

Chapter 13: Sea-cliff Interferometry: Dover Heights, 1946

Joe Pawsey and the Founding of Australian Radio Astronomy- Early Discoveries, from the Sun to the Cosmos

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ESM_13.1.pdf: Historical Introduction to “Solar Radiation at Radio Frequencies and its Relation to Sunspots”, McCready, Pawsey and Payne-Scott (1947)

The MPP paper of 1947 was submitted to the journal with a thorough historical introduction that provided valuable information concerning the methods the authors had used as they carried out the ground-backing research. Appleton was likely the referee, requiring that the historical details be omitted in the published version. Sullivan has described in *Cosmic Noise* (2009, p 129) the consequences of the omission of the background material.

Extract from the original version, before the paper was refereed:

In the period between Southworth's discovery [1942] and its delayed publication, Reber (1944) observed solar radiation on 160 MHz. [This paper did not arrive in Australia until June or July 1945.] If this radiation [as observed by Reber] were thermal in origin, it would require a temperature about a hundred times the optical value, a conclusion not mentioned by Reber. Shortly after Reber's publication, two restricted reports reached us which indicated that occasionally very large amounts of solar radiation are emitted at metre wavelengths, and that gross variations in intensity occur from day to day. The first report stated that on a number of days early in 1945 certain Royal New Zealand Air Force radar stations on 200 MHz had reported appreciable amounts of solar radiation. The second report described the observation by English radar stations on frequencies between 40 and 200 MHz of radiation coming from the direction of the sun. The effect continued for several days and coincided with the presence of exceptionally large sunspots of February 1942. These latter observations have since been described by Hey (1946) [the *Nature* paper]. On receiving the New Zealand report we began similar observations and the results showed that the radiation was subject to rapid fluctuations and was associated with sunspots, as reported in a letter to *Nature* (Pawsey, Payne-Scott and McCready, 1946): [published 9 February 1946, submitted 23 October 1945, "Radio- frequency radiation from the sun"]. In a prior letter, not available here until our initial work was completed, Appleton (1945) [*Nature*, 3 November 1945, submitted 23 September 1945 "Departure of Long-

Wave Solar Radiation from Black Body Intensity”]¹ described reports of radio noise (hiss) received on the short-wave communication band at times of marked solar activity, and concluded that the noise originated in active areas on the sun. The observed intensities were, like Reber’s, greatly in excess of the expected black body radiation.

Sullivan (2009, p 129) has commented on the significance of the changes introduced in the refereeing process in 1946-1947:

The introductions to the original and final versions of this paper (McCready, Pawsey, and Payne-Scott 1947) provide an especially good example of how historical information is usually lost in the formalism of a scientific paper. In this case it appears to have happened because of referee comments rather than in the initial writing. The submitted version (for some reason also with a different author order than the published paper) contained historically interesting material about what the Sydney group knew from overseas reports and when they knew it. The finally published version, however, was modified in several places to merely recite who published what and what they said. In particular, the phrase “In a prior letter, not available here until our initial work was completed, Appleton (1945) ...” was changed to simply “Appleton (1945) ...”

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¹ See Sullivan (2009), page 90, for a discussion of the complex controversy surrounding the Appleton paper of 1945, and the key role played by Ronald Burgess in the calculations of the expected solar noise which was not credited in the published paper.