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APR 3<sup>rd</sup> 1950.

Dear Peter

Thank you very much for your letter and enquiries of Jan 17<sup>th</sup>. Although we have not corresponded before, I have greatly admired your pioneer work in Radio Astronomy and hope for great things now you have the resources of the Bureau of Standards behind you. Most of your questions will probably have been answered by Stanley and the "Stanley and Sae" contribution to our three recent papers. I will however make a few remarks about your paragraphs, in turn.

(1). You may not have noticed in the June 1949 paper but we say "effective" sea reflection coefficient of less than unity. As explained in the Stanley-Sae paper this is due to the curvature of the earth, it is independent of frequency, varies with angle of incidence and obviously increases with the height of the observing site. It places a limit on the measurement of angular widths of sources as also does the receiver bandwidth. The effects of both receiver bandwidth and sea waves increase with the interference fringe number and are zero at minimum elevation. These effects are of the order of

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$$\frac{\Delta f \times n}{f} \quad \text{and} \quad \frac{\Delta h \times n}{h}$$

(  $h$  = height of cliff  $\Delta h$  of waves  
 $f$  = frequency  $\Delta f$  bandwidth  
and  $n$  fringe number )

(2) I think our knowledge on variations is adequately covered in the Stanley and Sae paper. The source size idea is the best I could think of and I see the analogy of twinkling stars and planets is used by Smith and Lovell (Nature Mar 18 1950) (punched & thence from my letters to Ryle!) To get over the difficulty of amplitude fluctuations I suggest using frequencies

greater than 150 Mcb. As regards the fluctuations themselves an analysis by Lee and myself after Paper II was written showed that the incidence of variations decreased quite rapidly with increasing altitude of the source. Our annual variation curve is of course capable of two interpretations (1) that the fluctuations are seasonal and (2) that they are associated with the time of day that the source uses. We hope to set this out within the next few months. Personally I favour (1).

(3) I think Stanley has dealt with this as far as possible.

I suggest that before you make any decisions you obtain some idea from Mills at R.P. or Ryle at Cambridge ~~on~~ ~~the~~ of the techniques and snags associated with the vertical system. Personally I think both techniques should be exploited simultaneously.

As regards cooperation I think the suggestion is very good and hope to have some discussions with the Cambridge people in the near future. I will then inform you further. If the Australian Treasury will grant me the funds I am hoping to see you personally towards the end of the year. In any case I should be delighted to keep in touch with you by correspondence. My address while I am in England will be

c/o H.S. R. L.O.

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Yours very sincerely

John Bolton.