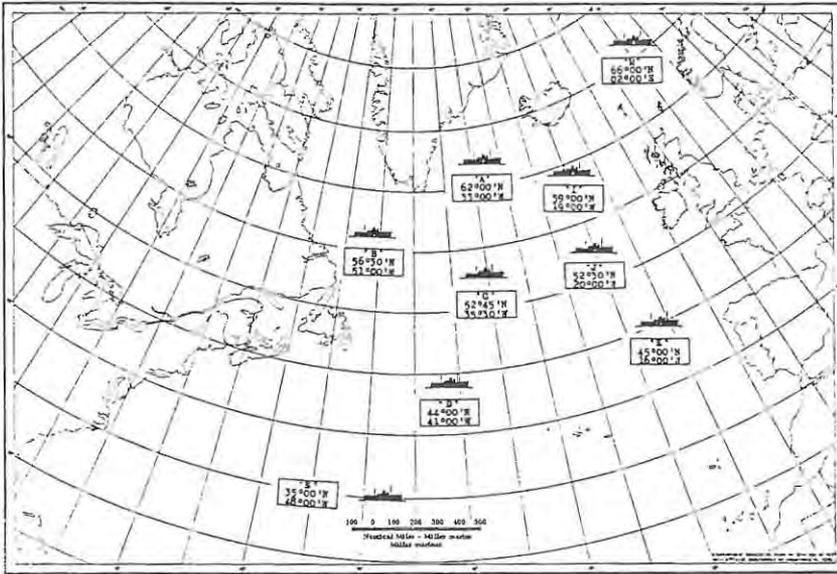


Fig 1: The North Atlantic Weathership System showing 9 Ocean Stations

Fig 2: Location of Station "P" and Line "P" Stations, Station A2, Station CZ3 and selected place names in the Pacific Ocean. Figure taken from Tabata, S. B. Thomas and D. Ramsden, 1986, *Annual and Interannual Variability of Steric Sea Level along Line P in the Northeast Pacific Ocean*, Journal of Physical Oceanography, Vol.16, No.8, p.1379.

