

# ASHBURTON AND THE 'CANTERBURY PROJECT': NEW ZEALAND RADIO-METEOROLOGICAL RESEARCH FOLLOWING WWII

GLENN VALLENDER,<sup>1,2</sup> ALASTAIR PERKINS,<sup>1,2</sup> and WAYNE ORCHISTON<sup>2,3,4</sup>

<sup>1</sup> Private researchers, Rolleston and Ashburton, New Zealand

<sup>2</sup> RASNZ Historical Section (ge.vallender@xtra.co.nz ; perkins.fam@xtra.co.nz)

<sup>3</sup> University of Science and Technology of China, Hefei (wayne.orchiston@gmail.com)

<sup>4</sup> University of Southern Queensland, Toowoomba, Australia



**ABSTRACT:** During WWII scientists in New Zealand, Britain and the USA involved in radar research and development were especially interested in instances where signals were received from over the horizon under certain meteorological conditions. This led to a collaborative project to be hosted by New Zealand, but the end of WWII in the Pacific in 1945 delayed the launch of the so-called 'Canterbury Project' until 1946.

In this poster we explain what the 'Canterbury Project' was, and why it should be of interest to some astronomers.

## 1. INTRODUCTION

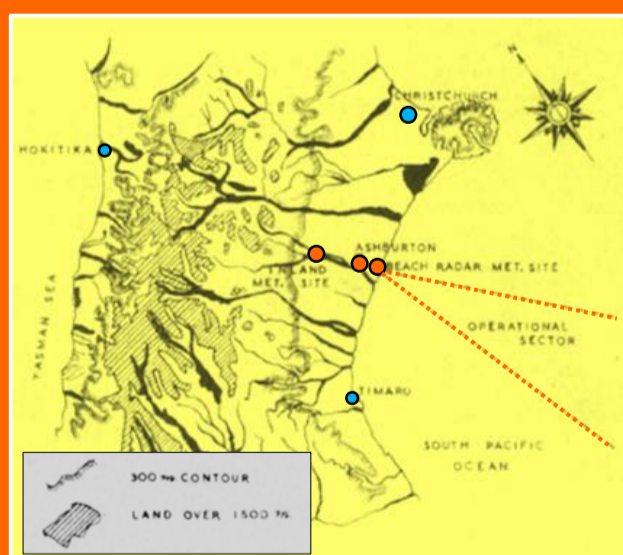
The 'Canterbury Project' saw its genesis in 1943–1944 as a by-product of research carried out by Dr Elizabeth Alexander (1908–1958). Cambridge-educated Alexander (the subject of another poster at this conference) was Head of Operations Research in the NZ Radar Development Laboratory in Wellington, and among other tasks she was responsible for investigating 'anomalous propagation'.

Thus, she was particularly interested in meteorological conditions that influenced radio propagation and sometimes produced signals from over the horizon. In a military war-time setting a full understanding of this was crucial for radar operators. Since the requisite weather conditions were found on the Canterbury Plains Alexander arranged a major NZ–British–US research initiative, known as the 'Canterbury Project' (Barnett and Alexander, 1944). This was approved by the NZ War Cabinet during WWII.

## 2. EXPLAINING THE 'CANTERBURY PROJECT'

What Dr Alexander could not know was that the war would end soon, and with it her contract, and that she and her children would leave New Zealand.

Accordingly, a new (peace-time) Canterbury Project contract was negotiated with the Government, and Ashburton Aerodrome (77 km WSW of Wigram Aerodrome) was selected as the primary research base (see the map, below left). Although there was some British and American input, the Project was under the direction of the NZ Department of Scientific and Industrial Research (DSIR). Mr A.D. Lowe was the officer in charge at the airfield, and Dr Alexander's former assistant, Bob (later Dr Bob) Unwin was the lead scientist. The Project ran from September 1946 through to 16 December 1947, and at its peak 41 people lived and worked at the airfield (see the photograph below). The Mayor of Ashburton was very proud of the town's involvement in this international endeavour, and he liked to refer to the 'Ashburton Project' rather than the 'Canterbury Project'.



One of the reasons Ashburton was chosen as the Project headquarters was the prevalence of 'Föhn winds' in this region, those prevailing hot, dry 'nor-wester' winds that had already dropped all their moisture (picked up in crossing the Tasman Sea) on the western side of the Southern Alps. Super-refraction of radio waves in this setting sometimes was associated with 'ducting', "... a form of guiding of waves that happens close to the earth's surface, under certain weather conditions. Points within a duct which may be 'out of sight' of each other, over the horizon, can still 'see' each other because both are within the duct." (Harris, 2018: 349).

The Canterbury Project involved observations made from four Avro Anson aircraft and a naval ship, with a radar (as shown here on the right), and using kites, radio sondes and balloons.

Initially the 97 MHz radar antenna was sited at Wakanui, on the coast near Ashburton, but in October 1947 it was re-located to Ashburton Aerodrome. Nonetheless, the concrete foundation at Wakanui that supported the antenna is still present (and even visible on aerial photographs—see bottom left), but the shoreline is rapidly eroding here and soon this relic of New Zealand radio-science will be swallowed by the sea.



## 3. CONCLUDING REMARKS

The Canterbury Project was a fundamental early window into our understanding of the role of weather conditions on radio wave transmission and ducting (Milnes and Unwin, 1950). It was a major international radio-science project of which we can be justly proud, and an important component of our scientific heritage.

Finally, the special relevance of the 'Canterbury Project' for us as astronomers is that the radar antenna also was used to monitor solar radio emission immediately after sunrise and before sunset in 1947. This, we hope, will be discussed in a future Historical Section poster.

## 4. FURTHER READING

- Barnett, M.A.F., and Alexander, E., 1944. *The Possibility of Investigation of the Föhn Wind and Sea Breeze Phenomena in New Zealand with a View to Elucidating Certain Problems of Radio-Meteorological Forecasting in Other Parts of the World*. New Zealand Radio Development Laboratory Paper R.D 1/471.
- Fraser, G.J., 2005. The antecedents and subsequent development of scientific radar in New Zealand. *Journal of Atmospheric and Solar-Terrestrial Physics*, 67, 1411–1418.
- Harris, M., 2018. *Rocks, Radio and Radar: The Extraordinary Scientific, Social and Military Life of Elizabeth Alexander*. Singapore, World Scientific.
- Milnes, B., and Unwin, R.S., 1950. A radio meteorological investigation in the South Island of New Zealand. *Proceedings of the Physical Society*, B63, 595–616.