COMMONWEALTH OF AUSTRALIA

COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION

DIVISION OF RADIOPHYSICS

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A.1/3/1a.
JHP:MDH

17th May, 1950.

Dr. G. Reber,
P.O. Box 4868,
Cleveland Park Station,
Washington, D.C., U.S.A.

Dear Reber,

I have been asked to reply to your query about the usefulness of interferometry technique at λ25 cm. using a sheet of water as a reflector. We tried the technique last year on the same wavelength using a site about 250 ft. above the sea. We were looking for the discrete sources (Crab Nebula and Cygnus source in particular) and "hot" areas on the sun. The interference method seemed to offer excellent possibilities. Results were quite disappointing and the experiment has been discontinued. Some of the objectives of the experiment have been reached by using a single narrow-beam aerial; it is hoped to complete the others with a nearly complete two aerial interferometer.

The reason for the failure of the over-sea experiment was not clear at first but I believe the following factors are to blame:

(a) Absorption by oxygen at very low angles.

(b) The main cause was due to the properties of the sea as a reflector. If the sea were a flat smooth surface the effective reflecting region (say the 1st Fresnel zone) would be a narrow ellipse lying entirely within the aerial beam. Owing to the effect of waves (of only a few degrees slope) the effective reflecting region is composed of a large number of small separate areas spread over an area extending far outside the aerial beam. Those parts of the effective reflecting region lying outside the beam will not contribute to the received power flux. Those parts within the beam will provide a rapidly changing signal which is not efficient in causing interference fringes. The net result for our own site and beam width was an efficiency less than 10% the calculated value and perhaps much less than that figure.

I will send you a copy of our paper on Galactic radiation at 1200 Mc/s. (and also 3,000 Mc/s.) when published. This will not be for a considerable period however because of the inevitable delay in publishing.

Yours sincerely,

J. H. Piddington