

June 2nd, 1953  
Wailuku, Maui, T.H.

Dear Strand:

Many thanks for your letter of May 29th. Your interpretation of my data is correct however your presumptions are wrong! In the first place there isn't any standard atmosphere for Hawaii. The NACA atmosphere is way off out here. The bending for the individual days was computed from the radiosonde data for those particular individual days. Pressure, temperature and humidity were all taken into account. In this particular type of study it is not possible to average the atmosphere. The scatter in the bending is due to discontinuities in the refractive index with altitude. These discontinuities are mostly due to clouds or water vapor and their position and magnitude changes from day to day and perhaps from hour to hour. If the atmosphere is averaged all these discontinuities are averaged out and the results are totally invalid. For these reasons the bending for all the separate days was computed. It would have been much easier to average the atmosphere and then compute the bending only once! If desired I could have gotten a standard atmosphere suitable for Hawaii from my data. However such doesn't seem to be of much interest.

In regard to the joint paper I would be happy to participate, except that I don't presently have much of anything to hold up my end. On the attached sheet is a synopsis of my results on this study as far as it has gone. You may include these with your paper at Boulder if you wish. Perhaps at a later date, after I understand the subject better, the results could be plotted in the form of curves and published. Nothing much has been done on refractive bending in the last six months because most of my effort has been toward getting some results on Cosmic Static. My apparatus has been functioning for about two months now. So far the accuracy of results have been limited by the ionosphere instead of the troposphere. Presently I am in process of raising the operating frequency. Continuation of this process should get rid of the ionosphere altogether. Then the final accuracy will be limited by the refractive bending in the troposphere. This does not change with wavelength until the wavelength is reduced to about 1cm. Below this wavelength the dielectric constant of water vapor gradually drops from its radio frequency value near 80 to the much lower optical value. Just where it reaches the latter is not presently known. For this reason water vapor is a much more effective bending agent at Cosmic Static wavelengths than at optical wavelengths. Thus the scatter should be larger at the former than the latter wavelength.

I expect to follow this up at a later date. However there is so much to be done that I don't know just when this will be.

Aloha,



Grote Reber