

19th October, 1956
G.P.O., Hobart
Tasmania, Australia

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Dear Hap:

Thank you for your letter of the 29th of August. During the past two months a considerable amount of data has been secured and experience obtained. As usual Mother Nature is not simple in her manifestations. It is now apparent that there are several phenomena acting irregularly and independently and sometimes simultaneously.

During the day, radiation comes in from a large fuzzy patch perhaps 30 degrees in diameter centered about 40 degrees south of the zenith. This source is quite feeble, very steady and always there. The intensity may or may not change slightly with the seasons. The source may or may not be present at night. Its apparent temperature is on the order of 1000 degrees. Its cause and significance are unknown and is an unexpected discovery entirely out of the blue. During the day a few feeble and irregular atmospheric are normally present, but this radiation from the south is a characteristic thermal hiss quite different from atmospheric.

The first two hours after dawn nearly always show a distinct minimum when the apparent temperature drops to about 300 degrees. This is an absorption phenomena which wipes out the southern daytime source. The absorption also wipes out the atmospheric and, for an hour or so, things are exceedingly quiet. Its time of occurrence definitely follows the sun, but whether or not there are changes in magnitude or duration with the seasons remains to be seen. No similar effect occurs at sunset. Again this is an ad-hoc discovery of unknown cause and significance.

Shortly after sunset a nighttime source of radiation appears about 25 degrees north of the zenith. It is probably less than 5 degrees in diameter and very strong with an apparent temperature of 100,000 degrees or more. Because of this intense nighttime source it is not possible to determine whether or not the daytime southern one is still present using existing antennas. This northern source is the one I was looking for, so I was very happy to find something about where predicted. Last August this source showed a maximum intensity of 10^5 degrees about 10pm. Then a gradual smooth

decline all night to 10^4 degrees before dawn. Now, two months later it is rather weaker all night with a broad minimum about 3 or 4 am and then flat or a gentle rise to dawn. This change in shape I was also expecting. If my predictions are correct it indicates sidereal structure. This cannot yet be proved as it may be merely somekind of a seasonal effect.

During periods of great solar activity the sun throws out large quantities of charged particles which reach the earth in a day or so. They fall primarily on the polar regions. In severe cases they cause an absorption phenomenon known to radio communications as "polar black out". The 520kc energy from the nighttime source seems rather susceptible to this kind of thing, which is a further indication that the nighttime source is really of celestial origin. During a severe polar black out the northern source is extinguished and the general level falls to daytime values. Thus it appears the large southern source is still there at night. Unfortunately, I've never chanced to be out there in person to manipulate the direction finding gear when one of these polar blackouts occurred. With approaching summer, the nights are getting shorter and atmospherics are becoming worse. However it appears that useful data can be secured all year around.

Finally there is the phenomenon of precipitation static as distinguished from atmospherics. Precipitation static is a coarse frying noise associated with rain, snow and hail. There is not any thunder or lightning. This year continues to be an exceedingly wet one with a lot of storms sweeping in out of the southwest. At times precipitation static reaches fantastic levels even before a rain drop or snow flake comes down. These great occurrences are beyond anything I've ever encountered elsewhere. The field strength at 520kc are on the order of a volt per meter. This obliterates all broadcast stations. Fortunately, such affairs only happen a couple of times a month and last for only an hour or less. However, the lesser cats of the same breed are very frequent and ruin about half of the recordings. During the day they may only be heard for a few miles but at night they must have some effect if they occur anywhere in Tasmania. This precipitation static is really the limiting feature of the whole investigation. Last year was quite dry and the few records obtained then did not show any such difficulty. Fortunately, every rain storm does not make precipitation static. In any case, I've gotten the wireless branch of the PMG and the Weather Bureau interested so something may come out of this bother yet. After encountering a couple of great

occurrences and noting the details, I'm convinced that precipitation static is the source of the radio waves from Jupiter discovered by the Carnegie fellows. You might mention this to Shearer when you see him.

New for the future, which is quite vague. After having gotten this far it seems worthwhile to continue. More data should be secured to elucidate these various matters. Also better data would be desirable, particularly in regard to the direction finding and measurement of angles. These can only be done in a crude way with two antennas. More would be better. Since the farmer seems to still be happy to have me around, I've decided to swing two more spans across the valley. Most of the material can be secured in a couple of months, so about the first of the year the quality of the data at 520ke should improve. Also the question arises about what kind of phenomena will be encountered at still lower frequencies. Fortunately my antennas have another natural resonance about 170ke. Consequently I am building further electronic apparatus to make measurements at this frequency. Between these two developments, it seems I'll be quite busy for the next few months.

Please remember me to your board of directors at the next round table meeting. Unfortunately, with all this going on here I probably won't be able to get back next January. However I'll keep you advised of progress. Enclosed are a few reprints of my last years work and some fotos of my present installation.

Best regards,

Grote Reber